Cristina Grisot

Cohesion, Coherence and Temporal Reference from an Experimental Corpus Pragmatics Perspective

Springer Open

Yearbook of Corpus Linguistics and Pragmatics

More information about this series at http://www.springer.com/series/11559

Cristina Grisot

Cohesion, Coherence and Temporal Reference from an Experimental Corpus Pragmatics Perspective

Cristina Grisot
Department of Linguistics
University of Geneva
Geneva 4, Switzerland

Acknowledgements

This book is the achievement of several years of research on time, which started when I was a PhD student at the University of Geneva and continued with my post-doctoral research at the universities of Neuchâtel and of Geneva. I wish to express my immense gratitude to Jacques Moeschler, my PhD supervisor and now an irreplaceable colleague, whose energy, sincerity, creativity and originality continue to inspire me in my work. His constant support and wise advice have been footholds on my path. I would like to express my deepest appreciation to the other members of the thesis committee for their useful comments and suggestions: Jesús Romero-Trillo, Vladimir Žegarac, Andrei Popescu-Belis, Louis de Saussure and Eric Wehrli. I would like thank Louis de Saussure in particular, who welcomed me into his team at the University of Neuchâtel when I started to write my PhD thesis and where I have spent several years for teaching. I want to thank colleagues with whom I collaborated for the research in this book: Bruno Cartoni, Thomas Meyer, Andrei Popescu-Belis, Sharid Loáiciga, Michèle Costagliola D'Abele, Joanna Blochowiak, Juan Sun and Jacques Moeschler. Thank you, dear colleagues, for everything you have brought me: the knowledge, the questions and the challenges. I would like to extend my deepest thanks to all those who have given me practical help on the manuscript, be it rereading, proofreading or the drawing of syntactic trees, to name but a few: your contributions are invaluable! I would also like to express my gratitude to the experimental participants for taking the time to read and to annotate the sentences in an accurate manner. I wish to recognize those who supported this research financially: the Swiss National Science Foundation, for financing the COMTIS and MODERN projects and for funding the OA publication[1]; the University of Geneva, for the *Tremplin* grant which allowed me to work full time on the thesis manuscript; and the University of Neuchâtel, for the *Egalité* grant which allowed me to finish the book manuscript. Special thanks are due to the reviewers of

---

[1] Published with the support of the Swiss National Science Foundation

Introduction

Despite the considerable amount of published literature on temporal reference and its linguistic expression, no previous study has dealt with verbal tenses in general and more specifically the categories of Tense, lexical aspect (hereafter, Aktionsart) and grammatical aspect (hereafter, Aspect) as cohesion ties contributing to the temporal coherence of a discourse from an empirical and an experimental perspective. This work aims to provide new methodological and theoretical insights into temporal reference and its linguistic components, from an experimental corpus pragmatics approach. This book, published in the *Yearbook of Corpus Linguistics and Pragmatics* series, illustrates how the study of linguistic and pragmatic phenomena benefits from the combination of two approaches: on the one hand, the rigorous and meticulous methodology found in the domains of corpus linguistics and psycholinguistics and, on the other hand, the rich theoretical understanding of language and the interpretation of sentence meaning and intended meaning provided by the fields of theoretical linguistics and pragmatics. As such, it investigates the phenomenon of temporal reference at the interface between corpus linguistics, theoretical linguistics and pragmatics, experimental pragmatics, psycholinguistics, natural language processing and machine translation. The line of research adopted in this book shows how theoretical studies bring forth new hypotheses about language meaning and language use, which are tested in both naturally occurring data and carefully designed experiments. This empirical and experimental testing provides evidence which might lead to the revision, if necessary, of the initial theoretical models. This book will give readers insights into how they can develop solid, empirically and experimentally based theoretical models of linguistic phenomena.

Since Halliday and Hasan's seminal work on cohesion in English (1976), the notions of *coherence*, *cohesion* and *cohesive ties* have been used extensively in reference to a series of phenomena, such as pronominal, demonstrative and comparative reference. In this book, I deal with *temporal reference* – the localization of eventualities (states and events) in time – in natural language and its role in establishing temporal cohesion and coherence. There are numerous ways in which temporal reference may be expressed, such as the grammatical categories of Tense and Aspect (generally referred to by the generic notion *verbal tense*), inherent temporal

features of the verb phrase (known as lexical/situation aspect or Aktionsart), temporal adverbials and connectives (such as *yesterday* and *before*, special particles such as the Mandarin Chinese aspectual particles -*le* and -*guo*, and pragmatic inferential principles of discourse comprehension, among others). In tensed languages, the primary focus of research on temporal reference has been Tense, with Aspect and Aktionsart secondary considerations. Crosslinguistic research from formal semantics over the past 40 years has pointed out that there are languages without the grammatical category of Tense (the so-called *tenseless* languages, such as Mandarin Chinese and Yucatec, Mayan, Mexico) and *mixed-tense* languages (with optional tense marking alongside untensed clauses, such as Navajo, Japanese and Korean) as noted by Tonhauser (2015). These studies have argued that Tense does not *fully determine* the temporal reference of a sentence but merely locates eventualities relationally (Smith 2008, 232).

Despite a long tradition of research on verbal tenses in tensed languages, there is no general consensus among current theories, except on a certain number of basic points, such as the use of *temporal coordinates* (e.g. Reichenbach 1947; Klein 1994) to describe verbal tenses and the notion of *temporal anaphor* (such as Partee 1973, 1984; Webber 1988; Kamp and Reyle 1993). The challenge for current research on temporal reference is to propose a crosslinguistically valid model that holds for both tensed and tenseless languages, mainly by decentralizing the role played by Tense and increasing the attention paid to the other constituents of temporal reference. To date, numerous semantic and pragmatic studies have been dedicated to individual verbal tenses in languages such as English, French and Spanish (see e.g. Moeschler et al. 1998 and de Saussure 2003 on French verbal tenses) without completely discriminating between types of temporal information from the categories of Tense, Aspect and Aktionsart. The direct consequence of approaches in which the three categories are not completely distinguished is the lack of a crosslinguistically valid model of temporal reference, which goes beyond language specificities and which allows for consistent contrastive analyses. Additionally, studies in psychology, psycholinguistics and neurolinguistics (such as Carreirras et al. 1997; Todorova et al. 2000; de Vega et al. 2004; Therriault and Raney 2007; Dery and Koenig 2015; Magliano and Schleich 2000; Bastiaanse 2008; Bastiaanse et al. 2011) have demonstrated that the constituents of a verbal tense, namely the categories of Tense, Aspect and Aktionsart are cognitively motivated.

For this reason, this book will investigate the semantics and pragmatics of Tense, Aspect and Aktionsart, which are considered as cohesive ties playing a role in the expression of temporal coherence relations. For Halliday and Hasan, the notion of *cohesion* is a semantic concept and a property of a text that occurs when the interpretation of an element in the discourse is dependent on the interpretation of a different element. As a semantic concept, cohesion is part of the system of the language and is established by the relation that is set up between two elements. They identify *grammatical* and *lexical cohesion*, with each type having its own cohesive ties and methods. Grammatical cohesion involves methods such as *substitution*, *anaphora* and *ellipsis.* Anaphora is exemplified in (1), where the pronoun *she* has Mary as

antecedent, and *done* refers back to *send a picture of the children*. Ellipsis is exemplified in (2), where it is the second verbal group which is elliptical. Grammatical cohesion consists of grammatical cohesive ties such as pronouns, discourse connectives and verbal tenses, whereas lexical cohesion occurs by the repetition of a word, such as in example (3), where the repetition of the word *apple* has a cohesive effect.

(1)   Mary promised to send a picture of the children, but she hasn't done.
(2)   Are you dieting? I have been for some time.
(3)   Wash and core six apples. Put the apples into a fireproof dish.

Hence, successive utterances in a cohesive text refer to the same entities, and their cohesion is provided by the links existing between various elements. However, example (4) is not coherent, even if "he" can refer to "John" (Hobbs 1979, 67).

(4)   John took a train from Paris to Istanbul. He likes spinach.

Hobbs argues that there is an expectation of coherence, which is deeper than the notion of a discourse just being "about" some set of entities. Similarly, temporal cohesion can be ensured when two verbal tenses refer to the same point of reference (Reichenbach 1947), as in example (5), or to different points, as in examples (6) and (7). Additionally, these three examples illustrate the types of temporal relations that comprehenders are led to infer when interpreting these successive utterances: *temporal simultaneity* in (5), where the phone call occurs at the same time as the arrival; *temporal precedence* in (6), where the phone call occurs before the arrival; and temporal succession in (7), where the phone call occurs after the arrival. In this book, I will refer to the first type of temporal relation as *synchronous*, and to the second and third as *sequential*. I will treat these as *coherence relations* (Hobbs 1979).

(5)   Mary was arriving home when her husband called her.
(6)   Mary arrived home. Her husband had called her.
(7)   Mary arrived home. Her husband called her.

Coherence relations have been investigated from three points of view: theoretical linguistics, computational linguistics, and psycholinguistics. Theoretical linguistics describes the factors that contribute to discourse coherence and has sought to categorize the different types of coherence relations whose role is to connect clauses and sentences. One of the best-known taxonomies is that proposed by Halliday and Hassan: *additive*, *temporal*, *causal* and *adversative* (contrast). As Kehler (2004, 244) suggests, all proposals for taxonomies of discourse relations are based on data analysis, but they do not pursue the goal of descriptive accuracy to the same extent. He points out that "an explanatory theory of coherence requires a set of externally driven principles to motivate and ultimately constrain the relation set". This is the direction

taken by Sanders and colleagues (Sanders et al. 1992, 1993; Sanders and Noordman 2000; Sanders 1997, 2005) in advocating the *cognitive approach to coherence relations*, in which psychological plausibility is the primary motivating factor:

> Understanding a discourse means constructing a mental coherent representation of that discourse by the hearer. […] An adequate account of the relations establishing coherence has to be psychologically plausible, because coherence relations are ultimately cognitive relations. (Sanders et al. 1992, 1).

Following Hobbs (1979), Sanders and colleagues (1992) argued that coherence relations point to coherence in the cognitive representation of discourse, and they see coherence relations as cognitive entities (Beaugrande and Dressler 1981; Mann and Thompson 1986; Sanders et al. 1992, 1993). At a more general level, they hoped to shed light on human cognition by investigating the mechanisms underlying discourse coherence. In this book, I endore this view of coherence relations and speak about temporal coherence both at the discursive and cognitive levels, with respect to the coherence established by comprehenders within and between the mental representations built during the comprehension process (Chap. 6).

A slightly different account of temporal relations has been proposed in the relevance-theoretic framework (Sperber and Wilson 1986; Wilson and Sperber 2012), where it is assumed that linguistic expressions underdetermine the content that a speaker explicitly and implicitly communicates. The hearer must therefore recover inferentially the speaker's intended meaning, with the interpretative process guided by the expectation of relevance and the quest for cognitive effects. Regarding temporal relations holding between eventualities, Carston (1988) and Wilson and Sperber (1998) convincingly argued that they should be treated as pragmatically determined aspects of "what is said". In other words, they are explicatures – that is, enriched forms of truth-functional propositional content. More specifically, linguistic expressions encode conceptual and procedural information (i.e. instructions for manipulating conceptual representations), respectively contributing to and constraining the interpretative process. As for verbal tenses, some scholars have argued they encode instructions on how to relate eventualities temporally, with respect to the moment of speech S, as well as to one another. In this book, I conduct annotation experiments, based on which I postulate the necessity of distinguishing between the temporal information from the categories of Tense, Aktionsart and Aspect. Consequently, I will attempt to propose an alternative model of the role that verbal tenses play in utterance and discourse comprehension, which is based on the conceptual and procedural content encoded by these three categories. I propose that Tense has a mixed conceptual-procedural nature, Aktionsart encodes conceptual information, whereas Aspect encodes procedural information (Chap. 5). Put differently, language encodes procedures on how to manipulate conceptual mental representations in order to ensure cognitive temporal coherence.

Why an Empirical Study?

It is easy to see linguists' growing desire to use robust and objective findings in addition to intuitive and subjective acceptability judgments or built examples. This is maybe due to a perceived dissatisfaction with the methods of so-called *armchair*

linguistics (in the sense of Fillmore 1992). Empirical linguistics aims to support or challenge current theories by way of authentic and reliable data and to propose new models for the interpretation of linguistic phenomena. McEnery and Wilson (1996) highlight that, broadly speaking, linguists have tended to favour the use of data which are either introspective (i.e. language data constructed by linguists) or naturally occurring (i.e. examples of actual language usage). Most linguists see these two types of data as complementary approaches, and not as mutually exclusive. Gries (2002) argue that, although intuition may be poor as a methodology for investigating mental representations, linguists' intuitions are useful for the formulation of testable hypotheses about linguistic structure and behaviour. Introspective and corpus data were the two main sources of data for theoretical linguistics until the mid-1990s. Other sources have since been considered, such as experimentation, language acquisition, language pathologies, neurolinguistics, etc. Kepser and Reis (2005) argue that linguistic evidence coming from different domains of data sheds more light on the issues investigated than where data are drawn from a unique source. Multisource converging evidence can either validate the theory or bring contradictory results, therefore opening up new perspectives.

    In this research, both corpus data and experimental data are used. Corpus data were randomly selected from four stylistic registers (literary, journalistic, legislation and political discourse from the Europarl corpus), in order to draw generalized conclusions. Experimental data consist of natural data (i.e. corpus data) and controlled experimental items built for the specific purposes of the experiments. Corpus data come from four languages (English, and three Romance languages, French, Italian and Romanian) and are analysed contrastively, with the aim of proposing a crosslinguistic valid *tertium comparationis*. Qualitative and quantitative analyses are carried out both for corpus data and for experimental data. Experimental data are drawn from three types of investigation: *annotation* experiments, in which comprehenders are asked to evaluate consciously the meaning or the contextual usage of a linguistic category; offline experiments with *acceptability judgement* tasks, in which comprehenders are asked to evaluate consciously the acceptability of different versions of the experimental items; and online experiments with *self-paced reading* tasks, in which readers have to read experimental items in different experimental conditions at their own pace and which allow direct access to the participants' processing of the experimental items.

    These types of investigations and their subsequent types of data are complementary and necessary in pragmatic research. Regarding the complementarity of corpus and experimental data, Gilquin and Gries (2009) argue that a corpus has a fourfold purpose in experimentation: (a) validator, where the corpus serves as a validator of the experiment; (b) validatee, where the corpus is validated by the experiment; (c) equal, where corpus and experimental data are used on an equal footing; and (d) stimulus composition, where the corpus serves as a database for the items used in experiments. Compared to experimentation, corpus work deals with a larger range of phenomena that can be investigated. Experiments, however, allow for the study of phenomena that are infrequent in corpora. Moreover, corpus data are naturally occurring data, whereas experimental data are artificial data. Finally, manipulation of variables is only possible by way of the experimental design. Corpora and

experiments have advantages and limits that are complementary. Nowadays, for these reasons, linguists tend to use both of these empirical methods.

Furthermore, this book proposes a modelization of the semantics and pragmatics of verbal tenses and of the categories Tense, Aspect and Aktionsart, that was implemented in the fields of Natural Language Processing and Machine Translation. The innovative model of temporal reference developed in this research consists of features that were shown to be valid and effective by natural language processing techniques serving to label raw corpus data automatically. The statistical machine translation systems trained on these automatically labelled data, with the features provided by the model of temporal reference developed in this book, gave better results when translating verbal tenses than did other systems which do not make use of these features. These improvements represent a solid empirical validation of the model proposed. More generally, this research highlights the need to develop linguistic and pragmatic models of language that are empirically and experimentally derived, not only for the testing of hypotheses issued from existing solid theories but for their validation by successful implementation in applied fields, such as natural language processing, machine translation and second language teaching, among others.

The Research Questions

The focus of this research on time and verbal tenses comes from an apparently simple empirical question: *how can one improve the translation of verbal tenses by statistical machine translation systems*? This question was asked in the context of two inter-disciplinary Swiss research projects, COMTIS and MODERN,[1] which aim to improve the quality of machine-translated texts in terms of their overall coherence. The coherence of a text depends on several cohesive ties, such as pronouns, discourse connectives and verbal tenses. Crosslinguistic analyses of bilingual and multilingual translation corpora pointed to one frequent and problematic translation divergency: the translation of the English Simple Past into French, Italian and Romanian (Chap. 3). For this translation divergency, four verbal tenses are most frequently used in these Romance languages: the simple past, the imperfect, the compound past and the present (as described in Chap. 1). In order to solve this empirical issue, other related issues had to be addressed, from theoretical, empirical and experimental perspectives. So, the research presented in this book can be organized according to four main research questions.

Firstly, *what is the basis of the role of a verbal tense and its constituent categories as cohesive ties?* Chaps. 1 and 2 present a comprehensive discussion of previous attempts to answer this question, as included in grammar books, and general linguistic, semantic and pragmatic studies. Where grammar books and a considerable amount of pragmatic studies give accounts of individual verbal tenses in English, French, Italian and Romanian (such as the English Simple Past, the French Passé Composé or Imparfait, the imperfect in Romance languages), general linguis-

---

tic studies focus on meaning and role at the discursive level of Tense, Aktionsart and Aspect. However, as formal semantic-discursive models in particular have pointed out, the role of Tense, Aktionsart and Aspect is not only sentential but mainly relational – that is, it goes beyond sentence boundaries. A detailed review of the relevance-theoretic pragmatic account shows that this theory is well placed to account for the role of these cohesive ties, for two reasons. The first is its assumption that language underderminates the speaker's intended meaning, which must be recovered contextually. The second is the characterization of encoded meaning, in terms of conceptual or procedural types of information. During comprehension, hearers built conceptual mental representations, which are manipulated according to the procedural information encoded by certain linguistic expressions or linguistic categories. The comprehensive discussion in Chaps. 1 and 2 will lay the foundations for formulating a certain number of hypotheses with respect to the role of Tense, Aktionsart and Aspect in discourse comprehension. These hypotheses are put forward and tested in annotation experiments in Chap. 4.

Secondly, *can temporal relations be treated as cognitive coherence relations linking the mental representations of eventualities built by comprehenders?* This question is addressed in Chap. 6, which explores the cognitive bases of the temporal cohesive ties investigated in this research and of the temporal relations holding between eventualities. Building on Hobbs' (1979, 1985), Sanders et al.'s (1992, 1993) and Evers-Vermeul et al.'s (2017) cognitive approaches to discourse relations, I will show that temporal relations are cognitively motivated for two reasons. The first is that they affect both processing and language acquisition (Mandler 1986; Segal et al. 1991; Murray 1995, 1997; Grisot and Blochowiak 2015, 2017; Evers-Vermeul et al.'s 2017). The role of two French temporal connectives (*ensuite* and *puis*) in expressing the sequential temporal relations holding between events expressed with the Passé Composé and the Passé Simple is thus assessed in Chap. 6. The second reason is that the linguistic categories triggering temporal relations (Tense, Aspect and Aktionsart), along with temporal connectives and temporal adverbials, are themselves cognitively motivated, as has been found by numerous experimental studies carried out in psychology and neurolinguistics.

In the light of this, I discuss the notion of *temporal cognitive coherence*, which is linked to the coherence established within the multithreaded mental representations that comprehenders build during language comprehension (Gernsbacher and Givón 1995; Graesser et al. 1997). In this model, language is seen as encoding processing instructions on how to construct mental representations of the situations described (Zwaan and Radvansky 1998). According to the innovative model of temporal reference put forward in this book, the category of Tense both contributes to and constrains the construction of mental representations. Furthermore, aspectual information from Aktionsart and Aspect also contributes to and constrains the construction of mental representations respectively. In particular, Aktionsart provides the type of eventuality to be included in the conceptual mental representation (state, activity, achievement or accomplishment), whereas Aspect constrains this process by instructing the comprehender to represent the eventuality as completed or in progress.

Thirdly, *how do hearers consciously evaluate temporal information from Tense, Aspect and Aktionsart during the comprehension of naturally occurring data?* This question is tackled in Chaps. 3 and 4. In Chap. 3, I describe the bilingual and other multilingual corpora on which the current research is based. The monolingual and crosslinguistic analyses of these corpora reveal a source language's most frequent and most problematic verbal tenses with regard to their translation into a target language. In particular, the English Simple Past presents a unique challenge when it comes to its translation into French, Italian and Romanian. In Chap. 4, I assess comprehenders' capacity to evaluate the meaning of a verbal tense consciously, with respect to a series of features drawn from the discussions provided in Chaps. 1 and 2. These features are linked to the semantics and pragmatics of Tense (i.e. the localization of eventualities with respect to the moment of speech S, as well as to one another, operationalized as the [±narrativity] feature), of Aktionsart (i.e. the actual realization of an eventuality in a context, operationalized as the [±boundedness] feature) and of Aspect (i.e. the speaker's perfective or imperfective viewpoint, operationalized as the [±perfectivity] feature).

This experimental research has led me to put forward an innovative proposal regarding the role of the cohesive tie attributed to verbal tenses and its constituent categories (Chap. 5). I suggest a relevance-theoretic pragmatic account of Tense, Aktionsart and Aspect, according to which these categories encode conceptual and procedural types of information. This account is entailed by the *Highly Discriminatory* (HD) model of temporal reference, which aims to discriminate between the categories and principles that play a role in determining temporal reference, disregarding the type of language explored – that is, tensed, tenseless or mixed. This model predicts that the global interpretation of temporal reference at the discursive level is determined, on the one hand, by the linguistic means existent in a language and on the other hand, by their ad hoc inferential contextual determination. It distinguishes between temporal information supplied by Tense, Aktionsart, Aspect, Mood, temporal adverbials, temporal connectives, aspectual markers and markedness, among others (cf. Binnick 1991, 2012). In this chapter, I also revisit the verbal tenses explored in this book according to the HD model and re-analyse their meaning and their contextual usages in terms of their conceptual and procedural content.

Fourthly, *how can one predict the verbal tense used in a target language?* This question is directly linked to the applicative purpose of this research that is, to improve the results of statistical machine translation systems in terms of coherence. This issue is assessed both in the crosslinguistic analyses of annotated data, where the annotators' answers are compared with the verbal tense used in the target language, and in a generalized mixed model in which the fixed factors tested are the features of [±narrativity], [±boundedness] and [±perfectivity]. The first two features are also assessed using methods relevant to the fields of Natural Language Processing and Statistical Machine Translation (Chap. 7). In this chapter, I describe automatic annotation experiments using *classifiers* and translation experiments performed by statistical machine translation systems, as implemented by my colleagues Thomas Meyer and Andrei Popescu-Belis for the [±narrativity] feature (Meyer et al. 2013;

Grisot and Meyer 2014; Meyer 2014) and by Sharid Loáiciga for the [±bounded-ness] feature (Loáiciga and Grisot 2016; Loáiciga 2017).

With all this in mind, this book critically reviews the limitations of the current models of temporal reference in general and of verbal tenses in particular and incorporates insights and contributions from different fields (corpus linguistics, contrastive analysis, theoretical and experimental pragmatics, psychology and psycholinguistics) in order to advance an innovative comprehensive model of temporal reference, based on relevance-theoretic notions such as the conceptual/procedural distinction. This research gives a new account of Tense, Aktionsart and Aspect as temporal cohesive ties, founded on a detailed corpus study and empirical findings which point to the need to account for corpus and experimental data when making claims about tendencies and regularities in language. Furthermore, it addresses how these cohesive ties play a crucial role in establishing temporal discourse coherence and cognitive coherence. This account has significant implications in the fields of natural language processing and machine translation and could in future be implemented in other fields, such as language teaching and translation studies.

The Structure of the Book
Chapter 1, "The Linguistic Expression of Temporal Reference", consists of two main sections and ends with a summary. First, I address the description of four types of verbal tense (the simple past, the imperfect, the compound past and the present) in English, French, Italian and Romanian, as presented by grammar books and pragmatic studies focusing on individual verbal tenses. Second, I review the semantics of Tense, Aktionsart and Aspect, which are the constituent categories of the generic notion *verbal tense*, as they are discussed in general linguistics.

Chapter 2, "Formal Semantic-Discursive and Pragmatic Assessments of Temporal Reference", contains three main sections and ends with a summary. First, I consider the contribution of verbal tenses to discourse interpretation and the calculation of temporal relations in several formal sematic-discursive theories. Second, I discuss Grice's treatment of temporal relations as conversational implicatures. Third, having briefly introduced the basic tenets of Relevance Theory and the conceptual/procedural distinction, I pay particular attention to the relevance-theoretic account of temporal relations as "pragmatically determined aspects of *what is said*" and to the ongoing debate on the purely procedural vs. mixed nature of the meaning encoded by verbal tenses.

Chapter 3, "Corpus-Based Contrastive Study of Verbal Tenses", consists of four main sections and ends with a summary. First, I give an account of the importance of using authentic, naturally occurring and systematic data, as well as of the advantages and limitations of using corpora in linguistic and pragmatic research. Second, I describe the three sets of translation corpora that were compiled for this research: bilingual English-French, bilingual French-English, multilingual English-French-Italian and Romanian. In these sets of data, I assessed the frequency of verbal tenses in the source language and their translations into a target language.

Chapter 4, "Experimental Study Using Annotation Experiments", includes four main sections and ends with a summary. First, I discuss several issues linked to

using annotation data, such as reliability, validity and the measurement of inter-annotator agreement. Following my proposal in Grisot (2017a), I interpret inter-annotator agreement rates, measured with the Ҟ coefficient, as dependent on the degree of accessibility to consciousness and the degree of availability to conscious thought and, as such, on their conceptual or procedural nature. Second, I advance a series of hypotheses regarding the meaning of Tense, Aktionsart and Aspect, and their predictions with respect to comprehenders' behaviour when they have to evaluate it consciously in annotation experiments. Third, I describe the annotation experiments and discuss their results. Fourth, in order to assess the role of Tense, Aktionsart and Aspect in predicting the verbal tense used in a target language, I discuss the results of a generalized mixed model suited to the data.

Chapter 5, "A Pragmatic Model of Temporal Cohesive Ties", comprises four main sections and ends with a summary. First, I put forward the HD model, which is an innovative model of temporal reference distinguishing between the temporal information from Tense, Aktionsart, Aspect, Mood, temporal adverbials, temporal connectives, aspectual markers and markedness, among others. Second, I develop a mixed conceptual-procedural account of Tense, by specifying that the notion of *context*, referred to as ConText, is understood as a cognitive construct consisting of a set of assumptions selected during the interpretation process, rather than determined in advance and expanded during the interpretation process when the expectation of relevance is satisfied or abandoned. In the ConText, the comprehender inferentially constructs the conceptual content of Tense and Aktionsart and makes use of the procedural information encoded by Tense and Aspect in order to manipulate the conceptual representations built. Third, I revisit the verbal tenses investigated in this book according to the HD model.

Chapter 6, "Temporal Coherence", consists of four main sections and ends with a summary. First, I provide a general account of coherence relations as cognitive entities and focus on the status of temporal relations. Second, in order to support the proposal that temporal relations are cognitively motivated, I address the results of a series of online and offline experiments carried out in order to test the processing and conscious evaluation of temporal relations, as expressed by the French Passé Composé versus the Passé Simple and by the temporal connectives *ensuite* and *puis*. Third, I tackle the notion of cognitive temporal coherence, by arguing that the cohesive ties investigated in this research are cognitively motivated categories and by exploring a psycholinguistic account of coherence according to which mental representations of discourse segments are structured and coherent.

Chapter 7, "Application to Natural Language Processing and Machine Translation", contains two main sections and ends with a summary. First, I review the literature on Natural Language Processing and Machine Translation which has investigated temporal information. Second, I describe the automatic implementation of [±narrativity] and [±boundedness] and show that these are effective at improving the results of statistical machine translation systems, in terms of lexical choices of verbs and of verbal tenses in automatically translated texts.

The book ends with a conclusion, in which I summarize the main contributions of this research and propose areas of further study.

Contents

List of Figures

List of Tables

Chapter 1
The Linguistic Expression of Temporal Reference

1.1 Verbal Tenses in English and Romance Languages

This section aims to provide an insight into the semantics of three verbal tenses expressing past time: the simple past, the compound past and the imperfect, in English, French, Italian and Romanian. This description reflects the way in which they are approached in grammar books and in linguistic studies. This synthesis is continued in Chap. 2, where I will give the formal semantic-discursive and pragmatic accounts of their usages and their contribution to discourse interpretation. While Chaps. 1 and 2 introduce a number of specific points related to the predicted usages of these verbal tenses, Chap. 3 presents the results of a contrastive analysis carried out on bilingual and multilingual translation corpora. Moreover, theoretical hypotheses formulated according to the accounts provided in the first two chapters are tested using annotation experiments (Chap. 4), offline acceptability and self-paced reading experiments (Chap. 6). Based on the results of these experiments, Chap. 5 puts forward a re-analysis of the semantics and pragmatics of the simple past, the compound past and the imperfect in English, French, Italian and Romanian.

These languages mark the categories of Mood, Tense and Aspect synthetically (by inflection) and analytically (by periphrasis) on the verb. According to traditional grammars, Romance languages have four moods: the *indicative*, the *subjunctive*, the *conditional* and the *imperative*. Romanian exhibits another paradigm, deriving from the epistemic future, called the *presumptive*. These grammars present a temporal-aspectual system for all moods, but the most complex one belongs to the indicative mood: present, past (the simple past, also called aorist or preterit, the compound past, the imperfect and the pluperfect) and future forms (the future, the future perfect and the future in the past). As for the English verbal system, the indicative mood is the most developed. Subjunctive and conditional interpretations may be expressed through the preterit form V+-*ed*, and the second form of irregular verbs.

Table 1.1 Grammatical category and denominations of the target verbal tenses

Grammatical category	English	French	Italian	Romanian
Simple past	*Simple Past*	*Passé Simple*	*Passato Remoto*	*Perfectul Simplu*
Imperfect	*Past Progressive*	*Imparfait*	*Imperfetto*	*Imperfectul*
Compound past	*Present Perfect*	*Passé Composé*	*Passato Prossimo*	*Perfectul Compus*
Simple present	*Simple Present*	*Présent*	*Presente*	*Prezentul*

The classical grammatical accounts of these verbal tenses offer a very heterogeneous picture, which consists, for each verbal tense, of main and secondary 'meanings'. Significant variability is also identifiable in the linguistic terminology used in grammars, such as *value*, *meaning*, *usage*, *utilization*, *meaning effect*, and *contextual effect*. I aim to show that the lack of a common framework makes it impossible to compare the verbal systems of the four languages considered in this research. This comparison is necessary to identify the features to be included in any model that explains and predicts the cross-linguistic variation of the translations of the verbal tenses considered.

In this section, I will use the terms 'simple past', 'compound past' and 'imperfect' when referring to the *grammatical category*, and the denominations of each verbal tense as given in Table 1.1 when referring to the *tensed verbal form* in the languages considered.[1]

1.1.1   The Simple Past

The English Simple Past is described in grammar books as having both temporal and non-temporal usages. In this book, I deal only with temporal usages. Classical descriptions of the SP (Quirk et al. 1985; Comrie 1985; Leech and Svartvik 2002; Radden and Dirven 2007) present it as "the deictic time preceding speech time" (Radden and Dirven 2007, 218), which has a main temporal meaning in reference to *past* time. Hence, the English Simple Past is usually described as representing an action or state as having occurred or having existed at a past moment or during a past period of time that is definitely separated from the actual moment of speaking or writing.

Radden and Dirven (2007, 218) note three properties of the Simple Past: *focus on the past time*; *detachment from present*; and *definiteness.* Quirk et al. (1985) also define multiple elements for the the Simple Past, which for them combines two features of meaning in reference to past time: the event/state must have taken place

---

[1] The abbreviations used in the interlinear translations are the following: SP simple past, PP pluperfect, IMP imperfect, PRES present, FUT future, SUBJ subjunctive, AUX auxiliary verb, PERF perfective aspect, IMPERF imperfetive aspect, AOR aoristic aspect, RFX reflexive pronoun, 1/2/3 first/second/third person pronoun, SG singular, PL plural.

in the past, with a gap between its completion and the present moment, as in (8); and the speaker must have in mind a definite time at which the event/state took place, as in (9) and (10).

(8)   I *stayed* in Africa for several months (→ I am no longer in Africa)
(9)   Freda *started* school last year/in 1950.
(10)   Prices *slumped* last winter/yesterday.

As for the combination of the Simple Past with Aspect, it can express both perfective and imperfective aspect, as in (11) and (12) from Huddlestum and Pullum (2006). The first example has a perfective interpretation: it reports a promise made in the past. The second example can be interpreted perfectively or imperfectively. In the former case, the sentence denotes a single act of mowing the lawn located as a whole in the past time. In the latter case, Sue habitually or regularly mows the lawn, and this state of affairs holds at the moment to which the speaker is referring.

(11)   I *promised* to be back for lunch.
(12)   Sue *mowed* the lawn.

Aktionsart and types of situations also play a role in the interpretation of the Simple Past. The distinction between states and events gives rise to three interpretations (Leech and Svartvik 2002): *state* in (13); *single event* in (14); and *set of repeated events* (i.e. *habit*) in (15). According to Leech and Svartvik, the 'habit' interpretation combines event interpretation and state interpretation. The *state* interpretation can be specified by adding an adverbial of duration, as in (16), whereas the *habit* interpretation can be specified by adding an adverbial of frequency or duration, as in (17).

(13)   Napoleon *was* a Corsican.
(14)   Columbus *discovered* America.
(15)   Paganini *played* the violin brilliantly.
(16)   Queen Victoria *reigned* for sixty-four years.
(17)   He *played* the violin every day from the age of five.

The Simple Past may be accompanied by an overt indicator of time (Quirk et al. 1985). The element of definite meaning (a past event/state) must be recoverable through inference from the immediate or larger context, or general world knowledge. Comrie (1985, 41) emphasizes that the Simple Past "only locates the eventuality in the past, without saying anything about whether the situation continues up to the present or into the future". As we have noted above, one of the properties of the Simple Past is *detachment from present*. This is due to a conversational implicature (Grice 1975) based on Grice's maxim of manner, explained as follows by Comrie (1985, 41–42):

> Statements about the present moment are more relevant than those about other times, so that the use of a form explicitly locating a situation in the past suggests that that situation does not hold at the present, otherwise the present tense would be used.

The Simple Past may be used in relation to an immediate situation, which has a definite character, as in (18), in a domestic situation where it is known that the front door is locked at bedtime every night. Situational definiteness supplied by general knowledge explains the use of the Simple Past in historical or biographical statements that have specific people, places or objects as their topics, as in (19). The use of the Present Perfect in the preceding sentence provides a context for mentioning the time, and so it allows a Simple Past in the second sentence, as in (20).

(18)   *Did* you *lock* the front door?
(19)   Byron *died* in Greece.
(20)   They *have decided* to close down the factory. It *took* us completely by surprise.

Radden and Dirven (2007, 219) also note the use of the Simple Past to express bounded past situations, presented as a series of events, typically in narratives, as in (21). The individual events from example (21) are temporally ordered (signalled by their coordination and the conjunction *and*), and are thus interpreted as successive. Labov and Waletzky (1967) argued that two sentences, which are interpreted as temporally successive, form a narrative text. The first event is deictically situated in the past time related to the speech moment S, while the subsequent event is related to the first one.

(21)   I *grabbed* his arm and I *twisted* it up behind his back and when I *let go* his
        arm there *was* a knife on the table and he just *picked* it up and *let* me have it
        and I *started* bleeding like a pig. (Labov and Waletzky 1967, quoted in
        Radden and Dirven 2007, 219)

According to Quirk et al. (1985, 187) the Simple Past also has special uses that occur in certain contexts, such as (a) in *indirect speech,* where there is a transfer from the past tense of the reporting verb to the verb of the subordinate clause (known as *back shifting* or *harmony of tenses*), as in (22), or *forward shifting,* as in (23), where the sentence containing speech or thought in the future contains reported speech referring to present time.

(22)   A: *Did* you say you have/*had* no money? B: Yes, I am completely broke.
(23)   My wife will be sorry that she *missed* seeing you this evening.

One point that arises from these traditional descriptions is that they simply depict intra-linguistically the meanings of the Simple Past—in particular, the main usage that specifically means "true before speech time" (Riddle 1986, 267).

In Romance languages, the simple past is also classically described as having similar main and secondary meanings. The French Passé Simple is defined as expressing a past event, completed in the past with no connection to present time (Grevisse 1980, 873; Wagner and Pinchon 1962, 413).[2] The focus on the accomplishment of the event in the past is the feature that distinguishes the Passé Simple from the Passé Composé, the second of which expresses a link to the speaker's or a

third person's present time. Scholars have argued that the Passé Simple provides an objective interpretation of the situation described. It is also distinguished from the Imparfait, which presents a past situation as not accomplished.

The Italian Passato Remoto is described as having the aoristic aspect: that is, it expresses the eventuality as completely ended (Bertinetto 1986). He argues that aoristic tenses do not present in their semantics a reference moment R, contrary to perfective tenses such as the Passato Prossimo. Consequently, the Passato Prossimo can be used in temporal sentences (i.e. it allows reference to past and future) and in atemporal sentences (i.e. the omnitemporal value), whereas the Passato Remoto necessarily expresses a relation of the eventuality's anteriority with respect to the moment of speech S. Bertinetto (1986, 430) points out that the Passato Remoto in example (24) imposes a temporal and definite interpretation (i.e. an identifiable woman who lost her son, where E < S), whereas the Passato Prossimo in example (25) allows an atemporal and indefinite interpretation (i.e. a hypothetical situation where a woman could lose her son at an imaginary moment).

(24) Per consolarmi, cercai di pensare ad una madre che *perse* il proprio figlio.
     To comfort myself, I tried to think of a mother who lose.3SG.PS her son
     'To comfort myself, I tried to think of a mother who lost her son.'
(25) Per consolarmi, cercai di pensare ad una madre che *ha perso* il proprio figlio.
     To comfort myself, I tried to think of a mother who lose.3SG.PC her son
     'To comfort myself, I tried to think of a mother who lost her son.'

There are cases, however, where the Passato Remoto may produce different interpretations. Firstly, it can have a non-deictic usage as in (26), where it behaves like a pluperfect (from Bertinetto 1986, 431). Secondly, the Passato Remoto is used for atemporal expression in sayings and proverbs (i.e. the so-called gnomic usage) as in (27).

(26) Ritornando dal viaggio che *feci/avevo fatto*, trovai una montagna di posta.
     Coming back from the journey I do.1SG.PS/PP, I found a mountain of mail
     'Coming back from the journey I made/had made, I found lots of mail.'
(27) Cosa fatta in fretta non *fu* mai buona.
     Things made in haste not be.1SG.PS ever good
     'Things done in haste are never good.'

Bertinetto (1986) and more recently Squartini and Bertinetto (2000) argue that in Italian the Passato Remoto and the Passato Prossimo, being perfective, are more similar than different, and this becomes more visible when compared to the Imperfetto. This is mainly due to the aoristic drift undergone by the compound past.

---

[2] Tahara (2000, 2004) provides a detailed presentation of the various approaches to the French Passé Simple. For other discussions see also Vetters (1996). For a pragmatic account, see de Saussure (1998a, b, 2003).

Zafiu (2013, 59) notes that Perfectul Simplu is used in literary texts with third person pronouns and expresses impersonal remarks (i.e. there is no explicit speaker who commits to what was said). It designates situations prior to the present, without indicating any relation with the moment of speaking S, as in (28). When used in fiction, the Perfectul Simplu cannot be subordinated to verbs of declaration, as shown in (29), and it contrasts with the Perfectul Compus in direct and indirect speech, as shown in (30).

(28) Monstrul o   *văzu*   pe prințesă.
       The monster see.3SG.PS the princess
       'The monster saw the princess.'
(29) *Spuse*   că *fu*   acasă.
       Say.PS.3SG that be.3SG.PS at home.
       ''He said that he was at home.'
(30) Am văzut   casa,   *spuse* el.
       See.PC.1SG the house, say.PS.3SG
       'I saw/have seen the house, he said.'

The Perfectul Simplu used in southern varieties expresses the recent past (i.e. eventualities that took place during the same day) and can be used for all persons, contrary to the literary simple past, which can only be used for the third person, as in example (31).

(31) Unde   *fuseși* de dimineață?   Mă *dusei* la moară.
       Where be.PS.2SG this morning. RFX go.PS.1SG to the mill
       'Where were you this morning? I went to the mill.'

Similarly to the Perfectul Compus, the Perfectul Simplu expresses the eventuality from a perfective viewpoint, i.e. it expresses a completed situation, as in (32). It can be accompanied by durative and iterative temporal adverbials, as in (33) and (34) respectively.

(32) *Citi* cartea.
       read.PS.3SG the book
       'She read the book.'
(33) *Citi* din carte timp de trei ore.
       read.PS.3SG the book for three hours
       'She read from the book for three hours.'
(34) *Veni* în vizită în fiecare zi.
       Come.PS.3SG to visit every day
       'She came to visit every day.'

Some scholars have analysed the French Passé Simple with respect to its role at the discursive level. For example, the aspectual approach insists on the aspectual—rather than temporal—distinction between the Passé Simple and the Imparfait

(Martin 1971, 93–94). This approach assumes that the perfective aspect of the Passé Simple provides a global view of the event, and the imperfective aspect of the Imparfait offers an interior view of the event in progress.[3] Kamp and Rohrer (1983), following the anaphoric approach, argued that the interpretation of verbal tenses depends on the temporal relations that they establish between discourse segments. They contend that the simple past is used in contexts where time progresses and events are temporally ordered, as in (35). They base their analysis on the three coordinates proposed by Reichenbach (S, R and E), pointing out that sentences with a Passé Simple introduce a new R moment in the discourse that is prior to the event moment E, while sentences with an Imparfait adopt the existing R (introduced by the precedent sentence with a Passé Simple), as in (36). This description has numerous exceptions, as scholars—including Kamp and Rohrer themselves—have pointed out, as in examples (37) and (38).

(35)   Pierre entra. Marie *téléphona.*
         Peter enter. Mary phone.3SG.PS
         'Peter entered. Mary *made* a phone call.'
(36)   Pierre entra. Marie *téléphonait.*
         Peter enter. Mary phone.3SG.IMP
         'Peter entered. Mary *was calling.*'
(37)   Marie *chanta*   et   Pierre l'*accompagna*   au piano.
         Mary sing.3SG.PS and Peter her accompany.3SG.PS at the piano
         'Mary sang and Peter accompanied her on the piano'
(38)   L'été de cette année-là *vit* plusieurs changements dans la vie de
         nos héros. François *épousa* Adèle, Jean-Louis *partit* pour le Brésil et
         Paul s'*achet*a une maison à la campagne.
         The summer of that year see.3SG.PS several changes in our heroes' lives.
         François marry.3SG.PS Adele, Jean-Louis leave.3SG.PS to Brazil and Paul
         buy.3SG.PS a house in the countryside.
         'The summer of that year saw several changes in our heroes' lives.
         François married Adele, Jean-Louis left for Brazil and Paul bought a house
         in the countryside.'

The *pragma-semantic* approach of French verbal tenses aimed to reduce the role of pragmatic (non-linguistic and cognitive) factors in determining the meaning of a verbal tense, and therefore to increase the semantic input (Kleiber and Riegel 1989, 1991; Kleiber 1994; Vetters 1996). Vetters (1996) argues that the Passé Simple vs. Imparfait opposition can be explained according to the pragma-semantic approach using a model with three levels (1996, 142):

---

[3] There have been several attempts to question the perfective aspect of the Passé Simple and the imperfective aspect of the Imparfait, such as Guenthner et al. (1978) and Molendijk (1990) respectively. For counter-arguments, see Vetters (1996).

i. The perfective/imperfective opposition is semantic, therefore descriptive and truth-conditional;

ii. The rules for temporal interpretation identified by Kamp and Rohrer (1983) are instructions encoded by the two verbal tenses;

iii. The communicative principle of relevance guides the pragmatic interpretation of the sentences.

For Vetters, the Passé Simple is aspectually *non-imperfective* (be it perfective or inchoative, as suggested by Guenthner et al. 1978), and encodes instructions for forward temporal sequencing (called *linearity* by Vetters). He suggests that cases where the simple past form is used without forward temporal sequencing, as in examples (37) and (38) above, are interpreted following the principle of optimal relevance. In his words, "the Passé Simple expresses temporal progression except when it is used in contexts where the linear interpretation would be costlier than a non-linear interpretation" (1996, 150), the higher cognitive cost being attributed to world knowledge. For example, in sentence (38), all the events are temporally located during *the summer of that year*, and their order is not specified. The hearer assumes that the speaker does not intend a sequential interpretation, and that the utterance is worth processing despite the lack of a temporal specification of the order.

1.1.2   The Imperfect

The imperfect in French (Imparfait), in Italian (Imperfetto) and in Romanian (Imperfectul) described by grammars as existing in opposition to the simple past, on the basis of the aspectual (grammatical aspect) orientations which each displays: imperfective for the former, and perfective for the latter. The French Imparfait is traditionally described as a tense of background information (Weinrich 1973), aspectually unaccomplished and imperfective, which needs a previously presented hosting event (Guillemin-Flescher 1981), as shown in example (39). Most scholars agree that the Imparfait is an anaphoric tense (Ducrot 1979; Kamp and Rohrer 1983; Tasmowski-De Ryck 1985; Molendijk 1990; Kleiber 2003; Berthonneau and Kleiber 1993; Vetters 1996) which must be related to an existing situation.

(39)   Pierre entra. Marie *téléphonait*.
         Peter entered. Mary call.3SG.IMP
         'Peter entered. Mary *was calling*.'

These features situate the Imparfait in opposition to the Passé Simple, which marks a break between the moment of speaking S and the global image of the situation happening before S. The Imparfait provides an interior perspective of the situation, which allows the distinction between what has effectively happened and what has yet to happen. Martin (1971, 70) argued that the Imparfait creates an opposition at a certain moment between '*la partie accomplie du processus avec la partie inac-*

complie' ('the accomplished part of the process with the unaccomplished one'), as in (40). The Passé Simple, on the contrary, considers the situation globally without analysing its inherent parts, though a temporal complement can mark the beginning or the end of the situation, as in the following examples from Riegel et al. (1994):

(40)   Coupeau *eut*   un accident. Il *sortait*   du village.
       Coupeau have.3SG.PS an accident. He get out.3SG.IMP of the village
       'Coupeau had an accident. He was getting out of the village.'

(41)   Après son accident, Coupeau *se   mit* à boire.
       After his accident, Coupeau RFX start.3SG.PS to drink
       'After his accident, Coupeau started to drink.'

(42)   Gervaise *attendit*   le retour de Lantier jusqu'à l'aube.
       Gervaise wait.3SG.PS the return of Lantier until daybreak
       'Gervaise waited until daybreak for Lantier to come back.'

Temporal reference in an utterance containing an Imparfait is generally calculated by taking into account three observations (Sthioul 1998, 207). Firstly, temporal reference is fixed in relation to an existing reference period R. Accordingly, a sentence containing an Imparfait cannot be interpreted in isolation, as in (43). The anchoring reference period can be provided by a temporal adverbial, as in (44), or another event, as in (45).

(43)   ?Marie *buvait*   un café.
       Mary drink.3SG.IMP a coffee
       'Mary was drinking a coffee.'

(44)   Hier à huit heures,   Marie *buvait*   un café.
       Yesterday at o'clock, Mary drink.3SG.IMP a coffee
       'Yesterday, at eight o'clock Mary was drinking a coffee.'

(45)   Paul *entra*.   Marie *buvait*   un café.
       Paul enter.3SG.PS. Mary drink.3SG.IMP a coffee
       'Paul entered. Mary was drinking a coffee.'

Secondly, the reference period is prior to S, as shown by the compatibility of a past temporal adverbial in example (46), and the incompatibility with a present time adverbial in (47) or future time adverbial in (48).

(46)   Il y a une heure, Paul *lisait*   le journal, et ça n'est pas prêt
       de changer.
       An hour ago,   Paul read.3SG.IMP the newspaper, and this is not going
       to change soon.
       'An hour ago, Paul was reading the newspaper, and this is not going
       to change soon.'

(47)   *Au moment où je vous parle,   Paul *lisait* le journal.
       *At the moment when I speak to you, Paul read.3SG.IMP the newspaper

(48)   * Dans une heure, Paul *lisait*   le journal.
       * In an hour,   Paul read.3SG.IMP the newspaper

Thirdly, the period during which E holds is longer than the reference period, as in example (46) where it continues up to present, and cannot be shorter than the reference period, as in example (49), from Ducrot (1979). In contrast, this is possible with both the Passé Simple and the Passé Composé, as shown in example (50). The Imparfait therefore presents the situation as unbounded (R included in E) and locates it prior to S. The consequences of R being included in E are that achievement implicatures are impossible even for telic situations, as in (51), and that the interpretation that the event expressed with the Imparfait includes the event expressed with the Passé Simple or Passé Composé, as in (39) or (45).

(49) L'année dernière, Paul *habitait*   à Paris (*mais seulement en mai).
      Last year,   Paul live.3SG.IMP in Paris (*but only in May)
      'Last year, Paul was living in Paris (*but only in May).'
(50) L'année dernière, Paul *habita/a habité* à Paris, mais seulement en mai.
      Last year,   Paul live.3SG.PS/PC in Paris (but only in May)
      'Last year, Paul lived in Paris (but only in May).'
(51) Pendant la reunion, Marie *buvait*   un café, qu'elle n'*a* d'ailleurs
      jamais *fini*.
      During the meeting, Mary drink.3SG.IMP a coffee, which by the way,
      she never finish.3SG.PC
      'During the meeting, Mary was drinking a coffee, which by the way,
      she has yet to finish.'

De Saussure and Sthioul (2005, 105) suggested that the basic semantic features that can be attributed to the Imparfait, regardless of its discursive context, are the dislocation of the referential anchoring of S and the inclusion of this reference point within the eventuality denoted by the verb.

The Italian Imperfetto is, for Bertinetto, a 'clearly imperfective' verbal tense (1986, 345). It presents all three aspectual oppositions recognized in the literature—namely, progressive, continuous and habitual (Comrie 1976), though the continuous aspect seems to be most representative. The progressive aspect of the Imperfetto is shown by the contrast between the examples in (52) and (53), where the Imperfetto indicates that the eventuality of having breakfast started before the moment when the news arrived, where in (54), the Passato Remoto expresses that the eventuality of having breakfast started exactly at the same moment as the news arrived. The habitual aspect is shown in (54), where there is no information about the total duration of the eventuality without explicitly marking it by an adverbial or by contextual information. The same holds for the continuous aspect in (55) from Bertinetto (1986, 347, 349).

(52) Quando arrivò la notizia, Andrea *faceva* tranquillamente colazione come
      ogni mattina.
      When the news arrived, Andrea make.3SG.IMP calmly breakfast as every
      morning
      'When he heard the news, Andrea was having breakfast, as he did every
      morning.'

(53)   Quando arrivò la notizia, Andrea *fece* tranquillamente colazione come
       ogni mattina.
       When the news arrived, Andrea make.3SG.PS calmly breakfast as every
       morning
       'When he heard the news, Andrea had breakfast, as he did every morning.'
(54)   Tino *pedalava*   ogni giorno per due ore.
       Tino pedal.3SG.IMP every day for two hours
       'Tino used to pedal/was pedaling every day for two hours.'
(55)   Cosa *facevi*   ieri dalla 2 alle 4?   *Dormivo.*
       What do.2SG.IMP yesterday from 2 to 4? Sleep.1SG.IMP
       'What were you doing yesterday from 2 to 4? I was sleeping.'

Bertinetto (1986, 352) points out that the aspectual information expressed by the
Imperfetto is linked to the notion of *indetermination*, evaluated in relation to the
continuation of the eventuality beyond the interval considered, to the delimitation of
the interval considered, and to the number of iterations. This indetermination is
most often resolved by contextual knowledge.

The main temporal interpretations of the Imperfetto are: *simultaneity in the past*
and *sequentiality of events* known as the narrative Imperfetto. The interpretation as
simultaneity in the past is linked to the notion of *temporal anchoring.* Both the pro-
gressive and the continuous versions of the Imperfetto require temporal anchoring,
which cannot be provided by a temporal adverbial alone, as shown in (56) and (58)
respectively. Examples (57) and (59), on the other hand, show that temporal anchor-
ing can be established with respect to another eventuality. This is linked to the fact
that temporal adverbials do not necessarily signal a reference moment R.

(56)   ?Ieri *giocavo*   a carte.
       Yesterday play.1SG.IMP at cards
       'Yesterday, I was playing cards. '
(57)   Ieri a quest'ora   *giocavo* a carte;   come passa il tempo!
       Yesterday, at this time play.1SG.IMP cards; how pass the time
       'Yesterday, at this time, I was playing cards; time flies.'
(58)   ?La settimana scorsa *mi   vedevo*   un film dopo l'altro.
       Last week   RFX watch.1SG.IMP a movie after another
       'Last week I was watching one movie after another.'
(59)   La settimana scorsa, mentre tu passavi tutto il tempo sui libri, *mi vedevo*
       un film dop l'altro.
       Last week, while you spend.IMP all your time on books,   RFX
       watch.1SG.IMP a movie after another
       'Last week, while you were spending all your time on books,
       I was watching one movie after another.'

Bertinetto points out that the Imperfetto can carry out the interpretation of simul-
taneity in the past independently of the occurrence of explicit markers such as *at the
same time, when* and *simultaneously,* markers that are necessary for the compound

or simple past forms, as shown in examples (60) and (61), from Bertinetto (1986, 357). In the absence of an explicit marker or an appropriate context, the compound past has an inceptive and then sequential interpretation as in (62).

(60) Quando Luca *è caduto*, Marco   *faceva*   le scale assieme a lui.
      When Luca   fall.3SG.PC, Marco make.3SG.IMP the stairs with him
      'When Luca fell, Marco was walking down the stairs with him.'

(61) Quando Luca *è caduto*, Marco   *ha fatto*   le scale assieme a lui al
      tempo stesso.
      When Luca   fall.3SG.PC, Marco make.3SG.PC the stairs with him
      at the same time
      'When Luca fell, Marco was walking down the stairs with him
      at the same time.'

(62) Quando Luca *è caduto*, Marco   *ha fatto*   le scale assieme a lui.
      When Luca   fall.3SG.PC, Marco make.3SG.PC the stairs with him
      'When Luca fell, Marco went down the stairs with him.'

Nevertheless, the Imperfetto can also be used to express temporal sequencing; this can be observed with the habitual Imperfetto in (63), and when triggered by context, as shown by the contrast between (64) and (65) from Bertinetto (1986, 358, 359).

(63) Il professore   *si alzava* alle 7 e un quarto, *si rasava*, *raccoglieva*
      le sue cose, e *scendeva* al bar per fare colazione.
      The professor himself wake up.3SG.IMP at a quarter past seven, himself
      shave.3SG.IMP, gather.3SG.IMP his things and go down.3SG.IMP at the café
      to have breakfast
      'The professor woke up at a quarter past seven, shaved, gathered his things
      and went down at the café to have breakfast.'

(64) *Suonavano*   le 8 ed egli si   *alzò*.
      Ring.3PL.IMP 8   and himself wake up.3SG.PS
      'The alarm clock rang at 8 and he woke up.'

(65) *Suonavano* le 8. Egli si   *alzò*,   si *lavò*, si *vestì*.
      Ring.3PL.IMP 8. He himself wake up.3SG.PS, himself wash.3SG.PS,
      himself dress.3SG.PS
      'The alarm clock rang at 8. He woke up, washed himself and got dressed.'

Probably the best known and most often discussed exception to the description of the imperfect in these terms is the so-called *breaking* or *narrative* imperfect, attested in all Romance languages (Savić 1979; Tasmowski-De Ryck 1985; Vetters 1996, Comrie 1976), in English (Klum 1961,190) and in ancient Greek (Kiparsky 1968,40). The narrative imperfect has features completely opposed to the first type of imperfect, as illustrated in examples (66) and (67) for the French imperfect, and (68) for Italian.

(66) Comme elle avait été à l'opéra, une nuit d'hiver, elle rentra toute
      frissonnante de froid. Le lendemain elle toussait. Huit jours plus
      tard elle *mourait* d'une fluxion de poitrine.
      Since she go.3SG.PP to the opera, one winter evening, she come.3SG.PS
      back all shivering. The day after, she cough.3SG.IMP. Eight days later,
      she die.3SG.IMP of tuberculosis
      'Since she had gone to the opera, one winter evening, she came back all
      shivering. The day after, she was coughing. Eight days later, she died of
      tuberculosis.'

(67) Le lendemain, il *partait*.
      The next day, he leave.3SG.IMP
      'The next day, he left.'

(68) L'indomani, a mezzogiorno in punto, egli *usciva* dalla città.
      The next day at noon precisely,   get out.3SG.IMP of the town
      'The next day, at noon precisely, he got out of the town.'

Classically, the narrative imperfect is defined in opposition to the imperfect, mainly because of three features: the perfective aspect triggering a perfective interpretation of the eventuality, the temporal sequencing of the eventualities expressed, and the presence of a temporal adverbial which sets the reference moment R. However, Imbs (1960, cited in Bertinetto 1986, 393) gives examples of the narrative Imparfait from Flaubert's *Bouvard et Pécuchet* whose perfective aspect can be questioned. Bertinetto therefore suggests that the aspectual nature of the narrative imperfect can only be determined contextually, and this is due to:

> […] la forte tensione imperfettiva che questo Tempo possiede nelle sue accezioni standard, e le possibili neutralizzazioni aspettuali cui esso va incontro in certi particolari contesti […] ma normalmente esso non giunge fino ad annullare del tutto le connotazioni aspettualli primarie.[4] (Bertinetto 1986, 393–394).

In other words, the narrative imperfect can rarely be replaced by a simple past form without any loss, and, more specifically, a 'temporal dilation of the event' that triggers a focalization on that event during the interpretation process. It is a psychological dimension rather than a discursive one.[5] Bertinetto points out that the 'narrative' interpretation is therefore mainly due to both linguistic and pragmatic factors, and occurs only when the context is taken in consideration. The narrative Imperfetto

---

[4] '…collision between the strong imperfective force that this tense has in its standard usages, and the possibility of aspectual neutralization in certain contexts […] but normally this cannot completely cancel the primary aspectual connotations.' (my translation)

[5] Bertinetto exemplifies this idea with the following passage from the novel *La cognizione del dolore* by C.E. Gadda: "*Ebbe* per il dottore, che non vedeva da tempo, espressioni cordiali ma brevi; e gli *demonstrava* la sua stima. Con garbo native *diede* senz'altro per inavvertiti i quattro millimetri di barba…". This passage describes an important moment in the existential development of the protagonist. The use of the narrative imperfect instead of the simple past form transfers what is said from the discursive level to the psychological level.

is used as a tool to focus on the eventuality expressed, an interpretative effect that does not occur with the simple past, as in (69).

(69)   L'indomani, a mezzogiorno in punto, egli *uscì* dalla città.
       The next day at noon precisely,   get out.3SG.PS of the town
       'The next day at noon precisely, he got out of the town.'

Scholars investigating the imperfect had to suggest a model that would explain the existence of both the imperfect and the narrative imperfect.[6] In the pragma-semantic approach, Vetters (1996, 142) argues that the Imparfait exists in opposition to the Passé Simple in relation to aspectual information and the instructions for temporal sequencing where the Imparfait is imperfective, and instructs the hearer to relate the situation to another past situation meronymically.[7] He does not include simultaneity in the procedural meaning of the Imparfait, since the narrative Imparfait does not express it. The interpretative process is finalized at the pragmatic level under the guidance of the principle of optimal relevance. As for the narrative Imparfait, it is characterized as it follows (Vetters 1996, 128):

- It provides instructions on temporal progression
- It can be replaced by the Passé Simple
- It is favoured when accompagnied by an anteposed temporal adverbial
- With states, it expresses an inchoative meaning (as in (70))

(70)   Quelques secondes plus tard, Luc *était* sous le chapiteau.
       A few seconds later,   Luc be.3SG.IMP under the tent
       'A few seconds later, Luc was under the tent.'

There are two aspectual values of the narrative Imparfait. The inability to interpret a unique and entire event in (71)—possible with the Passé Simple as in (72)—shows that the Imparfait can be imperfective. However, the Imparfait can also be undetermined for aspectual information, due to the Principle of Optimal Relevance (Sperber and Wilson 1986/1995). In other words, the hearer can correctly interpret an utterance with a narrative imperfect without determining its aspectual value, and this interpretation produces the necessary cognitive effects.

(71)   Le lendemain, il *travaillait*   de 5h à 8h.
       The next day, he work.3SG.IMP from 5am to 8am
       'The next day, he was working from 5am to 8am.'

---

[6] In a different framework, Molendijk (2002) reduces the semantics of the Passé Composé, Passé Simple and Imparfait to a series of logical-temporal relations expressed by these verbal tenses in a sequence of sentences, the semantics of the Imparfait being the relation of temporal simultaneity.

[7] Bethonneau and Kleiber (1993, 73) argue that the relation between a situation expressed by the Imparfait and another past time situation is similar to associative anaphora, where a part is linked to the whole.

(72)   Le lendemain, il *travailla*   de 5h à 8h.
       The next day, he work.3SG.PS from 5am to 8am
       'The next day, he worked from 5am to 8am.'

According to Vetters (1996, 144), the pragma-semantic approach explains both descriptive and interpretative usages of the Imparfait, without any need for a split analysis of the two types of Imparfait. For example, in all its instances in (73), the narrative Imparfait needs a reference situation recoverable from the context, i.e. the Imparfait difficult to interpret unless there is a logical link between the two events, as shown in (74), where it is not Mr. Chisnutt who shows up but Mr. Brown (Tasmowski-De Ryck 1985, 66).

(73)   Le commandant se jeta sur l'interphone et hurla qu'il *avait* à parler à
       M. Chisnutt. Trois minutes plus tard, M. Chisnutt *se présentait* chez le
       commandant.
       The commandant threw himself at the intercom and screamed that he
       have.3SG.IMP to speak to Mr Chisnutt. Three minutes later, Mr Chisnutt
       show up.3SG.IMP to see the commandant.
       'The commandant threw himself at the intercom and screamed that he
       had to speak to Mr Chisnutt. Three minutes later, Mr Chisnutt showed up
       to see the commandant.'
(74)   * ?Le commandant se jeta sur l'interphone et hurla qu'il *avait* à parler à
       M. Chisnutt. Trois minutes plus tard, M. Brown *se présentait* chez le
       commandant.
       The commandant threw himself at the intercom and screamed that he
       have.3SG.IMP to speak to Mr Chisnutt. Three minutes later, Mr Brown
       show up.3SG.IMP to see the commandant.
       'The commandant threw himself at the intercom and screamed that he
       had to speak to Mr Chisnutt. Three minutes later, Mr Brown showed up
       to see the commandant.'

Classically, the Romanian Imperfectul is described as presenting eventualities from an imperfective viewpoint. Zafiu (2013, 60) argues that the Imperfectul is better described as a means of marking the aspect in the past rather than a proper tense. The Imperfectul expresses durative (continuous) and iterative aspect, as in (75) and (76) respectively, from Zafiu (2013, 60–61).

(75)   Afară *ploua*   iar tu *stăteai* în casă   și *citeai*.
       Outside rain.IMP and you stay.2SG.IMP in the house and read.2SG.IMP
       'It was raining outside and you stayed indoors and read.'
(76)   *Deschidea*   și *închidea*   ușa de mai multe ori pe zi.
       Open.3SG.IMP and close.3SG.IMP the door several times a day
       'He opened and closed the door several times a day.'

To sum up, the imperfect in Romance languages is presented as mixed between Tense and Aspect. There is an ongoing debate among linguists on whether the imperfective usages of the imperfect are part of its semantics or pragmatically derived.

1.1.3   The Compound Past

The compound past is a verbal tense that presents a very different form of behaviour in English (Present Perfect) than it does in the Romance languages analysed: French (Passé Composé), Italian (Passato Prossimo) and Romanian (Perfectul Compus). In English, there is significant competition between the Simple Past and the Present Perfect for expressing reference to past time. The Present Perfect is a compound form that expresses the *perfect* aspect and makes reference to past time: it locates an eventuality in the past (E < S), and this is expressed from a reference moment that is in the present (R = S). The Simple Past, on the other hand, expresses the preterit (i.e. aorist) aspect and locates eventualities prior to S (E < S). This is expressed from a reference moment that is in the past (R = E). Traditionally, grammars of English distinguish between different adverbials: those only compatible with the Simple Past, which point to a moment or period of time that finished in the past, such as *yesterday, last night, in June* and *the other day*; those only compatible with the Present Perfect, which point to the period leading up to the present or recent past time, such as *since Tuesday, since yesterday* and *lately*; and those compatible with both verbal tenses, such as *today, this week* and *recently* (Leech and Svartvik 1975).

Klein (1992) describes the Present Perfect's inability to occur with a definite temporal adverbial (such as *at 4 o'clock*) as the *Present Perfect puzzle.* Giorgi and Pianesi (1997) point out that there are [+Present Perfect puzzle] languages, such as English, Norwegian, Danish and Swedish, and [-Present Perfect puzzle] languages, such as Romance languages, German, Dutch and Icelandic. Kamp and Reyle (1993) argued that, in languages that exhibit the Present Perfect puzzle, the perfect form expresses only the last of the three stages of a complete event (*preparatory stage, culmination point* and *result stage*). This characteristic explains the incompatibility of the form with past time adverbials,[8] as in (77), and their absence in narratives,[9] as in (78).

(77)   *Mary *has arrived* at 5.
(78)   *Mary *has arrived* and *has started* to cook. She then *has turned* on the TV and she *has watched* a movie.

---

[8] Spanish and Catalan are, however, subject to a constraint termed by Comrie (1985) the *hodiernal restriction*, also known as the *24 hours rule* (Vişan 2006; Aménos-Pons 2011).

[9] The Dutch complex past is an exception, as it is compatible with definite past time adverbials but cannot be used in narratives (Boogaart 1999, Vişan 2006).

Languages that do not exhibit the Present Perfect puzzle, such as Romance languages, express more than the *result stage* (Vişan 2006). This is what makes the Present Perfect in these languages compatible with a past time adverbial, as in (79), and what explains its possible usage in narratives, as in (80).

(79) Marie *est arrivée* à 5 heures.
Mary arrive.3SG.PC at 5 o'clock
'Mary arrived at 5 o'clock.'

(80) Marie *est arrivée* et *a commencé* à cuisiner. Elle *a* ensuite *allumé* la télé et *a regardé* un film.
Mary arrive.3SG.PC and begin. 3SG.PC to cook. She AUX then turn on.3SG.PC. the TV and watch.3SG.PC a movie
'Mary arrived and began to cook. She then turned on the TV and watched a movie.'

The main difference pointed out in grammars with respect to the competition between the Simple Past and the Present Perfect is that the former does not link the past time referred to and the present time, where the latter does. The Simple Past implies a gap between past and present time (i.e. the two moments are disconnected), whereas the Present Perfect implies that the eventuality expressed, be it a state as in (81), a habit as in (82), or an event as in (83), continues at the present time, pointing to the *resultative* eventuality holding at S. In (84) and (85), the Present Perfect makes reference to an indefinite eventuality located in a period leading up to the present (Leech and Svartvik 1975, 66). As for the usage illustrated in (84) and (85), there is a tendency in American English to prefer the Simple Past, as in (86).

(81) That house *has been* empty for ages.
(82) He *has attended* lectures regularly.
(83) The taxi has arrived.
(84) *Have* you ever *been* to Florence?
(85) All my family *has had* measles (in the last year).
(86) *Did* you ever *go* to Florence?

In a cross-linguistic typological analysis, Squartini and Bertinetto (2000) investigate the usages of the compound past and simple past forms in Romance languages. The main hypothesis for explaining the usage variation across Romance languages is the process of *aoristicization.* According to Harris (1982), the aoristicization process consists of a change from a purely perfect (the Present Perfect in English) to an aoristic, passing through several steps, of which the third corresponds to what is known in the French literature as the *accomplishment* compound past, and the fourth to the *anteriority* compound past.

- The compound past is restricted to present states resulting from past actions, and is not used to describe past actions themselves, however recent;

Portuguese	Spanish	Occitan Catalan	Standard Italian	Standard French	Standard Romanian	Northern Italian and French vernaculars

perfectal-------------->----------------------->------------------------->--------------------------aoristic

Fig. 1.1 Scalar orientation of Romance languages in the aoristicization process

- The compound past occurs in durative or repetitive contexts (similar to the English Present Perfect and the Present Perfect Continuous);
- The compound past expresses the archetypal Present Perfect value of past action with present relevance;
- The compound past expresses the aoristic function, while the simple past is restricted to formal registers.

Squartini and Bertinetto (2000) argue against distinct steps in the aoristic drift, and for a continuum stretching from perfect to aorist. Romance languages and dialects can thus be situated on such a continuum, as in Fig. 1.1. Portuguese is the only language that presents the opposite pattern, as the compound past is less used than the simple past for expressing past time reference. In all other languages and vernaculars, the compound past is more frequent than the simple past, a scalar orientation at its maximum in northern Italian and French vernaculars.

The third and the fourth steps were identified in the French literature as the accomplishment and anteriority usages of the compound past. Squartini and Bertinetto argue, as I will show later on, that in Italian there is an important difference between central and northern parts of Italy, where the compound past is used more frequently than the simple past, and the southern part of the country, where the situation is the converse. In Romanian, on the other hand, the compound past is more advanced in its aoristic drift, being the most frequent tense used to express past time reference.

Traditionally, the French Passé Composé is described as a "tense with two faces" (Martin 1971) because of its ability to express both past and present time. When describing the Passé Composé, scholars suggested monoguist and ambiguist analyses. Monoguist analyses consist of a focus either on the past time reference (i.e. the anteriority compound past, as in (87) and (88), such as Brunot 1922), on the present time reference (i.e. the accomplishment compound past, as in (88–91), such as Guillaume 1929), or on both usages, unified and undistinguished (e.g. Reichenbach 1947). The anteriority Passé Composé provides information about E preceding S, whereas the accomplishment compound past allows achievement inferences about a resultative state relevant at the moment of speech S. As for the third type of analysis, Reichenbach assumes a one-to-one correspondence between the Present Perfect and the Passé Composé, which are both characterized by the concomitance of R and S (i.e. $E < R = S$). As Luscher and Sthioul (1996, 198) point out, however, Reichenbach's analysis is problematic in examples (92) and (94), where the compound past is translated by a Present Perfect—unlike the perfectly acceptable (93) and (95), where the compound past is translated by a Simple Past.

(87)   Une fois, j'*ai conduit* sans   le permis de conduire.
       Once, I drive.1SG.PC without the driving license
       'Once, I drove without a driving license.'
(88)   Victor Hugo a écrit   *Les Misérables.* (Luscher and Sthioul 1996, 206)
       Victor Hugo write.3SG.PC Les Misérables
       'Victor Hugo wrote Les Misérables.'
(89)   Policier: Votre permis de conduire, s'il vous plait? Chauffeur : Je l'*ai oublié*
       à la maison.
       Policeman: You driving license, please? Driver: I forget.1SG.PC at home
       'Policeman: You driving license, please? Driver: I left/have left it at home.'
(90)   Isabelle *est sortie*. (de Saussure 2003, 232)
       Isabelle get out.3SG.PC
       'Isabelle has gone out.'
(91)   Il *a plu*. (de Saussure 2003, 232)
       It rain.PC
       'It rained/has rained.'
(92)   Hier, il *a plu*. (Luscher and Sthioul 1996, 199)
       Yesterday, it rain.PC
       'Yesterday, it rained/*has rained.'
(93)   Yesterday, it rained.
(94)   Le 21 janvier 1976, le Concorde *a atteri* à Rio. (Luscher and Sthioul 1996,
       199)
       On the 21 of January 1976, the Concorde land.3SG.PC in Rio
       'On the 21 of January 1976, the Concorde landed/*has landed in Rio.'
(95)   On the 21 of January 1976, the Concorde *landed* in Rio.

   Ambiguist analyses, on the contrary, argued for the existence of an ambiguous
Passé Composé, where only contextual information can disambiguate between its
possible interpretations (such as Vet 1980, Luscher and Sthioul 1996, among oth-
ers). Vet (1980) suggested describing the Passé Composé with two reference points:
a main reference point expressing simultaneity to S; and an auxiliary reference point
expressing anteriority to S. His second suggestion is that the analysis depends on
the lexical aspect of the situation: transitional (i.e. telic) vs. non-transitional (i.e.
atelic) situations. Telic situations allow an anteriority interpretation of the Passé
Composé accompanied by past time adverbial, as in example (96), and an accom-
plishment interpretation with a present time adverbial, as in (97). Atelic situations
allow only accomplishment interpretations, as in (98), where the Passé Composé is
incompatible with a present time adverbial (from Luscher and Sthioul's 1996 dis-
cussion of Vet's analysis).

(96)   Hier,   Chantal *est sortie.*
       Yesterday, Chantal go.3SG.PC out.
       'Yesterday, Chantal went out.'

(97)   En ce moment, Chantal *est sortie.*
        Today,   Chantal be.3SG.PRES out
        'Today, Chantal is out.'
(98)   *L'enfant *a* maintenant *pleuré.*
        The child AUX now cry.3SG.PC
        'The child has just cried.'

The compound past in Italian[10] is described as having two types of usage: *deictic* and *non-deictic*. The deictic usages of the Passato Prossimo corresponds to what has traditionally been called *current relevance, experiential* (Comrie 1976) or *existential* (McCawley 1971), and *inclusive* Passato Prossimo (Jespersen 1948/1961). Examples (99–102), from Lepschy and Lepschy (1998, 228–229), illustrate the meaning of *current relevance*. Bertinetto (1986) includes in the first of these cases the so-called *notizia fresca* Passato Prossimo—the 'hot news reading' of the compound past—as in (103).

(99)   Perché sei così arrabbiato con lui? Perché   mi *ha dato*   un calcio.
        Why are you so angry with him? Because me give.3SG.PC me a kick
        'Why are you so angry with him? Because he kicked me.'
(100)   Mio fratello *è partito*   due ore fa.
        My brother leave.3SG.PC two hours ago
        'My brother left two hours ago.'
(101)   Negli ultimi dieci anni *abbiamo cambiato* casa sette volte.
        In the last ten years   change.3PL.PC house seven times
        'In the last ten years we have moved seven times.'
(102)   Dante ci *ha dato* nella "Comedia" la maggiore opera della nostra letteratura.
        Dante us give.3SG.PC in his "Comedy" the greatest work in our literature
        'Dante has given us with his "Comedy" the greatest work in our literature.'
(103)   La sai l'ultima?   *È arrivato*   Gianni!
        Do you know the latest news? Arrive.3SG.PC John
        'Do you know the latest news? John has just arrived!'

The experiential meaning is illustrated in (104), where the Passato Prossimo expresses an eventuality that covers S. Bertinetto (1986, 418) argues that this case could be considered an extreme case of current relevance, where not only the resultative state but also the eventuality itself continues at, and maybe even beyond, S. He points out that inclusive usages of the Passato Prossimo are restricted as far as lexical aspect is concerned: inclusive interpretations of the Passato Prossimo can occur only with non-telic durative situations, as in (104), and other types of situations which become statives under the scope of negation, as in (105).

---

[10] The use of the Passato Prossimo and the Passato Remoto varies in different parts of Italy. In the north, the Passato Remoto is rarely used in spoken Italian, while in the south, it is more widely used than the Passato Prossimo. In central Italy, a distinction is made between the two tenses, also observed in literary Italian.

(104)   Finora,   Gianni *ha vissuto* in questa casa.
        Until now, John live.3SG.PC in this house
        'Until now, John lived in this house.'
(105)   Le donne di questo posto non *hanno* sempre *portato*   gonne corte.
        Women in this position   not AUX always wear.3PL.PC skirts short
        'Women in this position have not always worn short skirts.'

In (106), the eventuality is part of the life experience of the speaker, and is therefore considered to be linked to the moment of speech S. Bertinetto points out that when the Passato Remoto is used instead of the experiential Passato Prossimo, as in the pair of examples (107) vs. (108), there is an implication that the period of time referred to is completed. This implication could be explicated with temporal adverbials, such as *tra il 1968 e il 1973* 'between 1968 and 1973' or *durante la sua vita* 'during his life'. The Passato Prossimo in (107), on the contrary, does not trigger this type of implication.

(106)   *Sei* mai   *stato*   a Parigi?
        AUX ever be.2SG.PC to Paris
        'Have you ever been to Paris?'
(107)   Luca *fu*   tre volte in Francia.
        Luca be.3SG.PS three time in France
        'Luca was in France three times.'
(108)   Luca *è stato*   tre volte in Francia.
        Luca be.3SG.PC three time in France
        'Luca has been to France three times.'

In non-deictic usages, the reference moment R is disconnected from S. In these cases, the Passato Prossimo expresses a relation of an eventuality's anteriority to another past eventuality mentioned in the context, as in (109) and (110), from Bertinetto (1986, 421)

(109)   Ti avevo detto che *è finito*   il latte; perché non mi stai mai ad ascoltare?
        I had told you that finish.3SG.PC the milk; why don't you ever listen to me
        'I had told you that the milk is finished; why don't you ever listen to me?'
(110)   La casa è crollata   dopo che tu   *sei uscito.*
        The house collapsed after that you get out.2SG.PC
        'The house collapsed after you got out.'

According to the procedural pragmatics approach, Luscher and Sthioul (1996) argue that Vet's analysis in terms of "two semantics of the Passé Composé" (1996, 202) is not convincing, and suggest a pragmatic analysis consisting of having unique semantic content or a *base value* and two pragmatic or *contextual* usages. The base value consists of the event moment E prior to S, as in (88). In its base value, the French compound past shares semantic information (i.e. reference to past time:
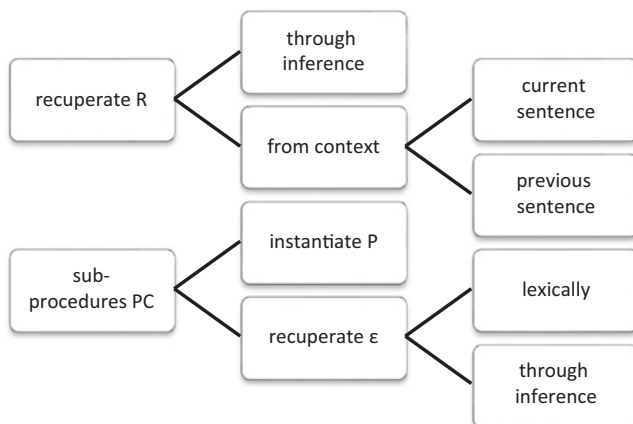
Fig. 1.2 Preliminary sub-procedures for interpreting the Passé Composé

E < S) with the other simple and compound tenses, such as Passé Simple, Imparfait, and Plus-que-parfait. As for the two pragmatic usages, the distinction is made by the position of the reference moment R: in the first type, the Passé Composé points to the event that took place in the past (R = E), whereas in the second, it points to the resultative state relevant in the present time (R = S).

Luscher and Sthioul (1996) propose a complex procedure for interpreting the Passé Composé that consists of a general procedure for recuperating R that is applicable to all tenses, as shown in the left panel of Fig. 1.2, and two sub-procedures specific to the Passé Composé, as shown in the right panel. The temporal interpretation of a sentence involves determining the R point from the context, such as a temporal adverbial from the current sentence or from the previous sentences, or through inference based on the temporal interpretation of previous sentences and world knowledge. The procedure of recuperating R is the same for all tenses, where E can be previous, simultaneous or posterior to R, or where R is previous, simultaneous or posterior to S. The first sub-procedure for interpreting the Passé Composé instructs the hearer to instantiate a P moment such that E < P < S. The second sub-procedure for interpreting the Passé Composé instructs the hearer to recuperate a resultative state, either lexically (for example *get out* entails *be out*) or through inference (e.g. *having eaten* implicates *not be hungry*). De Saussure (2003) argues that the resultative state is a product of conceptual relations holding between eventualities. The main idea is that accomplishment usages of the Passé Composé communicate that the event is perceived from S, and that the same event produced a resultative state true at S.

The complete procedure for interpreting the French Passé Composé proposed by Luscher and Sthioul (1996) (and reasserted in Luscher 1998) is provided in Fig. 1.3. The compound past has basic semantics according to which E is previous to S. The hearer is instructed to instantiate a P such that E < P < S. P is saturated according to contextual information by way of pragmatic inferences. It can be saturated as a reference moment R, which is simultaneous with either E or S. The former case corresponds to the anteriority usage, whereas the latter corresponds to the accomplishment
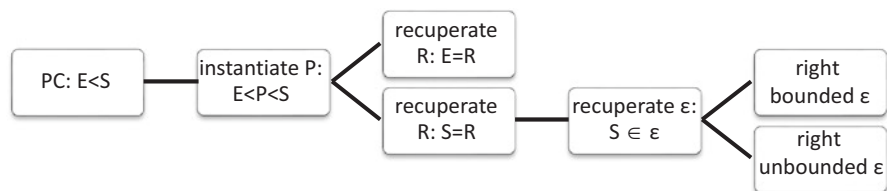
Fig. 1.3 Final procedure for interpreting the compound past

usage. As far as the latter usage is concerned, the hearer can further infer a resultative state true at S which is either right-bounded (e.g. *be out*, in example (97)) or right-unbounded (e.g. *the novel that was written*, as in the second interpretation of (88)).

De Saussure (2003) argues that the compound past, contrary to the simple past, does not provide information regarding temporal progression, and that both backward and forward temporal sequencing inferences are possible, as in (111), where time progresses from the first to the second event, and regresses from the second to the third. The adverb *en plus* 'besides' illustrates that there is no temporal order imposed by the compound past. The compound past can refer to future time when it is accompanied by a future temporal adverbial, as in (112) for the Passé Composé, and (113–114) for the Passato Prossimo. This is an interpretative use of the Passé Composé, where it does not refer to a fact but to a thought: the speaker imagines herself at a moment S′ (i.e. two months after S), when she can assert *I finished my thesis* (S < E < S′).

(111)   Le concierge   *a sorti*   sa clef, il *a quitté* les lieux, et en plus
          il *a fermé* la porte.
          The concierge take out.3SG.PC his key, he leave.3SG.PC the site, and in
          addition he lock.3SG.PC the door
          'The concierge took out his key, left the premises and then locked the door.'
(112)   Dans deux mois j'*ai fini*   ma thèse.
          In two months, I finish.1SG.PC my thesis.
          'In two months, I will have finished my thesis.'
(113)   Soltanto fra un mese sarà possibile capire   chi *ha avuto* ragione
          tra noi due.
          Only in a month it will be possible to understand who be.3SG.PC right
          between us two
          'Only in a month will it be possible to understand which of the two of us
          was right.'
(114)   Domani   *ho finito*.
          Tomorrow finish.1SG.PC
          'Tomorrow I will have finished.'

---

[11] 'The main feature opposing the compound past and the simple past is the compound past's ability to activate by way of temporal adverbials a reference moment R—that is, a point of evaluation which follows the event moment E on the time line and at which the eventuality is represented as being completed.' (my translation)

Bertinetto (1986, 1996) argues that:

> La caratteristica fondamentale che oppone il Passato Prossimo al Passato Remoto, e che accomuna al Passato Prossimo tutti i tempi composti, è la possibilità di attivare per mezzo di eventuali avverbiali temporali un Momento di Riferimento (MR), ossia un punto di valutazione che segue sulla liea del tempo il Momento dell'Avvenimento (MA), e rispetto al quale l'avvenimento stesso viene rappresentato come compiuto.[11] (Bertinetto 1996, 386).

He argues that the semantics of the Passato Prossimo requires instantiating the three temporal coordinates E, R and S on the timeline, where R and S generally coincide. The compatibility of the Passato Prossimo with a temporal adverbial rendering R explicit indicates that R is part of its semantics. R can refer to the moment of speech, as shown in (115), to an adverbial indicating the lapse of time between E and R, as in (116), or to no specific moment (i.e. omnitemporal value), as in (117).

(115)   A quest'ora (adesso, etc.) Gianni *è arrivato.*
             At this time (now, etc.)   John arrive.3SG.PC
             'At this time John has arrived.'

(116)   Gianni *è partito*   da due giorni.
             John   leave.3SG.PC since two days
             'John left two days ago.'

(117)   Una persona che *ha studiato*   non deve comportarsi così.
             A person   who study.3SG.PC not must behave himself like this
             'A person who studied cannot behave like this.'

These three types of examples are incompatible with the simple past form, which imposes a temporal localization of the eventuality before the moment of speech, E < S. Perfectul Compus does not specify the temporal distance between E and S, as shown in (118) and (119) from Zafiu (2013, 58), where both short and long periods are possible.

(118)   Dan *a venit*   acum cinci minute și te așteaptă.
             Dan come.3SG.PC now five minutes and he waits for you
             'Dan came five minutes ago and he has been waiting for you.'

(119)   Basarab I *a trăit*   acum șapte sute de ani.
              Basarab I live.3SG.PC now seven hundred years
             'Basarab I lived seven hundred years ago.'

The Perfectul Compus has deictic usages, as in examples in (118) and (119), and, in certain contexts, it functions as an anaphoric tense, as in examples (120–122) from Zafiu (2013, 58). In (120), the Perfectul Compus anaphorically makes reference to a past time R (i.e. a moment situated a week before the moment of speech). In (121), the Perfectul Compus makes reference to a future time R (i.e. a moment situated somewhere in the future). Finally, in (122), the Perfectul Compus makes reference to a recent past time R (i.e. a moment situated at lunchtime on the day before the moment of speech). Zafiu points out that in these examples, Perfectul Compus replaces the pluperfect, the future perfect and the imperfect, respectively.

(120) *A găsit*   ieri scrisoarea.   *A pierdut*-o acum o săptămână.
       Find.3SG.PC yesterday the letter. loose.3SG.PC now a week
       'Yesterday, he found the letter. He had lost it a week ago.'
(121) O să merg la Ploiești și, când *am terminat* treaba, o să mă întorc.
       I will go to Ploiești, and, when finish.1SG.PC job, I will come back
       'I will go to Ploiești, and when I have finished the job, I will come back.'
(122) Te-*am căutat*   ieri   la prânz. Unde-*ai fost*?
       you look.3SG.PC yesterday at lunch. Where be.2SG.PC
       'I looked for you yesterday at lunch. Where were you?'

    The Perfectul Compus can be used to express anticipation (a future value), as in
example (123), where the speaker expresses her intention to accomplish an action
very quickly in the immediate future (from Zafiu 2013, 58), and the very recent past,
as in (124), from Sporiș (2012, 70).

(123) Gata, *am plecat*.
       Ready leave.1SG.PC
       'I am done and I'm off.'
(124) *A intrat*   chiar acum pe poarta liceului.
       Enter.3SG.PC right now through the gate high school
       'He has just entered through the high school gate.'

    Vișan (2006) points out that the Perfectul Compus, as well as the compound past
in all Romance languages, does not exhibit the Present Perfect puzzle (Klein 1992).
In other words, the Perfectul Compus may co-occur with a definite past adverbial,
as in (125). The Perfectul Compus is still a perfect, due to its link to S (R = S) and
its usage to express resultativity, as shown in (126) from Vișan (2006). At the same
time, the Perfectul Compus may be used in narratives, as shown in (127).

(125) Ion *a plecat*   ieri   la ora 5.
       John leave.3SG.PC yesterday at 5 o'clock
       'John left yesterday at 5 o'clock.'
(126) Mi-*ai spart*   capul!
       Me crack.2SG.PC skull
       'You've cracked my skull!'
(127) Maria și Ion *au plecat* de acasă devreme și s-*au întors* seara târziu.
       După ce *au intrat* în casă, *au făcut* de mâncare, *au luat* cina si s-*au culcat*.
       Maria and John leave.3PL.PC from home early and come back.3PL.PC
       in the evening late. After they enter.3PL.PC the house, they prepare.3PL.PC
       the dinner, eat.3PL.PC and go.3PL.PC to bed.
       'Mary and John left home early and came back late in the evening. After
       they entered the house, they prepared dinner, ate, and went to bed.'

The Perfectul Compus in standard Romanian is fairly advanced in the aoristiciza-tion process (the so-called *aoristic drift*), more so than in Italian and French (Squartini and Bertinetto 2000). Previous corpus-based studies have shown that the simple past has a more reduced usage in written cultivated texts, literary style and narratives in Romanian than in French and Italian (Squartini and Bertinetto citing Savić 1979; Călărașu 1992). Squartini and Bertinetto (citing Călărașu 1992) note that the analysis of a contemporary Romanian epistolary novel showed that simple past is completely absent, where it is present in its French translation. As for newspaper texts, Squartini and Bertinetto (citing Savić 1979) also note the absence of the simple past.[12] These results are similar to those found in the analysis of the multilingual corpus described in Sect. 3.4. Vișan (2006) therefore suggests that the Perfectul Compus is semanti-cally richer than its English counterpart the Present Perfect, and that it ranks highest in the aoristicization process. She furthermore suggests that the Perfectul Compus and Perfectul Simplu have identical functions in narratives and that they are inter-changeable. When they alternate in the same text, this takes place without necessar-ily imposing a change of perspective, as shown in (128) from Vișan (2006, 65). This behaviour is due to the compound past's significant progress along the aoristic drift.

(128)   Vorbind așa,   *au ajuns* aproape de Tecuci, unde poposiră la o dumbravă.
        Speaking while, arrive.3PL.PC close to Tecuci, where stopp.3PL.PS
        in a glen
        'As they were speaking, they arrived close to Tecuci, where they stopped
        in a glen.'

Vișan points out that Romanian data reveal that the Perfectul Compus is frequently used in both spoken and written Romanian, and that 'the narrative value of the Perfectul Compus alternates with the narrative Perfectul Simplu' (Vișan 2006, 66). Her usage of the term *narrative* makes reference to Smith's (2003) notion of *discourse modes.*

Regarding the aspectual information expressed by the Perfectul Compus, the lat-ter presents the situation from a perfective viewpoint, i.e. it expresses a completed situation, as in (129), from Zafiu (2013, 59). It can be accompanied by a durative adverbial, as in (130), and by iterative temporal adverbials, as in (131).

(129)   *A citit*   cartea.
        Read.3SG.PC the book
        'She read the book.'
(130)   *A citit*   din carte timp de trei ore.
        Read.3SG.PC from the book for three hours
        'She read from the book for three hours.'
(131)   *A venit*   în vizită în fiecare zi.
        Come.3SG.PC to visite every day
        'She came to visit every day.'

---

[12] There is, however, a variety of Romanian spoken in the regions of Oltenia and Muntenia where the simple past is used very often, and expresses temporal proximity (short periods prior to S). The compound past is used to express more distant situations (Squartini and Bertinetto 2000).

The Perfectul Compus can be used both in contexts with temporal progression, as in (132), and with backward temporal sequencing, as shown in (133), from Zafiu (2013, 59), and in (134), from Vişan (2006, 63). As seen in all three examples, explicit temporal connectives are possible, but not necessary for the expression of temporal progression or reverse order. Vişan (2006) makes the hypothesis that temporal ordering is triggered by the sequence of tense forms themselves.

(132)   *Am ajuns*   acolo. *Am văzut* dezastrul.   *Am chemat*   poliţia.
        Get.1SG.PC there. See.1SG.PC the disaster. Call.1SG.PC the police
        'I got there. I saw the disaster. I called the police.'
(133)   *Am ajuns*   acolo pe la prânz. *A fost* o zi teribilă.
        Get.1SG.PC there around noon. Be.PC a terrible day
        'I got there around noon. It was a terrible day.'
(134)   În acea zi *a plouat* mult. Cu toţii *erau* iritaţi. Maria l-*a lovit* din greşeală
        pe Mihai.   Ion *a căzut*.   Martin l-*a împins* şi *a căzut* şi el.
        That day it rain.PC a lot. All be.3PL.IMP irritated. Maria hit.3SG.PC
        by mistake Mihai. Ion fall.3SG.PC. Martin him push.3SG.PC and then
        fall.3SG.PC he too
        'That day it rained a lot. We were all out of sorts. Maria hit Mihai
        by mistake. Ion fell. Marin pushed him and then he fell too.'

To sum up, the compound past is a verbal tense locating E < S via an R which can be R = E or R = S. In the usage E = R < S, the compound past is similar, but not identical, to the simple past and the imperfect. It can be distinguished from the simple past according to the instructions and constraints on temporal progression encoded by the simple past. Similarly, the compound past can be distinguished from the imperfect according to difference of viewpoint, i.e. perfective for the compound past, and imperfective for the imperfect.

1.1.4   The Present

The simple present in English (Simple Present), in French (Présent), in Italian (Presente) and in Romanian (Prezentul) exists in opposition to the verbal tenses classically described as *expressing past time*, i.e. the simple past, compound past and imperfect, based on E/S relations. The simple present expresses a relation E = S, whereas the simple past, compound past and imperfect express a relation E < S. Similar to the simple past, compound past and imperfect, the simple present can refer to times other than the present time.

Semantically speaking, Quirk et al. (1985, 176) describe the Simple Present as 'the most general and unmarked category'. For example, (135) and (136) contrast with respect to the time span to which the statement applies. The generic statement in (135) applies to past, present and future, whereas the more specific statement in (136) applies to the past, and implies that this bird species is extinct.

(135)   Albatrosses *are* large birds.
(136)   Albatrosses *were* large birds.

Referentially speaking, the Simple Present locates eventualities simultaneous to the moment of speech, but its usages are highly dependent on its combination with Aktionsart or Aspect: *state present* applies to states; *habitual present* applies to the habitual aspect and dynamic events; and the *instantaneous present* applies to verbs with little or no duration such as achievements, as well as to performative verbs in order to accomplish specific speech acts. According to Quirk et al. (1985, 179), the state present includes generic statements, as in (135), proverbs, as in (137), scientific statements, as in (138), and statements in which the span of time is determined according to our world knowledge, as in (139), in contrast to (140).

(137)   Honesty *is* the best policy.
(138)   The Nile *is* the longest river in Africa.
(139)   Margaret *knows* several languages.
(140)   The soup *tastes* delicious.

The habitual present applied to dynamic eventualities, such as activities and accomplishments, refers to a sequence of events repeated over an unrestricted time span, as in (141). The frequency of the repetition can be specified with frequency adverbials, such as in (142).

(141)   She *makes* her own dresses.
(142)   Bill *drinks* heavily every night.

We find similar descriptions of the simple present in Romance languages. For example, Riegel et al. (1994) note that the French Présent is used to express eventualities that take place at the moment of speech, and for habitual and timeless statements (general truths such as maxims, proverbs, and theorems). They point out that the Présent can place the situation in any period of time, past or future, and even in all periods of time (omnitemporal value). As a simple form, the Présent expresses the process while ongoing, without taking into consideration its delimitations or duration. The limits and duration are provided by the semantics of the verb, as in (143), with a punctual situation, and in (144), with an activity. The omnitemporal value, i.e. the *permanent present*, occurs in definitions, as in (145), in general truths (considered by the speaker to be true at any period of time), as in (146), and in proverbs or maxims, as in (147). Examples (148) and (149) show identical usages for the Romanian Prezentul Simplu.

(143)   La bombe *explose*.
         The bomb blow up.3SG.PRES
         'The bomb blows up.'

(144) Elle *marche*   au milieu   de la rue.
       She walk.3SG.PRES in the middle of the street
       'She walks in the middle of the street.'
(145) Une haquenée *est*   un petit cheval ou une jument, de taille moyenne.
       A hackney be.3SG.PRES a small horse or a mare, of a middle size
       'A hackney is a small horse or a mare, of a middle size.'
(146) Le soleil *se   lève*   à   l'Est.
       The sun   RFX rise.3SG.PRES in the east
       'The sun rises in the east.'
(147) Tous les matins du monde *sont*   sans   retour.
       All the mornings of world be.3PL.PRES without return
       'All the world's mornings never come back.'
(148) Acum *locuiesc*   aici.
       Now live.1SG.PRES here
       'I live here now.'
(149) Triunghiul *are*   trei laturi.
       The triangle have.3SG.PRES three sides
       'A triangle has three sides.'

   For Bertinetto (1986, 329–331), the Presente is used non-deictically in atemporal statements, as in (150), definitions, proverbs, gnomic statements and omnitemporal assertions, as in (151), and deictically when it expresses simultaneity to the moment of speech—that is, where $E = R = S$. The Presente has deictic usages when it occurs with temporal adverbials such as *al momento attuale* 'at the present moment' and *in questo preciso istante* 'in this very moment', but only with durative situations, as in (152). When used with non-durative verbs, it expresses a comment about a situation in progress (i.e. the reporting Presente), as in (153). When the Presente is used with non-durative verbs, it expresses the inceptive aspect, as shown by the contrast between examples (154) and (155), where the latter illustrates the impossibility of a progressive interpretation. It can also have a reiterative interpretation, as in (156).

(150) La verità *è*   un bene supremo, ma non sempre.
       The truth be.3SG.PRES a good supreme, but not always
       'The truth is a supreme good, although not always.'
(151) Parigi si   *trova*   in Francia.
       Paris RFX find.3SG.PRES in France
       'Paris is in France.'
(152) In questo preciso istante, Carlo *dorme*.
       In this very moment,   Carlo sleep.3SG.PRES
       'At this very moment, Carlo is sleeping.'
(153) In questo preciso istante, Clara *esce*.
       In this very moment,   Carla get out.3SG.PRES
       'At this very moment, Carlo is getting out.'

(154)   Ora *piange*;   lo sapevo!
        Now cry.3SG.PRES. it know.1SG.IMP
        'Now he's crying. I knew it!'
(155)   ??Adesso Edoardo *piange*.
        Now   Eduard cry.3SG.PRES
        'Eduardo is crying now.'
(156)   In questo momento, Gaetano *raccoglie*   le biglie che Monica ha
        sparso per terra.
        In this moment,   Gaetano pick up.3SG.PRES the marbles that Monica
        scattered on the floor
        'At this moment, Gaetano picks up the marbles that Monica scattered
        on the floor.

The simple present can also express habitual situations, as in (157), interpreted
as 'every time I go to the mountains, I feel another like person', and in (158).

(157)   In montagna   *mi   sento*   un altro.
        In the mountains RFX feel.1SG.PRES another person
        'In the mountains I feel like another person.'
(158)   Amedeo *viaggia*   sempre in prima classe.
        Amedeo travel.3SG.PRES always in the first class
        'Amedeo always travels in the first class.'

An utterance in the French Présent may also express the iterative aspect with an
appropriate temporal adverbial, as in (159) and (160). Sentences without a temporal
adverbial can sometimes remain ambiguous between a present action and a habitual
activity.

(159)   Elle *regarde*   la télévision parfois/souvent /tous les soirs.
        She watch.3SG.PRES TV sometimes/often/every evening
        'She watches TV sometimes/often/every evening.'
(160)   Claire *joue* au tennis.
        Claire play.3SG.PRES tennis
        'Claire plays tennis.'

With respect to Aspect, the Italian Presente views an eventuality from both imper-
fective and perfective points of view. The imperfective simple present can be easily
be replaced by the progressive periphrases *stare* + gerund and *stare a* + infinitive ('be
+ -*ing*'), whereas the perfective simple present occurs mainly in deictic non-standard
usages where it expresses reference to past time. Similarly, the Prezentul Simplu
expresses the situation while it is happening, without taking into consideration its
delimitations or duration. The limits and the duration are provided by the semantics
of the verb, or by adverbials in the context. Hence, sentences with the verb in the
simple present may express imperfective and continuous, as in (161), iterative, as in

(162) and perfective with an achievement (punctual situation), as in (163) (from Zafiu (2013, 57)). Contemporary Romanian, like French, does not have grammaticalized periphrases with a progressive meaning, contrary to other Romance languages such as Italian. The distinction between progressive and non-progressive present must therefore be made based according to other lexical items or contextual information.

(161)   *Așteptă*   în stradă.
         wait.3SG.PRES in the street
         'He is waiting in the street.'

(162)   El își   *verifică*   mesageria telefonică de trei ori pe zi.
         He RFX check.3SG.PRES voicemail three times a day
         'He checks his voicemail three times a day.'

(163)   Deodată, fotografia   îi *cade*   din mâini.
         Suddenly, the photograph RFX drop.PRES from his hands
         'Suddenly, the photograph drops from his hands.'

The simple present can also express reference to times other than the present, which can be observed both in English and Romance languages. For example, it can make reference to past or future times (i.e. R is located before or after S) with the help of a temporal adverbial or according to contextual knowledge. The utterance is related to S, but the event is shifted into the past, as in (164), or the future, as in (165) and (166), from French.

(164)   Je *sors*   à l'instant   du lycée.
         I get out.1SG.PRES at the moment from the high school
         'I have just gotten out of high school.'

(165)   Elle *part*   demain pour le Pérou.
         She leave.3SG.PRES tomorrow for the Peru
         'She leaves tomorrow for Peru.'

(166)   J'*arrive*   dans cinq minutes.
         I arrive.1SG.PRES in five minutes
         'I will be arriving in five minutes.'

Similarly, the French Présente can locate the eventuality in the future, as in examples (167–171), where the posteriority of R with respect to S is expressed explicitly by an adverbial or inferred in the context, as in (170) and (171) in Italian, and (172) and (173) in Romanian. Authors studying the futurate present in Romance languages (Rebotier 2009; Salvi and Vanelli 2004; Manea 2008) note that the futurate present is used more often in Romanian and Italian than in French.

(167)   *Resto*   a casa nel pomeriggio.
         Stay.1SG.PRES at home this afternoon
         'I'll stay at home this afternoon.'

(168)   *Parto*   domani.
        Leave.1SG.PRES tomorrow
        'I am leaving tomorrow.'
(169)   Fra un anno *mi trasferisco*   a Milano.
        In a year   RFX move.1SG.PRES to Milan
        'In a year's time I will move to Milan.'
(170)   Adesso *esco*.
        Now   get out.1SG.PRES.
        'I'm getting out in a second.'
(171)   *Vengo*   subito.
        Come.1SG.PRES at once
        'I'll come at once.'
(172)   Măine   *plec*   la Ploieşti.
        Tomorrow leave.1SG.PRES to Ploieşti
        'Tomorrow I am leaving to Ploieşti.'
(173)   *Citesc*   şi eu toate textele primite.
        Read.1SG.PRES also I all texts received.
        'I am also reading all the texts received.'

As for the English Simple Past, it expresses reference to the future with time
adverbials when the event is 'unalterably fixed in advance, and is certain as it would
be, were it taking place in the present' (Quirk et al. 1985, 182) as in (174).

(174)   The plane *leaves* for Ankara at eight o'clock tonight.

Temporal adverbials may express a shorter or a longer period of time, whether in
the past or the future. They can also mention an initial or a final boundary of the
process. In example (175), the temporal adverbial marks the initial boundary, while
the final boundary is indefinite. In example (176), the initial boundary of the period
of time beginning in the past is specified, while the final boundary remains unspeci-
fied. On the contrary, example (177) indicates that the process is oriented towards
the future, starting with the initial boundary marked by *désormais* 'from now on'.

(175)   Il *neige*   depuis vingt-quatre heures.
        It snow.PRES for twenty-four hours
        'It has been snowing for the last twenty-four hours.'
(176)   Je me   *lève*   à cinq heures depuis vingt ans.
        I   RFX wake up.1SG.PRES at five o'clock since twenty years
        'I have been waking up at five o'clock for the last twenty years.'
(177)   Désormais,   je me *lève*   à cinq heures.
        From now on, I wake up.1SG.PRES at five o'clock
        'From now on, I will wake up at five o'clock.'

One of the best known usages of the simple present is where it makes reference to non-present, termed the *historical* or the *narrative present*. It is used to make reference to real or fictional past events, whether in an independent phrase or a whole paragraph. In contrast to the simple present, which may express an immediate past event with the appropriate temporal adverbials, the narrative present shifts the event into the past, as in (178) from English, (178) from French, (180) and (181) from Italian, and (182) and (183) from Romanian.

(178)   I couldn't believe it! Just as we arrived, up *comes* Ben and *slaps* me
         on the back as if we'*re* life-long friends. 'Come on, old pal,' he *says*,
         'Let me buy you a drink!' I am telling you, I nearly fainted on the spot.

(179)   En 1789, le peuple de Paris   *prend*   la Bastille.
         In 1789, people   from Paris take.3SG.PRES the Bastille.
         'In 1789, people from Paris took the Bastille.'

(180)   In armonia con questo giudizio, Andreotti *compie*   con regolarità,
         a Firenze, dove era nato il 15 marzo 1924, gli studi medi...
         According to this opinion, Andreotti carry out.3SG.PRES regularly
         in Florence, where born.3SG.PC on 15th of March 1924, his medical studies
         'According to this opinion, Andreotti regularly carried out his medical
         studies in Florence, where he was born on 15th of March 1924.'

(181)   Ieri   *vado*   al cinema, e   chi ti   *trovo*?
         Cinzia e Mario, naturalmente!
         Yesterday, go.1SG.PRES to cinema, and who RFX find.1SG.PRES?
         Cynthia and Mario, naturally
         'Yesterday I went to the cinema, and who did I find there? Cynthia and
         Mario, naturally.'

(182)   Ieri   *am fost*   la Ploieşti. *Am mers* cu trenul. În compartiment,
         văd o figură cunoscută.
         Yesterday go.1SG.PC to Ploieşti. go.1SG.PC by train. In the compartment,
         see.1SG.PRES a familiar face
         'Yesterday I went to Ploieşti. I went by train. In the compartment I saw
         a familiar face.'

(183)   Cuza *moare*   în 1873.
         Cuza die.3SG.PRES in 1873
         'Cuza died in 1873.'

The past time reference is provided by the context, such as temporal sequences like the alternation with past time verbal tenses, as in (182), or by temporal adverbials whose past time interpretation is based on contextual knowledge, as in (183), from Zafiu (2013, 56). The past time reference of the simple present is impossible out of context, as shown by the incompatibility of the Prezentul with an indexical past time adverbial in (184).

(184)   *Ieri   *plec*   la Ploieşti.
        Yesterday leave.1SG.PRES for Ploieşti
        'Yesterday I left for Ploieşti.'

From a procedural pragmatics perspective, Luscher (1998) proposes an interpretative procedure for the simple present. He suggests that the simple present has unique semantics identified in descriptive usages, which is preserved in interpretative usages. When interpreting a narrative present utterance, the hearer is instructed to instantiate a moment of perspective P such that P = S. In some cases, the identification P = S does not correspond to the situation described, as in (185), where the speaker has already arrived, and as in (186), where the speaker has yet to arrive (from Luscher 1998, 203).

(185)   Tu es là depuis longtemps? Non, j'*arrive.*
        Are you here for a long time? No, I arrive.1SG.PRES
        'Are you here for a long time? No, I have just arrived.'
(186)   Commencez sans moi,   j'*arrive.*
        Begin   without me, I arrive.1SG.PRES
        'Begin without me, I'm coming.'

He points out that the hearer's assumption is that the speaker used the simple present rather than another possible form (*venir de* corresponding to a recent past and immediate future respectively) so that her interlocutor could make a set of specific inferences using the instruction P = S. To interpret the utterances in (185) and (186), the hearer must build a moment of conscience S′, distinct from S, such that S′ is included in E. The hearer must instantiate S′ as a moment that produces the largest cognitive effect. The interpretation of (185) is that it corresponds to the speaker's thought at the moment at which he arrived, which occurred in the recent past, whereas for (186), the preferred interpretation is that it corresponds to the hearer's perception of the moment when the speaker will be arriving (in the next few minutes). The same process occurs in (187), where the hearer builds a posterior moment of conscience S′, corresponding to the speaker's thought about E.

(187)   Dans dix ans, je *suis*   à la retraite.
        In ten years, I be.1SG.PRES retired
        'In ten years, I will be retired.'

As far as the narrative present is concerned, the interpretative process is similar. Because there is a constraint on the hearer such that the semantics of the simple present is S = P, he interprets the utterance as being the thought of an external observer occurring at a moment of conscience S′ given by the temporal adverbial. An alternative analysis is proposed in Moeschler (2014), who suggests that the usages of the narrative present may be characterized by three pragmatic features: [±narrative], [±subjective] and [±explicit]. For Moeschler, the narrative present displays five of

the six possible combinations of these features. As such, he proposes a minimal basic Reichenbachian semantics shared by the simple and the narrative present, combined with different groupings of pragmatic features (cf. the discussion in Sect. 5.4).

   In this section, I have provided a description of the various contextual usages of the simple past, the imperfect, the compound past and the present in English, French, Italian and Romanian. This description shows that grammars and linguistic studies have addressed each verbal tense as a whole, hence without necessarily distinguishing between the information from the categories of Tense, Aktionsart and Aspect. In order to understand their input better, I review them in Sect. 1.2, from the point of view of grammars and linguistic studies. Later, in Chap. 4, these categories and their meanings are tested in annotation experiments and interpreted with respect to their conceptual and procedural types of encoded content. As will be shown, the results of the annotation experiments indicate that Tense encodes both conceptual and procedural types of information, Aspect is of a procedural nature, and Aktionsart is of a conceptual nature. A re-analysis of these categories in these terms is provided in Chap. 5.

1.2   Temporal Cohesive Ties

1.2.1   Tense

Tense has played a central role in analyses of temporal reference ever since the beginning of the formal study of meaning in the early 1970s, where it was defined as a *temporal operator* (Prior 1967, 1968). Prior's tense logic offered an *internal* perspective on time (i.e. humans stand inside time, at the point of speech, which is the deictic centre). The major debate in philosophy on the metaphysics of time is between the *A-theory* (known as the *tensed* theory) and the *B-theory* (known as the tenseless theory of time) (cf. Prosser 2013; Ludlow 2013). Prior's logic is based on the A-theory (or *A-series* of time as proposed by McTaggart 1908), which postulated that one time is *present* while other times are ordered degrees of *pastness* and *futurity*. *Pastness, presentness* and *futurity* are therefore properties of time, and change as time passes. In the B-theory, in contrast, time is ordered according to three relations: *being earlier than, later than*, or *being simultaneous with*. No time is objectively *past, present*, or *future*, and the apparent passage of time is an illusion (cf. Prosser 2013).

   As a temporal operator, Tense applies to the basic form of a sentence, and shifts the evaluated time of that sentence to the past or to the future. The so-called Priorian tense operators (corresponding to definite verbal tenses) are (from Binnick 1991, 243):

F= $_{def}$ 'It will be the case that'
G= $_{def}$ 'It will always be the case that'
P= $_{def}$ 'It has been the case that'
H= $_{def}$ 'It has always been the case that'

A sentence p, as in (188), would be symbolized as in (189). Binnick (1991, 244) argues that the tense-logical language proposed by Prior is, one the one hand, much richer than is necessary to describe verbal tenses in natural language, as shown by the operators in (190) corresponding to (191), and, on the other hand, insufficient or too reductionist because it accounts for neither the present tense, the preterit nor the inter-relations between Tense, Aspect and Aktionsart.

(188)   John leaves home.
(189)   F*p*
(190)   FF*p*
(191)   It will be the case that it will be the case that John leaves home.

The treatment of tenses in logic assumed that the present tense did not provide an essential contribution, corresponding to *p* itself. However, Binnick (1991) points to the fact that an operator for the present tense is necessary, because in natural language the present tense is distinguished from the other verbal tenses, and contributes to the compositional treatment of other verbal tenses. Similarly, other operators such as *Past* or *Perf* should be introduced to describe the English verb system accurately (cf. Bennett and Partee 1978; Dowty 1972; Nerbonne 1986).

However, as Nerbonne (1986) points out, the semantics of the Priorian *Past* operator, formulated in (192), poses a problem if it is applied to two sequences p_1 and p_2 in a narrative text; this is because it would trigger an indefinite interpretation, due to the fact that no order between t_1 and t_2 can be established using (192).

(192)   PAST (p) holds at t iff $\exists\, t' < t$ and p holds at t'

Nerbonne's suggestion is to give the indefinite interpretation embodied in (192), and to find a model that allows for the specification of the ordering of the time periods in which successive sentences hold. In other words, Tense should refer to definite time periods, which are to be specified in the context. So, the logic-based models, in which Tense was analysed in terms of operators with truth-conditions, were replaced with the *referential* model of Tense, which refers directly to temporal entities and expresses temporal relations (Arnauld and Lancelot 1660/1972; Beauzée 1767; Reichenbach 1947; McCawley 1971; Dowty 1979; Kamp 1979; Kamp and Reyle 1993; Partee 1973, 1984; Hinrichs 1986; Nerbonne 1986; Steedman 1997; Hornstein 1990; Klein 1994; among others).

In the referential approach, Tense is a deictic category, in that it relates entities to a deictic centre, which is usually the moment of speech S (i.e. the *now* of the speaker). Described in these terms, expressing reference to a temporal point seems to be both the meaning and the function of Tense in discourse. According to this approach, it is assumed that Tense, also referred to as *verbal tense*, expresses a relation between two or three coordinates (in Reichenbach's system): the moment of speech, the event moment and the reference moment, respectively.

Both the Port-Royal Grammar and Beauzée attempt to formalize the meaning of French verbal tenses, addressing the intuitive idea that they express a relation

between the moment of speech and the moment of the eventuality. Arnauld and Lancelot (1660/1975) propose a system of two coordinates: the moment of speech, and the event moment (in Reichenbach's terminology). These two coordinates can be linked by a relation of anteriority (for example, E < S for the simple past) or by a relation of simultanity (for example, E = S for the simple present). This model, even though it was innovative for its time, had a significant drawback: several verbal tenses received the same formal description, whether expressing past (such as the Passé Simple, Passé Composé and Imparfait in French), present or future time. These need to be further differentiated, based criteria other than the E/S relation. An example of a plausible criterion is the *24 hours* rule proposed to distinguish between the simple and the compound past. According to this rule, the simple past expresses eventualities that took place 24 hours or more before the moment of speech (called a *definite past time*), and the compound past expresses eventualities that took place fewer than 24 hours before the moment of speech (called an *indefinite past time*).

It is the French linguist who offered a solution to Port Royal's problem. He suggests using a third coordinate called *comparison term* (a reference point in Reichenbach's terminology) corresponding to *the moment from which the eventuality is considered.* This comparison term is the concretization of the need to have secondary criteria to distinguish between several verbal tenses. Beauzée's model establishes two pairs of coordinates: on the one hand, *existence period/moment* (event moment S, in Reichenbach's terminology) and comparison term R; and on the other hand, R and the moment of enunciation E. These three coordinates can exist in a relation of *anteriority, simultaneity* or *posteriority.* The combination of the pairs of coordinates and relations leads to nine tenses, which could be discriminated more specifically with the help of other secondary criteria.

The introduction of this third coordinate allowed for better discrimination between the simple and the compound past, where the former expresses an eventuality seen from the past and the latter an eventuality seen from the present. Beauzée focused on another important opposition, between the simple past and the imperfect. As the distinction between the two verbal tenses is a problem of Aspect, he tried to express it using the comparison term, which can be either a point (i.e. a moment) or an interval. This idea exposes the first limitation of his model, which is the imprecise nature of the comparison term and the need to identify these specific data in the cotext. According to de Saussure (1998a, b), the comparison term can be interpreted as either a mental projection of S, an aspectual point of perspective, or a time interval concomitant with the event itself. A second limitation is the circular

---

[13] Klein (1994) also proposes three parameters to explain the relationships between Tense and Aspect, namely topic time TT, time of situation TSit and time of utterance TU. These correspond more or less to what Reichenbach called R, E and S, but there are some theoretical differences. In the sentence *The light was on*, TSit corresponds to the time at which the light was on, and TT corresponds to the time at which such a claim was made. Both TT and TSit are distinct from the time when the utterance was made, which is time of utterance TU. According to Klein, TT precedes TU, and TU is included in TSit, since it is possible that the light was one before, during and after the time of utterance. In Klein's words, 'TT is the time span to which the speaker's claim on this occasion is confined' (Klein 1994, 4).

explanation of the distinction between the simple past and the imperfect: the former provides a comparison point to the latter, and the latter provides an interval of comparison for the former (see de Saussure 1998a, b for an extensive discussion).

As research into verbal tenses in French emerged, Reichenbach (1947) proposed an abstract formalization of the English verbal system. His framework includes three temporal coordinates used for the temporal anchoring of eventualities. Reichenbach assumes that there is a timeline (represented graphically from left to right), and argues that 'tenses determine time in reference to the time point of the act of speech, i.e. of the token uttered', called the *point of speech* S (1947, 288). His model—like Beauzée's—includes the moment when the eventuality occurred, called the *point of event* E, and a third point, called the *point of reference* R, which is a temporal point of view. The point of reference is a key notion in Reichenbach's model.[13]

R is a parameter necessary for temporal anchoring, as shown by the semantics of the Past Perfect. Reichenbach (1947, 288) notes that:

> For a sentence as 'Peter had gone' we see that the time order expressed in the tense does not concern one event, but two events, whose positions are determined with respect to the point of speech. […] In the example the point of the event is the time when Peter went; the point of reference is a time between this point and the point of speech.

Reichenbach did not describe the nature of R in a detailed manner: this is given by the context (i.e. covert expression of R) or in the cotext by a temporal adverbial (i.e. overt expression of R), and temporally anchors one or more eventualities (p.288). In his words:

> In an individual sentence like the one given it is not clear which time point is used as the point of reference. This determination is rather given by the context of speech. In a story, for instance, the series of events recounted determines the point of reference, which in this case is in the past, seen from the point of speech. Some individual events lying outside this point are then referred, not directly to the moment of speech, but to this point of reference determined by the story.

De Saussure (1998a, 38) argues that this lack of specification on the nature of R leads to several possible interpretations. R could be a *projection of S* and thus an *observation/evaluation point* situated on the timeline. De Saussure (1998a) assumes that the addressee establishes the point of reference starting from contextual hypotheses, and if more specific information is provided, he either confirms or re-evaluates the initial calculation of R. Reichenbach did not specify whether R should be seen a point, as an interval, or as both, but his analysis of extended tenses seems to indicate that the notion of *temporal extension* is linked to the speaker's aspectual viewpoint (i.e. Aspect) rather than to R. Reichenbach's system is not designed to accommodate Aspect, so much as considering that "in some tenses, an additional indication is given concerning the time extension of the event" (pp. 290). He notes that, in languages as French, two verbal tenses are used to express this aspectual difference: the Imparfait for extended events; and the Passé Simple ("passé défini") for events that are not extended. This aspectual difference corresponds to the *imperfective/perfective* distinction.

For Reichenbach, all three temporal coordinates are necessary for each verbal tense, in order to establish the temporal reference of one or more eventualities. However, S and E play a crucial role in defining the semantics of the so-called *simple* tenses (past, present and future). He assumed that:

- The present tense conveys that S and E are simultaneous;
- The past tense conveys that E precedes S;
- The future tenses convey that E follows S.

Moreover, the three coordinates are linked by three possible temporal relations, i.e. *precedence*, *simultaneity* and *succession*. The anchoring procedure begins with the relation between R and S, and continues to that between E and R. This leads to *relative* and *absolute* tenses, where R coincides with S in the former, and R is distinct from S in the latter.

Reichenbach's system uses R to account for the difference between the Present Perfect (periphrastic construction) and the Simple Past. In both cases, E precedes S (the eventuality took place in the past), but it is the position of temporal point of reference R and its relation to E and S which discriminates between the two tenses: for the Simple Past, R coincides with E and precedes S, and for the Present Perfect, R coincides with S while E precedes them. This distinction between the simple and the compound past is also made in French, where the simultaneity of R and S illustrates the relevance of the resulting state in the present for the Passé Composé. According to Reichenbach, the English Present Perfect is often used as an extended tense, with the specification that the duration of the event reaches up to S (pp. 292), as in (193) and (194). If the speaker does not intend to communicate the duration of the event then the Simple Past is used, as in (195).

(193)   I *have seen* him.
(194)   I *have known* him for 10 years.
(195)   I *saw* him ten years ago.

Reichenbach's system also provides an interesting account of the sequence-of-tense phenomenon (SOT). According to Reichenbach, when sentences are combined to form a compound sentence, the verbal tenses of the relevant clauses are adjusted in relation to one another according to certain rules. He proposed two rules: (a) *the permanence of the reference point* (R is the same for all clauses, as in (196)); and (b) *the positional use of the reference point* (R is the carrier of the temporal position). When temporal localization is provided by an adverbial, it refers not to E but to R. In example (197), the adverb *yesterday* refers to both R and to E, which are simultaneous, whereas in (198) the adverb refers only to R.

(196)   I mailed the letter when John came and told me the news.
(197)   I met him *yesterday*.
(198)   I had met him *yesterday*.

In example (196), the connective *when* signals that the eventualities *mailing the letter, John's coming* and *John's telling the news* have the same reference moment R. However, the eventualities are temporally sequenced: the event of the first clause precedes that of the second and third clauses. If the temporal relation is explicitly specified in the sentence by way of connectives such as *before* or *after*, the rule of the permanence of R is replaced by the more general rule, the positional use of R. In example (199), R changes incrementally: R_1 in the first clause changes in R_2 in the second clause, and finally in R_3 in the third clause.

(199)   He was healthier when I saw him than he is now.

In English, the simple past is used in contexts where the compound form is used in other languages, such as French in example (201) and German as in example (202). According to Reichenbach, this is due to the strict adherence to the principle of the positional use of R in English. In this way, the sentence in (200) is possible in French, even in the absence of a definite temporal adverb, as in example (201), while in German the compound past (Perfekt) would be used, as in (202). Reichenbach notes that a language is compelled to satisfy one of the two principles, but not both (pp. 295).

(200)   This is the man who *drove* the car yesterday.
(201)   C'est l'homme qui *a conduit* la voiture (hier).
(202)   Dies ist der Mann, der den Wagen *gefahren hat*.
         'This is the man who has driven the car'

Reichenbach's system has several limitations that have received particular attention in the literature, leading in turn to various amendments (such as Comrie 1976, 1981, 1985; Hornstein 1990; Declerck 1986; see Giorgi and Pianesi 1997 for a discussion). However, these reduce neither the importance nor the wide application of Reichenbach's model. Most of the criticisms made of Reichenbach's system concern the nature and the functions of the reference moment R.

One of the first problems to be pointed out concerns Reichenbach's suggestion that R and S are included in the semantics of all tensed constructions. This forced him to provide a complex description of simple tenses, such as $E = R < S$ for the simple past and $E = R = S$ for the present tense. Only complex verbal tensed constructions provide evidence that R is distinct from S and E, as is the case in the past perfect and future perfect.

---

[14]One of Comrie's amendments of Reichenbach's framework was to modify the distinction between *absolute* (deictic) and *relative* tenses. Deictic tenses have S as one of their arguments, where relative tenses use an unanchored reference time instead of S. Both types have E as a second argument: thus, deictic tenses convey the relation between S and E, while relative tenses convey the relation between R and E. Whereas S refers deictically to the moment of utterance, R is determined anaphorically in the context.

A second limitation is the lack of specification of the nature of R, which permits several hypotheses about how Reichenbach conceived of R, and what its exact function is (a limitation already identified in Beauzée's system, as well). This limitation has lead to several proposed improvements, such as Comrie (1981), who proposed removing R for absolute tenses (present, past and future), keeping it for relative tenses[14] (such as the Present Perfect or the Past Perfect), and duplicating it for the Past Conditional. Another proposal was Vetter's (1996), which considered R to be an aspectual point of perspective that would allow for the perfective vs. imperfective distinction. Bertinetto (1986) made two propositions: a temporal adverbial does not necessarily signal the reference moment; and R must necessarily be posterior to E. Therefore, temporal adverbials have two functions: (i) when the temporal adverbial expresses simultaneity with E, it has the function of *temporal localization*; and (ii) when the temporal adverbial expresses posteriority with respect to E, it coincides with R. The second case can also be expressed in aspectual terms (i.e. Aspect): $E < R$ conveys a meaning of perfectness (i.e. *compiutezza* in Italian and *accompli* in French).

According to Reichenbach's view of the relation between R and a temporal adverbial, examples (203) and (204) receive the same description, $E < R < S$, where the adverb *exactly* could be inserted in the first example where *already* could be inserted in the second one. In other words, R has a complex function: (i) the temporal localization of E with absolute tenses, as in (203); and (ii) signalling of a subsequent interval of time, when the resultative state of R still holds with relative tenses, as in (204).

(203)   Giovanni *uscì* a mezzogiorno.
        John go out.PS at noon.
        'John went out at noon.'
(204)   Giovanni *era uscito* a mezzogiorno
        John go out.PC at noon.
        'John was out at noon.'

However, Bertinetto (1986, 47) argues against this interpretation, and suggests that in both (203) and (204) the temporal adverbial has the function of temporal localization, with R explicitly expressed in neither of these two utterances. Hence, R is implicitly determined in the context. Additionally, the temporal adverbial in (203) has the function of temporal localization, whereas in (204) it signals R. According to him, the Passato Remoto in (203) does not require an R, whereas the Passato Prossimo in (204) does; as a result, it is either implicitly determined in the context, or provided by the temporal adverbial. In addition, Bertinetto introduces a closely linked notion, which is *temporal anchoring* (TA). In (205) and (206), the second clause is temporally anchored on the first one. However, the temporal organization of the events is very different, with temporal simultaneity in the former example, and temporal sequencing in the latter.

(205)   Quando dormo bene, russo fragorosamente.
         'When I sleep well, I snore vociferously.'
(206)   Quando dormo bene, lavoro meglio.
         'When I sleep well, I work better'.

Another revision of the initial Reichenbachian system is that suggested by Reichenbach himself, which is further discussed by Comrie (1985) and Hornstein (1990). It has been suggested that the relation between the three points should be split into two distinct relations, one between R and S, and one between E and R. The relation between E and S is never realized directly: it is inferred (cf. Moeschler et al. 2012 for a pragmatic model of verbal tenses in French suggesting a three-paired division). R is thus pivot information between E and S. For example, as Giorgi and Pianesi (1997, 88) argue, R can explain the incompatibility of present time adverbials with the SP, as in (207–210), and their compatibility with the compound past, as in (211–214), whether in English, Italian, French and Romanian, or many other languages besides.

(207)   *Now I ate enough.
(208)   *Adesso *mangiai* abbastanza.
(209)   *Maintenant je *mangeai* assez.
(210)   *Acum *mâncai* destul.
(211)   Now I have eaten enough.
(212)   Adesso *ho mangiato* abbastanza.
(213)   Maintenant j'*ai mangé* assez.
(214)   Acum *am mâncat* destul.

The prediction states that if R is the temporal specification of S but not of E, then the compound past described by Reichenbach as $E < R = S$ is compatible with present time adverbials, whereas the simple past is not.

In his instructive exploration of the semantics of temporality in French, Gosselin (1996) also transformed Reichenbach's punctual temporal coordinates into intervals. This semantic framwork consists of a system of rules capable of assigning abstract aspectual-temporal representations to utterances according to their linguistic, lexical and syntactic content. In his words, the instructional semantics model is based on the hypothesis that linguistic expressions encode instructions for building the abstract representations necessary for the subsequent identification of their contextual usages:

> Au lieu de décrire la signification hors contexte des différents marqueurs, on admet qu'ils codent des instructions pour la construction d'éléments de représentation, et que c'est de la combinaison des éléments de représentation ainsi construits que résultent, directement ou

---

[15] 'Instead of describing the meaning of different linguistic expressions out of the context, we assume that they code instructions for building elements of representations, and that it is the combination of these elements of representations built in this way that results, directly or indirectly (after the resolution of conflicts), in global representations, from which the linguistic expression's effects on meaning may be distinguished.' (my translation)

indirectement (à la suite de conflits et de leur résolution), les représentation globales, à partir desquelles les effets de sens des marqueurs peuvent être distingués.[15] (Gosselin 1996, 13).

His model assumes that temporal-aspectual abstract representations make use of four types of *temporal intervals*: (i) the interval of the eventuality itself, corresponding to the four classes of Aktionsart; (ii) the interval of enunciation, corresponding to the beginning and the end of the utterance; (iii) the interval of what is perceived on the temporal axis, having a function similar to Reichenbach's reference moment R; and (iv) the interval delimited by temporal adverbials, whose function is to identify the interval of the eventuality and/or the reference interval. Every abstract representation of an utterance is associated with an interval of enunciation, at least one interval of the eventuality, and a reference interval. He thus adopts Reichenbach's three mutually exclusive temporal relations (anteriority, posteriority and simultaneity).

Reichenbach's analysis led to the development of several formal semantic-discursive theories, envisaging the interpretation of verbal tenses as temporally related to the preceding sentences, hence as an anaphoric device (Kamp 1979; Hinrichs 1986; Kamp and Rohrer 1983, Partee 1973, 1984; Nerbonne 1986) (cf. discussion in Sect. 2.1).

1.2.2   Aktionsart

In her article for the *Oxford Handbook of Tense and Aspect* (Binnick 2012), Hana Filip points to the rich and varied terminology in the literature regarding lexical aspect and its place in the domain of aspect. She distinguishes between *lexical aspect, aspectual class* and *aspectual form.* Lexical aspect is a semantic category that concerns properties of eventualities (in the sense of Bach 1986), which makes reference to Aristotle's distinction of *kinesis* 'motion, change' and *energia* 'actuality, actualization, activity' (cf. Kenny 1963). This notion is used when it is only verbs, taken as lexical items, which are at stake. Aspectual class—also known as *Aktionsart, modes d'action* in French (Vetters 1996) and *azione verbale* in Italian (Bertinetto 1986)—is a wider notion than lexical aspect, and refers to aspectual properties of the verb phrases and sentences. Aspectual form concerns the expression of grammatical aspect (in this book, Aspect).

---

[16]A stative situation is defined as taking place or being done; it is unchanging and therefore homogeneous throughout its duration (i.e., it does not include stages). Situations that are not static are called dynamic situations. Such a situation may be punctual (momentary) or durative. Within the class of dynamic situations, *actions, events* and *processes* may be distinguished. Actions are carried out under the control of an agent (e.g. *John dug a hole*) whereas processes and events are not. Moreover, events may be both punctual and durative, whereas processes are only durative. A situation is agentive if it is caused/performed/ instigated by an agent. States are by definition non-agentive (Declerck 2006).

[17]It is also worth mentioning Parsons's syntactic and semantic features of events (1990). In his subatomic semantics, English sentences contain three main elements which constrain the event, namely, subject, verb and tense.

In this research, Aktionsart is used in reference to the ontological features used to describe situations expressed by the verb phrase, such as *stativity,*[16] *durativity, homogeneity*, *agentivity* and *telicity* (following Dowty 1972; cf. Declerck 2006 for a detailed discussion of ontological features and their application in English). Aktionsart is the expression of these inherent features of a situation represented by a verb phrase, outside of its marking for Aspect and Tense. This is due to the fact that, in many cases, Tense and Aspect modify and override the inherent temporal features of a situation.

Among the classifications of Aktionsart proposed in the literature, I will make reference to Garey (1957), Vendler (1957, 1967) and Lyons (1977).[17] Lyons' fourfold distinction distinguishes *states, actions, processes* and *events*, and makes use of the ontological features of dynamicity, homogeneity and agentivity. Vendler's taxonomy distinguishes *states, activities, accomplishments* and *achievements.* His classification was suggested for English verbs, and makes use of the ontological features of durativity, telicity and homogeneity. A two-fold classification can be made between states and non-states, according to the criterion of compatibility with the progressive. For French verbs, Garey (1957) makes use of the telicity feature to propose a two-fold classification: atelic situations (states and activities) vs. telic situations (accomplishments and achievements). Vendler's four-fold taxonomy was also proposed for Italian (Bertinetto 1986) and for Romanian (Stoicescu 2010, Novakov and Lazović 2009).

Vendler discusses the relation between verbs and time, a relation that can be expressed by Tense on the one hand, and the use of a verb on the other. In his words, it is 'the particular way a verb presupposes and involves the notion of time' (1957, 143). He proposes that English verbs[18] can be grouped into four 'time schemata' or aspectual classes: activities, accomplishments, achievements and states,[19] and distinguishes them by their restrictions with time adverbials, verbal tenses and logical entailments.

- Activities: run, push a cart
- Accomplishments: run a mile, draw a circle
- Achievements: recognize, reach the top, spot the plane, win the race
- States: love, know, like

Vendler's classification of aspectual classes presents an initial distinction according to the criterion of *compatibility with the progressive*. This criterion provides a coarse-grained classification of Aktionsart as *states* on the one hand and as *events* on the other: events (i.e. accomplishments, achievements and activities) are compatible with the progressive, whereas states are not. However, Žegarac (1991, 195)

---

[18] Scholars (Dowty 1979; Verkuyl 1972, 1996; Comrie 1976) have argued that Vendler's approach was too simplistic and that lexical aspect applies to a verb phrase (verb and objects) rather than the verb alone, since the objects can modify the aspectual class. For example, *sing* is an activity and *sing a song* is an achievement.

[19] Mourelatos (1978) argues that Vendler's scheme is too narrow, and instead proposes an ontological typology. For him, all verb predicates are *situations*. Situations can be divided between *states* and *actions* (occurrences). Actions are divided between *activities* (processes) and *events* (performances). Events include *developments* (accomplishments) and *punctual occurrences* (achievements).

points out that the number of verb states in English incompatible with the progressive is reduced, as shown by the following plausible examples:

(215)   Peter *is being* polite.
(216)   John *is living* in Muswell Hill.
(217)   Mary *is loving* the fruit salad.

A finer-grained distinction between the first three types of events can be drawn according to their compatibility with temporal adverbials: activities combine with *for* adverbials, as in (218), accomplishments combine with *in* adverbials, as in (219), and achievements, which are punctual, combine with *at* adverbials, as in (220).

(218)   He ran in the forest *for* thirty minutes.
(219)   He ran five miles *in* one hour.
(220)   He knocked at my door *at* 4 a.m.

Another discriminating criterion is the notion of *homogeneity*, described by Vendler (1957,145–146) as follows:

> …running and its kind go on in time in a homogenous way; any part of the process is of the same nature as the whole. Not so with running a mile or writing a letter; they also go on in time, but they proceed towards a terminus, which is logically necessary for their being what they are.

This can be seen by comparing (221) and (222) with (223) and (224). If it is true that someone has been running for an hour, then it is true that he has been running for every period within that hour. The same is true for loving someone. In these cases, the situations take place in a homogenous way. In case of running a mile in an hour, the mile mark was not reached in the first quarter of that hour, but only at its end. Running a mile consists of several internal phases oriented towards the natural end. Reaching the top of the mountain is a punctual occurrence with no internal phases, thus the feature of homogeneity is strictly speaking not applicable.

(221)   Max ran for an hour.
(222)   Max loves Mary.
(223)   Max ran a mile in an hour.
(224)   Max reached the top of the mountain.

If compatibility with the progressive and homogeneity criteria is applied, the outcome is that activities and states are atelic and homogenous while accomplishments are telic and non-homogenous.

---

[20] Other tests for states are proposed by Lakoff (1965), as noted by Žegarac (1991). States are incompatible with the imperative, complements of the verbs *persuade* and *remind*, the *do-something* construction and use with *instead of.*

[21] These cases were described as the *imperfective paradox* (Dowty 1972; Parsons 1990, Moeschler and Reboul 1994; Reboul 1996).

Table 1.2 Aktionsart and ontological properties

	Punctual	Durative	Telic	Dynamic
States	−	+	−	−
Activities	−	+	−	+
Accomplishments	−	+	+	+
Achievements	+	−	+	+

Generally speaking, the linguistic tests applied for distinguishing aspectual classes (Dowty 1979, 55–60) are:

- non-stative tests to distinguish between states and non-statives verb phrases:

  iv. states cannot be used with the progressive, with the imperative, in pseudo-cleft constructions, nor with adverbs such as *deliberately*, *carefully, reluctantly*[20];
  v. when achievements pass the non-stative tests, it is due to a change in interpretation, in which the focus is on the development of the process, re-categorizing them as activities;

- use of the *for*-adverbials and *in*-adverbials test:

  vi. states and activities take *for*-adverbials
  vii. accomplishments and achievements take *in*-adverbials

- entailment tests with the progressive:

  viii. x is V-*ing* entails x has V-*ed* for activities but not for accomplishments[21] (i.e. *if one stops pushing a cart it still means one pushed it*)
  ix. the test does not apply to states and achievements

Post-Vendlerians, e.g. Dowty (1972), often categorize Vendler's classes using the features [± punctual], [± durative], [± telic], [± dynamic]. Table 1.2 shows that states have duration, are stative and atelic; activities have duration, are dynamic and atelic; accomplishments have duration, are dynamic and telic; achievements are punctual, telic and dynamic.

Stoicescu (2010) argues that the progressive test (cf. Vendler's proposal) does not work in Romanian, since all four aspectual classes may occur with the imperfect, as in examples (225–228).

(225) Ion *iubea* muzica.
       John love.IMP the music.
       *John was loving the music.
       'John used to love music.'
(226) Ion *alerga*.
       John run.IMP
       'John was running.'

---

[22] For a discussion of the criteria and of the classes suggested, see Bertinetto (1986, section 2.2.).

(227)   Ion *săpa* şanţul.
        John dig.IMP the ditch
        'John was digging the ditch.'
(228)   Ieri la ora 5 Ion *găsea* inelul.
        Yesterday at 5, John find.IMP the ring
        'Yesterday at 5, John found the ring.'

She, among many others, adopts the view that *telicity* is a more appropriate criterion for distinguishing between Aktionsart classes (in the sense of Garey 1957). Telicity concerns the realization of the inherent goal of the action expressed by the verb. For example, *to swim* is an atelic verb, because it is realized as soon as it begins, while *to arrive* is a telic verb, because the action expressed has an inherent goal that must be reached for the action to have taken place. Telicity is a criterion that distinguishes between states and activities on the one hand (atelic) and accomplishments and achievements on the other hand (telic). Telic situations have a change of state, which becomes the outcome, or the goal of the eventuality. Telic eventualities have a natural final endpoint, which is an intrinsic boundary. Atelic eventualities have arbitrary final endpoints. For Bertinetto (1986), in Italian telic situations correspond to *azione transformativo* ('achievements[22]') and to *azione risultativo* ('accomplishments'), whereas atelic situations correspond to *azione continuativo* 'activities' and *azione stative* 'states'.

Boundedness is closely related to telicity, as pointed out by scholars like Declerck (1979, 1989, 1991a, b, 2006) and Depraetere (1995a, b). Telicity and boundedness are the two faces of the same coin, i.e. lexical reference.[23] If telicity evokes the potential actualization of a situation, boundedness represents the actual realization of the situation in a context. Situations are telic or atelic, and they can be realized contextually as bounded or unbounded. For example, *running a mile* is a telic situation. In an utterance, it can be expressed as bounded, as in (229), or unbounded, as in (230). These examples indicate that telicity is an inherent feature of eventualities which is not sensitive to linguistic context. Boundedness, in contrast, is sensitive to context, such as the tense of the verb and grammatical aspect, past perfective in (229) and present imperfective in (230).

(229)   Max *ran* the one-mile race.
(230)   Max *is running* the one-mile race.

---

[23] The notion of reference goes back to Frege, and was used in linguistics by Milner (1982) for referential expressions. It was developed by Reboul (1994), Moeschler (1994) and Moeschler et al. (1998), and applied to temporal and lexical reference. They suggest the notions of *temporal* and *aspectual* reference which can be *virtual* and *actual*. According to them, when a sentence is uttered, the corresponding utterance receives an actual temporal reference corresponding to the localization of the eventuality in time. As for Aktionsart, telicity represents the virtual lexical reference, whereas boundedness represents the actual lexical reference of a situation.

Depraetere (1995a) comments that '(a)telicity has to do with whether or not a situation is described as having an inherent or intended endpoint; (un)boundedness relates to whether or not a situation is described as having reached a temporary boundary' (pp. 2–3). A situation is bounded if it is presented as having reached a temporal boundary, irrespective of whether the situation has an intended or inherent endpoint, as in examples (231) to (233). A situation is unbounded if it is presented as not having reached a temporal boundary, as in examples (234) to (236).

(231)   I met John at 5 o'clock.
(232)   Judith played in the garden for an hour.
(233)   Julian lived in Paris from 1979 until May 1980.
(234)   I have lived in Paris.
(235)   She lives on the corner of Russell Square.
(236)   She is writing a nursery rhyme.

A situation has two main boundaries, the left-hand one expressing the beginning and the right-hand one expressing the end. Telicity indicates only the right-hand boundary, i.e. at the end of the process. Boundedness indicates either one (beginning or end) or both boundaries. In discourse, other linguistic markers such as temporal adverbials serve to mark the boundaries, such as *since, from* or *as soon as* for the left-hand boundary, *until* or *till* for the right-hand boundary, and *from… until* for both boundaries. Boundaries are important for marking the limits of a situation in time, and thus influence the temporal structure of the discourse. Generally speaking, telic verbs take *in*-adverbials and express non-homogenous and bounded verb phrases (accomplishments and achievements), and atelic verbs take *for*-adverbials and express homogenous and unbounded verb phrases (states and activities). Depraetere (1995a) discusses factors that influence the classification of situations as accomplishments, achievements, activities or states, such as noun phrases, prepositional phrases, Tense and Aspect. She argues that noun phrases affect telicity (i.e. a noun phrase can turn an atelic situation such as *leak* into a telic one, as in the pair of sentences (237) and (238)). My suggestion is that it is boundedness which is affected, rather than telicity. For example, Aspect influences boundedness, as shown in the pair of examples (238) and (239): in the former, there is a telic unbounded situation which turns into a telic bounded situation, due to the perfective aspect.

(237)   *Petrol* was leaking out of the tank.
(238)   *The petrol* was leaking out of the tank.
(239)   The petrol *leaked* out of the tank.

Numerous scholars have taken interest in the interaction between Tense, Aktionsart and Aspect (Garey 1957; Moens 1987; Dowty 1979; Comrie 1976; Parsons 1989; Smith 1986 and 1997, to name but a few). This interaction consists

---

[24] Garey's analysis takes for granted that the French Passé Simple is perfective and the Imparfait is imperfective.

Table 1.3 Aktionsart and Aspect: interrelations in French

	Imperfective	Perfective
Telic	*Pierre arrivait.*	*Pierre est arrivé.*
Atelic	*Pierre jouait.*	*Pierre a joué.*

mainly of two cases: the first is the case when the interpretation of one category depends on the other; and the second is the case of incompatibility. Garey (1957), for example, describes the interrelations between Aspect[24] and Aktionsart for French verbs, as in Table 1.3. He explains that telic situations expressed with imperfective aspect are interpreted as the action of directing oneself towards a goal without knowing if the goal is attained, whereas those expressed with perfective aspect are interpreted as the action of attaining the goal previously established. Atelic situations expressed with imperfective aspect are interpreted in terms of the existence in time of that situation, without saying anything about its beginning or its end, whereas those expressed with perfective aspect are interpreted as the affirmation of the existence in time of an action, including its cessation.

The perfective aspect in (241) and (242) depicts an atelic situation as bounded, whereas the non-perfective Simple Present in (240) depicts the situation as unbounded.

(240)   John *loves* Mary too.
(241)   John *has loved* Mary too.
(242)   At that time, it was clear that John *had loved* Mary too.

Moreover, perfective forms referring to telic situations entail the attainment of the ending point of that situation, as in (243) (Dowty 1979; Comrie 1976). This principle does not apply to atelic situations, such as *push a cart* or *sing songs*, where the sentence does not entail the realization of the ending point of the situation, as in example (244). The imperfective forms do not carry such implications, whether for telic situations, as in (245), or atelic situations, as in (246). The imperfective applied to atelic situations entails a different kind of information, creating subject matter called the *imperfective paradox*. This is not the case for telic situations, such as making a chair.

(243)   Il *fabriqua/a fabriqué* une chaise.
        He make.3SG.PS/PC a chair
        'He made/has made a chair.'
(244)   Il *poussa/* il *a poussé* un chariot.
        He push.3SG.PS/PC a cart
        'He pushed/has pushed a cart.'
(245)   Il *fabriquait* une chaise.
        He make.3SG.IMP a chair
        'He was making a chair.'
(246)   Il *poussait* un chariot.
        He push.3SG.IMP a cart
        'He was pushing a cart.

Comrie (1985) and Smith (1986) observed that states in English are incompatible with the progressive, as in (247), whereas in Russian, the perfective applies only to telic situations. French, on the other hand, does not impose restrictions on the combination between lexical and grammatical aspect.

(247)   *She *was being* tired.

Tense plays a significant role in determining the Aktionsart of a sentence (Moens 1987). Example (248) in the SP points to a single event and is a telic bounded situation, whereas (249) is interpreted as a habitual state of affairs and is an atelic unbounded situation (Moens 1987, 54). Depraetere (1995a) argues that it is because the Simple Present triggers a habitual reading that the situation is classified as atelic and unbounded. He therefore suggests that any factor which triggers a habitual reading can affect a situation's classification in terms of (un)boundedness and (a) telicity, as in (250), from Depraetere (1995a, 12).

(248)   John *wrote* a good book.
(249)   John *writes* a good book.
(250)   He *went* to London five times.

The strong relationship between Aktionsart and verb inflection has also been observed for Russian: Dragoy and Bastiaanse (2013) note that Russian children strongly prefer to use perfectives to refer to past time, and imperfectives to refer to the present, as suggested by Gagarina (2004). Moreover, the acquisition of Aspect is dependent on children's developing ability to distinguish aspectual lexical categories, as shown by Stoll (1998). Dragoy and Bastiaanse (2013) emphasize that Russian Aspect is built on lexical aspect, and that the lexical nature of the verb semantically guides time reference assignment in children: "situations with defined boundaries (e.g. punctual events) expressed through perfective verbs naturally refer to the past, and situations focused on internal structure (e.g. on-going activities) as expressed through imperfective verbs refer to the present time frame" (p. 116).

According to Dahl (1985), these correlations are often observed across languages: past and perfective inflections are generally associated with telic and bounded situations (predicates that presuppose an inherent endpoint of the eventuality), while present and imperfective inflections are associated with atelic and unbounded situations (predicates that describe eventualities without an endpoint). For example, in a recent study on language acquisition, Stoicescu (2010) investigated these correlations in Romanian children aged between 1;5 and 2;2. In 70% of cases, she found that atelic situations (states and activities) were used with the Prezentul verbal tense, whereas more telic situations were used with the Perfectul Compus (76%). These patterns decrease with age. For example, after 2;2 years, the correlation between telic situations and the Perfectul Compus decreases to 50% of predicates; the correlation between atelic situations and the Prezentul starts decreasing at the age of 1;10 (Stoicescu 2010, 189). Stoicescu suggests a possible explana-

tion for the correlation between [±telicity], [±perfectivity] and [±pastness], which is the notion of [±*boundedness*]. In her words:

> Telicity, perfectivity and pastness involve the notion of boundedness. It is possible that children operate with this single concept when employing past morphology. Similarly, atelicity, imperfectivity and present tense all involve the notion of unboundedness. Working only with two representations and applying them at several levels of the language seems like a good strategy to relieve pressure on the linguistic system. (Stoicescu 2010, 190).

In this research, Aktionsart was operationalized as the [±boundedness] feature. The linguistic tests used to distinguish between bounded and unbounded eventualities are *in-/for*-adverbials, homogeneity, and entailment with the progressive. For example, the eventuality 'writing the long letter' in (251) is bounded, as shown by its compatibility with an *in*-adverbial, its lack of homogeneity (the writing of the letter took place in several phases, with each phase different from the others) and its lack of entailment with the progressive (had the president stopped in the middle of the writing, the letter would not have been written).

(251)   John entered the president's office. The president wrote the long letter
        in 2 hours.
(252)   John entered the president's office. The president sat behind the desk
        for an hour.

On the contrary, the eventuality 'sitting behind the desk' in (252) is unbounded, as shown by its compatibility with *for*-adverbials ('for an hour/ ten minutes'), its homogeneity (sitting behind the desk does consist of different phases, but the president has been sitting for the whole time) and its entailment with the progressive (had the president stopped sitting at a certain moment, he could say that he had sat).

Stoicescu points out that these mismatches, observed in children older than 2;2 and in adults, are dealt with by *coercion*, an idea previously suggested by de Swart (1998) for French verbal tenses. Stoicescu notes that Romanian verbal tenses are aspectually sensitive (similar to the French Imparfait and Passé Simple, as suggested by de Swart), and select either atelic or telic predicates. In case of mismatches, coercion operators trigger a recategorization into the necessary aspectual class (de Swart 1998). However, aspectual shifts are cognitively costly, and are likely to be avoided. Therefore, speakers produce structures where Aktionsart and Aspect match (Stoicescu 2013).

To sum up, the inherent temporal information of the verb phrase can be categorized into four classes: states, activities, achievements and accomplishments. It seems that a coarser-grained distinction can be made depending on the language. For English, Vendler (1967) suggests a classification according to compatibility

---

[25] Declerck (2006) classifies Aspectual categories with respect to their semantics: the *perfective—imperfective* opposition, the latter consisting of the *ingressive* (inchoative or inceptive), the *progressive* (continuous) and the *egressive* (terminative), and the *semelfactive—iterative* opposition. For him, the pair of verbal tenses Simple Past—Past Continuous points to the aspectual nonprogressive—progressive opposition. For Comrie, the Simple Past may express both the habitual and the non-progressive aspects, but it is excluded from the progressive aspect.

with the progressive: accomplishments and activities can occur with the progressive, whereas states and achievements cannot. For French (and Romance languages in general), Garey (1957) proposes a classification regarding the expression of inherent ending boundaries: states and activities are atelic, whereas accomplishments and achievement are telic.

1.2.3   Aspect

Grammatical aspect, or simply Aspect in this book, refers to the possibility of using grammatical forms (i.e. verbal forms) to express the way in which the speaker wants to represent the internal temporal structure of a situation—in other words, her viewpoint of the situation to which she is referring (Declerck 2006, 28). For Comrie (1976), Aspect refers to 'different ways of viewing the internal temporal consistency of a situation'; it is what makes the difference between the English *he was reading* and *he read*, or the French *il lisait* and *il lut*, since in both cases we have an absolute past tense (Comrie 1976, 3). He divides Aspect according to two main aspectual oppositions: *perfective* vs. *imperfective*; and *perfect* vs. *nonperfect*. The imperfective aspect is a complex hierarchical category consisting of the *habitual* and the *continuous* aspects, and the continuous aspect encompasses the *progressive* and *non-progressive* aspects.[25] The *perfect* vs. *nonperfect* opposition makes reference to the current relevance of a past situation, as exemplified by the use, or non-use, of the English Present Perfect. Comrie argues against using the terms *perfective* and *perfect* interchangeably. The same applies to the terms *perfective* and *aoristic*, where the aorist is restricted to perfectivity in the past tense.

This book considers only the *perfective* vs. *imperfective* distinction when referring the category of Aspect. According to Comrie, the perfective aspect[26] indicates the viewpoint of a situation as a single whole, without internal structure, and with highlighted boundaries. The imperfective aspect expresses the viewpoint of the internal structure of the situation, or of a moment other than the initial or the final moments. Prototypical examples of these two grammatical viewpoints are provided in (253), from Serbian. The second verb presents the totality of the situation referred to (the entirety) without reference to its internal temporal consistency: a single unanalysable and indivisible whole. Such verbal forms have a perfective meaning, and the grammatical verbal forms expressing it are called *perfective* aspect. The forms referring to John's reading, below, do not present the situation in the same way; instead, there is explicit reference to its internal constituency. In this case, reference is made to an internal phase of John's reading, giving explicit information on neither the beginning nor the end of the situation. Such verbal forms have an

---

[26] The *perfective* aspect suggested in studies of Slavic languages is called *boundedness* aspect by Allen (1966). This multiple usage of the same term might lead to some confusion. In this book, boundedness represents bounded and unbounded representations of telic and atelic situations as they are actualized contextually (cf. Declerck 2006, 72).

imperfective meaning and the grammatical verbal forms expressing it are called *imperfective* aspect.

(253)   Ivan *čital*   kogda ja *vošel*.
        John read.IMPERF when I enter.PERF.

This distinction is morphologically marked in Slavic languages, English (only the progressive morpheme *–ing*, as in (254)) and Mandarin Chinese, and periphrastically marked in languages such as Italian (*stare*) and French (*être en train de*), as in (255) and (256). In languages such as Romanian or German, the perfective/imperfective distinction is marked neither grammatically nor lexically (Dahl and Velupillai, 2013).

(254)   John *was reading* when I entered.
(255)   Jean *était en train de lire*   quand je suis entré.
        John read.3SG.*être en train de*   when   I enter.1SG.PC
(256)   Gianni *stava leggendo* quando sono entrato.
        John read.3SG.*stare*   when   I enter.1SG.PC

Examples (257–259), translating (253) into French, Italian and Romanian respectively, illustrate that the imperfect in Romance languages is associated with the imperfective meaning, and the simple or the compound past are associated with the perfective meaning. As such, the connection between Aspect and temporal reference in Romance languages rests on the general interpretation of perfective verbs referring to a complete situation as expressing past time, and imperfective verbs referring to an incomplete or ongoing situation as expressing present time.

(257)   Jean *lisait*   quand j'*entrai*/je *suis entré*.
        John read.3SG.IMP when   enter.1SG.PS/PC
(258)   Gianni *leggeva*   quando *entrai/ sono entrato*.
        John read.3SG.IMP when   enter.1SG.PS/PC
(259)   Ion *citea*   când *intrai/ am intrat*.
        John read.3SG.IMP when   enter.1SG.PS/PC

The difference between perfectivity and imperfectivity is not necessarily an objective difference between situations, nor the speaker's objective perspective of the situation. It is possible for the same speaker to refer to the same situation, once with the perfective aspect and once with the imperfective. Her choice depends on her intention of presenting the situation as a whole and completed, or focusing on an internal phase of an ongoing situation. The verbal system in Slavic languages is organized around the category of Aspect: Trnavac (2006, 24) notes that the tense system is aspectually constrained, in the sense that perfective forms in the non-past (present) cannot have an interpretation of present time, but instead imply future time, as in example (260); this is in contrast with imperfective forms, as in (261).

The verbs in the perfective aspect appear in two tense forms (i.e. past and future), whereas the imperfective aspect allows the derivation of three tense forms.

(260) On   pročita*et*   knigu.
       He read.PRES.PERF book.
       'He will read the/a book.'
(261) On   čita*et*   knigu.
       He read.PRES.IMPERF book.
       'He reads/is reading the/a book.'

Tense and Aspect are two distinct and yet interdependent categories. For example, the perfective and imperfective aspects in Serbian are morphologically expressed, and occur with both past and non-past (present and future) verbal tenses. There are four past verbal tenses: past tense (preterit), pluperfect, aorist and imperfect. The past tense and the pluperfect may occur with both imperfective and perfective aspects, as in shown in examples (262) to (265). The aorist verbal tense occurs only with the perfective aspect, as in (266), whereas the imperfect verbal tense occurs with the imperfective, as in (267). However, aorist, imperfect and pluperfect are not very common in modern Serbian. When they do occur, they are regarded as stylistically marked replacements for certain uses of the general simple past. All non-past tenses may occur with both perfective and imperfective aspects. Perfective aspect used with present verbal tense does not refer to the moment of speech. These non-past tenses usually appear in temporal and conditional clauses.

(262) On je   pita*o*.
       He AUX ask.PRET.IMPERF
       'He asked/was asking/has been asking.'
(263) On je   *u*pita*o*.
       He AUX ask.PRET.PERF
       'He asked/has asked.'
(264) On je   bi*o*   pita*o*.
       He AUX be.PRET.IMPERF ask.PRET.IMPERF
       'He had been asking.'
(265) On je   bi*o*   upita*o*.
       He AUX be.PRET.PERF ask.PRET.PERF
       'He had asked.'
(266) On *u*pita.
       He ask.AOR.PERF
       'He asked.'
(267) On pitaše.
       He ask.IMPERFECTIVE.IMPERF
       'He was asking.'

Similarly, in Russian, the reference to past (the suffix –*l*) and future can be made with both perfective and imperfective verbs, but only imperfective verbs can be used to express reference to the present (Dragoy and Bastiaanse 2013).

The pragmatic interpretation of Aspect is that the speaker makes use of one or another form in order to express her standpoint regarding the eventuality. For example, in (268), the first verb in the simple past (expressing the perfective aspect) and the second one in the imperfect (expressing the imperfective aspect) refer to the same past time event. However, each of the two forms provides the reader a different viewpoint: from the exterior in the former; and from the interior in the latter.

(268)   Quel mattino, Giovanni *andò* a scuola come al solito. Ma mentre *andava*, si avvide di una cosa sconvolgente: era uscito in pantofole.
        (Bertinetto 1986, 80)
        That morning, John go.3SG.PS to school as usual. But while go.3SG.IMO, look up a disturbing thing: get out.3.SG.PC
        'That morning, John went to school as usual. But while he was on his way, he noticed a disturbing thing: he had left his slippers on.'

Numerous misconceptions and misuses of the notion *perfective* aspect have led to significant confusion among linguists, and therefore their descriptions of individual languages (as pointed out by Comrie 1976; Žegarac 1991). Firstly, there is the assumption that the perfective vs. imperfective aspects indicate situations of *short* vs. *long* duration. The English sentence (269) can be translated into Russian either with the perfective, in (270), which suggests a (subjectively) short period, with a perfective form, in (271), which suggests a (subjectively) long period, or with the imperfective, in (272), which is neutral (Comrie 1976, 16–17). Another example is the distinction between the French Passé Simple in (273) and Imparfait in (274), where there is no differentiation, objective or subjective, with respect to the period of time. Instead, the former expresses the period of thirty years as a single complete whole, whereas the latter focuses on the internal structuring of the reign, expressing this at any point during the thirty years of reign.

(269)   I *stood* there for an hour.
(270)   Ja *postojal* tam čas.
        He stay.PERF.SUBJECTIVE for an hour
(271)   Ja *prostojal* tam čas.
        He stay.PERF.SUBJECTIVE for an hour
(272)   Ja *stojal* tam čas.
        He stay.IMPERF for an hour
(273)   Il *régna* pendant trente ans.
        He reign.PS for thirty years
        'He reigned for thirty years.'
(274)   Pendant son mariage avec Lady Ann, il *régnait* trente ans.
        During his marriage to Lady Ann, he reign.IMP for thirty years
        'During his marriage to Lady Ann, he reigned for thirty years.'

Secondly, perfective aspect was associated with *limited*, *punctual* or *momentary* duration, the imperfective expressing *unlimited* duration. The sentences in (269–274) show that both perfective and imperfective forms can be used to express limited periods such as *an hour* or *thirty years*. Comrie argues that the "punctuality" interpretation is due to the fact that the perfective aspect does not give direct expression to the internal structure of a situation, but presents it as a single unit. Moreover, Žegarac (1991, 43) points out that the perfective in Serbian, in (275) and (276), indicates that the eventuality *preplivati* 'swim across' took place within ten minutes, whereas the eventuality *stići* 'arrive' occurred ten minutes after some point in time. These examples illustrate very well the interaction between Aspect and Aktionsart.

(275) *Preplivali* su reku za deset minuta.
       'They swam across the river in ten minutes.'
(276) *Stigly* su za deset minuta.
       'They arrived in ten minutes.'

Thirdly, a frequent characterization of perfectivity is that it indicates a *completed* action. The term "completed" was erroneously understood as "complete", in the sense that the former focuses on the ending point of a situation (Comrie 1976, 18). The perfective denotes a complete situation, with a beginning, middle and end, without focusing on any of these. This is the case when it is explicitly contrasted with an imperfective form, which expresses a situation in progress. The perfective can be used to express the beginning of a situation when it is combined with stative verbs (lexical aspect), such as the Russian *ponimat* ("understand"). In (277), the perfective *ponjal* means "come to understand, grasp" (Comrie 1976, 19).

(277) Nakonec on *ponjal*, v čem delo.
       'At last he grasped what was up.'

Fourthly, the perfective is associated with a *resultative* interpretation, indicating the successful completion of the situation. Similar to the completion interpretation, the resultative is identified when the perfective in (278) is contrasted with the imperfective form in (279) (Comrie 1976, 20).

(278) Ja *ugovoril* ego.
       I persuade.PERF him
       'I succeeded in persuading him.'
(279) Ja *ugovarival* ego.
       I persuade.IMPERF him
       'I tried to persuade him.'

---

[27] For the opposition between the progressive and the preterit, Parsons (1989) emphasizes the importance of Aktionsart and of temporal adverbials for the semantics of the progressive (cf. the *imperfective paradox*, Dowty 1979).

The interpretations of *perfective* in terms of *completion* and *resultative* meanings are due to a focus on the final stage of a situation that arises in the opposition to the *imperfective*. In other words, the perfective stands in opposition to the imperfective, being the unmarked member of the binary perfective/imperfective opposition. Most of the descriptions of the perfective do not correspond to an inherent meaning of the perfect, but to its functioning in opposition to the imperfective.

Tense-prominent languages, such as English and Romance languages, do not have morphologically expressed Aspect (except the English progressive *–ing*[27]). Aspect can be inferred from the use of a certain verbal tense, which can be related to one or the other of the two aspects. If the verbal tense is unmarked for the use of Aspect, then the lexical aspect of the verb phrase is used to determine it (Trnavac 2006). In Romance languages, the distinction between these two aspects is mainly inferred by the distinction between the simple past and the imperfect. The French Passé Simple is used in perfective contexts, whereas the Imparfait is used in imperfective contexts, such as in examples (280) and (281) respectively. Examples (282) and (283) illustrate the Italian Imperfetto and Passato Remoto. As the temporal adverbial indicates, both tenses make reference to past time (E < S). The difference between the two utterances is therefore an aspectual one. In the former, the event is presented as in progress at the moment of reference ('around 5'), whereas in the latter, the event is completed and has a resultative state holding at the moment of reference ('around 5').

(280)   Tout à coup, Jean *tomba*.
        Suddenly,   John fall.3SG.PS
        'Suddenly, John fell.'
(281)   A cette époque, Jean *tombait*   souvent.
        At that time,   John fall.3SG.IMP often
        'At that time, John used to fall often.'
(282)   Ieri,   verso le 5, Giovanni *andava* a scuola.
        Yesterday, around 5, John go.3SG.IMP to school
        'Yesterday around 5, John was going to school.'
(283)   Ieri,   verso le 5, Giovanni *è andato* a scuola.
        Yesterday, around 5, John   go.3SG.PC to school
        'Yesterday around 5, John went to school.'

The English verbal system allows the expression of the habitual aspect only for the past tense, as in (284), and the progressive, as in (285). The Simple Past makes no distinction of aspect, allowing the expression of the habitual, as in (286), but excluding the progressive. The French verbal system makes a clear distinction between perfective and imperfective for the past tense, corresponding to the Passé Simple in (287) and the Imparfait in (288). The Imparfait expresses both habitual and progressive aspect. The construction *être en train de* is a supplementary means of expressing the progressive aspect, and can be used for past and present time, as in (289) and (290). French, like Italian, Spanish or Russian, has a general imperfec-

tive periphrase, corresponding to the habitual and progressive aspects in English. Romanian, on the contrary, does not have an imperfective periphrase.

(284)   John *used to* work here.
(285)   John *was working* when I entered.
(286)   John *worked* there.
(287)   Jean *lut*.
        John read.3SG.PS
        'John read.'
(288)   Jean *lisait*   quand le facteur est arrivé.
        John read.3SG.IMP when the postman arrived
        'John used to read/was reading when the postman arrived.'
(289)   Jean *était en train de* lire   quand le facteur est arrivé.
        John be.3SG.IMP.*être en train de* read when the postman arrived
        'John was reading when the postman arrived.'
(290)   Jean *est en train* de lire   et ne veut pas te parler.
        John be.3SG.PRES.*être en train de* and does not want to talk to you
        'John is reading and he does not want to talk to you.'

As far as the continuous aspect is concerned, languages present two categories of continuity in time: progressive, as in (291), and non-progressive, as in (292). There are languages where the two types of meaning must be expressed by means of the progressive and nonprogressive forms, such as English, and others where the use of the specifically progressive form is optional, such as Italian and French. This means that the nonprogressive form does not exclude progressive meaning, as the English translation of the Italian sentence in example (292) illustrates.

(291)   Gianni *sta cantando*.
        'John is singing.'
(292)   Gianni *cântă*.
        'John sings/John is singing.'

A series of indicators of the perfective and imperfective aspects has been suggested for tense prominent languages, as shown by the following examples in French. Vetters (1996) argues that there are several types of perfective indicators occurring in perfective contexts which are incompatible with the Imparfait: (i) temporal indicators making the end of the situation explicit, such as *jusqu'à 8 heures* 'until 8 o'clock', as in (293), or making the beginning and the end of the situation explicit, such as *du matin jusqu'au soir* 'from morning until night', as in (294); (ii) temporal indicators making the total duration of the situation explicit, such as *en 50 minutes* 'in 50 minutes', as in (295); (iii) the repetition of the situation signalling

---

[28] In this example, and others which follow, the acceptable use of tenses differs between the source and target languages (here, French and English respectively). As such, the unacceptability mark (*) is not necessarily found in the same places when it comes to the translation of the example.

that it is completed, such as *trois fois* 'three times', as in (296); (iv) temporal indicators making the punctual realization of the situation explicit, such as *à l'instant* 'instantaneously', as in (297); and (v) a change of state or position accompanied by temporal indicators, such as *le jour d'après* 'the next day', or *quelques secondes plus tard* 'a few seconds later', as in (298). In (299), the Imparfait is possible, but is used in its *narrative* or *breaking* interpretation (Tasmowski- De Ryck 1985).

(293)   Le 5 juin 1989, Jules **attendait/attendit* jusqu'à 5 heures.
        'On the 5th of June 1989, Jules was waiting/waited until 5 o'clock.'[28]
(294)   Le 5 juin 1989, Jules **étudiait/étudia* du matin jusqu'au soir.
        'On the 5th of June 1989, Jules was studying/studied from morning
        until night.'
(295)   Le 5 juin 1989, Jules **rentrait/rentra* chez lui en 50 minutes.
        'On the 5th of June 1989, Jules *was coming back/came back home
        in 50 minutes.'
(296)   Le 5 juin 1989, Jules **sonnait/sonna* trois fois à la porte.
        'On the 5th of June 1989, Jules *was ringing/rang at the door three times.'
(297)   À l'instant, Paul **trouvait/trouva* la solution.
        'Instantaneously, Paul found the solution.'
(298)   Quelques secondes plus tard, Luc *fut* sous le chapiteau.
        'A few seconds later, Luc was under the tent.'
(299)   Quelques secondes plus tard, Luc *était* sous le chapiteau.
        A few seconds later,   Luc be.3SG.IMP under the tent
        'A few seconds later, Luc was under the tent.'

As for imperfective indicators signalling that the situation is in progress, there are also several categories: (i) background situations introduced by *quand* 'when', *pendant que* 'while', and *pendant* 'during', as in (300) and (301); (ii) situations interrupted by other events preventing them from being completed, as in (302); (iii) telic situations accompanied by temporal adverbials expressing a long period, such as *pendant la guerre* 'during the war' and *pendant sa jeunesse* 'during his youth', as in (303); and (iv) non-specified repetition of a situation accompanied by temporal adverbials, such as *souvent* 'often', *toujours* 'always', *en général* 'usually' and *regulièrement* 'regularly', as in (304).

(300)   Nous **fûmes/étions* à l'étude quand le proviseur entra.
        'We *studied/were studying when the teacher came in.'
(301)   Elle remonta à sa chambre, et pendant que je l'**embrassai/embrassais*,
        elle dit (…).
        'She went back up to her room, and while I kissed/was kissing her,
        she said (…).'
(302)   Il se **noya/noyait* quand l'agent le sauva.
        'He *drowned/was drowning when the agent saved him.'

(303)   Quand il était jeune, Jean *prit/prenait son café avec moi.
        'When he was young, John drank/*was drinking his coffee with me.'
(304)   A cette époque, Jean * étudia/étudiait toujours du matin jusqu'au soir.
        'At that time, John always studied/was always studying from morning
        until night.'

As indicated in (299), and in (305) below, there is no one-to-one mapping
between the verbal tense and Aspect. The *narrative* Imparfait is used in a perfective
context. There are therefore numerous scholars who have criticized the classical
distinction between perfective Passé Simple and imperfective Imparfait, as dis-
cussed by Vetters (1996) for French; several modern models have been suggested in
order to explain this lack of one-to-one correspondence (such as the neutrality of the
Imparfait, or the proposal made in this thesis, according to which the tensed verbal
form consists of both Tense and Aspect, whose values combine; see Sect. 4.3).

(305)   Tout à coup, Jean *tombait*.
        Suddenly, John fall.IMP
        'Suddenly, John fell.'

As far as Romanian is concerned, it is only recently that the Romanian Academy
has introduced the category of Aspect (GLR, edited by V. Guțu-Romalo 2005 in 2
volumes). As pointed out by Margan (2009), Romanian grammars traditionally con-
sider aspectual distinctions to be lexicalized, as in aspectual verbs (*a începe* 'to
begin', *a înceta* 'to begin', *a se pune pe* 'to start doing something'), aspectual words
(*deja* 'already', *tot* 'still', *mereu* 'always, în fiecare zi/lună* 'every day/month), and
aspectual prefixes (*a reciti* 'to read again'). GLR proposes the category of *aspect*
(which includes both Aspect and Aktionsart), which is 'specific to the verb and
which points to the structure of the time interval when the situation described by the
verb takes place' (2005, vol. 1, 449). GLR makes the aspectual distinctions of
[±perfectivity], [±durativity], [±genericity], [±iterativity] and [±inchoativity], as
illustrated by the following examples from Margan (2009, 52):

(306)   El *a scris*.PC. (perfective)
        'He wrote.'
(307)   El *scria*.IMP. (imperfective)
        'He was writing.'
(308)   El *scrie*.PRES. (durative)
        'He writes.'
(309)   El *intră*.PRES. (punctual)
        'He enters.'
(310)   El *ascultă*.PRES muzica anilor 70. (determinate)
        'He listens to music from the 70s.'

(311)   El *ascultă*.PRES muzică. (generic)
(312)   'He listens to music.'
(313)   El *a scris*.PC o scrisoare saptâmâna trecută. (unic)
        'He wrote a letter last week.'
(314)   El *a scris*.PC două scrisori saptâmâna trecută. (iterative)
        'He wrote two letters last week.'
(315)   El *a scris*.PC scrisori în fiecare zi. (repetitive)
        'He wrote letters every day.'
(316)   El *începe*.PRES să scrie. (inchoative)
        'He starts to write.'
(317)   El *continuă*.PRES să scrie. (continuative)
        'He continues to write.'
(318)   El *termină*.PRES de scris. (egressive)
        'He finishes writing.'

According to GLR, Romanian expresses only the first of these distinctions—perfective and imperfective—grammatically. All other distinctions are expressed lexically. Aspect in Romanian is only expressed with past and future time verbal tenses, and is associated with 'the interpretation "anterior to the moment of reference R", which is different from S' (GLR 2005, 449). The category of Aspect is, therefore, dependent on Tense, since it can only be expressed when $R \neq S$.

The notions of Aspect and temporal reference are only partially overlapping. Grammatical aspectual marking does not provide information about the temporal localization of eventualities with respect to one another, but instead represents the speaker's viewpoint of the eventuality expressed. Bertinetto (1986) suggests that the imperfective aspect provides an *instant of focalization*, and explicitly draws the focus to an instant included within the open time interval when the eventuality takes place. The perfective aspect, in contrast, refers to a closed time interval, and no instant other than the final boundary (or, more rarely, the initial boundary) of the eventuality can be focalized.

To sum up, Aspect consists of a binary distinction expressing a viewpoint of the situation. Where this distinction is expressed morphologically in Slavic languages, in Romance languages it is most often associated with the simple past and the imperfect used in perfective and imperfective contexts. Žegarac (1991, 50) points out that the lack of the perfective-imperfective grammatical distinction in one language has been erroneously taken to indicate the lack of lexical meaning characterizing either the perfective or the imperfective. He supports his claim by citing Ferdinand de Saussure:

---

[29] 'Slavic languages regularly distinguish two aspects of the verb: the perfective represents the action in its totality as a point outside of any becoming; the imperfective presents it in progression on the timeline. These categories are difficult for a French person, whose language neglects them: if they were predetermined, it wouldn't be as it is.'

Les langues slaves distinguent régulièrement deux aspects du verbe : le perfectif représente l'action dans sa totalité comme un point en dehors de tout devenir ; l'imperfectif la montre en train de se faire sur la ligne du temps. Ces catégories font difficulté pour un français parce que sa langue les ignore: si elles étaient prédéterminées, il n'en serait pas ainsi.[29] (1967, 161–162).

To fill this gap, French scholars identified a series of indicators of the perfective and imperfective aspects. Nevertheless, the great variety of these indicators, as well as the lack of one-to-one mapping, represents a significant drawback for their actual usefulness for applicative purposes, such as Natural Language Processing and Machine Translation. A hypothesis could be made that Aspect is a relevant criterion that might explain the cross-linguistic variation of verbal tenses. It seems that numerous languages grammatically encode the [±perfectivity] feature (Dahl and Velupillai 2013), which can be considered a parameter with two values: positive and negative.

The question that arises at this point of the discussion regards the means by which the application of the perfective/imperfective distinction would be possible in contrastive studies. Let's imagine that one or more languages expressing this distinction grammatically are contrasted with one or more languages that do not express it by the same grammatical means. If the contrastive analysis is carried out based on translation corpora, then the target language can be used to infer features of the source language. This is the principle behind the *translation spotting* and *cross-linguistic transfer* methods (see Sect. 4.3.3 for an empirical implementation). If a text written in a language where the distinction is not expressed grammatically is translated into a language where this distinction is expressed grammatically, then identifying the aspectual information in the target language makes it possible to transfer it back to the source language. My argument is that this makes it possible to have an abstract perfective/imperfective distinction, which is detached from concrete lexical and language-specific means, such as that suggested by Vetters (1996) for French. Moreover, I will be arguing that operational contrastive analyses of languages, be it from typologically different languages or languages from the same family, can only be carried out if they consider abstract and language-independent features.

1.3   Summary

This chapter has given an account of three types of temporal cohesion ties, namely the categories of Tense, Aktionsart and Aspect (Sect. 1.1). Tense was considered by logicians to be an operator that applies to a proposition and it shifts its evaluation time. Furthermore, the referential approach to Tense showed that the meaning of this category is better explained in terms of temporal coordinates (S, R and E) and two temporal relations that may distinguish between these coordinates (precedence and simultaneity). I have argued that, despite its limitations, mainly linked to the notion of R, the most influential model in this form of analysis was Reichenbach's

(1947). I have also indicated that Reichenbach's analysis led to the development of several formal semantic-discursive theories envisaging the interpretation of verbal tenses as temporally related to the preceding sentences, hence as an anaphoric device. In other words, they have pointed to the fact that temporal information from Tense is not necessarily applied at the sentential level, but goes beyond this. This is an issue that I will tackle in more detail in the next chapter.

I have dedicated a section of this chapter to Aktionsart, defined as a category referring to ontological features of eventualities (that is, a generic term used to refer to states, activities, accomplishments and achievements, without distinguishing between them) expressed by the verb phrase. Aktionsart is considered as a temporal cohesive tie, because of its contribution to the general temporal knowledge provided in a discourse. This temporal information inherent to situation types can be modified and overridden by Tense and Aspect. In this research, I have focused on one of the ontological features of situations—namely, *telicity*, and its contextual component, *boundedness*. Roughly, telicity evokes the potential actualization of a situation, where boundedness represents the actual realization of the situation in a context. I have argued that situation boundaries are important for marking the limits of a situation in time, and have thus an influence on the temporal structure of the discourse. I will discuss this issue from an experimental perspective in Chap. 4 and from a theoretical perspective in Chap. 5.

The third temporal cohesive tie investigated in this chapter, (grammatical) Aspect, refers to the speaker's ability to use grammatical means in order to express how the internal temporal consistency of an eventuality can be viewed. The two main aspects, the imperfective and the perfective, refer to rather complex semantic domains (Comrie 1976). This grammatical marking is expressed morphologically in Slavic languages, and inferred in other languages (such as the Romance family) from a series of indicators. The role of Aspect as a cohesive tie comes from the temporal information it provides on the speaker's viewpoint of an eventuality and its interrelations with Tense and Aktionsart.

However, more classically, the temporal information provided by these categories was mainly referred to using the generic term *verbal tense*. Section 1.1 discussed classical monolingual descriptions of verbal tenses in English, French, Italian and Romanian. This description pointed out several issues. The first is related to the dissimilar manner in which classical grammars and studies describe verbal tenses and their usages. For example, the literature on French addresses verbal tenses in terms of their main and secondary usages, also called descriptive and interpretative usages. The literature on English indicates that verbal tense refers to past, present or future time, and and distinguishes a separate role played by aspectual information, such as the progressive morpheme *-ing* and lexical aspect (states vs. events). Moreover, the literature on Italian and Romanian continues to describe verbal tenses in terms of their deictic and anaphoric usages. The second issue regards the level of analysis adopted in classical and more recent research into verbal tenses in these four languages. Research into verbal tenses is richer in French than it is for

all of the other three languages, as will also be seen in Chap. 2. Thirdly, this dissimilar description is problematic for a systematic contrastive analysis of verbal tenses in English, French, Italian and Romanian. According to the methodology used in the research field of *Contrastive Analysis*, a neutral and cross-linguistically valid *tertium comparationis* is needed in order to compare verbal tenses and establish degrees of similarities and differences. I will propose such a model in Chap. 5, based on the corpus study described in Chap. 3, and the results of annotation experiments provided in Chap. 4.

Chapter 2
Formal Semantic-Discursive and Pragmatic Assessments of Temporal Reference

2.1 The Formal Semantic-Discursive Account

Temporal cohesive ties—whether taken individually or as components contributing to the meaning of verbal tenses—has received extensive attention from scholars working in formal-semantic and pragmatic approaches to discourse. Various studies have aimed to explain and model the role of Tense, Aspect and Aktionsart in constructing the structure and the meaning of a discourse, either by focusing on the semantic meaning and making use of semantic rules, such as Bennet and Partee (1978), Dowty (1972), Kamp (1979), Kamp and Reyle (1993), Lascarides and Asher (1993), or by focusing on the contextually determined meaning of these semantically underdetermined categories in order to build the speaker's intended meaning, such as Grice (1967, 1975, 1989), Sperber and Wilson (1986), Levinson (2000), Moeschler et al. (1998) and de Saussure (2003). This chapter assesses these approaches to time and to temporal information at the discursive level, and highlights the relevance-theoretic approach to verbal tenses. Based on these accounts, a series of hypotheses regarding the nature of the meaning of Tense, Aspect and Aktionsart and their roles at the discursive levels are formulated and tested in annotation experiments (Chap. 4). These experiments provide new evidence that partially validate and partially challenge the theoretical accounts discussed in the present chapter.

In Sect. 1.2.1, I noted that Tense was treated as a logical operator in Prior's tense logic. The semantic interpretation of the operators PRES, PAST and FUT was further developed by Bennett and Partee (1978) in a non-compositional semantic model. Their system is non-compositional in that it provides different semantic interpretations rules for verbal tenses in English, such as the Present Perfect, the Past Perfect, the Present Perfect Progressive, and so on. As for the aspectual operators PERFective and PROGgressive, they were analysed by Dowty (1972) in a compositional semantic model. Bennett and Partee's (1978) theory has the basic

assumptions that expressions and sentences must be judged in terms of their truth-value, and that temporal operators have scope over the whole sentence. Their treatment recalls Reichenbach's system (1947) of temporal coordinates and temporal relations. Their model makes use of the following elements (adapted from Binnick 1991, 253):

> T, which is the set of all instants of time t;
> Temporal ordering relations (*earlier* <, *later* > and *identical* =) so that two members of T, t_1 and t_2 can be $t_1 < t_2$ or $t_1 > t_2$ or $t_1 = t_2$.
> I, which is an interval of T (a subset with no gaps) that can be bounded (i.e. has an initial and a final boundary) or open-ended (signalled by the symbol ∞); an interval with only one member t is called a *moment of time*. Let I be an interval between points t_1 and t_2, which are its first and the last moments. Let I' be a member of $[T]$. I is a *proper subinterval* of I' iff I ∈ [T] and I ⊂ I' (that is, I ⊆ I' and I ≠ I'). When an interval I wholly precedes an interval I' (that is, the final point t of I and the initial point t' of I' are such that $t < t'$), we write I [<]I' .

For Bennett and Partee, the evaluation in terms of truth conditions of a sentence, with respect to the temporal localization of eventualities in time, is relative not to a point or a moment t but to an interval I. For example, the sentence *John is reading* is true *at noon*, but the sentence *John is building his dream house* cannot be true *at noon*, and is instead true relative to an interval of time. With this proposal, Bennett and Partee point to the interaction between Tense and Aspect on the one hand (treated as temporal operators in their model) and Aktionsart on the other hand, which requires an extended period of time for states, activities and accomplishments. For example, for Bennett and Partee, the truth conditions of the simple past are as follows:

> *John eat fish* α is true at interval of time I if and only of I is a moment of time. α refers to an interval of time I' and there exists a subinterval of I' , I'' , such that I'' [<]I and John eats the fish is true of I'' . (Bennett and Partee 1978,13)

If α is *yesterday*, the interval I' is the time frame corresponding to yesterday, during which the event occurred, and I is the interval corresponding to today. The subinterval I'' is the event time, and is included in I' . Binnick (1991, 256) argues that the condition for I'' to be a proper subinterval of I' does not seem to be obligatory, as in example (319), where the frame time *at the precise moment when John opened the door, Sue was kissing Igor* is a moment which follows from the meaning of the adverbial *when*.

(319)   When John opened the door, Sue was kissing Igor.

Also building on Reichenbach's model for verbal tenses, McCawley (1971), Partee (1973, 1984), Hinrichs (1986), Nerbonne (1986) and Webber (1988), among others, accounted for verbal tenses and their discursive function as temporal anaphors. In these formal semantic theories, temporal information is not a sentence specific feature, but a relational feature applying beyond sentence boundaries. Partee (1973, 244–247) justifies the notion of temporal anaphora by pointing to a series of common features between temporal and pronominal anaphora, such as no

necessity for a linguistic antecedent (as in the pair of examples in (320) and (321), where the former is the temporal anaphor and the latter the pronominal anaphor), the existence of a definite antecedent for a definite anaphor (which is the same time in the case of temporal anaphor, as in (322), and the same referent in the case of pronominal anaphor, as in (323)), the possibility to have an indefinite antecedent (both for temporal anaphor, as in (324), and for pronominal anaphor, as in (325)), and the fact that both pronouns and temporal anaphors can act as bound variables (that is, bounded by a quantifier, as in (326) and (327) respectively).

(320)   I didn't turn on the oven.
(321)   She left me.
(322)   Sheila had a party last Friday and Sam got drunk.
(323)   Sam is married. He has three children.
(324)   Mary woke up some time during the night. She turned on the light.
(325)   Pedro owns a donkey. He beats it.
(326)   Whenever Mary telephoned, Sam was asleep.
(327)   Every woman believes that she is happy.

In these accounts, Reichenbach's reference time and Kamp's (1979) system of discourse representation structures are centred on the treatment of temporal anaphora. Kamp's theory, the *Discourse Representation Theory*, or DRT for short, is a formal semantic theory that considers the articulation between the truth conditions of sentences (which, according to model-theoretic semantics based on Montague Grammar, depends on the connection between the meaning of the expression uttered on the one hand, and on its factuality on the other) and the phenomenon of language interpretation (Kamp 1979, 1981, Kamp and Reyle 1993).[1] In DRT, Kamp and Reyle assume that the interpretation of sentences and texts is constructed in the form of abstract structures that they call *discourse representation structures,* or *DRSs.* DRSs are logically related and built by applying certain rules, called *DRS Construction Rules.* A DRS consists of *discourse referents* (entities that a piece of

---

[1]A more recent proposal in this vein is made by Bittner (2014), who speaks about a universal semantic representation language that she applies to four typologically different languages: English (Tense-based), Polish (Tense-Aspect-based), Mandarin (Aspect-based) and Kalaallisut (Mood-based, Eskimo-Aleut family). Her model of *universal typed logic* allows a direct type-driven composition using syntactic and semantic rules, which operate in tandem and can thus inform and constrain each other (Bittner 2014, 8). The model, called Categorial Grammar Update with centering, makes use of complex universal algebra and sub-algebra (following Bach 1986; Kamp 1979; Moens and Steedman 1988) of discourse referents (drefs) for individuals, times, eventualities, sets, and worlds. According to her model, in tensed languages as English and Polish, temporal anaphora (to times and sets of times) is parallel to nominal anaphora (to individuals and sets of individuals) and modal (to worlds and sets of worlds). Tenseless languages, like Mandarin and Kalaallisut, refer directly to eventualities, and temporal relations are inseparable from other types of relations between eventualities – mereological, spatial, causal, modal, individual-related, etc. Hence, Bittner suggests that grammatical categories and lexical meanings are language specific (parochial categories in her terms), whereas the syntactic and semantic primitives that all languages use to build their parochial categories and parochial lexical meanings are universal.

discourse is about, functioning as variables) and *conditions* that apply to these referents.

The main idea of this theory regarding the semantics of coherent multi-sentence discourse and text uttered by the same speaker is that each new sentence of a discourse is interpreted in the context provided by the sentences preceding it—that is, a representation structure (van Eijck and Kamp 1997). DRSs are linguistic units larger than single sentences, but their representation is made sentence by sentence while maintaining the semantic cohesiveness of the discourse or text (Kamp and Reyle 1993). Semantic cohesiveness is provided by various kinds of *cross-reference* that connect coherent pieces of discourse (Kamp and Reyle 1993, 59). The processing of a piece of discourse is incremental; in the process of comprehension, the interpreter must relate or connect the new sentence to the information structure he has already obtained from the preceding ones. The "old" information structure will be "updated" in the light of the interpretation process, and the updated information structure becomes the new context for the processing of a following sentence, until the entire discourse has been interpreted. This representational and dynamic approach of meaning at the discursive level recalls the psycholinguistic *procedural approaches* to the meaning of linguistic expressions (Bras 2008 citing Sanford and Garrod 1981, Fodor 1983). Meaning is seen as instructions for incrementally building mental representations of discourse. The procedural nature of the meaning of some linguistic expressions, as well as their role in discourse interpretation was also a topic of debate in Relevance Theory, and among its followers. I will consider in more detail the procedural/conceptual distinction applied to verbal tenses, as well as its integration into the model proposed in this research.

Constructing a DRS for one sentence basically consists of introducing a new discourse referent for the described eventuality, setting the temporal relation between this discourse referent and the time of utterance, introducing a discourse referent *t* for the time denoted by the adverb (if the sentence contains a temporal adverb), and finally, setting the temporal relation between this discourse referent (constraining information) and the described eventuality (Kamp and Reyle 1993, 514). An additional step specifies the type of the described eventuality (state or event). For example, in example (328), the arrival occurs at some indefinite time on a specific day in the past. Mary's entering the house is linked to the time of the arrival. The interpretation of (328) involves establishing an event discourse referent for the arrival event, and linking it to a reference time discourse referent that points to an interval just after the time of arrival. The processing of the second sentence introduces an event that then must be included in the reference time interval, whose property is to shift the reference time discourse referent from just after the time of arrival to just after the time of the entering of the house.

(328)   Mary arrived during the day. She let herself into the house.

Regarding the construction of DRSs for sequences of sentences, and thus temporal ordering such as in (329), Kamp and Reyle (1993, 521) argue that 'the eventuality described by a non-initial sentence is interpreted as standing in some specific

relationship to some other event introduced by an earlier sentence or to some earlier introduced time *t*.' They make use of Reichenbach's temporal coordinates—more specifically, of the reference point R in the form of a new condition α that represents a time or an event that is already present in the DRS. Following this idea, interpreting the second sentence (with a progressive verb form, and describing a state) involves establishing that the α from the first sentence is included in the reference point of the second one, hence leaving R unchanged. For the processing of the third sentence (with a simple past tense, and describing an event), the relation is not that of inclusion but that of succession: the reference point of the current interpreted sentence temporally succeeds the reference point of the preceding ones.

(329)   A man entered the White Hart. He was wearing a black jacket.
        Bill served him a beer.

For Kamp and Rohrer, verbal tenses encode information about how to establish the temporal reference of an eventuality, related to a reference point and to other eventualities in a discourse. In a text containing a succession of sentences whose main verb is in the Passé Simple or Passé Composé, the order of the sentences corresponds to the order of the events. The same principle can be applied when interpreting a succession of events in a complex sentence. The Passé Simple and the Imparfait thus encode interpretation rules: a Passé Simple introduces a new event representation with a reference point that succeeds the reference point of the previous sentence, whereas an Imparfait introduces a new state representation, which covers a period that includes the reference point of the event introduced previously by a Passé Simple or a Passé Composé. The Passé Simple encodes a forward temporal inference, the plus-que-parfait encodes a backward inference, and the Imparfait encodes an inclusive temporal inference. Unfortunately, this idea has numerous counterexamples discussed by Kamp and Rohrer (1983, 260) themselves, as in (330), as well as by Moeschler (2000a, 2000b), de Saussure (1997, 2000a, b) and Tahara (2000) for the Passé Simple, and de Saussure and Sthioul (1999, 2005) for the Imparfait, among others.

(330)   Bianca *chanta* et Pierre l'a*ccompagna* au piano.
        'Bianca sang and Peter accompanied her on the piano.'

Kamp and Rohrer therefore propose a predictive model for interpreting the Passé Simple (time moves forward) and Imparfait (time stagnates), and they put forward some of the exceptions to the rules, explained in terms of the complexity of temporal indexicality and the role of temporal adverbs in building DRs, as well as the notions of *temporal* and *personal perspectives* on eventualities. Within DRT, only sentential syntax and the compositional semantics of the DRSs affect the interpretation of temporal anaphora. Lascarides and Asher (1993) emphasize that, in DRT, forward movement of time is encoded in the logical form of the clauses through the forward movement of their reference times, while statives do not encode this information. One of the limits of DRT is the fact that the semantic rules provided are too

specific, and limit the extent to which the model they suggest can cover the empirical data (Kamp and Rohrer 1983). Lascarides and Asher (1993) propose counterexamples to the DRT analysis such as '*Max fell. John pushed him.*', where the temporal order of events mismatches their textual order, and thus rules for constructing the logical form yield a DRS with wrong truth conditions.

These limits have been considered by the *Segmented Discourse Representation Theory*, or SDRT for short, which was developed to elaborate on DRT in the beginning of the 1990s (Lascarides and Asher 1993; Asher and Lascarides 2003) and proposes a certain number of refinements to solve various problems, among them the problems mentioned by Kamp and Rohrer (1983). SDRT, offering a formal account of the hypothesis that discourse has a hierarchical structure upon which interpretation depends, was well received, and soon accepted as the most elaborated semantic alternative to pragmatic models of temporal interpretation at the discursive level. SDRT addresses temporal relations among discourse segments (sentences in SDRT and mental representations in DRT) according to the context (consisting of cotext and world knowledge in SDRT, compared to only cotext in DRT).

Despite the strengths of this theory, such as a complete system of rules that can produce each of the proposed discourse relations, the awareness of and the modelization of the fact that the human mind must make a decision between two possible interpretations by cancelling the default interpretation and favouring the most specific one (de Saussure 2003), SDRT is a coherence-driven theory (Kehler 1994, 2004). Precisely, it posits that temporal relations are resolved "purely as a by-product of reasoning about coherence relations holding between utterances", hence "treating simple and complex tenses as anaphoric is unnecessary" as pointed out by Kehler (1994, 1). Further limits relate to a lack of correspondence between the model and real linguistic situations, as well as to its lack of cognitive likelihood (de Saussure 2003). Firstly, the logical rules can have an extreme degree of specificity that renders the model very complex and even ambiguous, and for this reason, they should be replaced by general pragmatic principles which are activated contextually, and based on the addressee's world knowledge. A second issue is that of the default narration relation. For example, for the narration relation to take place, a minimal set of conditions is required, such as a conceptual relation and the occurrence of verb tenses that provide instructions for the progress of time in that specific context. Hence, discourse relations seem to be the consequence of—rather than the reason for—temporal interpretation, as argued by Moeschler (1998a). Another proposal is made by de Saussure (2003), using a procedural pragmatic framework which postulates that verbal tenses encode instructions on how to interpret discourses temporally (cf. Sect. 2.3.3.)

Other scholars (Jespersen 1924; Dry 1981, 1983; Dowty 1986; ter Meulen 1997; C. Smith 2003) have focused on the role of the aspectual classes of the verb phrase in determining the temporal relations between sentences in discourse. Dowty (1986) builds his model on narrative texts, and argues (p. 37) that there is temporal progression with accomplishments and achievements, as in (331) and (332), and a lack of temporal progression with activities and states, as in (333) and (334).

(331)   John entered the president's office. The president walked over to him.
(332)   John entered the president's office. The president woke up.
(333)   John entered the president's office. The president sat behind a huge desk.
(334)   John entered the president's office. The clock on the wall ticked loudly.

In his words,

> If a sentence in a narrative contains an accomplishment or achievement predicate but no definite time adverb, that sentence is understood to describe an event occurring later than the time of the previous sentence's event (…narrative time "moves forward" in the second sentence)…If on the other hand the second sentence of the sequence has a stative or an activity predicate, the state or process it describes is most usually understood to overlap with that of the previous sentence: narrative time does not "move" in the second sentence. (Dowty 1986, 37)

Dowty gave an initial exception to this rule: that of the progressive. Specifically, when a progressive form is used, the sequence is interpreted as lacking temporal advancement, no matter what the aspectual class of the verb phrase is, such as an activity, as in (335) and (336).

(335)   John entered the president's office. The president was looking
        out the window.
(336)   John entered the president's office. The president was writing a letter.

Another exception is that of certain lexical stative verbs (e.g. *stand, sit, realize*) which are ambiguous between a *stative* and an *inceptive* interpretation. With the inceptive interpretation, they behave like achievement verb phrases, and determine the temporal progression in discourse, as in (337). Other stative verbs can receive an inceptive interpretation with adverbials such as *suddenly* or *in a moment*, leading to temporal progression, as in (338).

(337)   John entered the president's office. The president realized
        why he had come.
(338)   John sat in his chair going over the day's perplexing events
        again in his mind. Suddenly, he was asleep.

Dowty proposed that temporal information in discourse depends on sentence semantics (which includes determining aspectual classes) and pragmatic principles. He claimed that the temporal relationships between sentences of a discourse are determined by three factors:

- Semantic analysis of aspectual classes using the interval semantics model (Taylor 1977, Dowty 1979). The main idea of the model is that recursive semantic clauses are to be stated in terms of the notions of truth of a sentence with respect to an interval of time. The truth of a sentence with respect to a given interval I is independent of the truth of that same sentence with respect to either subintervals of I, or moments within I or superintervals of I.

- The Temporal Discourse Interpretation Principle (TDIP)
- Gricean conversational implicatures and the "common sense" principle

Dowty (1979, 1986) argued that it is the aspectual class of the whole sentence (rather than any of its constituents) that is relevant to the temporal effect on discourse interpretation. Dowty's idea is that the aspectual class of a phrase or a sentence is determined in a mechanical and completely explicit way by the lexical aspectual class of its main verb, noun phrases, adverbials, tenses and other constituents, by way of compositional semantic rules. The sentence in (339) is an example of the computation of the aspectual class of the sentence: *walk* is an activity; *walk to the station* is an accomplishment; and the whole sentence is stative because of its progressive form.

(339)   John was walking to the station.

Based on this observation, Dowty proposed the TDIP for temporally interpreting successive sentences in a discourse. The TDIP postulates that the reference time[2] R of a sentence in a sequence of sentences is to be interpreted as consistent with the definite time adverbials occurring in the sentence (if there are any), and otherwise with a time immediately preceding the reference time of the previous sentence. Dowty points out that the time distance between the R points of the two sentences is determined by pragmatic principles, such as the hearer's understanding of the nature of the events related, the overall degree of detail in which events are being described, and common knowledge about the usual temporal relations among events.

According to the interval semantics model, when a sentence with an accomplishment or achievement interpretation is true at an interval I, it is false at all subintervals, and at all superintervals of I (by entailment). For sentences with an accomplishment or achievement reading, TDIP thus predicts that the sequence of sentences must be interpreted as non-overlapping intervals. Consequently, there is temporal progression.

The case of states and activities is different in this respect. Again, according to the interval semantics model, when a sentence with a stative/activity interpretation is true at an interval I, it is true at all subintervals of I. The model makes no prediction for the superintervals of I, thus allowing for sentences with a stative interpretation to be true at all superintervals of I, as in (340).

(340)   John was asleep from 1 pm to 2 pm; in fact, he fell asleep at noon
         and did not wake up until 3 pm.

For sentences with a stative/activity reading, TDIP thus predicts that the sequence of sentences must be interpreted as overlapping intervals. Consequently, there is no

---

[2] For Dowty (1982), reference time R and speech time S are contextual parameters of the utterance.

temporal progression, as in (341). The situation is different in (342), where the causal relation between the first and the second sentences cancels the overlapping interpretation of the *look out the window* activity.

(341)   John entered the president's office. The clock ticked loudly.
(342)   John asked were the children were. Mary looked anxiously out the window.
        Their coats lay on the lawn, but they were not in sight. (Dry 1983)

As far as the interpretation of sequences of sentences containing the progressive or expressing iterative or habitual aspect, Dowty (as well as Dry 1983) assumes that they behave as stative sentences. The TDIP predicts no temporal progression, as in (343) and (344).

(343)   John entered the president's office. The president was writing a letter.
(344)   John entered the president's office. They played football together
        on Sundays.

Kozlowska (1998a, 1998b) and Moeschler (1998b) gave arguments against Dowty's hypothesis that aspectual classes *determine* the temporal structure of a discourse. Sentences (333) and (334) have a temporal progression interpretation if the verbal tense is changed, as shown in the French examples in (344) and (345), where a Passé Simple form is used corresponding to the inceptive reading of *to sit* and *to tick* (Kozlowska 1998a, 117). Dowty himself points out that the effect of the aspectual class of temporal interpretation can be cancelled by an inceptive reading, introduced for example by an adverbial such as *suddenly*, as already shown in (338).

(345)   Jean entra dans le bureau du président. Le président *s'assit* derrière
        un énorme bureau.
        'John entered the president's office. The president sat behind a huge desk.'
(346)   Jean entra dans le bureau du président. L'horloge murale *marcha*
        bruyamment.
        'John entered the president's office. The clock ticked loudly.'

There are some cases where the temporal interpretation predicted by the TDIP does not apply, such as cases where the second sentence in a discourse describes the same situation but in a more detailed manner, as in (347), cases where a simultaneous interpretation is inferred from the context, as in (348), cases where the second sentence describes subevents of the situation expressed in the first sentence, as in (349), and cases where a progressive expresses the speaker's subjective viewpoint, as in (350).

(347)   John knelt at the edge of the stream and washed his face and hands.
        He washed slowly, feeling the welcome sensation of the icy water on his
        parched skin. (Dowty, 1986, 58 citing Dry 1983)

(348)   At the signal, every one went to work at once. Mary searched the room
           for any of the items of the list that might be there. John went next door to
           do the same in Bill's apartment. (Dowty 1986, 58)
(349)   Pedro dined at Madame Gilbert's. First there was an hors d'oeuvre.
           Then the fish. After that the butler brought a glazed chicken.
           The repast ended with a flaming desert. (Dowty 1986, 58 citing Kamp)
(350)   In the darkness, John felt his way up the stairway of the dilapidated
           old house. Halfway, there was a loud cracking noise under his feet,
           and suddenly he was falling through space. (Dowty 1986, 55)

Dowty points out that the TDIP may be considered to describe the 'default' cases of discourse interpretation, and is applicable when the discourse does not provide other sources of temporal information which have priority, such as time adverbials, entailments and implicatures regarding the ordering of events.

Smith (2007, 2008) suggested an aspectual model of discourse interpretation for tenseless and mixed-temporal languages. She proposed a model for Mandarin Chinese developed according to the DRT framework (Kamp and Reyle 1993). She includes syntactic, semantic and pragmatic components, and also makes use of contextual information. The syntactic component is the functional ASP-P node of the syntactic structure. The two semantic components are Aspect (perfective, imperfective and neutral viewpoints) and Aktionsart (realized by the verbs and its arguments). The pragmatic component is represented by the default inferences about temporal localization of eventualities.

The viewpoints introduce the reference time R, the event moment E and the relation between the two, as well as boundedness information, which is represented by conditions relating the situation time interval to the entity E (information specified by the construction rules). Perfective viewpoints introduce a bounded eventuality, imperfective viewpoints introduce an unbounded eventuality, and finally, neutral viewpoints provide information that the situation is only partially visible (i.e. there is no information regarding boundaries). Moreover, lexical aspect conveys boundedness in zero-marked sentences containing a neutral viewpoint: punctual and telic eventualities (i.e. accomplishments and achievements) are bounded, whereas ongoing events (i.e. activities) and states are unbounded.

The third temporal coordinate involved in temporal reference, the moment of speech S, is introduced into the DRS for each clause automatically (Kamp and Reyle 1993). R's relation to S is established by pragmatic inference. By default, bounded situations are located as preceeding S (i.e. in the past) and unbounded situations are located as co-occuring with S (i.e. in the present). These default inferences may be overridden by additional information. The pragmatic principles that underlie Smith's account of temporal reference are the Deictic Principle, the Bounded Event Constraint and the Simplicity Principle of Interpretation.

Ter Meulen's Dynamic Interpretation of Tense and Aspect (1995/1997) is a discourse semantics approach to temporal reference based on the role played by aspectual classes, and used to interpret sentences in a discourse dynamically. Her

suggestion is that aspectual classes and their aspectual properties determine how the events are temporally related in a discourse, and that this aspectual information 'controls the dynamics of the flow of information about described change encoded in text' (1997, 6). She redefines the well-known aspectual classes as *holes* (i.e. activities such as *drive around, pour, damage*), *filters* (i.e. accomplishments such as *walk a mile, drive home, land*) and *plugs* (i.e. achievements such as *arrive, finish, begin*). Similar to the DRT and SDRT frameworks, ter Meulen assumes that sentences are interpreted at the level of the discourse: each sentence is interpreted according to the information provided by the previous ones. For example, if a given sentence is interpreted as describing an event as a *hole*, then the information expressed in the following sentence is interpreted as being part of that event 'as if information it conveys flows through the hole' (p. 7). When a sentence is interpreted as a *filter*, then it restricts the information in the following sentence to describe another simultaneous situation. Finally, when a sentence is interpreted as a *plug*, it blocks any information about a simultaneous situation. Hence, the context must redirect its temporal direction by interpreting the next sentence as describing another later event.

Ter Meulen points out that factors such as Tense, Aspect, noun phrases, prepositional phrases and verbal arguments (as previously discussed by Depraetere 1995a) interact with verbs when it comes to determining their aspectual class, and therefore their function as holes, filters or plugs. Moreover, causal connections or other knowledge of the world can modify and overrule these general semantic principles. Temporal reasoning, a form of logical reasoning, requires that premises supposed to be true trigger conclusions supposed to be true if the argument is valid. The temporal information manipulated in logical reasoning can come from three sources: (i) the descriptive content of the utterance; (ii) aspectual classes; and (iii) perspectival information (i.e. provided by grammatical aspect). In ter Meulen's model, these types of temporal information are modelled as *ordered representations of information*, obtained according to rules provided by Dynamic Aspect Trees (DATs). Two other important elements in the study of temporal reasoning in ter Meulen's model are *temporal adverbials* and *verbal tenses*. For example, events described by simple past tense clauses and interpreted as filters and plugs affect the perspective by shifting the temporal vantage point. In example (351), the third sentence is interpreted as a different event, occurring after the event from the first sentence. In contrast, the event that caused the perfect state in the second sentence must precede both the simple past events from the first and third sentences. From (351), one can legitimately infer (352) (as pointed out by ter Meulen 1997, 15).

(351)   The car hit the fence. The driver had been killed. The police arrived.
(352)   The driver was killed before his car hit the fence and before
          the police arrived.

Similarly, Boogaart (1999), investigating the role played by Aspect and Aktionsart in determining the temporal ordering of eventualities in English and Dutch, suggested that Aspect does not *determine* the temporal interpretation of a discourse, but

allows both temporal sequencing and temporal simultaneity. In Boogaart's model, there are several factors that influence the temporal interpretation of a discourse containing reference to past time, such as Aktionsart (states vs. events), Aspect (perfective vs. imperfective), discourse type (narrative vs. non-narrative) and pragmatic incompatibility (i.e. an interpretation is pragmatically incompatible with an utterance if it is not supported either by world knowledge, or by the cooperative principle and maxims in the sense of Grice).

2.2 The Gricean Account

Grice (1967, 1975, 1989) challenged the classical view that pragmatics is concerned only with the nonconventional or contextual meaning, such as irony and metaphor. He moved the focus from the *conventional* vs. *nonconventional* distinction to the *truth-conditional* vs. *non-truth-conditional* distinction. Truth-conditional meaning is expressed by *what is said* and belongs to the domain of semantics, while non-truth-conditional meaning is expressed by *what is implicated* (i.e. implicature) and belongs to the pragmatic domain. Grice thus establishes a fixed border between the two domains. One of the consequences of this position is that implicated meanings do not contribute to the truth-conditions of utterances. An initial distinction proposed by Grice is between *conventional* implicatures and *conversational* implicatures. Conventional implicatures are triggered by specific expressions. In (353), the speaker implies that his friend and his colleagues will most probably go to prison in the near future. This implicature is triggered by the adverbial *yet*.

(353)   How is your friend doing? Oh quite well, I think; he likes his colleagues, and he hasn't been to prison *yet*.

Conversational implicatures occur in discourse, and are the result of the application of conversational maxims or the conversation principle. They can either be triggered by specific words (i.e. *generalized conversational implicature*), as in (354), where the meaning of *and* is the temporal meaning 'and then', or not (i.e. *particularized conversational implicature*), as in (365), where B implicates that the A will find petrol at the garage round the corner.

(354)   I took out the key and opened the door.
(355)   A: I am out of petrol. B: There is a garage round the corner.

Grice (1975, 57–58) and Sadock (1978) propose a list of six criteria to test for conversational and conventional implicatures (see Moeschler 2012, 416–417 for a detailed presentation of the six criteria). According to these criteria, conversational implicatures are *calculable* (originate from a working-out procedure), *cancellable, non-detachable*, *non-conventional*, *carried out not by what is said but by the speech act,* and *indeterminate* (do not have precise content attached). In contrast, conven-

tional implicatures are *non-calculable, non-cancellable, detachable, conventional, carried out by what is said,* and *determinate.* According to Sadock (1978), and as pointed out by Moeschler, these conditions are neither necessary nor sufficient to test for implicatures, mainly because they are linked to each other.

As shown in (354), temporal (and causal) relations are interpreted as conversational implicatures[3] (the application of the orderliness maxim). Contrary to what has been suggested by Grice, among others, the temporal and causal relations in sentences (356)–(359) (Wilson and Sperber, 1998; Wilson 2011) are not necessarily triggered by the connective *and*, since they arise whether it occurs or not in the sentence.[4]

(356) John dropped the glass and it broke.
(357) John dropped the glass. It broke.
(358) Peter left and Mary got angry.
(359) Peter left. Mary got angry.

One of Grice's assumptions was that logical operators such as & 'and' and their correspondents in natural language (the connective *and*) are semantically equivalents. A consequence of this assumption is that, if the order of the two conjuncts is reversed, the truth conditions of the utterance do not change. Cohen and Bar-Hillel (1971) pointed out that Grice's treatment of temporal and causal relations as conversational implicatures (thus non-truth-conditional) is inappropriate. The sentence in (360) illustrates that the temporal ordering of the two eventualities is part of the truth-conditions of the utterance, which is what prevents the disjunction in (360) from being redundant.

(360) It's always the same at parties: either I get drunk and no-one will talk to
        me or no-one will talk to me and I will get drunk.

Following Cohen and Bar-Hillel (1971), Carston (1988) pointed out that what Grice called conversational implicatures were actually truth-conditional (under the scope of logical operators and connectives). Carston convincingly argued that tem-

---

[3] It is worth mentioning the neo-Gricean account of temporal relations, which is similar to the Gricean one, and in particular temporal relations being implicatures triggered by the connective *and* (Atlas & Levinson 1981, Levinson 1983, 1987, 1989, 2000; Horn 2004).

[4] Since temporal relations also arise in the absence of the connective *and,* I have not spoken about it in this research. The reader may refer to Wilson (2011) and Blochowiak (2014a, 2015b) for interesting discussions regarding the puzzles concerning the connective *and*, defined as five types of problems: sequencing, interval, cause-consequence, unspecified sequence and Horn's problem. Grice's solution for these temporal interpretations triggered by *and* was the maxim of orderliness. Dowty's solution (1986) was the Temporal Discourse Interpretation Principle. Blochowiak proposes a solution within the relevance theoretic framework by suggesting a finer-grained notion of contextual assumptions (i.e. the Relevance Nomological Model, see Blochowiak 2014b), and by discussing the usages of *and* with respect to two oppositions: *extensionality* vs. *intensionality*; and *homogeneity* vs. *heterogeneity*.

poral and causal interpretations are pragmatically determined aspects of what is said, and therefore part of the explicature of the utterance. Advocates of Relevance Theory make the distinction between the explicit meaning of an utterance (i.e. *what is said*) and the conventional (or "encoded") meaning of the linguistic expressions employed. Wilson and Sperber (1998) assert that temporal and causal 'connotations' in examples (401)–(404) are not encoded in the meaning of the sentences uttered, and follow Carston's idea that they are pragmatically determined aspects of the explicit form of those utterances (i.e. explicatures).

Gibbs and Moise (1997) were the first to conduct an experimental study of ordinary speakers' identification and labelling of what is 'said' vs. what is 'implicated'. In their paper, Gibbs and Moise designed their experiments to determine whether people distinguished what speakers say from what they implicate, and if they viewed what is 'said' as being enriched pragmatically. They used five categories of sentences,[5] and participants had to choose between a minimal vs. enriched interpretation. Example (361) illustrates the *temporal relation* type of sentence, as well as the two possible interpretations (minimal or literal meaning, and the pragmatically enriched meaning):

(361)   'The old king died of heart attack and a republic was declared'.
(362)   <u>Minimal</u>: order of events unspecified
(363)   <u>Enriched</u>: the old king died and then a republic was declared

The experiments were designed to manipulate the type of sentence, the instructions and the context of the targeted sentence. In the first experiment, the instructions consisted in explaining the two types of interpretations of the sentence, and no context was given. In the second experiment, the instructions were more detailed, including information about linguistic theories addressing the distinction between what is 'said' and what is 'implicated'. In the last two experiments regarding *temporal relation* sentences, linguistic contexts were provided (short stories in order to favour the enriched interpretation (in the third experiment), as in example (364), and the minimal interpretation (in the fourth experiment), as in example (365).

(364)   The professor was lecturing on the life of Jose Sebastian.
         He was a famous rebel in Spain who fought to overthrow the King.
         Many citizens wanted Sebastian to serve as their President.
         "Did Jose Sebastian ever became President?" one student asked.
         The professor replied, *The old king died of a heart attack before and a republic was declared.*
(365)   Mike liked to take long bike rides each day. He also liked to sing as he rode because he has a terrific voice. Mike's roommate thought this was funny. He said to someone that *Mike likes to ride his bike and sing at the top of his lungs.*

---

[5] Cardinal (Jane has three children), possession (Robert broke a finger last night), scalar (Everyone went to Paris), time-distance (It will take us some time to get there) and temporal relations.

Gibbs and Moise's four experiments showed that speakers assume that enriched pragmatics plays a significant role in what is said: the enriched interpretation was preferred in the first three experiments, but not in the last one, where the context caused a strong bias in favour of the minimal interpretation. Manipulation of the instructions and training did not have any effect on the participants' judgements.

Three observations can be made concerning the *temporal relation* type of sentences: (a) temporal sequencing is an inference drawn contextually[6]; (b) it is independent of the specific instructions that speakers received; and (c) it can be blocked in a context providing a bias in favour of the minimal interpretation (that is, the unspecified order). On the basis of their results, Gibbs and Moise argue that there might be two types of pragmatic processes: one that provides an interpretation for what speakers say; and another that provides an interpretation for what speakers implicate. They argue that this position can be explained by the principle of optimal relevance (Sperber and Wilson 1986), although they acknowledge the difficulty of testing it experimentally.

Based on these observations, Relevance Theory (in particular, Carston 1988) proposes that the temporal and causal interpretations of such sentences should be analysed as pragmatically determined aspects of *what is said.* In other words, there are aspects of what is linguistically encoded that are pragmatically determined. This remark is linked to the proposal in Relevance Theory of the *inferential model* of communication (consisting of two phases: decoding and inference), and to the conceptual vs. procedural distinction of types of encoded information (Blakemore 1987).

2.3   The Relevance-Theoretic Account

2.3.1   Basic Relevance-Theoretic Tenets

Relevance Theory is a cognitive pragmatic theory of language comprehension (Sperber and Wilson 1986/1995; Wilson and Sperber 1998, 2004, 2012), which has in recent years been approached empirically, experimentally, and from various points of view relating to neighbouring fields, as seen in Padilla Cruz's (2016) collection, to name one example. The *cognitive* characterization is due to three hypotheses assumed in this theory. Firstly, the processes implied in pragmatic interpretation are not specific to language, but are localized in the central system of thought. This hypothesis finds its roots in the theory of modularity of mind (Fodor 1983; Sperber 2005; Caruthers 2006).

---

[6] In his Model of Directional Inferences (2000a), Moeschler makes the same prediction about temporal relations between eventualities. They have an inferential nature and are drawn according to contextual assumptions. They can be blocked (minimal interpretation) under certain specific linguistic and contextual conditions.

Secondly, the essential feature of human communication is the expression and recognition of intentions (Grice 1989). This hypothesis led to the suggestion of an inferential model of communication that included both the *code* model (as it has been believed since Aristotle that communication is achieved by coding and decoding messages) and the *inferential* model (as communication, according to Grice, is achieved by producing and interpreting evidence about the speaker's intended meaning). Another of Grice's central claims, recycled in Relevance Theory, is that utterances automatically create expectations that guide the hearer towards the speaker's intended meaning. Grice defines these expectations in terms of the *conversation maxims* and the *cooperative principle.* Relevance Theory adopts neither Grice's maxims nor the cooperative principle, but hypothesises that "the expectations of relevance raised by an utterance are precise and predictable enough to guide the hearer towards the speaker's meaning" (Wilson and Sperber 2004, 607).

Thirdly, the search for relevance is a basic feature of human cognition. Hence, utterances raise expectations of relevance, because the search for relevance is a basic feature of human cognition which communicators may exploit (Wilson and Sperber 2004, 607). This is expressed in the *Cognitive Principle of Relevance*, which states that "human cognition tends to be geared to the maximization of relevance" (Wilson and Sperber 2004, 610).

An input (a sight, a sound, an utterance, a memory) is relevant when it connects with existing or background knowledge in order to produce a *positive cognitive effect*—i.e. bringing new information, developing existing information or correcting existing information. These cognitive effects are positive if they help the hearer to create true representations of the world. There are numerous potentially relevant stimuli, but humans will search for the most relevant stimulus. According to Relevance Theory, in equal situations, the greater the positive cognitive effect achieved by processing an input, the greater its relevance will be. Relevance is thus weighed in terms of *cognitive effects* and *processing efforts:*

- Other things being equal, the greater the positive cognitive effect achieved by the least processing efforts, the greater the relevance of that input to the individual at that time.

According to Relevance Theory, utterance interpretation takes place via non-demonstrative inference, a process that 'takes a set of premises as input and yields as output a set of conclusions which follow logically from, or are at least warranted by, the premises' (Sperber and Wilson 1987:698), and which makes use of deductive rules without being governed by them. The premises used in the non-demonstrative process are assumptions existent in the memory. These assumptions can come from perception, linguistic decoding, encyclopedic memory, or can be added to the memory of the device as a result of the deductive process itself. Sperber and Wilson explain,

> The set of assumptions in the memory of the deductive device at the start of a deductive process can be partitioned into two proper subsets, each acting as the context in which the other subset is processed. […] We assume that a crucial step in the processing of new information is to combine it with an adequately selected set of background assumptions – which

constitutes the context – in the memory of the deductive device. For each item of new information, many different sets of assumptions from diverse sources (long-term memory, short-term memory, perception) might be selected as context. (Sperber and Wilson 1986/1995, 137–138)

Sperber and Wilson (1998) note that what is retrieved from encyclopaedic memory and transferred to the memory of the deductive device are not individual assumptions but chunks of information (also named *schemas, frames* or *scripts*). Assimakopoulos (2017, 230) explains that these chunks of information "can either provide ready-made contextual assumptions or skeletal schemas (scripts), which, together with new information derived from the utterance, create fully articulated assumptions".

Given the cognitive orientation of the theory, their definition of the *context*, which is a key notion, is psychologically oriented:

> A psychological construct, a subset of the hearer's assumptions about the world. It is these assumptions, of course, rather than the actual state of the world, that affect the interpretation of an utterance. A context in this sense is not limited to information about the immediate phsysical environement or the immediately preceding utterances: expectations about the future, scientific hypotheses or religious beliefs, anecdotal memories, general cultural assumptions, beliefs about the mental state of the speaker, may all play a role in interpretation. (Sperber and Wilson, 1986/1995, 15–16)

Assimakopoulos (2017) points to the fact that the relevance theoretic approach to the notion of *context* as a cognitive construct challenges the more traditional views based on notions like *common* (Stalnaker 1974, 2002) or *mutual knowledge* (Schiffer 1972). The relevance theoretic context consists of a set of assumptions rather than true facts about the world, assumptions which are *manifest* to the hearer: he is capable of mentally representing them and accepting them as true at some given moment, whether they are indeed veridical (Assimakopoulos 2017). Moreover, Sperber and Wilson challenge the traditional hypothesis according to which contexts for interpretation are determined in advance of the comprehension process, and suggest that contexts are *selected* during the interpretation process. They adopt the view of a dynamically changing context, which is determined online via expansion of the initial context, consisting of a set of assumptions about the world originating in the memory (cf. Assimakopoulos 2017 for an extensive discussion).

One of the most basic tenets of this theory is the relevance-theoretic comprehension procedure: the hearer follows a path of least effort to find the cognitive effects needed, in order of accessibility. The interpretation process stops when the hearer's expectations of relevance are satisfied (or abandoned) (Wilson and Sperber 2004, 636), taking into consideration *what is said* and *what is implicated* (as suggested by Grice). For Grice, the explicit/implicit distinction refers to the difference between an utterance's truth-conditional and non-truth-conditional content, where the latter depends solely on pragmatics. The relevance-theoretic framework assumes quite a different position. There are two kinds of assumptions communicated by a speaker: explicatures and implicatures, defined as follows (Carston 2004, 635, citing Sperber and Wilson 1986).

- An assumption communicated by an utterance U is explicit [hence an explicature] if and only if it is a development of a logical form encoded by U. [in case of ambiguity, a surface form encodes more than one logical form]
- An assumption communicated by U which is not explicit is implicit [hence an implicature]

Explicatures are developments of the logical form, through decoding and pragmatic enrichment, into a full propositional form of the utterance, as in (367), which is the explicature of (366). The star assigned to the word Mary indicates that a particular referent has been assigned to the name "Mary". The explicature consists of more precise and elaborated information, such as reference assignment, the narrowing of the concepts *get* and *unit*, the enrichment of the meaning of words like *enough*, and adding the cause-consequence relation between the two segments.[7] On the other hand, sentence (368) is an independent assumption inferred as a whole from (367), and a further premise concerning the relation between Mary's recent failure at university and her current state of mind (Carston 2004).

(366)   X: How is Mary feeling after her first year at university?
        Y: She didn't get enough units and can't continue.
(367)   Mary* did not pass enough university course units to qualify
        for admission to second-year study, and as a result, Mary* cannot
        continue with university study.
(368)   Mary* is not feeling very happy.

According to Relevance Theory, the *relevance-theoretic interpretative procedure* consists of several subtasks that take place in parallel. The logical form encoded by an utterance containing incomplete conceptual representations is treated in the inferential process in three ways (Wilson and Sperber 2004, 615):

- Constructing an appropriate hypothesis about the explicit content (explicatures) via decoding, disambiguation, reference resolution and other pragmatic enrichment processes (narrowing, loosening, saturation, free enrichment, ad hoc concept construction[8])

---

[7] This is an important point of divergence between relevance theorist and neo-Gricean pragmatic frameworks. Neo-Griceans have followed Grice in considering these aspects of communicated meaning to be implicatures (see Carston 2004, sections 4–6).

[8] Carston (2004) discusses the pragmatic aspects of explicatures (the pragmatically determined aspect of *what is said*). Disambiguation concerns the selection of sense for polysemantic words (such as *bank*), the candidates being supplied by the linguistic system itself. Reference resolution concerns referent assignment to deictics, overt indexicals and referential expressions. Saturation concerns pragmatic developments of the logical form required by covert indexicals (such as *better, same, too, enough*), and is under linguistic control. Free enrichment is not triggered by a linguistic expression, and concerns aspects of the interpretation of the utterance that are relevant for the implicatures. The utterance *I've had a shower* contains the idea of *today*, that comes through free enrichment, and is considered in the implicature *I don't need to have another shower now/today*. In neo-Gricean pragmatics, these aspects of utterance meaning are generalized conversational implicatures.

- Constructing an appropriate hypothesis about the intended contextual assumptions (implicated premises)
- Constructing an appropriate hypothesis about the intended contextual implications (implicated conclusions)

Wilson and Sperber point that there is no sequential order in which these subtasks of the comprehension process take place, due to the fact that comprehension is an online process. They take place in parallel and the resulting hypotheses are, if necessary, revised or elaborated as the utterance unfolds. Thus, explicatures and implicatures (consisting of implicit premises and conclusions) are constructed by a process of "mutual parallel adjustment with hypotheses about both being considered in order of accessibility" (Wilson and Sperber 2004, 617).

At this point, I would like to have a closer look at explicatures. Explicatures roughly correspond to Grice's category of *generalized conversational implicatures* and to Levinson's (2000) *informational amplifications of utterances*. They are enriched forms of the propositional form, and are truth-conditional: an explicature is true or false iff the proposition expressed by the utterance is true or false (Sperber and Wilson 1986; Wilson and Sperber 2004; Cartson 2002). The main idea is that a proposition cannot be true when its explicature is false, and the explicature cannot be true when the proposition is false.

Explicatures, contrary to other forms of implicit meaning such as entailments and presuppositions, can be made explicit (Moeschler 2013). This happens either in the form of basic explicatures, as in (370), which enriches (369) with a temporal variable, or in the form of higher-order explicatures as in (371).

(369)   It's raining.
(370)   It's raining, I mean, right now.
(371)   Can you take down the garbage? It's not a question; it's an order.

The most convincing example of phenomena taking place at the level of explicature is given by the lexical-pragmatic processes involved in the construction of ad-hoc concepts: narrowing and loosening. However, other phenomena have gradually been considered as taking place at the level of explicatures. For example, the contrast interpretation of the discourse connective *but*, which was treated as conventional implicature by Grice, is analysed by Blakemore (1987) and followers as procedural encoding, constraining the comprehension process. More recently, in relation to connectives, Moeschler (2015, 2016) suggests that conceptual meaning is associated with logical entailments, whereas procedural information is activated at two levels: explicatures (and therefore truth-conditional) and implicatures (and therefore non-truth-conditional).

Wilson and Sperber (2004, 613) point to the fact that, due to the *presumption of optimal relevance* given below, it is reasonable for the hearer to follow the path of least effort, because the speaker is expected (within the limits of her abilities and preferences) to make her utterance as easy as possible to understand.

> The ostensive stimulus is relevant enough to be worth the audience's processing effort. It is the most relevant compatible with communicator's abilities and preferences. (Wilson and Sperber 2004, 612).

This idea was honed by the conceptual/procedural distinction (Blakemore 1987; Wilson and Sperber 1993; cf. discussion in Sect. 2.3.2). Since a speaker is not expected to make her addressee's task of obtaining the most relevant interpretation more difficult than necessary, the utterance she chooses to formulate may contain conceptual and procedural types of information. Therefore, procedural meanings are instructions encoded by linguistic expressions that specify paths to follow during the comprehension procedure, which involves manipulating conceptual representations. Wilson and Sperber (1993, 151) argue that conceptually encoded information contributes either to explicatures (the proposition expressed and higher-level explicatures) or to implicatures (see Nicolle 1998 for arguments against this option), whereas procedurally encoded information limits the formulation of either explicatures (the proposition expressed and high-level explicatures) or implicatures.

2.3.2   The Conceptual/Procedural Distinction

One of the proposals made by Relevance Theory, aiming to explain how specific linguistic items contribute to the inferential processes involved in utterance interpretation, is the replacement of the speech act theoretic distinction between *describing* and *indicating* with the cognitive distinction between *conceptual* and *procedural* types of encoded meaning (Blakemore 1987, 2002; Wilson and Sperber 1993).[9] Procedural meaning points to encoded instructions about how to manipulate conceptual representations. Both the concept and the linguistic expression are stored in the lexicon, where procedural information is embodied as rules written explicitly in the lexical entries of linguistic expressions (Curcó 2011). For relevance-theorists, a speaker is not expected to make her addressee's task of obtaining a relevant interpretation more difficult than necessary. Therefore, procedural meanings are instructions encoded by linguistic expressions that specify paths to follow during the interpretation process, involving the manipulation of conceptual representations in order to access the most relevant context.

The conceptual/procedural distinction was first meant as a solution for the semantic/pragmatic division of labour, and has remained a significant explanation for the contribution of linguistic meaning to utterance interpretation. Over the last 20 years, there has been growing interest in establishing discriminatory features of procedural rather than conceptual information, and in applying the distinction to

---

[9] In the French literature, a very influential work was that of Ducrot (notably Ascombre and Ducrot 1983), who suggested similar ideas in the framework of argumentation and polyphony. Ducrot spoke about instructional expressions (such as *puisque* 'since' and *mais* 'but'), and his model aimed to model their argumentative function.

Table 2.1 Cognitive and linguistic features

Cognitive criteria	Linguistic criteria
1. Representational status	1. Truth-value
2. Accessibility to consciousness	2. Behaviour with negation
3. Degree of availability to conscious thought	3. Compositionality
	4. Rigidity
4. Degree of conceptualization	5. Degree of paraphrasability
	6. Behaviour with loosening and narrowing
	7. Type of inference triggered

various linguistic expressions—for example, Escandell-Vidal et al.'s (2011) collective volume, Sassamoto and Wilson's (2016) special issue, and Grisot (2017a), to name but a few. Numerous attempts have been made in the literature to define and characterize conceptual vs. procedural information, including qualitative features. In Grisot (2017a), I divide them into two types: those that are *cognitive* (appealing to cognitive processes taking place when the speaker processes expressions encoding conceptual or procedural types of information); and those that are *linguistic* (referring to the linguistic system itself). The two types of criteria summarized in Table 2.1 are challenged in Grisot (2017a), where I put forward a quantitative approach to conceptual, procedural and purely pragmatic meaning.

The first attempts to define and characterize conceptual vs. procedural information included qualitative features such as *representational* vs. *computational* and *truth-conditional* vs. *non-truth-conditional*. One very significant contribution to the discussion is Wilson and Sperber (1993) hypothesis of the cognitive foundations of the distinction. They characterize conceptual vs. procedural information in terms of accessibility to consciousness vs. inaccessibility to consciousness, easily graspable concepts vs. information resistant to conceptualization, and information capable of being reflected on vs. information not available through conscious thought (Wilson and Sperber 1993, Wilson 2011). These features of conceptual and procedural information not only find their roots in the parallel that has been made between natural language and the 'language of thought', but also in the 'massive modularity hypothesis' (Sperber 2005; Carruthers 2006). Sperber and Wilson (1998, 172–173) suggest that the constituents of a language are systematically related to other objects, such as constituents of other language, with states of language users, or with possible states of the world. Based on these remarks, Wilson (2011, 10) indicates that:

- Conceptual expressions in natural language are systemically linked to concepts, which are constituents of language of thought;
- Procedural expressions in natural language are systematically linked to states of language users;
- Sentences of the language of thought are systematically linked to possible states of the world.

Wilson argues that, according to the second hypothesis, procedural expressions have the function of putting the language user *into a state in which some of these*

domain-specific cognitive procedures are highly activated (2011, 11). The output of the highly activated procedures functions as ostensive cues, more likely to be selected by the hearer during the comprehension process. In Wilson's words, expressions like *dog* or *think* encode conceptual representations (constituents of language of thought), accessible to consciousness and capable of being reflected on, evaluated and used in general inference. By contrast, procedural expressions such as *but* and *or* activate domain-specific procedures belonging to fodor-modules (encapsulated and inaccessible), and are inaccessible to consciousness and resistant to conceptualization.

The main idea is that, during the interpretation process, the hearer builds conceptual representations and uses encoded procedures for manipulating them. A conceptual representation differs from other types of representations in that it has logical properties and truth-conditional properties. The sentence in (372) has the logical form (373) and the propositional form (374). Wilson and Sperber (1993) argue that the logical form recovered by decoding and the propositional form recovered by a combination of decoding and inference are conceptual representations.

(372)   Peter told Mary that he was tired.
(373)   x told y at t_i that z was tired at t_i.
(374)   Peter Brown told Mary Green at 3.00 pm on June 23 1992 that Peter Brown
         was tired at 3.00 pm on June 23 1992.

As far as procedural information is concerned, Wilson and Sperber (1993) argue that it represents constraints on the inferential phase of comprehension, as in example (375), which can be interpreted as in (376) and in (377). Quoting Blakemore (1987, 1992), Wilson and Sperber (1993, 158) note that the connectives *so* and *after all* do not contribute to the truth conditions of the utterances, but constrain the inferential phase of comprehension by indicating the type of inference the hearer is expected to make.

(375)   Peter's not stupid. He can find his own way home.
(376)   Peter's not stupid; *so* he can find his own way home.
(377)   Peter's not stupid; *after all* he can find his own way home.

It seems that the key idea in distinguishing the two types of information is the notion of the *contribution to* (conceptual) or *constraining of* (procedural) the construction of explicatures and implicatures. Unfortunately, these two notions are quite vague, and cannot easily be used as discriminating criteria. An initial attempt has been made to use the contributing/constraining distinction in relation to the truth-conditional evaluation of a proposition. But the picture is not black and white: Wilson and Sperber (1993) distinguish four possible combinations: (a) conceptual and truth-conditional (most regular content words, such as manner adverbials *seriously* and *frankly*); (b) conceptual and non-truth-conditional (illocutionary adverbials such as *seriously, frankly, unfortunately*); (c) procedural and non-truth-conditional (discourse connectives like *so* and *after all*); and (d) procedural and truth-conditional

(such as personal pronouns *I* and *you*). Discourse connectives constrain the construction of implicatures by guiding the search for intended contexts and contextual effects. Pronouns impose constraints on explicatures by guiding the search for the intended referent relating to the proposition expressed. As far as conceptual information is concerned, it may or may not contribute to the truth-conditions of the proposition expressed. Explicatures can, however, have their own truth-conditions (be false or true), and can therefore be contradicted, negated and used in entailment.

Another attempt to explain the contributing and constraining notions was to explain them in relation to their function in determining the intended inferences. De Saussure (2011, 61–62) points out that procedural expressions encode *specific* paths to follow in order to obtain *specific* inferences. The first consequence is that it is not impossible for the hearer to get to the intended inference in the absence of the procedural expression, but this would happen (though is not guaranteed) at a higher cognitive cost. The second consequence is that there are also more *general* inferences that are not specifically encoded by linguistic expressions. This is the case of inferences obtained by general means of pragmatic reasoning starting from conceptual-encyclopaedic information. For de Saussure, procedural information encoded by expressions such as *but* (Blakemore 1987) linking two propositions P and Q excludes a variety of possible inferences that can hold between two P and Q, and guides the hearer toward the intended specific inference. It is in this way that procedural information constrains the inferential phase of communication, and achieves better relevance by eliminating the unintended potential interpretations. Conceptual information, on the other hand, through the rich encyclopaedic entries opens up a large array of possible assumptions, therefore contributing to the inferred premises and conclusions achieved by general inference. While this account of the contribute/constrain division is interesting from a theoretical point of view, it is limited to use as a discriminating criterion.

De Saussure (2011) proposes a methodological criterion to distinguish between what is conceptual and what is procedural. In his words, an expression is procedural as it triggers inferences that cannot be predicted on the basis of a conceptual core to which general pragmatic inferences (loosening and narrowing) are applied. In his view, expressions that encode (at least apparently) both procedural and conceptual information (such as third personal pronouns, verbal tenses and some French pragmatic connectives such as *ensuite* 'then') should be considered procedural. He argues that procedural information:

> … either takes conceptual information as a parameter as with she, and therefore the conceptual information is simply under the dependence of the procedure, or the conceptual meaning has no motivation anymore and is just a relic of ancient versions of that word (the case of ensuite) (p. 65, original italics).

Escandell-Vidal and Leonetti (2011) propose that rigidity is the major feature of procedural information. Their hypothesis is that conceptual information is flexible, while procedural information is rigid.

> …Conceptual representations are flexible and malleable, which means that they can be enriched, elaborated on and adjusted in different ways to meet the expectations of relevance. (…) We claim that instructions, in contrast, are rigid: they cannot enter into the mutual adjustment process, nor can they be modulated to comply with the requirements of conceptual representations, either linguistically communicated or not. The instructions encoded by an item must be satisfied at any cost for the interpretation to succeed. (Escandell-Vidal and Leonetti 2011, 86)

This idea was also suggested for French markers expressing temporality by Moeschler (2000a), who argued that procedural information, e.g. encoded by temporal connectives, is stronger than conceptual information, e.g. encoded by aspectual classes (i.e. Aktionsart).

Escandell-Vidal and Leonetti argue that, despite their rigid character, instructions can give rise to a series of different interpretative effects. This is due to the different contextual assumptions, and data varying from one context to another. The main consequence is that cases of mismatch between the information from conceptual and procedural content will be solved by following the procedural constraints on interpretation. Escandell-Vidal and Leonetti (2011, 84–85) suggest a series of theoretical assumptions about procedural information, as follows:

- Instructions are operational: they specify a set of algorithms or logical operations.
- Instructions operate on conceptual representations.
- Instructions can operate at two different levels: that of syntactic computation and that of interpretation.
- Linguistic items can encode concepts and instructions. Conceptual representations are linked to encyclopaedic knowledge, but instructional meanings lack such connections.
- A strong connection was initially established between the lexical vs. functional (i.e. grammatical) distinction and the conceptual/procedural distinction. Recent work suggests, however, that functional words can also encode conceptual information (such as connectives, as suggested by Blochowiak 2015a, b, 2017, and verbal tenses, as suggested by Grisot and Moeschler 2014 and Grisot 2017a).

The classic view of the conceptual vs. procedural distinction assumes that there is a clear-cut distinction between what is conceptual and what is procedural. This has led to the assumption that there is perfect mapping between conceptual/procedural information and lexical vs. grammatical categories. It was assumed that lexical categories (nouns, verbs, adjectives bearing descriptive content, *-ly* adverbs) encode concepts, whereas grammatical or functional categories encode various kinds of constraints on inferential processes. Several scholars have argued against this assumption, showing that a single expression can encode both procedural and conceptual meaning. The prototypical expressions encoding a concept are lexical words, such as *door, bachelor, open*, etc. These entries in the mental lexicon are used to refer to sets of entities (the sets of entities which are doors, bachelors, and actions of opening things, respectively). However, as Moeschler (2016, 126) points out, "a concept is not only a mental representation of different sets of individuals, it

is the abstract or mental entity that allows the fixation of beliefs and knowledge: concepts are the locus of information construction, storage and retrieval." According to this definition of a concept, both lexical and functional categories (such as verbal tenses and connectives) may encode conceptual meaning. This proposal defends a dual and hybrid nature of linguistic expressions: conceptual and procedural encoding.

So, it could be the case that third person pronouns (*he, she*) not only encode the instruction to identify a highly accessible referent (Ariel 1994) but also include some conceptual information about the referent, such as male/female and animate (Escandell-Vidal et al. 2011, 24). Hence, the accessibility requirement is common for the whole class of third person pronouns, whilst the conceptual information varies from pronoun to pronoun. For example, the case of the pronoun *it* remains problematic for this approach, because it can refer both to objects and animate beings, without discriminating gender, as with *dog* or *baby*. Moreover, the gender distinction refers to grammatical gender and not to actual gender, as illustrated by the cross-linguistic difference between *the people* in English and *la gente* (feminine) in Italian. For Moeschler (2015), connectives are complex linguistic units conveying both conceptual and procedural information. His analysis of close connectives in French (*parce que* 'because', *donc* 'therefore' and *et* 'and') illustrates that they have conceptual and procedural content, with both types triggering different levels of meaning. They all share causal conceptual content, even though the set of entailments are not identical: P and Q for *parce que* and *et*, and only P for *donc*. Moreover, the causal meaning is an explicature (not defeasible) with *parce que*, and an implicature (defeasible) with *et* and *donc*.

For Wilson (2011, 10), conceptual expressions in natural language are systematically linked to concepts, which are constituents of the language of thought. In their earlier work, Sperber and Wilson (1998) described the relevance theoretic account of the mapping between the mental and the public lexicon. They assumed that mental representations consist of *mental concepts*, which are relatively stable units. A mental concept encompasses causal and formal (semantic or logical) relationships with external objects (i.e. words in a language) and relationships with other mental concepts. Sperber and Wilson (1998) argue against a one-to-one mapping between words in a language and mental concepts. Consequently, there may be:

- Concepts for which there is no word in a given language (one might expect that some languages do express them, or they can be expressed by means of a phrase) (none-to-one).
- Words lacking a conceptual counterpart (one-to-none), such as 3rd personal pronouns.
- Different words that correspond to one concept (many-to-one), such as synonyms.
- A word corresponding to several concepts (one-to-many), such as homonyms.

The lack of one-to-one mapping can be explained by the existence of words in a language relating to all grammatical categories that do not encode a 'full-fledged concept but what might be called a pro-concept. The semantic contribution of pro-

concepts must be contextually specified for the associated utterance to have a truth-value' (Sperber and Wilson 1998, 184). The authors make the claim that pro-concepts are so common that 'all words behave as if they encoded pro-concepts' (Sperber and Wilson 1998, 185). This is due to the fact that their semantic meaning must be worked out contextually—i.e. fine-tuned through inferential processes so as to create an *ad hoc* concept (Barsalou 1987, Carston 2002; Wilson and Carston 2007).

Ad hoc concept construction concerns the pragmatic adjustment of the concepts encoded in the utterance. The utterance *He was upset but he was not upset*, said by the defence lawyer of a man who murdered his wife, is not a contradiction. The hearer understands that the man was upset, but not upset to the point that he might kill his wife. The two interpretations of *upset* correspond to two concepts of upsetness resulting from a narrowing of the ad hoc concept UPSET. This view of concepts was initially adopted for 'open' classes of words (nouns, verbs, adverbs and verbs), as in example (378), from Wilson and Carston (2007, 235), where the hearer is prompted to build a fine-tuned ad hoc concept *drinking alcohol* by way of lexical narrowing (i.e. the word conveys a more specific sense than the encoded one). Another means of contextual adjustment is lexical broadening,[10] involving the use of a word to convey a more general sense that the encoded one, as in (379), from Wilson and Carston (2007, 235).

(378)   I am not *drinking* tonight.
(379)   That bottle is *empty*.

The hearer makes hypotheses about this type of content at the level of explicatures (i.e. truth-conditional content). This occurs mainly because:

> The meaning encoded in a linguistic expression underdetermines the content the speaker communicates, not only at the level of her implicatures but also the propositional content she communicates explicitly (i.e. the explicature of the utterance) (Carston 2010, 156).

So, during communication, the addressee's task is to identify the speaker's informative intention—that is, the content she wants to transmit, along with her communicative intention (Sperber & Wilson 1986/1995). To do so, the addressee has to accomplish a series of sub-tasks, determining the logical form of the speaker's utterance (by decoding), the propositional form (by inference) or (first level) *explicature*, the speaker's propositional attitude or *high-level explicature*, and the most relevant implicature of the speaker's utterance. Conceptual, procedural and pragmatic meanings play a role in performing these sub-tasks. Procedural meaning, encoded by specific linguistic items, triggers specific inferences which constrain this interpreta-

---

[10] According to Wilson and Carston (2007), there are several types of broadening, namely approximation, hyperbolic extension, metaphorical extension and category extension (e.g. the use of salient brand names for a broader category), among others. Narrowing and broadening make use of the encyclopaedic properties of a concept, where at least one property is shared between the pro-concept and the ad hoc concept. The enrichment process is carried out using the encyclopaedic properties of the concept, contextual information, pragmatic expectations, and principles of relevance.

tive inferential process, whereas conceptual information is treated at the level of the explicatures of the utterance by way of pragmatic enrichment processes like narrowing and broadening, linked to the concept which they encode. Pragmatic interpretations are recovered by general inferences, rather than triggered by linguistic expressions, and depend on the contextual hypotheses that the hearer formulates. Therefore, they can be localized at the level of implicatures. In Grisot (2017a), I propose a quantitative approach guarantees that the investigation of each level in the inferential interpretative process is valid and reliable: the pragmatic adjustment of conceptual meaning by narrowing and broadening; the specific inferential paths signalled by expressions encoding procedural information; and general inferences (i.e. implicated conclusions formulated according to implicated premises and the propositional form of the utterance) (Sect. 4.1).

2.3.3   Verbal Tenses as Procedural Expressions: Reichenbachian Coordinates

As far as temporal reference is concerned, in the relevance theoretic framework, it is generally assumed that verbal tenses are fully procedural expressions. From this perspective, verbal tenses encode only procedural information. Two approaches can be distinguished. According to the first, procedural meaning mainly concerns the saturation of Reichenbachian coordinates for locating eventualities in time (Nicole 1997; de Saussure 2003, 2011; Escandell-Vidal and Leonetti 2011; Aménos-Pons 2011). According to the second, procedural meaning is linked to the expression of temporal relations between eventualities: it guides "directional" forward and backward inferences in Moeschler's terms (2000a).

    The discussion of verbal tenses involves their function of establishing temporal reference by the positions of temporal coordinates (speech point S, reference point R and event point E) and determining the temporal sequencing of eventualities. De Saussure (2011) suggested that a verbal tense is a procedural marker, in that it specifies the computations that should be made with hearer's mental representations of eventualities. The output of the computation is a contextual value in the form of an inference. The procedure encoded by a verbal tense demands that the hearer find the configuration of temporal coordinates S, R and E which is most relevant and consistent with contextual assumptions, in order to locate an eventuality before, at the same time as, or after S.

    The main relevance-theoretic assumption regarding tense markers is that the meaning of a verbal tense is underdetermined. Consequently, to yield the speaker's intended meaning, a verbal tense must always be contextually enriched by inference in accordance with the principles of relevance. N. Smith (1990) points out that a verbal tense can only locate temporal reference in an underspecified way. Establishing actual temporal reference takes place by way of contextual enrichment, according to expectations of optimal relevance. Smith's assumption was that the

various connotations associated with a verbal tense correspond not to different meanings of that tense, but to different interpretations of a unique meaning combined with various contextual assumptions.

Nicolle (1998) followed Smith's assumption, and proposed that tense marking is procedural information. In his words,

> Tense markers, in those languages which have them, may be characterized as merely imposing constraints on the determination of temporal reference. Similarly, markers of modality may be viewed as encoding constraints on the existential status of situations and events. Conversely, it is difficult to see how markers of tense and modality could be characterized conceptually. Take for instance, example (1) [Mary has eaten] and (2) [Mary has climbed Everest]; the "present perfect" does not encode information about itself but about the events described in (1) and (2), say, that the event [Mary eat] and [Mary climb Everest] are meant to be represented as occurring at some time in the past whilst having present relevance. As a result of these considerations, grammatical markers of tense and modality may be characterized as exponents of procedural encoding, constraining the inferential processing of conceptual representations of situations and events.

The first relevance-theoretic analyses of French verbal tenses expressing past time pointed to the fact that they have inferential descriptive and interpretative usages, computed according to the instructions encoded by a verbal tense, and to contextual information (Moeschler et al. 1998; Luscher and Sthioul 1996; Luscher 1998, Sthioul 1998; de Saussure and Sthioul 1999, 2005; Tahara 2000; de Saussure 2003). Descriptive usages of the Passé Simple are outlined in terms of a basic semantic framework using Reichenbachian coordinates E, R and S—or, more precisely, $E = R < S$. This description corresponds to the procedural information encoded by the Passé Simple, which is to locate the eventuality before S via an R which is simultaneous with E. The temporal localization of an eventuality must therefore be calculated contextually, and this is an inferential process. Following de Saussure (2003), I will from now on call this trend the *procedural pragmatics* approach.

De Saussure's proposal is that the interpretation process is an algorithmic procedure. As far as temporal interpretation is concerned, verbal tenses play an important role, in that they set the temporal reference of eventualities in relation to the moment of speech. In his words (2003, 179):

> La référence temporelle correspond au moment du temps, dans la conscience du destinataire, pour lequel les conditions de vérité du procès décrit sont vérifiées. Il est vraisemblable que l'esprit applique une stratégie aspectuelle pour se représenter les événements.[11]

For example, to process the sentences in (380) and (381), from de Saussure (2003, 179), the hearer does not determine a temporal interval lasting from a few seconds in the former to a few hours in the latter, but a punctual and bounded cognitive representation of the eventuality. This is mainly due to the assumption that the Passé Simple is a perfective verbal tense.

---

[11] 'Temporal reference corresponds to a moment in time when, for the hearer, the truth-conditions of the eventuality are verified. It is possible that the human brain applies an aspectual strategy for cognitively representing events.' (my translation)

(380)   La bombe *explosa*.
        'The bomb exploded.'
(381)   Frédéric et Marie-Hélène *emplirent* la piscine.
        'Frédéric and Marie-Hélène filled the pool.'

As for the second sentence in (382), containing a telic eventuality (i.e. accomplishment), the hearer builds an unbounded cognitive representation due to the Imparfait. De Saussure argues that the Imparfait imposes an imperfective reading of eventualities, regardless of their type (state, activity, accomplishment or achievement).

(382)   Luc *arriva* au stade. Augustin *courait* le 1500 mètres.
        Luc arrive.PS at the stadium. Augustin run.IMP the 1500 meters
        'Luc arrived at the stadium. Augustin was running the 1500 meters.'

More generally, temporal reference is an important factor for determining the temporal sequencing of eventualities in the discourse. For de Saussure, temporal order consists of three types of temporal relations: *positive* (i.e. forward sequencing), *negative* (i.e. backward) and *null* (i.e. simultaneity and indeterminacy). Temporal sequencing is the result of an algorithm, which consists of a *general* procedure and *specific* procedures. Procedural markers, such as verbal tenses and temporal connectives, trigger specific procedures taking place in the interpretation process. Moreover, conceptual relations (such as *push-fall*) and procedural markers impose constraints on determining the temporal sequencing of eventualities.

As for the analysis of specific verbal tenses, de Saussure (2003, 222) argues that the Passé Simple encodes an instruction for temporal progression by default. This instruction is blocked when the hearer does not have sufficient contextual information to interpret the utterance, as in (383), and in cases of temporal encapsulation, as in (384) and (385), from de Saussure (1998b, 249).

(383)   François *épousa* Adèle. Paul s'*achet*a une maison à la campagne.
        'François married Adele. Paul bought a house in the countryside.'
(384)   Une terrible tempête *fit* rage. Quelques tuiles *tombèrent*. Un arbre du
        jardin *fut arraché.*
        'A terrible storm raged. Some tiles fell. A tree was torn from the garden.'
(385)   Ce samedi *marqua* le début de la relation de Paul et Marie.
        Ils *déjeunèrent* ensemble. Ils se *promenèrent* sur les berges.
        Le soir, ils *s'embrassèrent* pour la première fois.
        'That Saturday marked the beginning of Paul and Mary's relation.
        They had lunch together. They went for a walk on the riverbank.
        In the evening, they kissed for the first time.'

The Passé Simple may occur in contexts with backward temporal sequencing, but only accompanied by an appropriate connective, such as *dès que* 'as soon as', as
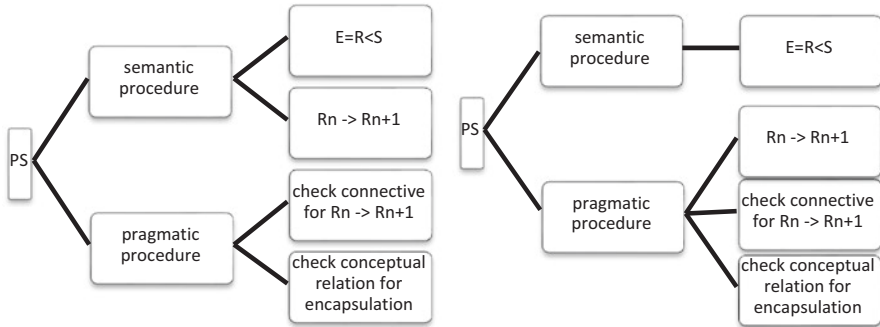
Fig. 2.1 Interpretation of the Passé Simple: Version 1 and 2

shown in examples (386) and (387), from de Saussure (2003, 223). Without the connective, the Passé Simple imposes temporal progression (i.e. the convicted fainted before the reading of the sentence).

(386) Le condamné s'*évanouit* dès que le juge *lut* la sentence.
       'The convicted fainted as soon as the judge read the sentence.'
(387) Le condamné s'*évanouit*. Le juge *lut* la sentence.
       'The convicted fainted. The judge read the sentence.'

Consequently, de Saussure proposes two possible descriptions of the semantics and the pragmatics of the Passé Simple (de Saussure 2003, 228), which are interpretative procedures.[12] In version 1, on the left-hand side of Fig. 2.1, there are *two semantic procedures* specific to the Passé Simple (i.e. to locate E before S via an R simultaneous to E, and to increment R if possible, marking temporal progression) and *two pragmatic procedures* (i.e. if there is a connective or a conceptual relation requiring backward temporal progression, allow it). However, hearers apply the default procedures unless they are blocked by the contextual information regarding the connectives and conceptual rules. Version 2, on the right-hand side of Fig. 2.1, is based on the argument that the value of R must be computed contextually; hence, in this version, this step is independent independent of the semantic procedure and is included in the pragmatic interpretation, which therefore includes three steps.

Taking the same procedural pragmatics approach, Sthioul (1998), Tahara (2000) and de Saussure (2003) discuss *descriptive* and *interpretative* usages of the Passé Simple. In Relevance Theory, utterances point to world representations—i.e. they represent hypotheses, thoughts, beliefs, etc. about the world (or the fictional world of a novel). In this case, utterances are used descriptively. There are also cases when an utterance is used to represent the thought or belief of third party at odds with the speaker's at the moment of speech S. In this case, utterances are used subjectively (de Saussure 2003, 130). As far as verbal tenses are concerned, de Saussure argues

---

[12] For the exact algorithm to follow, see de Saussure (2003, 228).

Table 2.2 Descriptive and interpretative usages of the Passé Simple

Descriptive usages of Passé Simple	Interpretative usages of Passé Simple
Perfective	Inchoative or Perfective
$E = R < S$	$E = R < S$
$R_n \rightarrow R_{n+1}$	$R_n \rightarrow R_{n-1}$ or R_{n+1}
Neutral perspective	Subjective perspective
Emphasized information	Emphasized information

that semantic and pragmatic temporal procedures, combined with contextual assumptions, may trigger interpretative usages. According to Tahara (2000), the Passé Simple has descriptive and interpretative usages, which present the features provided in Table 2.2.

Descriptive usages correspond to the classical description of the Passé Simple. As for interpretative usages, the Passé Simple can be inchoative, as in (388) and (389), from Sthioul (1998, 217 and 218). The interpretative Passé Simple can also be perfective, providing instructions for backward temporal sequencing, as in example (390), from Vuillaume (1990, 10). In all these examples, the Passé Simple presents the situation from a subjective perspective, identified by the hearer, based on contextual assumptions (i.e. the moment when Paul perceives the cold in the first example, and sees the monster in the second example, and the moment signalled by the temporal deictic *today*, corresponding to the character's—not the speaker's—*today*, in the third example).

(388)   Paul *sortit*. Dehors, il *fit* bigrement froid.
          'Paul went out. Outside, it was fantastically cold.'
(389)   Paul leva les yeux. Un monstre *se tint* devant lui.
          'Paul looked up. A monster was standing in front of him.'
(390)   Le malheur diminue l'esprit. Notre héros eut la gaucherie de s'arrêter
          auprès de cette petite chaise de paille, qui jadis avait été le témoin de
          triomphes si brillants. *Aujourd'hui* personne ne lui *adressa* la parole;
          sa présence était comme inaperçue et pire encore.
          (Stendhal H. de., *Le rouge et le noir*).
          'Misfortune lessens the spirit. Our hero had the clumsiness to stop next to
          this small straw chair, which was long ago the witness of such
          brilliant triumphs. Today nobody talked to him, as though his presence
          were unnoticed, or even worse.'

According to the procedural pragmatics approach, de Saussure (2003) (also de Saussure and Sthioul 2005) systemized these observations and proposed a general procedure for the interpretation of the Imparfait. Based on previous work (de Saussure and Sthioul 1999), he argued that the Imparfait instructs the hearer to build an *unsaturated P variable interior to the event*, which will be saturated contextually either by the reference moment R (corresponding to descriptive usages of the Imparfait) or by a moment of consciousness C (corresponding to interpretative

usages of the Imparfait). It is thus in the process of assigning temporal reference that the hearer builds a subjective perspective of the situation.

In his analysis of the narrative Imparfait, de Saussure suggested that it occurs when the hearer infers, from contextual information, either achievement implicatures (blocked in the descriptive usages of the Imparfait) or forward/backward temporal sequencing, as in (391) and (392) respectively. He emphasizes that the narrative Imparfait is not interchangeable with the Passé Simple because it provides a view of the event from the interior, whereas the Passé Simple views the process as a whole. In (391), the adverb *déjà* ('already') suggests the speaker's subjective perception of the situation from the interior, and occurs with the narrative Imparfait. The same utterance is not acceptable with the Passé Simple, as in (393), which imposes a view from the exterior.

(391)   Le train quitta Londres. Une heure plus tard, il *entrait déjà* en gare de Birmingham. (Sthioul 1998, 213)
The train left London. One hour later, it enter.3SG.IMP already in Birmingham station.'
'The train left London. One hour later, it was already entering Birmingham station.'

(392)   Judith ne reconnut pas le "joyeux colporteur" qui la *quittait* quelques semaines plutôt. Klum (1961, 258)
Judith did not recognize the "happy peddler" who her leave.3SG.IMP three weeks before.
'Judith did not recognize the "happy peddler" who broke up with her three weeks before.'

(393)   Le train quitta Londres. Une heure plus tard, il *entra* ?déjà en gare de Birmingham.
'The train left London. One hour later, it enter.3SG.PS already in Birmingham station.'

De Saussure (2011, 2013) explored cases when tenses do not refer to time, or refer to points in time other than those referred to in most cases. To be more precise, he pays special attention to narrative and background uses of the Imparfait, and future time reference with the Passé Composé, among others. According to de Saussure's (2011, 67) methodological criterion for distinguishing between conceptual and procedural information, these distinctive possible interpretations cannot be accounted for, unless they are written into the verbal tense's procedure. In other words, there are no identifiable conceptual cores of the Imparfait and Passé Composé that can predict their distinctive interpretations. According to de Saussure, there are three aspects that contribute to distinctive interpretations of certain verbal tenses:

- Constraining contextual assumptions
- Contextual saturation of temporal coordinates R and S
- Communicative principle of relevance

The Imparfait in (394) and (395) changes its behaviour (similar to the English progressive, except that it doesn't imply dynamicity) under the contextual constraints of boundedness and temporal sequencing in (394), by virtue of relevance. The third party subjective perspective of the eventuality, the C-point, as in (391), is a semantic procedural constraint. Since the sentence carries the presumption of its own relevance, its interpretation must be consistent with the pertaining contextual assumptions. And this happens by a pragmatic modulation of the temporal interpretation associated with the Imparfait. The situation is similar for the interpretation of the Passé Composé in (395), where the representation of the eventuality is pragmatically shifted into the future, from where it is conceived of as past. This shift occurs due to the future temporal adverbial positioning the projected point R corresponding to a third party's viewpoint.

(394) A huit heures, Marie *trouvait*   ses clés et   *sortait*.
       At eight,   Mary find.3SG.IMP her keys and get out.3SG.IMP
       'At eight, Mary found her keys and left.'
(395) Dans un an, j'*ai fini*   avec cette dette.
       In a year,   I finish.1SG.PC with this debt
       'In a year, I will have finished with this debt.'

Another example of the procedural nature of tense markers is that of the analysis of the simple and compound past forms in Spanish. Aménos-Pons (2011) accounts for the distinctive possible interpretations of the Spanish compound past (resultative, existential, universal, hodiernal past and hot news, illustrated in examples (396)–(400)) in terms of its procedural content (Aménos-Pons 2011, 241).

(396) Los precios *han subido* mucho. Ahora es imposible comprar nada.
       'Prices have increased a lot. Now it is impossible to buy anything.'
(397) *Ha viajado* muchas veces a Europa.
       'He/she has travelled many times to Europe.'
(398) *He vivido* treinta años aquí y conozco bien este país.
       'I have lived here thirty years and I know this country well.'
(399) Hoy, Luisa *ha salido* del trabajo a las ocho.
       'Today, Luisa has left her workplace at eight.'
(400) !!Luisa se *ha divorciado* el mes pasado!!
       'Luisa has got divorced last month!!'

He defines the procedural meaning of the Spanish compound past as follows:

- The hearer must represent an eventuality of any type as bounded, locate it in the past and consider some kind of relation between E and S (via an R connected to S)

Aménos-Pons comments that the relation E < S is common to all interpretations, but has a changing nature. Both resultative and existential interpretations convey the idea that an event has taken place, causing a result state that is thought to hold at S

(though the result state has a different source for each of the two interpretations). In hodiernal and hot news interpretations, the eventuality is seen as closely connected to S without any result state represented (closeness being chronologically established for the former and speaker-based for the latter). Finally, in universal interpretations no result state is represented, since the eventuality is still going on.

Two other parameters that influences the interpretation of the compound past in Spanish is Aspect (perfective vs. imperfective viewpoint) and Aktionsart (telic vs. atelic eventualities). Perfective tenses provide bounded representations of eventualities, and thus they tend to associate with telics. Aménos-Pons argues that, being perfective, the compound past instructs the hearer to build a bounded representation of the eventuality, regardless of its type (telic or atelic). As far as the role of lexical aspect is concerned, telics are particularly compatible with resultative interpretations of the compound past. This is due to the fact that they have natural endpoints and involve a change of state. Aménos-Pons points out that the relation between resultative interpretations and telics is not systematic (there are cases of resultative interpretation arising with atelics, and interpretations without a result state with telics). He suggests that this is due to the flexible conceptual nature of lexical aspect, which accepts contextual adjustment if required, according to the criterion of consistency with the principle of relevance.

For Aménos-Pons, the procedural content of an indicative verbal tense influences its chances of occurring in narratives. Narratives require the temporal localization of eventualities in relation to each other chronologically. In the case of the Spanish compound past, the temporal localization of a bounded eventuality (in relation to S and its resulting state holding at S) minimizes the Spanish compound past's chances of occurring in narratives. On the other hand, the Spanish simple past, which does not involve a direct relation between E and S, is preferred in narratives. The procedural meaning of the Spanish simple past is described in the following terms (Aménos-Pons 2011, 248):

- The hearer must represent an eventuality of any type as bounded and locate it in the past (via an R disconnected from S)

The Spanish simple past is also a perfective tense, therefore envisaging both telic and atelic eventualities as bounded. This illustrates that grammatical aspect has the same effect on eventuality type, for both verbal tenses.

Aménos-Pons' explanation of the procedural meaning of verbal tenses in Spanish gives rise to a very intriguing conclusion: *procedural information encoded by a verbal tense provides aspectual information*. A similar explanation is given by de Saussure (2003), who assumes that, when treating temporal reference expressed by a verbal tense, the human brain 'applies an aspectual strategy for building cognitive representations of eventualities' (de Saussure 2003, 179).

An initial drawback to de Saussure's model is the usage of the generic notion *verbal tense*, which does not foresee a distinction between Tense and Aspect with respect to their roles in building mental representations of eventualities. De Saussure's model assumes that verbal tenses encode procedural information providing aspectual information. One of the problems of this approach, where temporal

information and aspectual viewpoint are mingled, is that it might lead to confusion regarding the semantic meaning of a verbal tense and its pragmatic uses. Secondly, it cannot be applied for a language other than that on which the model was developed, such as languages where the distinction between Tense and Aspect is more relevant, including other tense-prominent languages like English where progressive aspect is morphologically marked, aspect-prominent languages, and tenseless languages.

The second drawback is the overwhelming emphasis given to the category Tense in Western European studies of Romance languages. Treating verbal tenses in this way prompts ambiguous temporal and aspectual interpretations of verbal tenses, and discourages scholars contrasting verbal tenses cross-linguistically (see also Jaszczolt 2005, 2009, 2012) and building an accurate understanding of how temporal reference is expressed in natural language.

Finally, any analysis of verbal tenses should also provide answers to questions about the status of *eventuality type* (because of their very rich inter-relations), the status of *Aspect* (perfective and imperfective, Comrie 1976), and the way in which these types of meanings relate to each other. The current literature suggests that eventuality type has a conceptual nature (Moeschler 1994), that grammatical aspect encodes procedural information (Žegarac 1991; Leonetti and Escandell-Vidal 2003), and that these types of information are hierarchically organized (Moeschler 2000a).

2.3.4   Verbal Tenses as Procedural Expressions: Temporal Relations

Wilson and Sperber (1998) discussed the temporal (and causal) relations of conjoined propositions (as well as the case of *and*), and suggested that they are pragmatically determined aspects of what is said, and thus part of explicatures. They argue that the treatment of utterances' temporal and causal connotations requires consideration of three interrelated issues: the *interval* problem; the *cause-consequence* problem; and the *temporal order* problem. The interval problem is shown by examples (401) and (402), where the hearer assumes different time intervals: almost instantaneous in the former, and a much larger interval in the latter. The cause-consequence problem is shown by examples (401) and (403), where the hearer assumes that the glass broke because it was dropped, as in the former, and that Mary got angry because Peter left, as in the latter.

(401)   John dropped the glass. It broke.
(402)   They planted an acorn. It grew.
(403)   Peter left. Mary got angry.

The source of the cause is different in these two examples: it is conceptual in the former, and speaker-based in the latter. Finally, the sequencing problem is shown by example (403), where the hearer would assume that Peter left before Mary got angry.

(404)   I took out my key. I opened the door.

As far as the interval issue is concerned, Wilson and Sperber (1998) point out that it also applies to single sentences, such as (405) and (406). If, by way of verbal tense, the eventuality is located at some point within an interval stretching back from the moment of speech S, the hearer's task is to choose from a series of logical possibilities: *within the last few minutes, within the last few hours, within the last few days, weeks, months*, etc. Wilson and Sperber argue that the hearer's choice affects the truth-conditions of the proposition and its cognitive effects. If the negation test is applied to verify the truth-conditional status, as in (407) and (408), the claim that the speaker has not had breakfast may be true within the last few minutes or hours, but false if the time interval refers to the last few weeks. The hearer's cognitive effects resulting from the processing of the sentence are greater for narrower intervals than for larger intervals.

(405)   I have had breakfast.
(406)   I have been to Tibet.
(407)   I have not had breakfast.
(408)   I have not been to Tibet.

Wilson and Sperber claim that the logical structure of the proposition is completed by the hearer's choice of the interval. This information is part of the explicature of the sentence. In the search for optimal relevance, the hearer narrows the interval according to contextual assumptions and encyclopaedic knowledge (or ready-made schema, such as taking a key and immediately using it to open the door, or having breakfast each morning) until he has an interpretation consistent with the communicative principle of relevance. In cases where no ready-made schema exists, such as in (409), the hearer might either make the hypothesis that the two events are unrelated and happened simultaneously or, in a very specific context (such as detective story for example), make the hypothesis that John used the handkerchief to open the door in order to avoid leaving fingerprints. In this case, there is an expectation of relevance for later justifying the use of the handkerchief.

(409)   John took out his handkerchief and opened the door.

As far as the cause-consequence problem is concerned, causality is an important part of human cognition,[13] allowing language users to predict the consequences of

---

[13] See, for example, Hume (1738), Davidson (1967, 1980), Talmy (1988) and more recent discussions such as Moeschler (2007), Reboul (2007), Blochowiak (2009, 2014b), among others.

their own actions and those of others. Relevance Theory assumes, as Wilson and Sperber (1998) point out, that cause-consequence schemas are highly accessible to the mind for the interpretation of sentences like (403). According to the communicative principle of relevance, the information that Peter left must contribute to the overall cognitive effects. If this is the case, all other possible interpretations will be discharged.

Moeschler (2000a, 2002b) discusses the advantages of relevance-theorists' explanation of the status of temporal and causal inferences. Firstly, the temporal interpretation corresponds to a pragmatic enrichment of the propositional form of the sentence, and contributes to its truth conditions. In example (410), from Wilson and Sperber (1998, 171), the disjunction is not redundant because each disjunct brings a genuine contribution to the truth-conditions of the utterance. This is based on the assumption that the events presented in each disjunct happened in a different order.

(410)   It's always the same at parties: either I get drunk and no-one will talk to me or no-one will talk to me and I get drunk.

Secondly, relevance theorists' explanation focuses on *processing efforts* rather than *cognitive effects*. Examples (405)–(408), with the compound past, produce two interpretations (either forward temporal inference or backward causal inference), and neither syntactic nor semantic structures indicate how the sentence should be interpreted. The interpretation is consistent with the communicative principle of relevance. This means that a temporal or a causal interpretation will be chosen, depending on which manifest facts are more accessible to the hearer, and based on the mutual cognitive environment.

Thirdly, forward temporal inference, i.e. the temporal order, and backward causal inference, i.e. the reverse-causal interpretation, are not the only possible relations between eventualities. There are two other possible relations, namely *simultaneity* as in (411), and *indeterminacy* as in (412).

(411)   Bill smiled.   He smiled sadly. (Wilson and Sperber 1998)
(412)   Cette nuit-là, notre héros *but* la moitié d'une bouteille de whisky
        et *écrivit*   une lettre à Lady Ann.
        That night, our hero   drink.3SG.PS half a bottle of whisky and
        write.3SG.PS a letter to Lady Anne
        'That night, our hero drank half a bottle of whisky and wrote a letter to Lady Anne.'

Moeschler (2000b) defines simultaneity and indeterminacy as follows:

- Simultaneity: E_1 covers (partially) E_2, which is a part of the eventuality denoted by E_1 is included in the temporal interval defining E_2

- Indeterminacy: the relation between E_1 and E_2 is undetermined if determining the relation is not necessary for understanding E_1 and E_2 or if determining the relation is not possible.

Fourthly, temporal order does not seem to be central to temporal coherence in discourse. Causality plays an important role, raising the question of the relation between temporality and causality. In example (413), the only possible relations are forward causal and temporal relations, while in (414), several relations are possible (forward temporal and causal, forward temporal and backward causal, or backward temporal and causal).

(413) Socrate *but*   un coup et *tomba*   raide.
       Socrates drink.3SG.PS a mouthful   and fall.3SG.PS stone
       'Socrates drank a mouthful and fell down dead.'

(414) Marie cria   et Pierre partit.
       Mary scream.3SG.PS and Peter leave.3SG.PS
       'Mary screamed and Peter left.'

These examples suggest that causal relations are a subset of temporal relations. Wilson and Sperber (1998) give an example where a causal relation occurs without a temporal relation, as in (415).

(415) Susan is underage and can't drink.

Moeschler's proposal is that causal and temporal relations are two sets of relations that can have a Boolean junction. This means that, for two eventualities E_1 and E_2, there can be an intersection of causal and temporal relations for which [E_1 causes E_2] implicates [E_1 precedes E_2]. Two sentences can produce identical cognitive effects on the basis of different explicatures and implicated premises, as in (416) and (417). In (416), the temporal relation [E_1 precedes E_2] is part of the explicature while the causal relation [E_1 causes E_2] is an implicated premise. In (417), the causal relation [E_1 causes E_2] is part of the explicature, while the temporal relation [E_1 precedes E_2] is part of the implicated premise.

(416) Max *a laissé*   tomber le verre (E_1). Il s'*est cassé* (E_2).
       Max dropp.3SG.PC the glass.   It break.3SG.PC
       'Max dropped the glass. It broke.'

(417) Le verre s'*est cassé* (E_2). Max l'*a laissé* tomber (E_1).
       The glass break.3SG.PC. Max it dropp.3SG.PC
       'The glass broke. Max dropped it.'

I have stated above that there are several types of possible relations between eventualities, as summarized in Fig. 2.2, which considers temporal and causal relations. As far as temporal relations are concerned, they may or may not be forward temporal inferences (temporal sequencing). In the case where there is no temporal
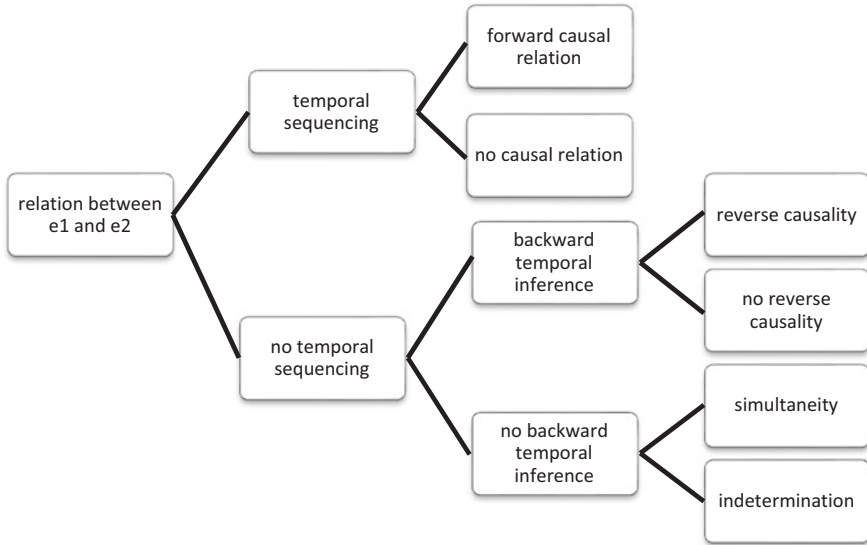
Fig. 2.2 Possible relations between eventualities

sequencing, there are two new possibilities: either there is or is not a backward temporal inference. And finally, if there is no backward temporal inference, then the cases of temporal simultaneity or indetermination can be identified. Temporal sequencing may or may not be accompanied by a forward causal relation, as in (413) and (415) respectively. Backward temporal inference may or may not be accompanied by reverse causality, as in (418) and (419) respectively.

(418) Max tomba.   Jean   l'avait poussé.
        Max fall.3SG.PS. John him push.3SG.PQP
        'Max fell. John had pushed him.'
(419) Jean *prépara*   son café.   Il s'*était levé*   sans entrain.
        John prepare.3SG.PS his coffee. He RFX wake up.3SG.PQP without energy
        'Jean prepared his coffee. He woke up without energy.'

Moeschler's principle of temporal interpretation of the discourse is that, during the comprehension process, the hearer makes inferences about the temporal sequencing of eventualities, which are forward or backward temporal inferences. In SDRT, these correspond roughly to the discourse relations Narration and Explanation respectively. These are not default inferences (in contrast to SDRT, where Narration is the default inference), but are driven by linguistic expressions (encoding procedural and conceptual information) and non-linguistic information (contextual hypotheses and encyclopaedic knowledge).

Of procedural expressions, the most relevant for temporal interpretation at the discursive level are connectives and verbal tenses. For example, the conceptual rela-

tion holding between the verbs *pousser-tomber* ('push-fall') and the compound past expresses a forward temporal and causal relation in (420), and a backward temporal and causal relation in (421). Examples (422) and (423) illustrate how the insertion of the connective changes the direction of the temporal and causal relation: backward in the former (despite the forward direction conveyed by the conceptual relation), encoded by the connective *parce que* ('because'); and forward in the latter, encoded by the connective *et* ('and').

(420)   Marie a poussé Jean. Il est. tombé.
        'Mary pushed John. He fell.'
(421)   Jean est. tombé. Marie l'a poussé.
        'John fell. Mary pushed him.'
(422)   Marie *a poussé* Jean <u>parce qu</u>'il *est tombé.*
        'Mary pushed John because he fell.'
(423)   Jean est. tombé <u>et</u> Marie l'a poussé.
        'John fell and Mary pushed him.'

Examples (426)–(429) illustrate the relation between verbal tense and connective. The Passé Simple in (424) and (425) conveys a forward temporal direction. The examples in (426) and (427) illustrate the compatibility of the Passé Simple with the connective *et*, which explicitly expresses the forward temporal relation. Example (428) demonstrates the incompatibility of the Passé Simple, conveying a forward relation, and the connective *parce que*, which imposes a backward relation. This incompatibility disappears in (429), where the backward relation is maintained by the conceptual relation between the verbs. As seen in examples (420)–(423), the Passé Composé is not directional (i.e. it does not impose a temporal direction), and is compatible with the direction imposed by the conceptual relation *pousser-tomber* ('push-fall') and the connectives *parce que* 'because' and *et* 'and'.

(424)   Marie *poussa* Jean. Il *tomba.*
        'Mary pushed John. He fell.'
(425)   Jean *tomba*. Marie le *poussa.*
        'John fell. Mary pushed him.'
(426)   Marie *poussa* Jean *et* il *tomba.*
        'Mary pushed John and he fell.'
(427)   Jean *tomba et* Marie le *poussa.*
        'John fell and Mary pushed him.'
(428)   ?Marie *poussa* Jean *parce qu*'il *tomba.*
        ?'Mary pushed John because he fell.'
(429)   Jean *tomba parce que* Marie le *poussa.*
        'John fell because Mary pushed him.'

The plus-que-parfait is the opposite of the Passsé Simple in this regard. It conveys a backward temporal relation, as in (430), and this relation is expressed explicitly by the connective *parce que*, in (431). Example (432) expresses the

incompatibility of the plus-que-parfait, conveying a backward relation, and the connective *et*, which imposes a forward relation.

(430)   Marie *poussa* Jean. Il *était tombé*.
        'Mary pushed John. He had fallen.'
(431)   Marie *poussa* Jean *parce qu*'il *était tombé*.
        'Mary pushed John because he had fallen.'
(432)   ?Marie *poussa* Jean *et* il *était tombé*.
        ?'Mary pushed John and he had fallen.'

The model developed by Moeschler (2000a, 2002b) for the temporal interpretation of discourse is called the Model of Directional Inferences (MDI). The basic assumption is that, if linguistic and non-linguistic sources provide contradictory directional information, the conflict must be resolved in order to achieve the intended cognitive effects. The MDI postulates the following hierarchies for the various types of information that contribute to directional inferences (Moeschler 2000a, 7):

- Connectives >> tenses >> verbs
- Contextual assumptions >> connectives >> tenses >> verbs
- Contextual information >> linguistic information
- Contextual assumptions >> procedural information >> conceptual information

The first hierarchy considers the hypothesis that, in case of mismatches, the direction encoded by connectives prevails over the direction given by the verbal tense, which in turn prevails over the direction given by the verbs (the conceptual relation). The second and third hierarchies are based on the relevance-theoretic assumption that linguistic information is underdetermined, and is adjusted according to contextual assumptions. In case of mismatches, the direction given by contextual assumptions prevails over the direction given by linguistic expressions. Finally, the fourth hierarchy asserts that procedural information (provided by connectives and verbal tenses) prevails over conceptual information (provided by conceptual relations and situation types). Consequently, there is another assumption resulting from these hierarchies:

- verbs and verbal tenses bear weak directional features
- connectives and contextual assumptions bear strong directional features

Moeschler insists on the fact that the working hypotheses of the MDI should not be considered fixed rules, because they can be overturned (2002b, 9). His idea is that the hearer's access to the intended interpretation is governed by the principles of *economy* (as defined by Relevance Theory) and *optimality* (Prince and Smolensky 1993). In his words (2002b, 2):

> The combination of linguistic and non-linguistic information is directed by the general principle of optimality. This principle states that an optimal interpretation minimizes the conflict information: the less conflict you meet, the more optimal the interpretation you get.

For de Saussure (2003), one of the MDI model's limitations comes from the prediction that the strong directional features given by connectives and contextual assumptions will always provide the temporal interpretation of the discourse. As a result, it is unclear what concrete role is played in discourse interpretation by the weak directional features given by verbal tenses and verbs. The second limitation regards the identification of accessible contextual assumptions. De Saussure points out three possible cases: (a) if contextual assumptions are built according to the presence of connectives (such as *parce que* or *et*), then the inference is triggered by linguistic expressions, meaning that the directional features given by contextual assumptions and connectives do not represent several features but are options linked to only one feature; (b) if contextual assumptions are built according to conceptual rules, then the directional features given by contextual assumptions and verbs represent, again, one and the same feature; and (c) if contextual assumptions are built according to other contextual information, then this must be explained in the model.

The third limitation concerns ambiguous examples. This is the case of temporal indeterminacy, where no temporal direction can be determined, that is to determine whether partially or totally covering whole-subpart relations, and cases where eventualities take place simultaneously (i.e. temporal simultaneity). Indeterminacy, in (433)–(435), and simultaneity, in (436), are classic problematic examples (Kamp and Rohrer 1983; Moeschler and Reboul 1998; de Saussure 2003). In such cases, the MDI's explanation is that a contextual hypothesis, coming from general world knowledge or conceptual rules, cancels the temporal direction provided by other sources, such as verbs, tenses or connectives. The MDI does not provide mechanisms to allow for non-directional temporal inferences, as in these examples, with the Passé Simple.

(433)   L'été de cette année là *vit* de nombreux changements dans la vie de
        nos héros. François *épousa* Adèle, Jean-Louis *partit* pour le Brésil et
        Paul *s'acheta* une maison à la campagne.
        'The summer of that year saw several changes in our heroes' lives.
        François married Adele, Jean-Louis left for Brazil and Paul bought a
        house in the countryside.'
(434)   Cette nuit-là, notre héros *but* une bouteille de whisky et *écrivit* une lettre à
        Lady Ann.
        'That night, out hero drank a bottle of whisky and wrote a letter
        to Lady Ann.'
(435)   Max *construisit* un château de cartes. Il *était* paisiblement à la maison.
        'Max built a house of cards. He was at home, in peace.'
(436)   Bianca *chanta* et Pierre l'*accompagna* au piano.
        'Bianca sung and Igor accompanied her on the piano.'

I would like to argue that both Moeschler's model (MDI) and de Saussure's procedural model (PM) are potentially accurate models for French verbal tenses with respect to how the hearer processes temporal information at the discursive level.

The two models have both similarities and dissimilarities. As far as similarities are concerned, I can suggest the following:

- They are both fine-grained models of semantic and pragmatic sources of temporal information.
- Both models make use of the conceptual and procedural information from linguistic expressions—namely, verbal tenses, connectives and temporal adverbials.
- Neither proposal models grammatical and lexical aspect concretely (one exception might be the PM's suggestion that a verbal tense such as the French Passé Composé triggers a perfective representation of the process).
- In both models, the interpretation process is driven by the pursuit of relevance.
- Both models are theoretical models, and lack consistent and objective empirical bases, such as corpus analyses and the experimental validation of hypotheses.
- They are both monolingual models, and lack therefore cross-linguistic perspective.

   I would identify the following dissimilarities between the models:

- The PM assumes that a verbal tense provides a temporal direction by default, whereas the MDI does not.
- The PM makes use of temporal relations, whereas MDI makes use of both temporal and causal relations holding between eventualities.
- The two models suggest a similar method for resolving potentially conflicting information: a hierarchy of features in MDI, and a conditional procedure (i.e. of the *if...then* type) making use of the same hierarchy of features in the PM.

   In more recent research, Moeschler and colleagues (Moeschler et al. 2012; Grisot and Moeschler 2014; Moeschler 2016) propose and defend the *mixed conceptual-procedural model* of verbal tenses (MCPM). The MCPM, more flexible than the MDI model, has been successfully tested and validated on empirical data such as the English Simple Past, and the French Passé Composé, Passé Simple, Imparfait and Présent Historique (Grisot and Moeschler 2014; Moeschler 2014).

   The MCPM is based on a classical Reichenbachian analysis of verbal tenses, supplemented by further pragmatic features. The use of S, R and E, as well as temporal relations of precedence and simultaneity (both co-extensional and inclusive), provides a general tense system template distinguishing between the sub-systems: one for past tenses, and the other for present and future tenses (Moeschler 2016, 130). The MCPM proposes a maximum of six pragmatic uses of verbal tenses, extrapolated from the following hierarchy of features: [±narrative] > [±subjective] > [±explicit]. The [±narrative] feature indicates whether or not temporal ordering is obtained by use of the current verbal tense; [±subjective] refers to the presence or absence of a point of view (perspective or *self* in Banfield 1982); and finally, the [±explicit] feature signals whether the perspective is explicitly mentioned or implicitly accessed, as shown in Fig. 2.3.

   For Moeschler (2016, 130),
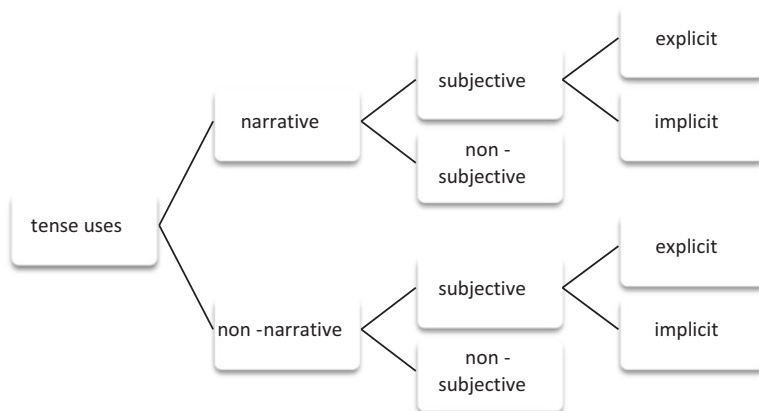
Fig. 2.3 Types of uses for tenses

Table 2.3 Conceptual and procedural analysis of the French Passé Simple (PS) and Imparfait (IMP)

Tenses	Meanings/Usages	Conceptual	Procedural		
			Narrative	Subjective	Explicit
PS	PS1	$E = R < S$	+	−	−
	PS2		+	+	+
IMP	IMP1	$E \supseteq R < S$	+	+	−
	IMP2		−	+	+
	IMP3		−	+	−
	IMP4		−	−	−

Pragmatic outputs of the interpretation of tenses are of the same kinds (they are defined by the values of these three features), whereas their differences lie in their semantics, that is, the relation between S, R and E they encode.

In other words, verbal tenses have a robust semantic component given by the different configurations of Reichenbachian temporal coordinates, which are encoded at the conceptual level, and pragmatic uses provided by the three features of the model, as shown in Table 2.3, from Moeschler (2016, 135). The table also indicates that, in actual usage, not all verbal tenses have all six of the usages predicted by the MCPM model. For example, the French Passé Simple has two main usages: [+narrative] [−subjective], as in (437), and [+narrative] [+subjective] [+ explicit], as in (438).

(437)   Max *entra* dans le bar. Il *alla* s'asseoir au fond de la salle.
        'Max entered the bar. He sat down at the back of the room.'
(438)   Aujourd'hui, personne ne lui *adressa* la parole. (Stendhal, *Le rouge et le noir*)
        'Today, no one spoke to him.'

The model of temporal reference defended in Chap. 5, the Highly Discriminatory model, offers large empirical and cross-linguistic testing of the theoretical assumptions behind the MDI and PM models, which were based only on French verbal tenses, as well as the MCPM model, which makes use of the generic notion of *verbal tense*, thus without distinguishing between the categories of Tense, Aktionsart and Aspect.

2.4 Summary

This chapter was dedicated to discussing formal semantic-discursive and pragmatic assessments of temporal cohesive ties. As in Chap. 1, it is evident that most scholars consider the notion of *verbal tense* to be relevant when determining temporal cohesion and temporal coherence in a discourse. Nevertheless, some of them have specifically focused on the role played by aspectual classes, for example, in order to explain the phenomena of temporal sequencing (also referred to by researchers working on coherence as *chronological sequential* temporal relations) and temporal simultaneity (also referred to as *synchronous* or *simultaneity* temporal relations) (see Chap. 6).

I have discussed a series of formal semantic-discursive accounts, such as Bennet and Partee's logical approach within a compositional semantics account, Partee's (1973, 1984) and Hinrich's (1986) treatment of verbal tenses as temporal anaphors, as well as the implementation of this idea in Kamp's discourse representation theory. As for Dowty's and ter Meulen's proposals focusing on the role of aspectual classes, the main drawback seems to be the rigidity of the rules employed by their models. Broadly, despite their accuracy in explaining temporal information provided by the language system, the main limitation is their inability to account for the aspects of meaning which are not encoded and which depend on the hearer's interpretation of the discourse.

Consequently, I have addressed a series of pragmatic assessments of time, such as the Gricean, neo-Gricean and post-Gricean accounts. I have focused on Relevance Theory, which—due to its cognitive foundations of the language comprehension process—is a suitable framework for developing robust accounts of Tense, Aktionsart, Aspect and their roles as cohesive ties. A central assumption of Relevance Theory is that the linguistic expressions that a speaker utters underdetermine the content that she communicates, not only at the level of implicatures but also the propositional content she communicates explicitly (that is, the explicature of the utterance). The hearer must therefore recover inferentially the speaker's intended meaning, at the levels of explicature and implicature. Another proposition of Relevance Theory is that linguistic expressions encode conceptual information and

procedural information (i.e. instructions for manipulating conceptual representations) which contribute to and constrain the interpretative process, respectively.

As such, I have discussed previous proposals according to which Aktionsart encodes conceptual information whereas Tense and Aspect represent instructions for the manipulation of these conceptual representations. In this chapter, I have shown that temporal relations holding between eventualities could be seen as semantic discourse relations (in DRT), as default interpretations associated with individual verbal tenses (as in Kamp and Rohrer 1983, Moeschler 2000a, 2002b, and de Saussure 2003), as conversational implicatures (as suggested by Grice), or as pragmatically determined aspects of *what is said* (as suggested by Wilson and Sperber 1998). In Chap. 5, and based on the experiments discussed in Chap. 4, I will argue that temporal relations holding between eventualities represent procedural information encoded by the category of Tense. The data tested in these experiments are drawn from bilingual and multilingual corpora which I explored and analysed. The following chapter is devoted to this topic.

Chapter 3
Corpus-Based Contrastive Study of Verbal Tenses

Check for updates

3.1 Dealing with Corpus Data

The corpus linguistics field has flourished over the last 50 years, mainly due to linguists' growing interest in having objective, quantifiable and reproducible data, and in using computers, which has without a doubt facilitated the use of large, and very large, corpora. For example, Kolaiti and Wilson (2014) carried out a corpus-based investigation of the unitary account from Relevance Theory, and lexical pragmatics in particular, in which narrowing, approximation and metaphorical extension are explained within the same model. They argue that:

> Corpus-based evidence provides a valuable complement to more traditional methods of investigation, by helping to sharpen intuitions, develop and test hypotheses and reduce the possibility of intuitive data being mere artefacts of the linguist. (Kolaiti and Wilson 2014, 211)

They point to the fact that corpus studies are a valuable source of inspiration for theorists in Relevance Theory, who are mainly concerned with the mental processes that enable the hearer to infer the speaker's meaning. This is primarily due to the fact that corpus work has forced 'us to consider examples that we might not have come up with ourselves, helping to sharpen and test our hypotheses, and raised new intriguing questions' (Kolaiti and Wilson 2014, 212).

Defining a corpus can be an easy and a difficult task at the same time, because of the numerous factors to consider, such as the type of text, the size, the purpose of creation, the way in which it can be analysed, etc. The well-known description of a corpus as "a body of naturally occurring language" (McEnery et al. 2006, 4) is largely accepted by the corpus linguistics community, as well as other domains that use corpora, such as empirical pragmatics, Natural Language Processing, Machine Translation and Translation Studies (Baker 1993, 1995).

The main features of corpora are that they have *finite size* (which may change over time, but which, in general, is pre-established such that construction criteria

like balancing can be applied), constitute a *representative sample* of the variety or varieties of the language analysed, and represent the *standard reference*. Corpora have been compiled for many different purposes, and as such have different kinds of design, and include texts of different natures. Another definition of a corpus is that it constitutes an empirical basis by which to identify the elements and patterns of the structure of a language in order to analyse variation, for example, or that it can be analysed distributionally to check how often and where a particular phonological, lexical, grammatical or pragmatic feature occurs.

Corpora were used in linguistics before the development of computers, but around the early 1960s it was computer use that gave an enormous boost to corpus linguistics, by reducing the time taken to create, use and analyse a corpus, and greatly increasing the size of databases. The definition of a corpus can thus be modified as follows: "a corpus is a collection of texts in an electronic database" (Kennedy 1998, 3), and therefore a collection in *machine-readable* form. This feature allows for semi-automatic and automatic compilation and analysis. As far as size is concerned, corpora are becoming larger and larger, as they can be tagged, compiled and analysed automatically. The most important aspect to take into account when doing corpus work is that the corpus type and size must be appropriate for the research goal (Gries 2009).

In the last 20 years, cross-linguistic studies have used more and more multilingual corpora, which has helped the revitalization of research in this domain the same time. Aijmer and Altenberg (1996, 12) indicate some of the benefits of corpus-based study in language comparison:

- They give new insights into the languages compared, giving the researcher language-specific and language-universal information, as well as information on typological and cultural differences;
- They illustrate differences between source texts (authentic texts) and their translations, and between native and non-native texts;
- They can be used in numerous domains, such as language teaching, translation, typology, semantics, pragmatics, Natural Language Processing and Machine Translation, among others.

Aijmer and Altenberg note that there is a difference—in use and purpose—between *comparable* corpora and *translation* corpora. Comparable corpora contain original texts in a certain language, and specify that the texts share broad criteria, such as stylistic genre, domain, purpose of creation, time of creation, etc. Their main advantage is that they present natural language in use, and have the property of being *authentic*. The most difficult problem with using these corpora is knowing what to compare (e.g. relating forms which have similar meanings and pragmatic functions in the languages compared, as suggested by Johansson 1998) and to what extent comparisons might yield insights.

Translation corpora contain texts that are intended to express the same meaning, and have the same discourse functions in the languages considered (Johansson 1998). Dyvik (1998) suggested that translations reveal semantic features of the source language. She argues that translation is a linguistic activity where the

translator evaluates meaning relations between expressions in an objective manner (as opposed to research which aims to develop or test a theory about relations of meaning between expressions). Translations thus provide objective linguistic data. For this reason, translation equivalence has been considered the best basis for comparison, and was used for a long time as the main principle for the construction of a *tertium comparationis* (Krzeszowski 1990) in CA. As a method used in linguistic research, corpus data have numerous advantages, as well as a series of limitations.

A great advantage of corpus data is that they allow both *qualitative* and *quantitative* analyses. In qualitative analyses of data, all sentences are treated with equal attention, and the results cannot be generalized, as they are limited to the sample of language analysed. In addition, no attempts are made to assign frequencies to the linguistic features identified in the data. In quantitative analyses, frequencies are assigned to linguistic features identified in the data; features are classified, counted and summarized. A basic step in quantitative analysis of data is to classify sentences or items according to a certain schema, and then count how many items (called *tokens* or *occurrences*) are in each group of the classification schema (called *types*). The result of this process is a *distribution* of the tokens in the corpus (McEnery and Wilson 1996).

Another advantage of working on corpora is that they form an empirical basis for researchers' intuitions. Intuitions are the starting point of any study, but can be misleading; sometimes, a few striking differences might lead to hazardous generalizations. Moreover, the results of analyses of quantifiable data allow not only generalizations (by way of statistical significance tests) but also predictions (by way of statistical analyses such as correlations[1] or multiple regression models,[2] which are often used when investigating a phenomenon as complex as language).

Corpus work is appealing when the researcher is concerned with a descriptive approach to the linguistic phenomenon considered, as well as the study of language in use, given the fact that the cotext is provided in the corpus. Corpora permit monolingual and cross-linguistic investigations. Furthermore, corpus work allows the researcher to uncover what is probable and typical, on the one hand, and what is unusual about the phenomenon considered, on the other hand.

Another advantage is that data from corpora can be annotated (enriched) with syntactic, semantic and pragmatic information, which allows more complex analyses of the corpus. Annotation is the practice of adding interpretative linguistic information to a corpus (Leech 2005), and thus enriching the original raw corpus. From this perspective, adding annotations to corpora provides additional value, and thus increases their utility (McEnery and Wilson 1996; Leech 2004). Firstly, annotated

---

[1]Correlation is a monofactorial statistical method, which investigates the relation between one independent variable (the predictor) and one dependent variable (the phenomenon of interest). Correlation does not obligatorily involve causality between the two variables (they can only be associated), and can be used only when the relationship is linear (Baayen 2008; Gries 2009).

[2]Multiple regressions are multifactorial statistical methods, which investigate the relation between several independent variables (predictors) and one dependent variable, as well as their interactions. The relation between independent variables and the dependent variable can be linear or non-linear (cf. Gries 2009, Baayen 2008).

corpora are useful both for researchers who make the annotations, and for other researchers, who can use them for their own purposes, modify them, or enlarge them. Secondly, annotated corpora allow both manual and automatic analysis and processing of the corpus; the annotations themselves often reveal a whole range of uses which would not have been practicable had the corpus not been annotated. Thirdly, annotated corpora allow an objective record of analysis which is itself open to future analysis, with decisions being more objective and reproducible. Due to automatic corpus analysis, annotated corpora are often used for training of Natural Language Processing and Machine Translation tools, such as automatic classifiers (Meyer et al. 2013).

One of the major issues with using translation corpora relates to their very nature, given the translation process and the way in which the source language can create a bias affecting the target text (the so-called *translationese* of Gellerstam 1996). Secondly, Baker (1993, 1995) points out that translated texts use *translation universals*, which are defined by Lefer (2009), quoting Laviosa (2002), as features of a translated language which are independent of the source language, such as simplification, explicitation and normalization. Thirdly, translated texts can only be compared to their original texts, and not to others. Another methodological concern when working with translation corpora is that they need to be aligned (at sentence or phrase level) and processed by parallel concordancers. As Lefer (2009) notes, alignment can be time-consuming, because automatic alignment requires manual control and correction for complete accuracy of data. Most parallel concordancers, such *ParaConc*, offer automatic pre-alignment tools. Two examples of well-known and well-used parallel corpora are *Europarl*[3] and *Hansard*.[4] Europarl is a corpus extracted from the proceedings of the European Union Parliament. It includes versions in 23 European languages, and the 1996 version contained 20 million words (Koehn 2005). The Hansard corpus is a bilingual corpus (English-French) of the proceedings of the Canadian parliament.

Other difficulties include the lack of multilingual corpora for less widespread languages, and the predilection for 'form-based research' where there is interest in a specific grammatical form (Granger 2003). These difficulties may require researchers to carry out their research manually, including building their corpus themselves, and annotating it if they are interested in phenomena other than a specific grammatical form, such as semantic or syntactic categories. Moreover, when researchers are interested in infrequent phenomena,[5] there will not be enough occurrences in the corpus. Difficulties are also encountered when investigating phenomena which are not lexically expressed, such as world knowledge used in inferences, as well as the cognitive basis of language. This is one reason why corpus data are more and more often combined with other types of data, such as experimental data.

---

[3] http://www.statmt.org/europarl/

[4] http://www.ldc.upenn.edu/Catalog/CatalogEntry.jsp?catalogId=LDC95T20

[5] For example, Grivaz (2012) studied causality in certain pairs of verbs, in a very large corpus and with human annotation experiments, and found that less frequent pairs had a high causal correlation while very frequent pairs had a small causal correlation.

Translation Spotting

Translational spotting or *transpotting* is a technique that makes use of the translation of a specific word or linguistic expression in order to distinguish its meaning and disambiguate between its senses. This method has been used not only for content words (Dyvik 1998; Noël 2003) but also for discourse relations (Behrens and Fabricius-Hansen 2003) and connectives (Zufferey and Cartoni 2012; Cartoni et al. 2013). The term *translation spotting*, coined by Véronis and Langlais (2000), initially referred to the automatic extraction of a translated equivalent in a parallel corpus. Translation spotting consists in detecting the translation of a particular word or expression in the target text, as shown by the examples of connectives in Table 3.1 (Cartoni et al. 2013).

Table 3.1 is an example of the investigation of the usages of the English connective *since*, carried out in translation corpora. The second column contains the translation of the original English sentence into French. The third column contains the linguistic expressions or types of linguistic expression used in French when translating the English *since*, called *transpots*. The idea behind this analysis is that French transpots provide information regarding the diverse contextual usages of English *since.*

Véronis and Langlais point out the difficulty of automatically spotting the words or sequences of words from the target language when there is no one-to-one correspondence between the source and the target language. Automatic spotting results have errors, and the aim of researchers working in Natural Language Processing is to reduce the number of errors as much as possible. For this reason, other researchers (Cartoni et al. 2013; Grisot and Moeschler 2014) performed the spotting manually, in order to get fully accurate data. Cartoni and colleagues agree that, despite the fact that translations do not reproduce the source language faithfully and have a number of inherent features (Baker 1993), they still can shed light on the source

Table 3.1 Example of translation spotting for the connective *since*

	English sentence	French sentence	Transpot
1.	In this regard, the technology feasibility review is necessary, *since* the emission control devices to meet the ambitious NOx limits are still under development.	À cet égard, il est. nécessaire de mener une étude de faisabilité, étant donné que les dispositifs de contrôle des émissions permettant d'atteindre les limites ambitieuses fixes pour les NOx sont toujours en cours de développement.	étant donné que
2.	Will we speak with one voice when we go to events in the future *since* we now have our single currency about to be born?	Parlerons-nous d'une seule voix lorsque nous en arriverons aux événements futurs, puisqu'à présent notre monnaie unique est. sur le point de voir le jour?	puisque
3.	In East Timor an estimated one-third of the population has died *since* the Indonesian invasion of 1975.	Au Timor oriental, environs un tiers de l population est. décédée depuis l'invasion indonésienne de 1975.	depuis
4.	It is 2 years *since* charges were laid.	Cela fait deux ans que les plaintes ont été déposées.	paraphrase

language. They suggest that theoretical insights developed according to analysis of a parallel corpus should be validated by monolingual experiments.

The theoretical idea behind translation spotting is that similarities and differences in translation can reveal semantic features of the source language (Dyvik 1998; Noël 2003). Dyvik's idea is that the activity of translation is one of the very few cases where speakers evaluate meaning relations between expressions in an objective manner, without doing so as part of some kind of meta-linguistic, philosophical or theoretical reflection. From this perspective, he suggests using translation corpora as a basis for semantic analyses. This method presupposes the existence of a *translational relation* between two languages. There are two aspects to be distinguished before determining a translational relation. The first is information regarding *parole*[6] and textual *token* items; the second is information about *langue* and *type* items. In the first case, translation choices are motivated only by reference to the particular text and its circumstances, whereas in the second case, translation choices are predictable and reflect translation correspondence relations between words and phrases, seen as types rather than textual tokens. According to Dyvik, it is on this second aspect of language that a translational relation should be built. A translational relation consists of a series of properties or, more precisely, a series of senses shared partially by the linguistic expressions standing in that translational relation. Translational relations can be identified using the translation spotting technique. In particular, in Cartoni and colleagues' study, the English connective *since* is translated into French by four linguistic expressions (three connectives and a paraphrase). In a sentence completion task experiment, Cartoni and colleagues showed that the four French translation possibilities form two clusters: a causal sense (for *étant donné que* and *puisque*); and a temporal sense (for *depuis* et *cela fait X que*). The translational relation of *since* and its transpots in French consist therefore of two properties or senses partially shared by these linguistic expressions.

Translational relations reflect partial semantic equivalences between words and expressions in different languages. Therefore, they are concrete tools for developing cross-linguistic semantic representations. A semantic representation groups together a set of linguistic expressions, across languages, which fall within the denotation of the representation (Dyvik 1998). Such cross-linguistically valid semantic representations are useful for improving the results of several Natural Language Processing tasks, such as machine translation systems, multilingual dictionaries and concordances.

Cross-Linguistic Transfer of Properties

Cross-linguistic transfer of properties is a novel technique that makes use of the notion of translational relation and its properties. My suggestion is that translation corpora permit the cross-linguistic transfer of semantic and/or pragmatic information. Samardzic (2013) also made use of this novel methodology to investigate the

---

[6]The well-known linguist Ferdinand de Saussure was the first to make the distinction between *parole* and *langue*, where the former refers to acts of language of individual people, and the latter refers to language as an abstract entity, proper to a linguistic community.

translation equivalents of a range of English light verb constructions into several languages. Unlike other European languages, Slavic languages encode Aspect morphologically. She applies the aspectual representation obtained in an English-Serbian cross-linguistic setting to classify English verbs into event duration classes.

In an experiment, native speakers of English were asked to judge Simple Past tokens with respect to Aspect and its two values *perfective* vs. *imperfective*. Participants found the task extremely difficult, and they had a very low agreement rate. The cross-linguistic transfer of properties method was therefore used in order to create human-annotated data (i.e. Simple Past tokens) with aspectual information. A native speaker translated the data into Serbian, and identified the contextual value of Aspect for each Simple Past token. Based on the assumptions related to translation corpora, this aspectual information was transferred back to the initial English source (see Sect. 4.3.3).

3.2   Bilingual Corpus: English-French

For the specific needs of this research, parallel (also called *translation*) corpora consisting of texts of four registers have been assembled. The qualitative and quantitative analyses of the corpora were carried out in two steps: (a) an initial, monolingual step, in order to see which verbal tenses occur in the corpus and to calculate their frequency in the source language; and (b) a secondary, bilingual step, in order to identify the verbal tenses used as translation possibilities in the target language for a certain tense in the source language, as well as to calculate their frequency. Analysis of frequency of tenses in the source language provided information about the verbal tenses that might be problematic candidates for machine translation systems. The assumption of this procedure is that frequent erroneously translated verbal tenses decrease the quality of the translated text more than infrequent incorrectly translated verbal forms. In this chapter, I will describe the corpus and provide the results of its analysis.

The purpose of this chapter is to describe the corpus work which is the first layer of the empirical work presented in this thesis. This research is partly based on parallel or translation corpora, consisting of texts written in English and their translations into three target languages. Three corpora have been built. The first and the second corpora are bilingual, consisting respectively of texts written in English and their translations into French, and texts written in French and their translations into English. The third corpus is multilingual, consisting of texts written in English and their translations into French, Italian and Romanian. All texts have been randomly selected, and belong to four stylistic registers: literature,[7] journalistic, legislation

---

[7] A detailed presentation of the texts from the four registers is available in the Appendix section. Some of the corpora were aligned at the sentence level by other researchers and are available for download online, and some were created during the COMTIS research project (typed and aligned manually by the author).

and EuroParl (Koehn 2005).[8] The literature register consists of the texts of several novels, either written in English and translated into French, or written in French and translated into English. The English-French-Italian-Romanian corpus consists of randomly selected passages from "Alice in Wonderland" by Lewis Carroll and their translations into the target languages. The journalistic register consists of texts from several newspapers, all of which have an online version. For the multilingual corpus, all texts were randomly selected from the Press Europ website[9] and aligned manually. The legislation register consists of randomly selected law texts from the multilingual JRC-ACQUIS parallel corpus and the EuConst Corpus.[10] The EuroParl register consists of the transcription of parliamentary debates. The language used in the EuroParl corpus is spoken but transcribed, therefore presenting features of both spoken and written language.

The purpose of the monolingual analysis is to identify frequent and less frequent verbal tenses, whereas the purpose of the cross-linguistic analysis is to identify *translation divergences*, i.e. each verbal tense which is consistently translated into the target language by more than one verbal tense. In Sects. 3.2, 3.3 and 3.4, I will describe the corpora and provide the results of the corpus analysis.

3.2.1   Monolingual Analysis

The English-French bilingual corpus consists of texts in English and their translations into French, belonging to four different stylistic genres according to the following proportions: literature 15%; journalistic 16%; legislation 38%; and EuroParl 31%. The corpus contains 1670 occurrences of predicative verbal tenses, occurring in a total of 725 sentences.[11] A total of 1281 predicative verbal tenses are considered,[12]

---

[8] The EuroParl corpus is a collection of the proceedings of the European Parliament from 1996 to 2011. It is available online at http://www.statmt.org/europarl/

[9] The translation of the journalistic articles into all the languages officially spoken in the European Union is available online at http://www.voxeurop.eu

[10] The JRC-ACQUIS corpus was collected by the Language Technology team of the European Commission's *Joint Research Centre* (JRC) in the context of the *Exploiting parallel corpora in up to 20 languages* workshop, held in Arona, Italy, on 26 and 27 September 2005. The EuConst corpus is a parallel corpus collected from the European Constitution (Tiedemann 2009).

[11] I use the word sentence to refer to a chunk of text, consisting of one or more complex clauses. Since verbal tense is a referential category and its meaning is underdetermined (as argued in Sect. 2.3), contextual and cotextual information is needed to determine its meaning. Therefore, the segmentation was performed manually, in order to decide the size of the text chunks relevant to determining the meaning of a verbal tense.

[12] The tenses under consideration are several tenses from the indicative mood: the simple present and past tenses, the present perfect and the past perfect, the present continuous and the past continuous.

Table 3.2 Verbal tenses by register in the English-French bilingual corpus

Register	No. of sentences	No. of verbal tenses	No. of verbal tenses considered	% of verbal tenses considered	% of verbal tenses not considered
Literature	118	255	232	14%	1%
Journalistic	155	275	228	14%	3%
EuroParl	136	512	403	24%	7%
Legislation	316	628	418	25%	13%
Total	725	1670	1281	77%	23%
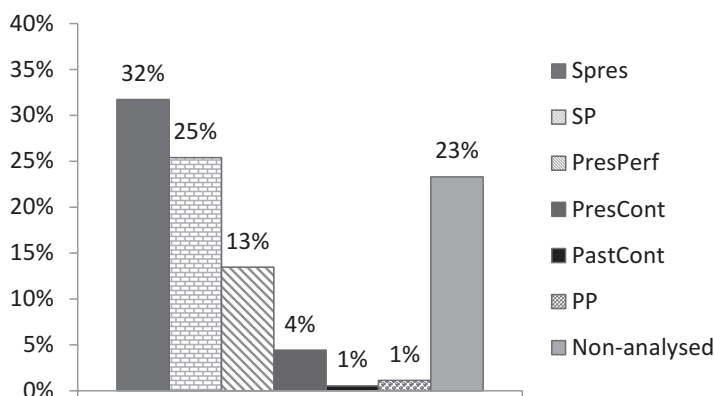
Fig. 3.1 Frequency of English verbal tenses in the English-French bilingual corpus

representing 77% of the verbal tenses occurring in the corpus, as shown in Table 3.2. The remaining 23% of verbal tenses have not been considered[13] in the analysis.

Figure 3.1 illustrates the frequency of verbal tenses analysed[14] in the English-French bilingual corpus, where the most frequent tenses are the Simple Present (32%), the Simple Past (25%) and the Present Perfect (13%), as opposed to the much less frequent past progressive, present progressive and past perfect verbal forms. This figure shows the unequal occurrence of verbal tenses in a corpus containing a total of 1670 predicative verbal forms relating to different stylistic registers. One possible explanation for the higher frequency of these verbal tenses is that they are highly context-dependent, and their interpretation depends on various contextual hypotheses.

Figure 3.2 presents the frequency of the three most frequent verbal tenses in each register. It shows that the Simple Past is the preferred tense in the literature register

---

[13] The non-analysed tenses are other tenses from the indicative mood (present perfect continuous and past perfect continuous, and all future tenses), English verbal tenses with conditional and subjunctive readings, and modal verbs.

[14] Legend: SP = Simple Past, PresPerf = Present Perfect, PresCont = Present Continuous, Spres = Simple Present, PastCont = Past Continuous, PP = Past Perfect and Non-analysed.
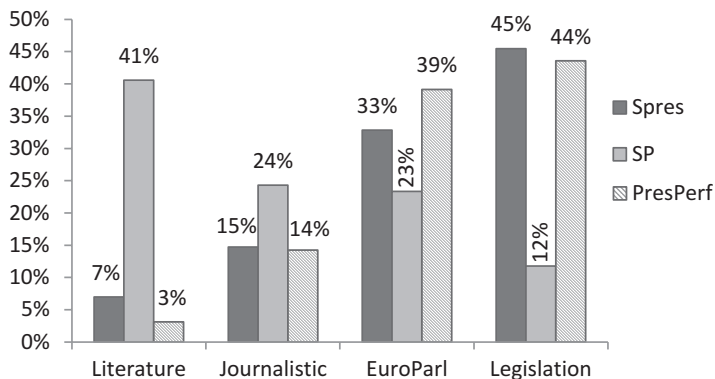
Fig. 3.2 Frequency of English tenses by register
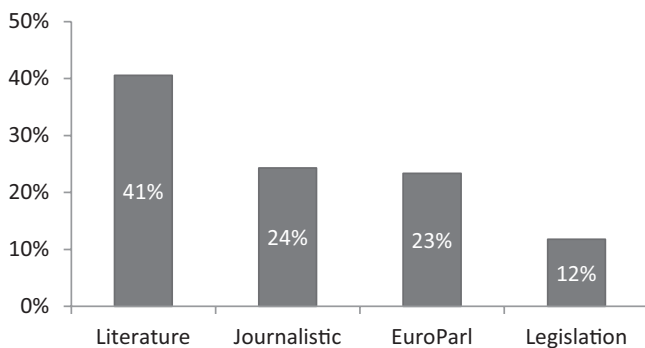
Fig. 3.3 The distribution of the SP by register

(representing 41% of the predicative tenses used) and in the journalistic register (24%). The Simple Present and the Present Perfect are used more frequently than the Simple Past in the EuroParl and legislation registers. The Simple Present and the Present Perfect show a similar distribution in the journalistic (15% and 14% respectively), EuroParl (33% and 39% respectively) and legislation registers (45% and 44% respectively), in contrast to the Simple Past.

These distributions are not surprising. Firstly, the Simple Past is preferred in narratives, instructing the addressee to order eventualities temporally with respect to one another. Secondly, the legislation register is a prospective and deontic register, and the Simple Present is a verbal tense appropriate for the expression of these interpretations (like the French Présent). The journalistic and EuroParl registers consist of mixed types of texts (small narratives, comments, descriptions, etc.).

Figure 3.3 shows the distribution of all Simple Past occurrences by register. 41% of Simple Past occurrences come from the literature register, with the remaining 59% shared between the journalistic (24%), EuroParl (23%) and legislation (12%) registers.

Table 3.3 English-French translation possibilities

English	Spres	PP	PastCont	PresCont	PresPerf	SP
French	PRES 81%	PQP 58%	IMP 67%	PRES 85%	PC 68%	PC 33%
						IMP 29%
					PRES 13%	PS 18%
						PRES 5%
	Others 19%	Others 42%	Others 33%	Others 15%	Others 19%	Others 15%

To sum up, the monolingual analysis of this corpus reveals that the most frequent verbal tenses are the Simple present, the Simple Past and the Present Perfect. In Sect. 3.2.2, I will provide the results of the cross-linguistic analysis, which show which verbal tenses consistently have more than one translation possibility in French (i.e. are ambiguous for machine translation systems).

3.2.2   Cross-Linguistic Analysis

The cross-linguistic analysis was performed using the *translation spotting* method, in order to identify *translation divergences*. A translation divergence occurs where a verbal tense for which there are at least two translation possibilities in the target language which are much more frequent than all the other possibilities. The analysis revealed two translation divergences among the verbal tenses considered: namely, the Simple Past and the Present Perfect. The results from Table 3.3 indicate that each of the first four verbal tenses is consistently translated into French by one frequent verbal form. Explicitly, the Simple Present is most often translated by the Présent,[15] the Past Perfect is most often translated by the Plus-que-parfait,[16] the Past Continuous is most often translated by the Imparfait[17] and the Present Continuous is most often translated by the Présent.[18]

The Present Perfect is one of the two translation divergences identified. The Passé Composé is most often used; the Présent is much less used, though it is more

---

[15] The Others category consists of very infrequent cases, such as 0 translation (5%), present participle, past participle and modal verbs (2% for each form), conditional, future, Imparfait, Passé Composé, Passé Simple, infinitive and noun (1% for each form) and infinitive (0.2%), forming a total of 19%.

[16] The Others category consists of Imparfait (3 occurrences representing 16%), Passé Composé (2 occurrences representing 11%), subjunctive, participle and anterior past (1 occurrence representing 5% for each form), forming a total of 42%.

[17] The Others category consists of Plus-que-parfait, noun and the *était en train de* lexical construction (1% for each form representing 11%), for a total of 33%.

[18] The Others category consists of Imparfait (4 occurrences representing 5%), 0 translation (3 occurrences representing 4%), modal verbs (2 occurrences representing 3%), future and Passé Composé (1 occurrence representing 1% for each form), forming a total of 15%.

French	English								Total
	Past continuous	Past perfect continuous	Past perfect	Present continuous	Present perfect continuous	Present perfect	Present	Simple past	
Imparfait	462 54%	7 27%	**365** **24%**	146 1%	18 2%	463 1%	1510 1%	**8060** **21%**	11031 3%
Impératif				37 0%	1 0%	6 0%	203 0%	11 0%	258 0%
Passé composé	139 16%	2 8%	**214** **14%**	282 1%	325 33%	**26521** **61%**	1253 1%	**19402** **49%**	48138 15%
Passé récent			1 0%	8 0%	3 0%	187 0%	2 0%	3 0%	204 0%
Passé simple	4 1%		6 0%	16 0%	2 0%	54 0%	42 0%	374 1%	498
Plus-que-parfait	27 3%	8 31%	**782** **52%**	2 0%	4 0%	217 1%	22 0%	1128 3%	2190 1%
Présent	216 25%	9 35%	102 7%	18077 96%	617 63%	**14736** **34%**	211334 97%	**9779** **25%**	254870 79%
Subjonctif	15 2%		28 2%	258 1%	6 1%	**1053** **2%**	2969 1%	568 1%	4897 2%
Total	863 100%	26 100%	1498 100%	18826 100%	976 100%	43237 100%	217335 100%	39325 100%	322086 100%

Fig. 3.4 Distribution of the French translation labels for 322,086 English verb phrases in EuroParl

frequent than any other form.[19] Finally, the Simple Past is the most significant translation divergence. It is translated into French by four verbal tenses. The first three are past time tenses (Passé Composé, Imparfait and Passé Simple) and the fourth is the present tense (i.e. the Présent).[20]

This distribution was confirmed by Loáiciga et al. (2014), who automatically examined 322,086 finite English verb phrases from the EuroParl corpus and their translation into French. The verbal tenses expressing past time (shown in bold in Loáiciga et al.'s table, provided in Fig. 3.4) exhibit significant translation divergences. They found that the Simple Past and the Present Perfect translation divergences are statistically significant ($p < 0.05$). For example, the English Present Perfect (the seventh column in Loáiciga et al.'s table) can be translated into French either with a Passé Composé (61% of English-French pairs), a Présent (34%) or a

---

[19] The Others category consists of past participle (11 occurrences representing 5%), subjunctive (7 occurrences representing 3%), noun (8 occurrences representing 4%), 0 translation (4 occurrences representing 2%), Imparfait, *venir de*, past infinitive, anterior future, Plus-que-parfait (2 occurrences representing 1% for each form), participle and past conditional (1 occurrence representing 0.5% for each form), forming a total of 19%.

[20] The Others category consists of 0 translation (14 occurrences representing 3%), past participle, PQP, subjunctive (10 occurrences representing 2% for each form), conditional, past infinitive, noun and present participle (4 occurrences representing 1% for each form), past conditional, infinitive (2 occurrences representing 0.5% for each form) and *venir de* (1 occurrence representing 0.2%), forming a total of 15%.

subjunctive (2%). Similarly, the Simple Past (the ninth column) can be translated either by a Passé Composé (49% of pairs), by a Présent (25%), or by an Imparfait (21%).

My hypothetical explanation for this linguistic variation in the French forms used to translate each of the verbal tenses considered is that the most frequent translated tenses share semantics and pragmatics with the source verbal tense, and are predictable forms. In contrast, less frequent forms (included in the Others category in our analysis) are context-dependent—i.e. depend on the specific type of text, its purpose, the translator's personal choice, etc.—and are unpredictable forms. Following Dyvik (1998), I suggest that predictable forms are about *langue* and *type* items, whereas unpredictable forms are about *parole* and *token* items. As far as this thesis is concerned, I will deal only with the predictable forms of the Simple Past translation divergence.

The Simple Past translation divergence is interpreted as following: the Simple Past has several usages, corresponding to several French tenses used as its translation possibilities. The French tenses used to render the semantic and pragmatic meaning of the Simple Past are: the Imparfait; the Passé Composé; the Passé Simple; and the Présent. The Passé Composé is used most frequently in the EuroParl and journalistic registers, whereas the Passé Simple is used most frequently in the literature register, and the Présent in 10% of the cases in the legislation register, in order to create a certain effect in deontic contexts, as shown in Fig. 3.5. The variability indicated by this distribution shows that stylistic register is not a good predictor of the verbal tense used in the target language. For example, in the literature genre, the Simple Past is translated by an Imparfait in 44% of cases, and by a Passé Simple in 40%. Hence, establishing a translation rule based on a one-to-one correspondence is not possible.

Examples (439)–(441) depict the translation divergence of the English Simple Past: in (439) the Simple Past is translated by the French Imparfait; in (440) by the Passé Composé; in (441) by the Passé Simple; and in (442) by the Présent.
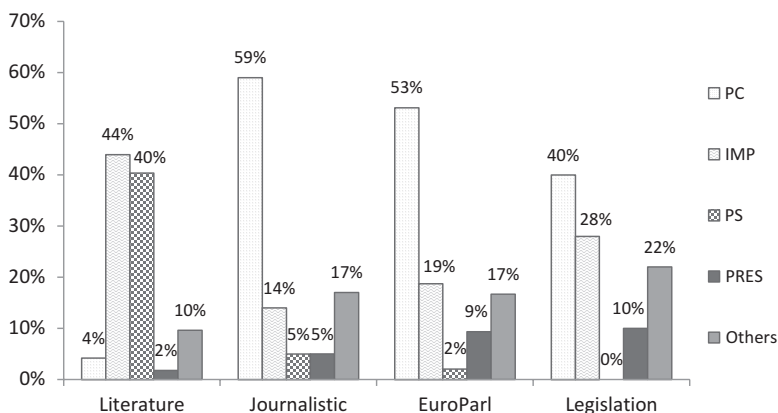
Fig. 3.5 Translation possibilities for the English Simple Past into French (column distribution)

(439) EN/SP: The atmosphere *had* more to do with the negative aspects of a
       great European project and vision than a positive promotion of what is
       deep and good about the European dream, and that is a disappointing
       feature of Nice. (EuroParl Corpus)
       FR/IMP: 'L'ambiance *avait* plus à voir avec les aspects négatifs d'un grand
       projet et d' une grande vision pour l' Europe qu'avec une promotion
       positive de ce que le rêve européen a de profond et de positif, et c'est là
       un aspect décevant de Nice.'
(440) EN/SP: I welcome the consultation process and can assure colleagues that
       in my Member State the authorities *took care* to carry out a broad and
       meaningful consultation. (EuroParl Corpus)
       FR/PC: 'Je me félicite du processus de consultation et je peux assurer
       mes collègues que les autorités de mon pays *ont pris soin* de mener une
       consultation vaste et significative.'
(441) EN/SP: Cyril had very little affection for him, and was only too glad to
       spend most of his holidays with us in Scotland. They never really
       got on together at all. (Literature Corpus)
       FR/PS: 'Cyril avait fort peu d'affection pour lui, et n'était que trop
       heureux de passer l'essentiel de ses vacances avec nous en Ecosse.
       Ils ne s'*entendirent* jamais véritablement.' (Literature Corpus)
(442) EN/SP: Something else they *had in common* was that they either conflicted
       with existing legal instruments or duplicated them. (EuroParl Corpus)
       FR/PRES: Ces initiatives *ont* également *en commun* que tantôt, elles
       sont en contradiction avec les instruments juridiques existants, tantôt,
       elles les dupliquent.

Corpus analysis reveals that there is a mismatch between theoretical descriptions
of verb tenses and actual usages in corpora. Certain verb tenses that the theoretical
literature predicts to be ambiguous for translation purposes, such as the English Past
Continuous or Past Perfect, are infrequent in the corpus described in this section.
Others, such as the English Simple Present and Simple Past, are ambiguous and
frequent, and thus represent a significant translation divergence.

Regarding the theoretical description of the Simple Past in terms of the
Reichenbachian coordinates S, R and E, the SP shares the same configuration only
with the Passé Simple ($E = R < S$). Even though the Imparfait has the same configu-
ration as the Passé Simple, Reichenbach (1947) emphasizes that the two verbal
tenses are different: the first is extended (i.e. progressive), and the latter non-
extensive. Moreover, the Passé Composé, which is the most frequent verbal tense
used to translate the SP, has a different temporal configuration from the Simple
Past—that is, $E < R = S$. Finally, the fourth tense used to translate the Simple Past
is the Présent, which is described as $E = R = S$. There are two questions that arise at
this point in the discussion. The first regards the relation between the source and
target languages: what do the verbal tenses used in the target language reveal about
the verbal tense used in the source language? The second question regards the fac-

tors which explain and predict this cross-linguistic variation. Several candidate features are tested experimentally in Chap. 4, wherein Sect. 4.4 provides a multifactorial analysis of the data.

3.3   Bilingual Corpus: French-English

3.3.1   Monolingual Analysis

The corpus consists of texts written in French and their translations into English, belonging to four different genres, according to the following proportions: literature 24%; journalistic 25%; legislation 21%; and EuroParl 31%. The corpus contains 1283 occurrences of predicative verbal tenses, occurring in a total of 603 sentences. A total of 1031 predicative verb tenses have been considered,[21] representing 80% of the verb tenses occurring in the corpus, as shown in Table 3.4. The remaining 20% of verbal tenses have not been considered[22] in the analysis.

Figure 3.6 illustrates the frequency of verbal tenses[23] in the corpus, where the most frequent are the Présent (37%), the Passé Composé (19%) and the Imparfait (14%), as opposed to the much less frequent Passé Simple and Plus-que-parfait (9% for the former and 3% for the latter).

Figure 3.7 presents the frequency of the analysed verbal tenses in each register. The Présent is the preferred tense in the journalistic and legislation registers (29% in the former and 26 in the latter), whereas the Passé Composé, Imparfait and Passé Simple are much less frequent (expect the Passé Composé, used in 14% of the cases in legislation). The distribution of these verbal tenses is more even in the literature and EuroParl registers.

Table 3.4 Verbal tenses by register in the French-English bilingual corpus

Register	No. of sentences	No. of verbal tenses	No. of verbal tenses considered	% of verbal tenses considered	% of verbal tenses not considered
Literature	162	305	275	21%	2%
Journalistic	172	320	220	17%	8%
EuroParl	180	392	332	26%	5%
Legislation	89	266	204	16%	5%
Total	603	1283	1031	80%	20%

[21] The tenses considered are several from the indicative mood, such as Imparfait, Passé Simple, Passé Composé, Présent and Plus-que-parfait.

[22] Non-analysed tenses are other tenses from the indicative mood, as well as other moods and modal verbs.

[23] Legend: PRES = Présent, PC=Passé Composé, IMP=Imparfait, PS = Passé Simple, PQP = Plus-que-parfait and Non-analysed.
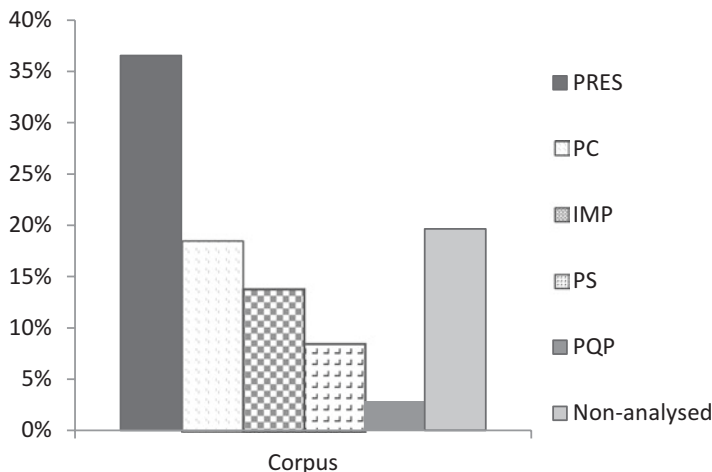
Fig. 3.6 Frequency of French verbal tenses in the French-English bilingual corpus
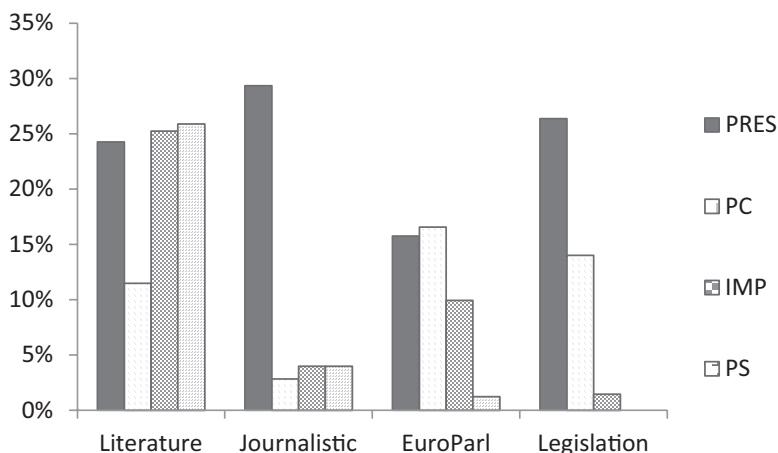
Fig. 3.7 Frequency of French verbal tenses by register

Figure 3.8 presents the distribution of each French verbal tense considered in the four registers. The Présent verbal tense occurs most often in the journalistic register (33%). 27% of the Présent tokens analysed occur in legislation, and 24% in EuroParl. Finally, 16% of the tokens come from the literature register. This distribution shows that the Présent is not specialized for any stylistic register. The Imparfait is often used in literature (44% of the Imparfait tokens) and EuroParl (41% of the Imparfait tokens). The Passé Simple and Passé Composé also seem to be stylistically specialized. In particular, most of the Passé Composé tokens occur in the EuroParl and legislation registers (51% and 27% respectively), whereas 72% of the Passé Simple tokens occur in the literature register.
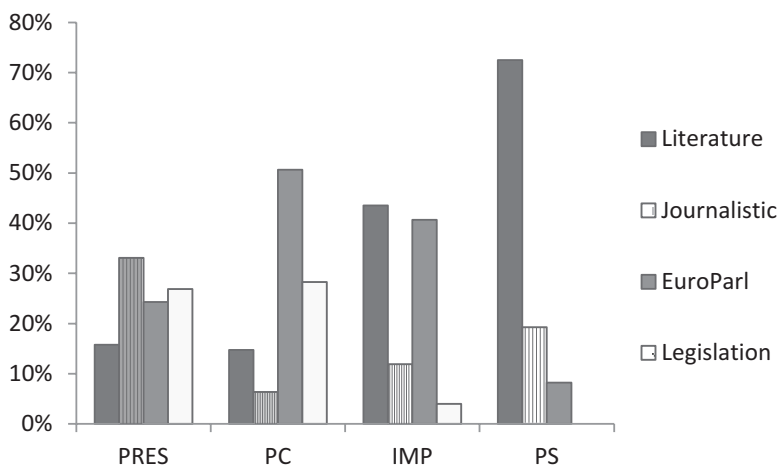
Fig. 3.8 Distribution of French verbal tenses in all registers

These results refute the predictions made in the literature—especially in the classical discourse analysis field—with respect to using verbal tenses exclusively in one or another stylistic register or type of discourse. For example, Weinrich (1973) predicts that the French Passé Simple is only used in texts of the *monde raconté* 'story' type (i.e. literature), as opposed to texts coming of the *monde commenté* 'commentary' type (i.e. journalistic, legislation and parliamentary discussion, among others), where other past time verbal tenses, such as the Passé Composé, are used.[24] Figure 3.8 indicates the Passé Simple is not exclusively used in the literary register, but also in the journalistic and EuroParl registers.

To sum up, the monolingual analysis of this corpus reveals that the most frequent verbal tenses are the Présent, the Passé Composé and the Imparfait. In Sect. 3.3.2, I will provide the results of the cross-linguistic analysis, which will show which verbal tenses consistently have more than one translation possibility in English.

3.3.2   Cross-Linguistic Analysis

The cross-linguistic analysis of the parallel corpora, performed by the translation spotting method, revealed two translation divergences among the verbal tenses considered: namely, the Passé Composé and the Plus-que-parfait. The results from Table 3.5 indicate that each of the first three verbal tenses considered (i.e. the Imparfait, Passé Simple and Présent) is consistently translated into English by one verbal form (i.e. the most frequent possibility for translation into the target

---

[24] For a critical discussion of discursive and textual theories regarding French verbal tenses, see de Saussure (2003).

Table 3.5 French-English translation possibilities

French	IMP	PS	PRES	PC	PQP
English	SP 82%	SP 93%	Spres 61%	SP 47.6%	SP 52.6%
				PresPerf 42.9%	PP 28.9%
					PresPerf 10.5%
	Others 18%	Others 7%	Others 39%	Others 9.5%	Others 7.8%

language). It can be seen that the Imparfait is most often translated by the Simple Past,[25] the Présent is most often translated by the Simple Present,[26] and the Passé Simple is most often translated by the Simple Past.[27] The Passé Composé is one of the two translation divergences identified for the French into English direction of translation. In particular, the Simple Past and the Present Perfect are far more frequent translation possibilities than the other forms.[28] Finally, the Plus-que-parfait is the second translation divergence. It is translated into English by three tenses: the Simple Past, Past Perfect and Present Perfect.[29]

Examples (443) and (444) illustrate the translation divergence of the French Passé Composé: in the former example, the Passé Composé is translated by the Simple Past, while in the latter, by the Present Perfect verbal tense.

(443)   French/PC: Une chance à laquelle, comme l'*a dit* notre collègue Böge, nous devons maintenant donner une forme concrète. (EuroParl Corpus)
        English/SP: 'An opportunity that must be given concrete shape, as the honorable Member Böge *said*.'

(444)   French/PC: J'*ai volé* un peu partout dans le monde. Et la géographie, c'est exact, m'a beaucoup servi. (Literature Corpus)
        English/PresPerf: 'I *have flown* a little over all parts of the world; and it is true that geography has been very useful to me.'

---

[25] The Others category consists of Past Perfect (12 occurrences representing 7%), *would* (7 occurrences representing 4%), Present Perfect, gerund (3 occurrences representing 2% for each form), Simple Present, Past Continuous, 0 translation, infinitive, past perfect continuous (2 occurrences representing 1% for each form), forming a total of 18%.

[26] The Others category consists of future (62 occurrences representing 13%, exclusively in the legislation register), Simple Past, Present Continuous, 0 translation (23 occurrences representing 5% for each form), Present Perfect (20 occurrences representing 4%), modal verbs (13 occurrences representing 3%), gerund (11 occurrences representing 2%), infinitive, past participle (4 occurrences representing 1% for each form), Past Continuous (2 occurrences representing 0.4%) and *would* (1 occurrence representing 0.2%), forming a total of 39%.

[27] The Others category consists of Past Perfect (4 occurrences representing 4%), modal verbs (2 occurrences representing 2%) and gerund (1 occurrence representing 1%).

[28] The Others category consists of Simple Present (7 occurrences representing 3%), Past Perfect, 0 translation (5 occurrences representing 2% for each form), Present Continuous, modal verbs (2 occurrences representing 1% for each form) and gerund (1 occurrence representing 0.4%), forming a total of 9.5%.

[29] The Others category consists of past participle, gerund and Simple Present (3% for each form), forming a total of 7.8%.

Examples (445)–(447) illustrate the translation divergence of the French Plus-que-parfait: in the first example, the Plus-que-parfait is translated by the Simple Past; in the second, by the Past Perfect; and in the third, by the Present Perfect.

(445)   French/PQP: Dans les années 1570, le sang des protestants massacrés *avait* littéralement *ruisselé* dans les rues de Paris, et le conflit qui s'en était suivi avait déchiré le pays pendant des générations. (Journalistic Corpus)
English/SP: In the 1570s, Paris literally *flowed* with the blood of slaughtered Protestants, and the ensuing conflict tore the country apart for generations.

(446)   French/PQP: Le père du jeune Fergusson, un brave capitaine de la marine anglaise, *avait associé* son fils, dès son plus jeune âge, aux dangers et aux aventures de sa profession. (Literature Corpus)
English/PP: 'Ferguson's father, a brave and worthy captain in the English Navy, *had associated* his son with him, from the young man's earliest years, in the perils and adventures of his profession.'

(447)   French/PQP: De plus, ce n'est pas la première fois que j' interviens dans un parlement - y compris celui -ci - et jamais personne ne m' *avait accusé* de faire de la flibusterie, bien au contraire. (EuroParl Corpus)
English/PresPerf: 'Furthermore, this is not the first time I have spoken in a parliament – this not even the first time I have spoken in this one – and nobody *has* ever *accused* me of filibustering.'

As with the English into French direction of translation, corpus works reveals mismatches between theoretical descriptions of verbal tenses and their actual usage in human communication. The Passé Composé and Plus-que-parfait represent cases where theoretical description, with the help of Reichenbachian temporal coordinates, seems to need improvements. In particular, the French Passé Composé is described as having the same temporal configuration as the Present Perfect (i.e. $E < R = S$). In other words, the Passé Composé and the Present Perfect are expected to be in a one-to-one translation correspondence—i.e. to share the same semantic and pragmatic content. The corpus work described in this section provides evidence against this association, and questions the classical configuration suggested for the Passé Composé. A linguistic theory of the meaning of the French Passé Composé must explain cases where the Passé Composé is translated by a Simple Past, as well as cases where it is translated by a Present Perfect.

Another interesting case is the Plus-que-parfait, which, is considered to have the same temporal configuration as the English Past Perfect (i.e. $E < R < S$). However, corpus work reveals that the Past Perfect is only one of the three verbal tenses used to translate the Plus-que-parfait into English (in 29% of cases). As shown in Table 3.5, the Simple Past is used in 58% of cases, and the Present Perfect in 11%. As with the Passé Composé, theoretical semantics and pragmatics need to provide an explanation for the Plus-que-parfait translation divergence.

To sum up, Sects. 3.2 and 3.3 provided quantitative and qualitative analyses of verbal tenses and their usage in the source language, as well as their translation possibilities into a target language. Two directions of translation were considered: English into French, and French into English. Cross-linguistic analyses have indicated the most problematic translation divergences in each of the two directions of translation. In this thesis, one translation divergence is systematically investigated, namely the translation of the Simple Past into a target language. In order to increase the empirical basis of this research, two other Romance languages are added: Italian and Romanian. The results of multilingual corpus analysis are provided in the following section.

3.4 Multilingual Corpus

The multilingual corpus consists of texts written in English and their translations into French, Italian and Romanian. This kind of corpus is called a *parallel translations* corpus (Granger 2003). The main advantage of parallel translations corpora is that one can identify language-independent patterns—i.e. translators' systematic choices regarding the target languages when dealing with the same form in the source language. The multilingual corpus described in this section was built to identify language-independent patterns for the translation of the English Simple Past. In Sect. 3.4.1, I will describe how data were collected, and in Sect. 3.4.2 I will provide the results of the corpus analysis by target language.

3.4.1 Data Collection

The multilingual corpus was created with the specific purpose of analysing the translation of the English Simple Past into three target languages. The chosen languages belong to the same language family: i.e. the Romance languages. Within the family, however, they belong to different groups. As noted by Hall (1964), Romanian belongs to the Eastern group, whereas Italian and French belong to the Italo-Western group, which is further divided into Western Romance (Portuguese, Spanish, Catalan, Occitan and French) and Proto-Italian (Italian). This choice of language allows for the control of cross-linguistic variance due to structural differences between languages.

To guarantee comparability with the bilingual corpus (English-French, described in Sect. 3.2), the multilingual corpus consists of texts belonging to the same stylistic registers: literature; EuroParl; legislation; and journalistic.[30] The occurrences of the SP were randomly selected from the English texts, then aligned with their translations into French, Italian and Romanian. Regardless of language or stylistic register,

---

[30]A detailed presentation of the texts used for data collection is provided in the Appendix section.

Table 3.6 Description of the multilingual corpus

	Literature	EuroParl	Legislation	Journalistic
English – French/Italian	38%	19%	25%	18%
English – Romanian	39%	16%	26%	18%

Table 3.7 Translation possibilities for the Simple Past into French, Italian and Romanian in the multilingual corpus

	French	Italian	Romanian
Compound past	37%	33%	49%
Imperfect	24%	18%	15%
Simple past	16%	22%	18%
Present	8%	5%	5%
Others	16%	21%	13%

the texts are all parallel translations, other than the English-Romanian data from the EuroParl register. Since Romania joined the European Union later than France and Italy, the Romanian data in EuroParl are available only after 2004. Therefore, the English into French/Italian data consist of parallel translations where the English into Romanian data are a separate file. Table 3.6 provides the percentage, by register type, of Simple Past occurrences in the source texts. 513 occurrences of the Simple Past and their translations into three target languages (a total of 1281 sentences in the four languages) were analysed.

3.4.2   Analysis and Results

The corpus was analysed from a cross-linguistic perspective using the translation spotting method. The results from Table 3.7 indicate that all three target languages make use of the same verbal forms most frequently. In particular, the French data from the multilingual corpus are comparable to the French data[31] from the bilingual corpus, described in Sect. 3.3.2. The Italian data show that the Passato Prossimo accounts for 33% of cases, followed by the Passato Remoto at 22%, the Imperfetto at 18%, the Presente at 5% and, finally, several other linguistic forms included in the Others[32] category. In Romanian, the Perfectul Compus is by far the most frequent

---

[31] The French Others category consists of noun (12 occurrences representing 3%), 0 translation, past participle, Plus-que-parfait and subjunctive (10 occurrences representing 2% for each form), gerund, infinitive, rephrase (6 occurrences representing 1% for each form), and conditional (1 occurrence representing 0.2%), forming a total of 16%.

[32] The Italian Others category consists of past participle (17 occurrences representing 4%), noun, 0 translation, Trapassato prossimo (i.e. the pluperfect), subjunctive, rephrase (12 occurrences representing 3% for each form), gerund, infinitive (3 occurrences representing 1% for each form) and conditional (1 occurrence representing 0.7%), forming a total of 21%.

Table 3.8 Frequency of verbal tenses in French, Italian and Romanian by register

	Verbal tense	Literature	EuroParl	Legislation	Journalistic
	Passé simple	**40%**	0%	0%	1%
	Imparfait	*35%*	*17%*	*14%*	*22%*
French	Passé composé	10%	**45%**	**63%**	**49%**
	Présent	1%	17%	12%	9%
	Passato Remoto	**55%**	0%	0%	9%
	Imperfetto	*28%*	*12%*	*14%*	*10%*
Italian	Passato Prossimo	1%	**40%**	**64%**	**52%**
	Presente	0%	10%	7%	8%
	Perfectul Simplu	**45%**	0%	0%	0%
Romanian	Imperfectul	*29%*	*7%*	*5%*	*9%*
	Perfectul Compus	13%	**76%**	**75%**	**66%**
	Prezentul	1%	3%	11%	8%

verbal tense used (49%), followed by Perfectul Simplu (18%), Imperfectul (15%), Prezentul (5%), and other linguistic forms included in the Others[33] category.

Table 3.8 provides the frequency of each verbal tense considered in each register, for each target language. It can be seen that, for all three languages, and for each register, verbal tenses have similar distributions. In particular, the most frequent verbal tenses in the literature register are the simple past and the imperfect. In the EuroParl, legislation and journalistic registers, it is the compound past which is most frequently used, with the simple past almost non-existent. This distribution could be interpreted as a register specialization for the simple past, showing the complementarity of the two verbal tenses expressing past time. In each register, and for all three languages, the imperfect is the second most frequent tense. Based on these data, and on theoretical considerations, I suggest reducing the English Simple Past translation divergence to a three-way divergence: simple and compound past; imperfect; and the simple present.

This interpretation is also shown in Figs. 3.9, 3.10 and 3.11 for each of the target languages. From these figures, one can see that, in French, 99% of the Passé Simple occurrences are in the literature register, and the remaining 1% in the journalistic register. In Italian, 93% of the Passato Remoto occurrences are in the literature register, and the remaining 7% in the journalistic register. In Romanian, all occurrences of the Perfectul Simplu belong to the literature register. As for the compound past, it has the lowest frequencies in the literature register in all three languages—at its lowest in Italian, at 1%. Regarding the imperfect, most of the occurrences are in the literature register, in all three languages. The EuroParl, legislation and journalistic registers also make use of the imperfect, with a frequency of 12% in French, 10% in Italian and 7% in Romanian. Finally, the lowest frequencies of the simple present

---

[33] The Romanian Others category consists of noun (11 occurrences representing 3%), 0 translation, past participle (9 occurrences representing 2% for each form), Mai mult ca perfectul (i.e. pluperfect), subjunctive, gerund and conditional (3 occurrences representing 1% for each form), infinitive and future (3 occurrences representing 0.5% for each form), forming a total of 13%.
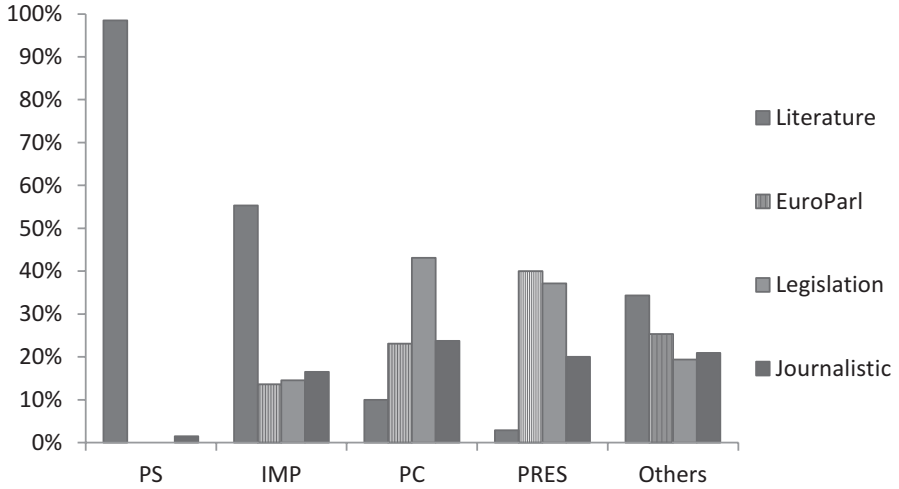
Fig. 3.9 Frequency of French verbal tenses
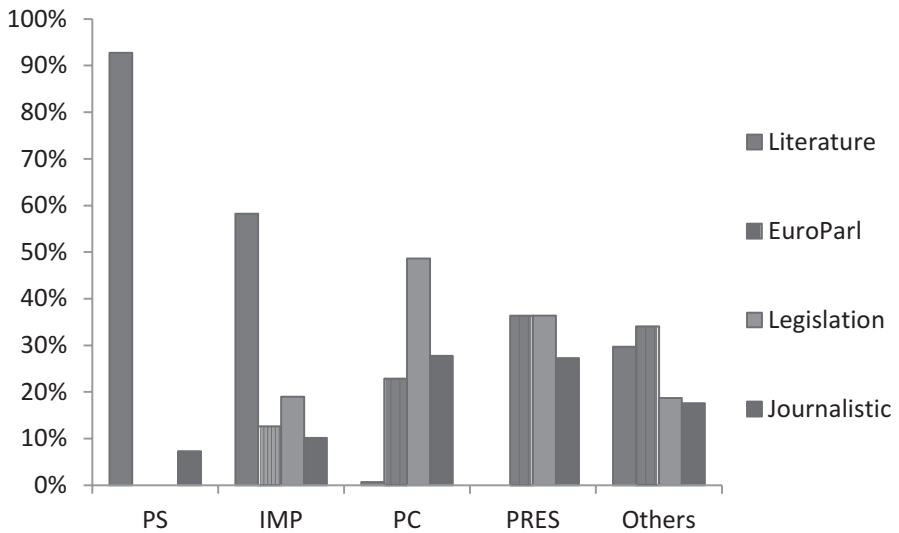
Fig. 3.10 Frequency of Italian verbal tenses

are in the literature register; the highest frequencies, on the other hand, are in EuroParl in French (40%), EuroParl and legislation in Italian (36% for each of the two registers), and legislation in Romanian (57%).

To sum up, the translation divergence of the English Simple Past identified in the English-French bilingual corpus is confirmed by the multilingual corpus. The Simple Past is most frequently translated into French, Italian and Romanian by a
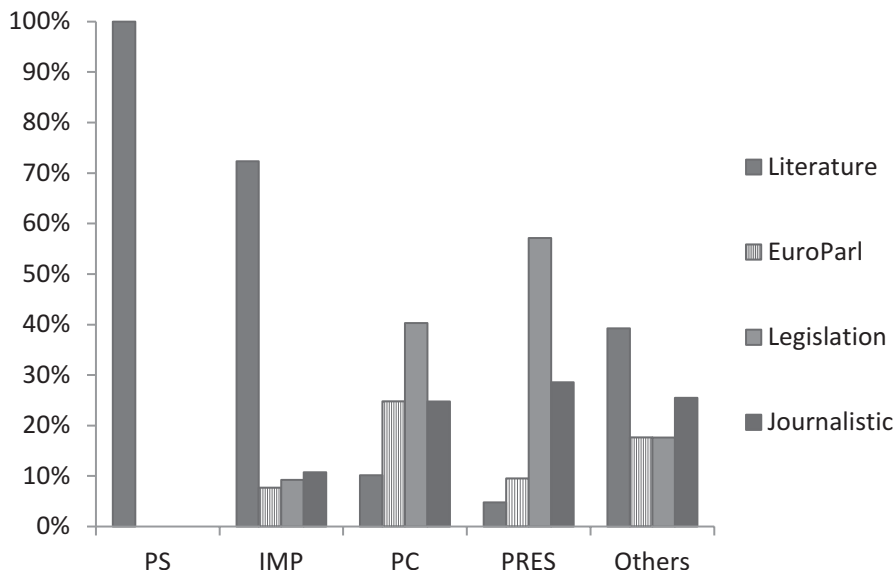
Fig. 3.11 Frequency of Romanian verbal tenses

simple past form in the literature register, and by a compound past form in the other three registers. Similarly, the simple present is used almost exclusively in the EuroParl, legislation and journalistic registers, in all three languages. Finally, the imperfect is used in all four registers to translate a Simple Past.

3.5 Summary

My aim in this chapter was to assess how verbal tenses are used cross-linguistically, by investigating them both in the monolingual side and the translation side of the parallel copora. At the beginning of the chapter, I explained that scholars turned to corpora because of the need for objective, quantifiable and reproducible data. In addition, pragmaticians have also adopted corpus data, to complement or even replace intuitive data, in order to sharpen intuitions, develop and test hypotheses, and avoid basing their research on scant data.

   The quantitative analyses of the data indicated that certain verbal tenses are more frequent—and more problematic, with respect to their translation in a target language—than others. Firstly, the analysis of the English-French parallel corpus revealed two main translation divergences: the Present Perfect, and the Simple Past. These two verbal tenses are both frequent in the corpus, and ambiguous: i.e. each of them is systematically translated into a target language by at least two verbal forms. Secondly, the analysis of the French-English parallel corpus revealed two main translation divergences: the Passé Composé, and the Plus-que-parfait. The Passé

Composé is both frequent and ambiguous, whereas the plus-que-parfait is ambiguous but much less frequent. Thirdly, the parallel translations corpus confirmed the Simple Past translation divergence identified in the bilingual corpus. The data on Italian and Romanian provided further evidence justifying the inclusion of the compound past and simple past in one unified category, so reducing the initial four-way divergence to a three-way divergence.

Based on the results, and applying the principle that the most frequent and most ambiguous verbal tense will be the most problematic for machine translation systems, the Simple Past translation divergence was chosen for further experimental investigations, which I will discuss in the next chapter. In this research, the term *disambiguation* does not imply that the Simple Past is polysemous. On the contrary, as argued in Sect. 2.3, Tense is an underdetermined linguistic category which must be worked out contextually. Consequently, a verbal tense does not have several *meanings*, but several contextual *usages*. The notion of the *disambiguation model* therefore refers to disambiguation between the various usages of the Simple Past. The basic idea is that the Simple Past has several usages, and each of these usages may be translated into a certain target language through a different verbal tense.

Chapter 4
Experimental Study Using Annotation Experiments

4.1 Dealing with Annotation Data: Inter-annotator Agreement and the *Ҝ* Coefficient

Inter-annotator agreement is widely used in corpus linguistics, computational linguistics, discourse studies and empirical pragmatics to evaluate agreement between two or more annotators when dealing with various types of linguistic information, ranging from semantic information to syntax, discourse phenomena (discourse relations, discourse connectives), figurative language and pragmatic usages of linguistic expressions, to name but a few. Inter-annotator agreement rates were needed because of scholars' worries about the subjectivity of the judgments required to create annotated resources, which may further serve as *gold-standard* data (i.e. trustworthy human-annotated data) for training, testing and evaluating the performance of automatic tools. As such, the main purpose was to assure *reliability*, defined as the adequate 'consistency among independent measures intended as interchangeable' (Moss 1994, 7) and *validity*, defined as the 'consonance among multiples lines of evidence supporting the intended interpretation over alternative interpretations' (Moss 1994, 7).

As I ague in Grisot (2017a), following Krippendorff (1980), reliability has three facets: *stability* of the process over time; *reproducibility* of the process under varying circumstances, at different locations and using different annotators; and *accuracy*, which refers to the degree to which a process conforms to a known standard. Potter and Levine-Donnerstein (1999, 271) point out that, of these three facets, reproducibility is 'the strongest realistic method by default' to assess reliability. This is the case because stability is directly dependent on the annotators' memory, while accuracy is not always achievable because, in some cases, known standards do not exist. Validity, on the other hand, may be established by a two-step process. The first is to develop an annotation scheme which guides the annotators in the analysis of the content submitted to them for judgement. According to Poole and Folger

(1981, cited by Potter & Levine-Donnerstein), annotation guidelines are 'a translation device that allows investigators to place utterances into theoretical categories' (Poole and Folger 1981, 477). As such, when the annotation guidelines are anchored in a theory, their validity can be assessed against theoretical predictions. The second step for establishing validity is to assess the annotators' judgement against a known standard. As Potter & Levine-Donnerstein point out, this can be done when such a standard exists. When this is not the case, they suggest that the annotators' *intersubjective judgements* (that is, judgements which are subjectively derived but shared among annotators) should be used as a standard (p. 266). For them, inter-subjective judgements have the advantage in that they:

> give readers the sense that the patterns in the latent content[1] must be fairly robust and that if the readers themselves were to code the same content, they would make the same judgement.

So, Potter & Levine-Donnerstein point to five key elements which are essential for a reliable and valid study: the annotation guidelines; the theory; the standard, if it exists; the inter-subjectivity of judgments (inter-annotator agreement); and the replicability of the results.

One of the first possible measures for inter-annotator agreement rate is *percentage agreement*. The percentage agreement is the ratio of observed agreements, either between two judges or in the majority of opinions among several judges. There is, though, a problem with inter-annotator agreement rate when it is measured by percentage agreement. This is *agreement due to chance*. If we consider the case of two judges, the amount of agreement we would expect to occur by chance (if annotators took a decision without accounting for the annotation guidelines) depends on two conditions:

- The *number* of categories (e.g. a binary distinction, as with mutually exclusive antonyms such as *dead/alive*, or a distinction with more than two categories, as with other antonyms such as *beautiful/very beautiful/ugly/very ugly*).
- The *frequency* of the categories. When the categories are equally frequent, the data is normally distributed. When one category is much more frequent that the other(s), the data are not normally distributed, and are thus skewed.

Given two studies investigating the same phenomenon, the one with a smaller number of categories will have higher agreement rates simply by chance. For example, for two equally frequent categories, there is a 50% chance that, when one judge makes a decision, the second judge will make the same decision (a proportion based on the fact that there only two choices; for four categories, there is a 25% chance that the two judges will make the same judgment).

---

[1] Potter & Levine-Donnerstein distinguish between three types of content that can be dealt with in annotation experiments: manifest content (which is on the surface and easily observable, such as the presence or the appearance of a word); pattern content (objective patterns that all annotators should be able to uncover, such as lexical meaning); and projective content (contents for which the annotators' content and world knowledge is required to judge meaning in context) (1999, 259).

In order to avoid the problem of agreement by chance, inter-annotator agreement can be measured with a series of chance-corrected coefficients, such as such as Cohen's *kappa* (Cohen 1960, Carletta 1996) or Aickin's *alpha* (1990). The most frequently used is Cohen's Kappa (Carletta 1996) (henceforth К), whose values range from 0 (signalling that there is no other agreement than that expected by chance) and 1 (signalling perfect agreement). In studies with more than two judges, several measures can be used to calculate inter-annotator agreement. One option is measuring agreement separately for each pair of judges, and report the average (Artstein and Poesio 2008). Another option is measuring *pairwise agreement* instead of percentage agreement. According to Artstein and Poesio (2008, 562), pairwise agreement for a certain item is *the proportion of agreeing judgement pairs out of the total number of judgements for that item*—in other words, calculating the majority of labels given by the annotators for each item.

In computational and corpus linguistics, the generally accepted threshold for trustworthy data is around 0.6–0.7. However, for pragmatics and discourse studies using this method, Spooren and Degand (2010) argued that К values lower than this threshold are frequent. According to them, there are two possible explanations for lower К values in linguistic studies. The first is that language is semantically under-determined, redundant and economical, and so the addressees must interpret it in the context. The second is the potential for coding errors, which can be: (i) errors regarding the initial working hypotheses (the annotation guidelines do not entirely capture the considered phenomenon); and (ii) errors due to individual strategies for each judge.

They suggest three methods of reducing coding errors and increasing the reliability of the data. The first is *double coding*, which consists of a discussion of disagreements: individual strategies become cooperative strategies, since this strategy requires making explicit the reasoning on which the judgement is based, and convincing the other annotator of the quality of the reasoning (e.g. Sanders and Spooren 2009 used double coding for their analysis of two connectives indicating causality in Dutch). The second method is *one-coder-does-all*, a method relying on systematic but probably subjective judgments. Spooren and Degand (2010, 254–255) explain lower К values with respect to the type of information encoded and its high context-dependence due to the fact that language is underdetermined. Their example is that of discourse relations, which can be marked explicitly or remain implicit. In their words,

> A coherence relation like cause-consequence can be marked explicitly (using a connective like *because*), or it can remain implicit (no connective), in which case the coherence has to be inferred; […] This implies that establishing the coherence relation in a particular instance requires the use of contextual information, which in itself can be interpreted in multiple ways and hence is a source of disagreement.

The third is the use of *descriptive statistics,* such as observed and specific agreement, and a discussion of the possible reasons for disagreements. These measures should complement the interpretation of the К value.

However, when annotation experiments are used to investigate naïve (i.e. untrained) speakers' intuitive behaviour when it comes to a linguistic or pragmatic phenomenon, the constraints mentioned above regarding annotator bias or methods of improving the value of Ϙ are no longer relevant. As Spooren and Degand (2010, 254) say of the *one-coder-does-all* strategy,

> Of course the coding will be subject to individual strategies developed by the coder, but these strategies will presumably be systematic and there is no reason to assume that such strategies will be conflated with the phenomenon of interest. […] So if our research question is whether judgements[2] occur more of often with *want* than with *omdat¸* an overcoding of judgments will not impede answer to the research question.

This means that the annotator's strategy corresponds to his/her way of understanding the phenomenon of interest. In other words, one could expect that measuring inter-annotator agreement rates might be influenced by the type of information dealt with. In particular, based on Wilson & Sperber's cognitive foundations of the conceptual/procedural distinction (1993/2012) (cf. discussion in Sects. 2.3.1 and 2.3.2), one would expect to find systematically different behaviour among native speakers when they evaluate these two types of encoded information consciously. In other words, conceptual meaning is available to conscious thought. Consequently, judging conceptual information is a rather easy task, resulting in high inter-annotator agreement rates. Procedural meaning is more difficult to evaluate consciously than conceptual information. Consequently, procedural information is harder to judge than conceptual information, and it results in medium inter-annotator agreement rates.

4.2 Annotation Experiments with Tense and Its Description Using Reichenbachian Coordinates

4.2.1 Hypotheses and Predictions

The experiments presented in this chapter have three aims. The first is to assess whether comprehenders are able consciously to identify and categorize the configuration of Reichenbachian coordinates E, R and S and their interpretation at two levels. According to Reichenbach (1947) (cf. discussion in Sect. 1.2.1), the meanings of the target verbal tenses tested in this chapter should be described as in Table 4.1. In other words, the meaning of each verbal tense can be split into the three pairs of coordinates E/R, R/S and E/S. In this research, I make the assumption

---

[2] Here, the authors make reference to Sanders and Spooren's (2009) study, in which the meanings of two Dutch connectives were annotated: *omdat*, which is most frequently used in objective causal relations (that is, expressing causality between events in the real world); and *want*, which is considered to be a prototypical marker of subjective causal relations holding between the speaker's conclusions on the basis of events in the world (Degand and Pander Maat 2003; Pit 2003; Canestrelli 2013).

Table 4.1 The meaning of verbal tenses using E, R and S (following Reichenbach 1947)

Structure	English	French
E=R<S	Simple Past	Passé Simple
	He came.	*Il vint.*
E=R<S	Past Continuous	Imparfait
	When I saw, he was coming.	*Quand je l'ai vu, il venait.*
E<S=R	Present Perfect	Passé composé
	He has come.	*Il est venu.*
S=R=E	Simple Present	Préset
	He comes.	*Il vient.*
S<R=E	Simple Future	Future
	He will come.	*Il viendra.*

that the three pairs of coordinates do not act at the same level. The first level is the localization of eventualities E with respect to S. Two options are possible: $E < S$ (i.e. past); and $E \geq S$ (i.e. non-past). At this level, in English, the Simple Past and the Past Continuous both locate eventualities in the past, and therefore have the description $E < S$. The Simple Present and Future locate eventualities in the non-past, and therefore have the description $E \geq S$. As for French, the Passé Composé, Passé Simple and the Imparfait locate eventualities in the past, and therefore have the description $E < S$. As with English, the Présent and Future locate eventualities in the non-past, and therefore have the description $E \geq S$.

The second level is the localization of eventualities with respect to one another, making use of R. Two options are possible: the case of temporal progression from E_1 to E_2, thus $R_1 \rightarrow R_2$ (i.e. a narrative usage of the verbal tense corresponding to a sequential temporal relation); and the case of lack of temporal progression from E_1 to E_2, thus $R_1 = R_1$, or indeterminacy $E_1? E_2$ (i.e. a non-narrative usage of the verbal tense corresponding to simultaneous and undetermined temporal relations). This property has been operationalized as the [±narrativity] feature. In (448), the first three eventualities expressed by a Simple Past have a narrative usage, whereas the fourth and final is used non-narratively.

(448) John screamed [E_2]. His leg was broken [E_3]. Mary pushed him [E_1]. She felt betrayed [E_4].

The second aim is to test the existent theoretical assumptions about the link between verbal tenses and the temporal interpretation of the relations holding among eventualities. As discussed in Sects. 1.1.1, 1.1.3, 2.1 and 2.3.3, scholars have formulated a robust hypothesis according to which the Passé Simple instructs the comprehender to interpret sequentially the series of eventualities it expresses, the Imparfait is used when eventualities should be interpreted simultaneously, and the Passé Composé is undetermined with respect to this property. These assumptions are illustrated in example (449). The verbs *vint* 'came' and *monta* 'get in', expressed with the Passé Simple, have a narrative usage; the verb *s'asseyait* 'sit' has a

non-narrative usage; and the verb *a regardé* 'looked at/has looked at', expressed with the Passé Composé, is undetermined with respect to this property.

(449)   On raconte qu'un Anglais *vint* un jour à Genève avec l'intention de visiter le lac. Il *monta* dans l'une de ces vieilles voitures où l'on *s'asseyait* de côté comme dans les omnibus. Il *a regardé* le lac émerveillé.
It is said that un Englishman come.3SG.PS one day to Geneva with the intention visiting the lake. He get in.3SG.PS in one of these old cars where you sit.3SG.IMP along the sides as on a bus. He look.3SG.PC at the lake amazed.

The case of the Imparfait is slightly more complicated than it looks. French scholars have observed that the Imparfait may have two usages: non-narrative, and narrative. Its narrative usage, known as the narrative Imparfait ("imparfait de rupture"), is characterized by the presence of a subjectivity marker or a temporal adverbial or connective that encodes an immediate transition towards a resulting state. This information is inferential, and directs discourse computation towards temporal sequencing. Thus, both narrative and non-narrative occurrences of the Imparfait express reference to past time, and are viewed as continuous eventualities. The non-narrative Imparfait does not express temporal sequencing, and is not viewed as being completed, whereas the narrative Imparfait expresses temporal sequencing, and is viewed as being completed (the final boundary is expressed by a temporal adverbial, or the Imparfait is used with a punctual eventuality). The former is illustrated in example (450), and the latter in (451).

(450)   Il y a une heure Max *boudait* dans son coin, et ça n'est pas près de changer.
An hour ago Max sulk.3SG.IMP in a corner, and this is not about to change.
'For an hour, Max has been sulking in a corner, and this is not about to change.'
(451)   Elle a fini par fuguer à Kaboul, où elle a été recueillie par une femme généreuse. Quelques mois plus tard, elle *épousait* un jeune cousin de sa bienfaitrice dont elle était tombée amoureuse.
She finally run.3SG.PC to Kabul, where receive3SG.PC.PSV by a kind woman. A few months later, she marry.3SG.IMP a younger cousin of her benefactor with whom she fall in love.3SG.PQP.
'Finally she run to Kabul, where she was taken in by a kind woman. A few months later, she married a younger cousin of her benefactor with whom she had fallen in love.'

The third aim is to test whether the [±narrativity] is cross-linguistically valid, and whether it can be used to predict the verbal tense used in a target language. For example, the analysis of translation corpora by the translation spotting method, discussed in Sects. 3.2.2 and 3.4.2, has shown that the English Simple Past translation
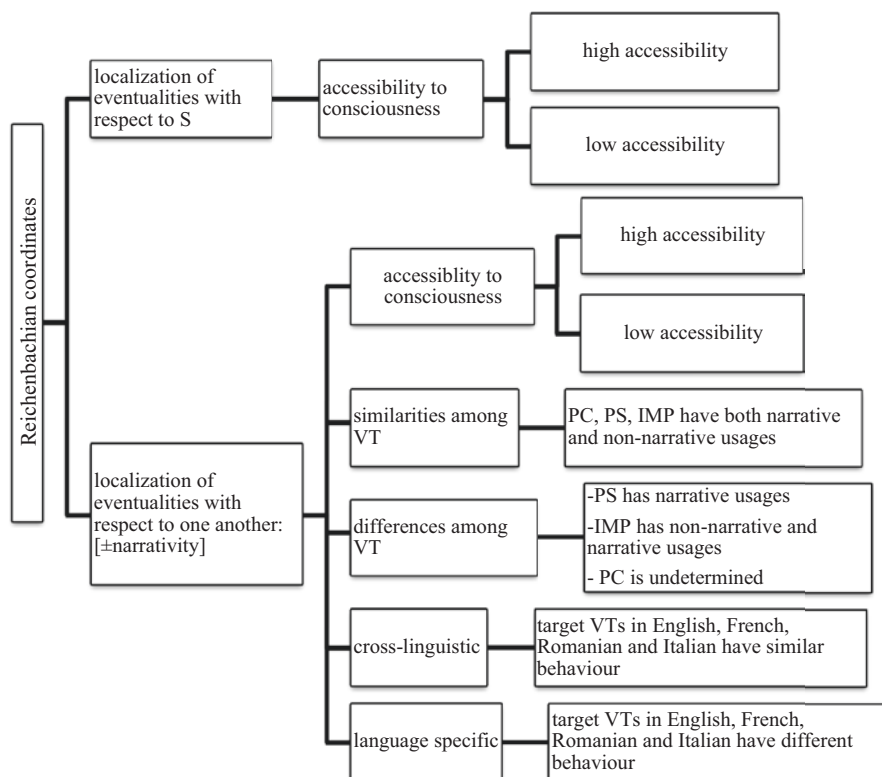
Fig. 4.1 Possible scenarios and their predictions regarding the category of Tense and its encoding of Reichenbachian coordinates

paradigm consists of four verbal tenses in French, Italian and Romanian. Cross-linguistic analyses of the annotated corpora should show whether a correlation between the [±narrativity] features and the verbal tense used in a target language can be established.

Taking into account the semantic and pragmatic descriptions of the target verbal tenses tested in this chapter, two research questions can be formulated. The first is *how do comprehenders consciously deal with the encoded information from Reichenbachian coordinates and their possible configurations?* The second is *do the current theoretical studies of verbal tenses and their role in expressing temporal relations have empirical coverage?*

In order to answer these two research questions, a series of scenarios and their subsequent predictions was formulated. These scenarios are summarized in Fig. 4.1. Accessibility to consciousness is understood in terms of the ease with which participants consciously carry out the task in an accurate manner. With respect to encoded information, two types of degrees of accessibility are possible: (i) high accessibility,

resulting in high ǩ values used to measure inter-annotator agreement; and (ii) low accessibility, resulting in low ǩ values. Based on the current theoretical descriptions of French verbal tenses carried out according to the procedural pragmatics approach (Nicolle 1997; de Saussure 2003; Escandell-Vidal and Leonetti 2011; Aménos-Pons 2011; cf. the discussion in Sect. 2.3.3), similar accessibility rates are expected for the localization of eventualities, with respect to S and to one another. This is broadly due to the fact that verbal tenses are considered to be procedural expressions, and their meaning is described using the three Reichenbachian coordinates. By contrast, if these two types of localizations have a different nature—in other words, take place at different levels of meaning—one would expect dissimilar degrees of accessibility to consciousness and, consequently, dissimilar inter-annotator agreement rates.

From a cross-linguistic perspective, if the [±narrativity] property is a cross-linguistically valid feature, then the target verbal tenses in the four languages studied in this research are comparable with respect to this feature. This means that we would expect to see strong correspondences between the narrative usages of these verbal tenses on the one hand, and their non-narrative usages on the other.

4.2.2   French Verbal Tenses and Reichenbachian Coordinates

Participants
Participants were 48 native speakers of French, Bachelor's students at the Faculty of Humanities of the University of Geneva and the University of Neuchâtel. Their participation in the experiment was voluntary and unpaid. They did not receive training before participating in the experiment.

Procedure and Material
The items used in this experiment were of two categories. The first category consists of 90 items randomly selected from the corpus (as described in Sect. 3.3), which represent *naturally occurring* items judged in their *original contexts*. The second category consists of 36 artificial sentences, built for the purpose of the experiment. Each item comprised a first sentence, to set the context, and a second sentence containing the targeted verb, as shown in examples (452), (453) and (454).

(452)   Le jeune soldat mis en cause a agi contre les ordres de ses supérieurs, il
           (être) aujourd'hui incarcéré et en attente d'être jugé pour meurtre.
           (Literature register)
           'The young soldier who was accused behaved against his superior's
           orders, he (to be) imprisoned today and waiting to be judged for murder.'
(453)   Marie a pris du poids. Avant de casser sa jambe, Marie (courir) tous les
           soirs pendant une heure. (Built example, the *past* condition)
           'Mary gained weight. Before breaking her leg, Mary (to run) every
           evening for an hour.'

(454) Marie s'entraîne pour le marathon. Elle (courir) tous les soirs
       pendant une heure.
       'Mary trains for the marathon. She (to run) every evening for an hour.'
       (Built example, the *non-past* condition)

The role of the first sentence was to set a past or a non-past time context. All the experimental items were distributed into sets of 15 items (for the corpus data) and 18 items (for the artificial sentences), with a total of 8 sets. Each participant received either corpus (natural) or built (artificial) data. Each experimental item was judged by 6 participants.

Participants were asked to give the tensed form of a verb, provided by the infinitive, such that it corresponds to the surrounding context. They received annotation guidelines, in which the task of the experiment was explained, and had a training session on 3–5 items. Then, they received the set of items to annotate in an independent manner. Each participant received either corpus (natural) or built (artificial) data.

The results of this experiment were evaluated by counting the majority of answers for each item, since there were more than two participants. The number of concordant answers must exceed agreement by chance, which is 50%, given the binary choice (i.e. the past vs. non-past context). Where responses were equally distributed (3 out of 6 annotators), the item was evaluated as *inconclusive*. Inconclusive items were excluded from further analysis. Finally, for a given item, where under 50% of the judges (a maximum 2 out of 6 annotators) made the same judgment, it was considered to be a disagreement. Due to the reduced number of participants who saw each item—that is, 6 per item—the evaluation was made manually. Moreover, labels given by participants were compared to a baseline, established according to the translation corpus for the natural data, and defined by the experimenter for the artificial, built data.

Results

A total of 126 items were evaluated, according to the evaluation scheme described above. The judges agreed on their label for 119 items (94.4%), and disagreed on 3 items (2.4%). Four items were evaluated as inconclusive (3.2%). Disagreements and inconclusive items were excluded from further analysis. Table 4.2 provides the results of the comparison between the label provided by the annotators and the reference baseline (from the translation corpus) for all data. The correspondence between the judges' label and the reference of 111 items (93.3%) corresponds to a K of 0.86.

Regarding the two types of data (natural vs. artificial), all three disagreements and the four inconclusive items were natural data; annotators agreed on the label

Table 4.2 Annotators vs. Reference baseline for past/non-past distinction in all data

		Annotation		
		Past	Non-past	Total
Baseline	Past	57	2	59
	Non-past	6	54	60
Column Total		63	56	119

Table 4.3 Judges vs. Reference baseline for past/non-past distinction in natural data

		Annotation		
		Past	Non-past	Row total
Baseline	Past	39	2	41
	Non-past	6	36	42
Column Total		45	38	83

provided for all artificial items. When compared to the reference baseline, there is a one-to-one correspondence between the annotators' labels and the baseline. This corresponds to a K value of 1.

As for the natural data, the annotators agreed on 83 items (92%). Among the agreements, the items were judged as expressing reference to the non-past in 45 items (54.2%) and reference to the past in 38 items (45.8%). Table 4.3 provides the results of the comparison between the label provided by the annotators and the reference baseline for natural data only. The correspondence between the annotators' label and reference of 75 items (90%) corresponds to a K of 0.80.

Discussion

This experiment aimed to test whether speakers are able to categorize the configuration of two Reichenbachian coordinates (E with respect to S). The hypothesis defended in this research is that the relation between these two coordinates is of a conceptual nature, and the ad hoc concept is built contextually. According to the qualitative features proposed by Wilson and Sperber (1993) for conceptual and procedural information, it was argued that judging conceptual information results in high K values. This experiment provided evidence that the conceptual information encoded by verbal tenses—that is, past vs. non-past—is determined contextually, and that the agreement between the participants produced high K values: 1 for artificial data, 0.80 for natural data, and 0.86 for all the data.

With respect to natural vs. artificial data, the difference in results is that the natural data used in this research are much more complex and harder to understand than the artificial data built for the purposes of the experiment. This is partly due to the type of data, which originate in parliamentary discussions, legislation, journalistic and literature stylistic registers. The two types of data are exemplified in example (455) for the natural data, in which the baseline reference to past time was expressed by a Passé Simple, and example (456) for the artificial data, in which reference to past time was expressed by an Imparfait.

(455) De son côté, l'Eglise catholique avait organisé, en 1986, la Rencontre nationale ecclésiale cubaine (ENEC), qui - tout en rappelant que Cuba est une nation chrétienne - (prendre acte) de la société cubaine telle qu'elle était et non telle que l'Eglise l'aurait souhaitée. (Journalistic register)

'For its part, the Catholic church had organized, in 1986, the Cuban National Ecclesiastic Meeting, which – remember that Cuba is a Christian nation – (take cognizance of) Cuban society as it was and not as the Church would have wished it.'

(456) Après son accident, Marie était très triste. Elle ne pouvait plus faire ce qui la rendait si heureuse. Marie (jouer) du piano. (Built example)

'After her accident, Mary was very sad. She could not do anymore what used to make her so happy. Mary (play) the piano.'

This experiment indicated that speakers have no difficulty consciously evaluating the localization of eventualities with respect to the moment of speech.

4.2.3 Passé Composé, Passé Simple, Imparfait and the [±Narrativity] Feature

Participants

Participants were 76 French native speakers, who were first year students at Faculty of Humanities from University of Geneva. Their participation in the experiment was organized during a linguistics class, but was unpaid and anonymous.

Procedure and Material

The materials used consisted of 300 items[3] randomly chosen from the French part of the parallel corpus, organized in 19 sets. Each participant received a set of 15 items. The data contained 127 occurrences of the Imparfait, described by the literature as most often non-narrative, 173 occurrences of the Passé Simple/Passé Composé (101 Passé Simple and 72 Passé Composé), described as most often narrative.

The annotation guidelines included two tasks. The first task was to read and understand the definitions of narrative and non-narrative usages, as follows:

- The eventualities are temporally linked. This means that E_1 happened before E_2. The relation may be explicitly expressed in the sentence, or may be implicit (it can be understood in the context).
- The eventualities are not temporally linked. This means that E_1 and E_2 either happened at the same time (simultaneously) or are not temporally linked (the opposite of the case above).

Each definition was accompanied by two explained examples, as given in (457), where the verbs *vint* 'came' and *monta* 'get in', expressed by the Passé Simple, have a narrative usage, the verb *s'asseyait* 'sit' has a non-narrative usage, and the verb *a regardé* 'looked at/has looked at', expressed by the Passé Composé, is undetermined with respect to this property.

---

[3]An item consists of a sentence where the verbal tense of interest occurs (for example, the Passé Simple, Passé Composé or Imparfait for Experiment 1) and another sentence, either preceding or following. This choice was made because of the need to have sufficient co(n)text for a pragmatic decision.

(457)   On raconte qu'un Anglais *vint* un jour à Genève avec l'intention de visiter
        le lac. Il *monta* dans l'une de ces vieilles voitures où l'on *s'asseyait* de côté
        comme dans les omnibus. Il *a regardé* le lac émerveillé.
        It is said that an Englishman come.PS one day to Geneva with the intention
        of visiting the lake. He get in.PS in one of these old cars when you sit.IMP
        on the sides as in a bus. He look.PC at the lake amazed.

Participants received training for 6 items, which was followed by a collective
discussion. The evaluation was performed manually, according to the evaluation
scheme which follows. The results were evaluated by counting the majority of
answers for each item. The number of concordant answers must exceed agreement
by chance, which is 50%, given the binary choice (i.e. narrative vs. non-narrative
usage). When that was not the case, the item was evaluated as *inconclusive*.
Inconclusive items were excluded from further analysis. Moreover, labels given by
participants were compared to a baseline established according to theoretical
descriptions of the verbal tenses considered.

Results

Table 4.4 provides the results of this annotation experiment, where 221 tokens of the
Imparfait, Passé Composé and Passé Simple were considered. Of the 300 items
annotated by four judges, 79 received showed no majority, and were thus inconclu-
sive. These items were not considered in the analysis. In the clean data of 221
tokens, judges agreed with the theoretical reference for 182 items (82% of the data),
with a $Ƙ$ value measuring inter-annotator agreement of 0.63.

The table shows that the narrative feature was identified for 86% of the annotated
tokens according to the theoretical predictions (i.e. Passé Simple and Passé Composé
together, 110 items labelled as narrative out of 128 in the corpus), and the non-
narrative feature in 77% of cases (Imparfait, 72 items labelled as non-narrative out
of 93 in the corpus). *A chi-square test performed on this result shows that the cor-
relation between the annotator's judgment and the theoretical reference is statisti-
cally significant (*Chisq *86.96, df = 1, p < .0001).*

In particular, as shown in Table 4.5, judges clearly recognized a primary narra-
tive usage for the Passé Simple (92%), but did not make the same clear judgment for
the Passé Composé narrative (in 77% of cases) or the expected non-narrative pri-
mary usage of the Imparfait (77.5%).

Table 4.4 Narrativity for Passé Simple/Passé Composé and imparfait: majority of annotators and
reference

		Majority of annotators		
		Narrative	Non-narrative	Total
Reference	Passé Simple/Passé Composé	110	18	128
	Imparfait	21	72	93
	Total	131	90	221

Table 4.5 Annotations for individual verbal tenses

Verbal tense/narrativity	Narrative	Non-narrative
Passé Simple	92%	8%
Passé Composé	77%	23%
Imparfait	22.5%	77.5%

Table 4.6 Narrativity for the Imparfait: Annotator 1 and Annotator 2

		Annotator 2		
		Narrative	Non-narrative	Total
Annotator 1	Narrative	17	35	52
	Non-narrative	19	159	178
Total		36	194	230

This results in about 23% of non-expected usages—that is, non-narrative usages—for the Passé Composé, and 22.5% of narrative usages for the Imparfait. This result opened the door to a further, finer-grained investigation: an annotation experiment of the Imparfait with the [±narrativity] feature.

4.2.4   The Imparfait and the [±Narrativity] Feature

Participants

The participants were 2 French native speakers, who were students at the Faculty of Humanities of the University of Geneva. They were paid for their participation in the experiment.

Procedure and Material

The material consisted of a total of 230 items containing Imparfait occurrences. 120 items were randomly selected from the French part of the parallel corpus, where French was the source language. 110 occurrences of the Imparfait were translations of Simple Past items into French, where French was the target language. The two annotators received annotation guidelines, consisting of the definition and examples for each type of usage. They received training for 6 items, which was followed by a group discussion. Evaluation was performed by calculating the inter-annotator agreement rate using the K coefficient.

Results

The results are presented in Table 4.6. Out of 230 annotated tokens, annotators agreed on the annotation of 179 tokens (77%), representing a K of 0.24. This very low K is explained by the fact that the two categories (narrative and non-narrative) are not equally distributed, and therefore the non-narrative category is the default case. The judges were not aware that there is a default case, and they assigned the categories by judging the sentences according to the annotation guidelines. If the

analysis only considers the 179 cases of agreement, the Imparfait was categorized in 90% of cases as non-narrative, and in 10% of cases as narrative.

The annotation results have also been analysed according to the original language. For the 120 Imparfait tokens where French was the source language, judges agreed on 90 items (75%). In the cases of agreement, the Imparfait was labelled as non-narrative in 84% of cases, and narrative in 16%. As for the 110 Imparfait tokens where English was the source language, judges agreed on 86 items (78% of cases). In the cases of agreement, the Imparfait was labelled as non-narrative in 97% of cases, and narrative in 3%. The results of this experiment show that categorization of the Imparfait, in terms of narrative and non-narrative usages, presents different patterns regarding the source language. However, using Fisher's Exact Probability test, the difference in categorization between the two source languages is not shown to be statistically significant ($p > .05$).

4.2.5 Passato Prossimo, Passato Remoto, Imperfetto and the [±Narrativity] Feature

Participants

There were two participants, both Italian native speakers originating from the southern part of Italy (Naples). Their participation in the experiment was voluntary and unpaid.

Procedure and Material

84 items, containing 37 Passato Prossimo, 27 Passato Remoto and 21 Imperfetto, were randomly chosen from the Italian part of the multilingual translation corpus. These items were originally written in English, and the targeted Italian verbal tense corresponds to a Simple Past in the source language. Annotators received annotation guidelines and received a training session. The first task in the annotation guidelines was to read and understand the instructions, containing definitions of narrative and non-narrative usages. They also included two examples for each usage, as given in (458)–(460), where (458) is an example of non-narrative usage, whereas (459) and (460) are examples of narrative usage.

(458)   V'erano porte tutt'intorno alla sala, ma *erano* [Imperfetto] tutte serrate.
        (Literature Corpus)
        'There were doors all around the hall, but they *were* all locked.'

(459)   Ma, risalito dopo pranzo con tale proposito, appena varcata la soglia,
        scorsi [Passato Remoto] lì dentro una ragazza che, inginocchiata
        davanti al fuoco e circondata da scope e secchi di carbone.
        (Literature Corpus)
        'On coming up from dinner, however, and mounting the stairs with
        this lazy intention, and stepping into the room, I saw a servant-girl
        on her knees surrounded by brushes and coal-scuttles'.

(460) Malgrado le misure di controllo adottate dalle autorità delle isole Faroe, nel 2004 *sono stati segnalati* [Passato Prossimo] alla Commissione nuovi focolai della malattia. (EuroParl Corpus)
       'Despite the control measures undertaken by the Faroe Islands, further outbreaks of ISA occurred and were notified by that State to the Commission in 2004.'

The second task was to read each item and decide if the highlighted verb had a narrative or a non-narrative usage. Participants received training for 6 items, which was followed by a discussion.

Results
Annotators agreed on 64 items (76%), and disagreed on 21 items (33%). The value of the К coefficient was 0.41. The disagreements were discussed in the second round of the experiment. The final results are provided in Table 4.7. Judges agreed on 76 items (89%), which represents a К value of 0.74.

As far as the analysis of individual verbal tenses is concerned, only the data containing agreements were considered (76 items). 16 Imperfetto were judged to be non-narrative (84%), 30 Passato Prossimo were judged to be narrative (88%), and 22 Passato Remoto were judged to be narrative (96%)(Table 4.8).

The results of this experiment indicate that the [±narrativity] feature is identifiable by native speakers, with reliable К values. Regarding this information, most often narrative values are attributed to the Passato Remoto and the Passato Prossimo, and non-narrative values to the Imperfetto. Like English and French speakers, Italian speakers have little ability to evaluate the temporal relations triggered by verbal tenses consciously. They do better when asked to insert connectives, which explicitly express the same implicit content. These findings provide a solid empirical basis to argue that the [±narrativity] feature is procedural, and that it is a cross-linguistically valid feature.

Table 4.7 Narrativity for Italian verbal tenses: Annotator 1 vs. Annotator 2

		Annotator 2		
		Narrative	Non-narrative	Total
Annotator 1	Narrative	55	4	59
	Non-narrative	5	21	26
Total		60	25	85

Table 4.8 Narrativity for Passato Remoto, Passato Prossimo and Imperfetto

	Narrative	Non-narrative	Total
Imperfetto	3	16	19
Passato Prossimo	30	4	34
Passato Remoto	22	1	23
Total	55	21	76

4.2.6 *Perfectul Compus, Perfectul Simplu, Imperfectul and the [±Narrativity] Feature*

Participants and Material
There were two participants, both Romanian native speakers. One of the judges is a research peer, and the other is a Bachelor's student from University of Geneva, Faculty of Humanities. Their participation in the experiment was unpaid.

Procedure
85 items, containing 50 Perfectul Compus, 14 Perfectul Simplu and 21 Imperfectul, were randomly chosen from the Romanian part of the multilingual translation corpus. These items were originally written in English, and the targeted Romanian verbal tense corresponds to a Simple Past in the source language. Annotators received annotation guidelines and received a training session. The first task in the annotation guidelines was to read and understand the instructions, containing definitions of narrative and non-narrative usages. They also included two examples for each usage, as given in (461)–(463), where (461) is an example of non-narrative usage and (462) and (463) are examples of narrative usage.

(461)   Erau uşi de jur împrejurul holului dar toate *erau* [Imperfectul] încuiate. (Literature Corpus)
          'There were doors all around the hall, but they were all locked.'
(462)   Aşa că, întorcându-mă de la masă, urcai scările cu intenţia de a-mi petrece după-amiaza lenevind. Când să intru în odaia mea, *văzui* [Perfectul Simplu] o tânără servitoare, îngenuncheată lângă sobă, înconjurată de perii şi găleţi cu cărbuni. (Literature Corpus)
          'On coming up from dinner, however, and mounting the stairs with this lazy intention, and stepping into the room, I saw a servant-girl on her knees surrounded by brushes and coal-scuttles'.
(463)   Cu toate că autorităţile din insulele Feroe au pus în aplicare măsuri de combatere au apărut alte focare de AIS, care *au fost notificate* [Perfectul Compus] Comisiei de această ţară în 2004. (EuroParl Corpus)
          'Despite the control measures undertaken by the Faroe Islands, further outbreaks of ISA occurred and were notified by that State to the Commission in 2004.'

The second task was to read each item and decide if the highlighted verb had a narrative or a non-narrative usage. Participants received training for 6 items, which was followed by a discussion.

Results
The results are provided in Table 4.9. Judges agreed on 64 items (75%), and disagreed on 21 items (25%). The value of *Ҟ* coefficient was 0.42.[4]

---

[4]This experiment was carried out in two rounds. 42 items were judged in the first round, and 43 items in the second. Due to the two judges' unfortunate lack of availability, only the data from the

Table 4.9   Narrativity for Romanian verbal tenses: Annotator 1 vs. Annotator 2

		Annotator 2		
		Narrative	Non-narrative	Total
Annotator 1	Narrative	47	0	47
	Non-narrative	21	17	38
Total		68	17	85

Table 4.10   Narrativity for Perfectul Simplu, Perfectul Compus and Imperfectul

	Narrative	Non-narrative	Total
Imperfectul	4	10	14
Perfectul Compus	30	6	36
Perfectul Simplu	13	1	14
Total	47	17	64

As far as the analysis of individual verbal tenses is concerned, only the data containing agreements were considered (64 items). The Imperfectul was judged to be non-narrative in 10 cases (71%), the Perfectul Compus was judged to be narrative in 30 cases (83%), and the Perfectul Simplu was judged to be narrative in 13 cases (93%) (Table 4.10).

As with Italian, this experiment shows that the [±narrativity] feature is identifiable by Romanian native speakers with reliable K values. Regarding this information, most often narrative values are attributed to the Perfectul Simplu and the Perfectul Compus, and non-narrative values to the Imperfectul. Moreover, native Romanian speakers have little ability to evaluate temporal relations triggered by verbal tenses consciously. They do better when asked to insert connectives, which explicitly express the same implicit content.

4.2.7   The Simple Past and the [±Narrativity] Feature

Participants

There were two participants, both English native speakers from the United Kingdom, who were studying Bachelor's level linguistics at the Faculty of Humanities of the University of Geneva. Their participation in the experiment was paid.

Procedure and Material

The material used consisted of 458 Simple Past tokens randomly chosen from the English part of the parallel corpus. As in the first two experiments, judges received

---

first round were judged a second time, to resolve the disagreements. For the first 42 items, the K value improved from 0.23 (agreement in 62% of cases) to 0.75 (agreement in 88% of cases). The results provided in Table 4.9 represent the data obtained after the second round, with the first 42 items, and the sole round, with the other 43 items. The low K value of the entire data is due to the fact that disagreements on the 43 items were not resolved.

annotation guidelines and received a training session. The first task from the annotation guidelines was to read and understand the instructions containing definitions of narrative and non-narrative usages. They also included two examples for each usage, as given in examples (464) and (465). The second task was to read each item and decide if the highlighted verb had a narrative or non-narrative usage. Participants received training on 10 items, which was followed by a discussion where each annotator had to "think aloud" his/her answers.

In the first example below, there are two events: 'the marriage that happened', and 'the wealth which was added'. The second event is presented in relation to the first (first he got married, and then he added to his wealth), which is why the Simple Past verbs happened and added are in narrative usage. In the second example, there are three states (was a single man, lived and had a companion) that describe the owner of the estate. States are not temporally ordered, which is why this example illustrates the non-narrative usage of the Simple Past.

(464) By his own marriage, likewise, which happened soon afterwards, he *added* to his wealth. (Literature Corpus)

(465) The late owner of this estate was a single man, who *lived* to a very advanced age, and who for many years of his life, had a constant companion and housekeeper in his sister. (Literature Corpus)

Evaluation of inter-annotator agreement rate was performed with the $Ҟ$ coefficient. In terms of cross-linguistic evaluation, the judged items were compared to a reference baseline containing the verbal tenses used for the translation of the Simple Past into French, from the French part of the parallel corpus.

Results

The results are provided in Table 4.11. Annotators agreed on 325 items (71%) and disagreed on 133 items (29%). The value of $Ҟ$ coefficient was 0.42. This value is higher than chance, but not high enough to point to entirely reliable linguistic decisions. Of the 113 items of disagreement, 19 items were signalled as having insufficient context for a pragmatic decision. They were excluded from further analysis.

Error analysis showed that the main source of errors was the length of the temporal interval between two eventualities, which was perceived differently by the two annotators. This led to ambiguity between temporal sequence or simultaneity, each of them corresponding to narrative and non-narrative usage respectively, as in example (466), where the eventualities "qualify" and "enable" were perceived as simultaneous by one judge but successive by the other.

Table 4.11 Narrativity for Simple Past: Annotator 1 and Annotator 2

		Annotator 2		
		Narrative	Non-narrative	Total
Annotator 1	Narrative	180	83	263
	Non-narrative	50	145	195
Total		230	228	458

(466)   Elinor, this eldest daughter, whose advice was so effectual, possessed a
        strength of understanding, and coolness of judgment, which qualified her,
        though only nineteen, to be the counsellor of her mother,
        and *enabled* her frequently to counteract, to the advantage of them all,
        that eagerness of mind in Mrs. Dashwood which must generally have
        led to imprudence. (Literature Corpus)

A possible explanation is the fact that personal world knowledge is used to infer temporal information, such as the length of the temporal interval between two eventualities—i.e. information which allows the judge to decide whether or not the eventualities are temporally ordered. Cases where the length of the temporal interval between two eventualities was greatly reduced were ambiguous for the judges, so each of them decided differently whether it was long enough for temporal sequencing or too short, in which case the simultaneity meaning was preferred.

Disagreements (114 items) were resolved in a second round of the annotation experiment, where the narrativity feature was identified with a new linguistic test that was explained to two new participants[5] (as suggested by Spooren and Degand 2010). Judges were asked to insert a connective, such as *and* and *and then* when possible, in order to make explicit the 'meaning' of the excerpt—that is, the temporal relation existent between the two eventualities considered. The connective *because* (for a causal relation) has also been proposed by annotators under the [+narrative] label, showing that causal relations should also be considered. The inter-annotator agreement rate in this second round of the experiment was corresponds to a *Ƙ* of 0.91, signalling very strong and reliable agreement.

In the data containing agreements, the Simple Past was judged as having narrative usages in 59% of cases and non-narrative usages in 41% of cases. This finding suggests that the Simple Past is not specialized for either of the possible values of the [±narrativity] feature. The cross-linguistic application of these findings consists of the observation of a pattern in the parallel corpus. The data containing agreements from both annotation rounds (435 items) were investigated and analyzed in relation to the reference baseline, defined according to the parallel corpus. The two alternative hypotheses are:

- The non-narrative Simple Past is more often translated with an imperfective.
- The narrative Simple Past is more often translated with a simple past or a compound past.

The results are provided in Table 4.12. They show that the narrative usages of the Simple Past correspond to narrative usages in the French part of the corpus (translation by a Passé Composé or Passé Simple) and the non-narrative usages of the Simple Past correspond to the non-narrative usages in the French text (translation with an Imparfait) in 338 items (78%). Using a chi-square significance test, this cor-

---

[5] The new participants are the author and a research peer, who was not aware of the purpose of the research. They are fluent in spoken and written English, and use it as professional language.

Table 4.12 Narrativity for the Simple Past: Annotators vs. Baseline

		Baseline		
		PC/PS	IMP	Total
Annotators	Narrative	208	49	257
	Non-narrative	48	130	178
Total		256	179	435
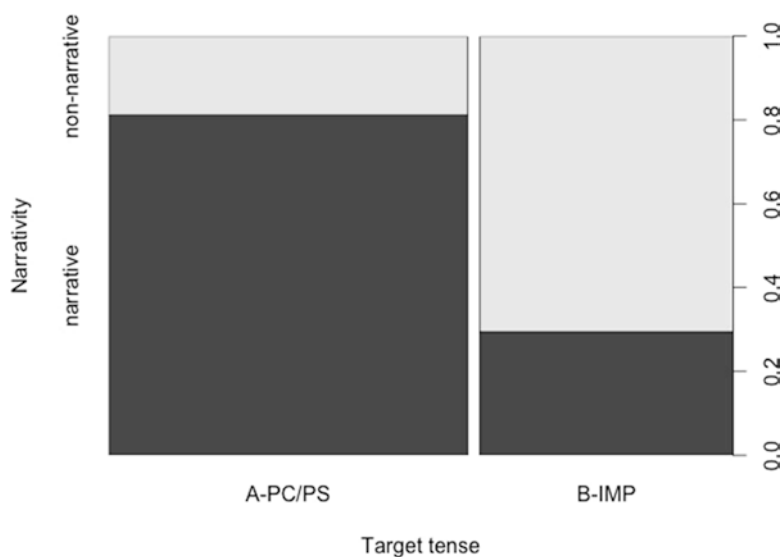
Fig. 4.2 Correlation between narrativity and target tense

respondence is shown to be statistically significant (Chisq 124.26, df = 1, $p < .001$). This correlation, shown in Fig. 4.2, is intermediately strong, having a Phi-coefficient of 0.52. The remaining 22%—for which annotators agreed on the narrativity label but which are not consistent with the verbal tense used in French—point to narrative usages of the Imparfait and to non-narrative usages of the Passé Composé.

The association plot in Fig. 4.3 shows the contribution to the overall significative chi-square of every cell (levels of the dependent and independent variable). In this plot, the area of the box is proportional to the difference in observed and expected frequencies. The black rectangles above the dashed line, indicating observed frequencies exceeding expected frequencies, correspond to narrative usage of the Simple Past positively correlated with the Passé Composé/Passé Simple value of the Target tense dependent variable, and to the non-narrative usage of the Simple Past positively correlated with the Imparfait value of the dependent variable. The grey rectangles below the dashed line, indicating observed frequencies smaller than expected frequencies, correspond to the lack of correlation between non-narrative
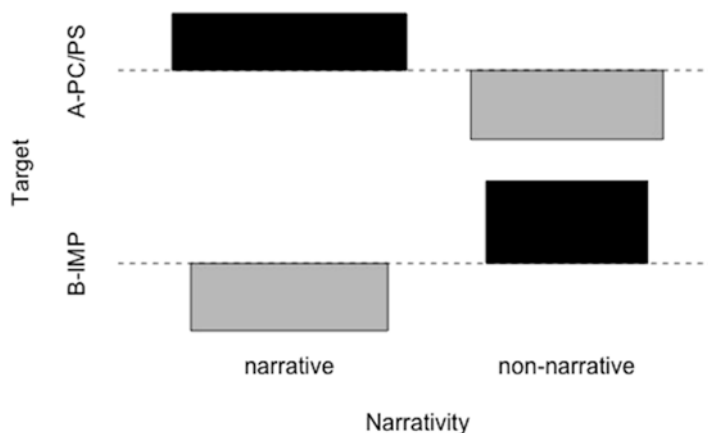
Fig. 4.3 Association plot for narrativity and target tense: residuals

usage of the Simple Past and the Passé Composé/Passé Simple, and narrative usage of the Simple Past viewpoint and the Imparfait value of the dependent variable.

The experiment described in this section showed that native speakers of English have little ability to consciously evaluate temporal interpretations triggered by Tense, operationalized as the [±narrativity] feature. The difficulty in consciously evaluating this type of information provides strong empirical evidence for the procedural nature of this feature, which is described as not easily accessible to consciousness. When speakers do not have conscious access to the instructions encoded by linguistic items, this information can be uncovered by other means. Participants were asked to propose a connective that would render explicit the implicit temporal relation (such as *and then*) or the implicit lack of temporal relation (such as *and at the same time*). The results showed that explicitating the implicit relation is an easier task for speakers than consciously evaluating these temporal relations. This represents strong empirical evidence for the procedural nature of this feature.

The results of experiments from Sects. 4.2.3 and 4.2.4 indicated that, for both French and English verbal tenses, the narrativity feature is identifiable after the second phase, when the judges inserted temporal connectives in order to render explicit the implicit temporal relation existing between the eventualities expressed. From a cross-linguistic perspective, the narrative usage of the Simple Past is translated with Passé Composé or Passé Simple (which themselves have a narrative usage), while an Imparfait is used to translate the non-narrative usage of the Simple Past. Moreover, when investigated in translation corpora, narrative usages of the Simple Past also point to narrative usages of the Imparfait (known as the *historical/breaking/narrative* Imparfait). These findings confirm the scenario according to which the [± narrativity] feature is procedural, and that it is a cross-linguistically valid feature.

The experiments presented in this section have shown two systematic patterns. When participants deal with the localization of eventualities with respect to S—that

is, in the past or non-past (present or future)—they point out the ease of the task, and have high rates of inter-annotator agreement. When they deal with the localization of one eventuality in respect to another, they express the greater difficulty of the task, and have lower rates of inter-annotator agreement. These patterns are interpreted in terms of the different cognitive costs required to accomplish these tasks: a reduced cost for the first; and a higher cost for the second. I argue that this observed difference may be explained in terms of the different content which the comprehender is dealing with: conceptual for the former, and procedural for the latter. The results of these experiments support the interpretation according to which the category Tense encodes conceptual information, which refers to the localization of an eventuality with respect to S, as well as procedural information, which refers to the localization of an eventuality with respect to another eventuality (the phenomenon classically treated as temporal sequencing). These two localizations are contextually determined.

4.3 Annotation Experiments with Aspect and Aktionsart

4.3.1 Hypotheses and Predictions

This section has two aims. The first aim is to assess whether comprehenders are able consciously to identify and categorize the inherent aspectual properties of verbal phrases, and the completion/entirety vs. ongoing status of an eventuality. The former property was operationalized as the [±boundedness] feature, and the latter as the [±perfectivity] feature.

Eventualities are theoretically distinguished between *bounded* (generally, achievements and accomplishments) and *unbounded* (generally, states and activities). Dowty (1986) suggested the link between eventuality type, temporal progression and verbal tense. He argued that bounded eventualities trigger temporal progression, as in examples (467) and (468), whereas unbounded eventualities express lack of temporal progression, as in examples (469) and (470).

(467)   John entered the president's office. The president walked toward him.
(468)   John entered the president's office. The president stood up.
(469)   John entered the president's office. The president sat behind a huge desk.
(470)   John entered the president's office. The clock on the wall ticked loudly.

Eventualities can be presented with a perfective or an imperfective point of view. The imperfective aspect restraints temporal progression, by presenting the situation as ongoing, or by setting a focus on an internal phase, as in (471). The perfective aspect favours temporal expression by presenting the situation as a completed whole (Comrie 1976; Dowty 1986) as in Sect. 4.3.3.

(471)   John entered the president's office. The president was writing a letter.
(472)   John entered the president's office. The president wrote a letter.

The second aim is to investigate the relation between the type of eventuality and the verbal tense used in a target language, as well as the relation between the speaker's viewpoint of that eventuality and the verbal tense used in a target language. From a bilingual perspective, Kozlowska (1998b) argued that there is temporal progression in French with bounded eventualities expressed with the Passé Simple, as in (473) and (474), but no temporal progression with unbounded eventualities expressed with the Imparfait, as in (475) and (476), where examples (473)–(476) are the French translation of examples (467)–(470).

(473)   Jean entra dans le bureau du président. Le président *s'avança* vers lui.
(474)   Jean entra dans le bureau du président. Le président *se leva*.
(475)   Jean entra dans le bureau du président. Le président *était* assis derrière un énorme bureau.
(476)   Jean entra dans le bureau du président. L'horloge murale *marchait* bruyamment.

From a bilingual perspective, the French Passé Simple and Passé Composé are described as expressing the perfective aspect, whereas the Imparfait is associated with the imperfective aspect in its non-narrative usages. However, the Imparfait has also narrative usages that present the situation as a completed whole (like the perfective aspect), in particular in its narrative usages. Narrative and non-narrative usages of the Imparfait were confirmed in the annotation experiment described in Sect. 4.2.4.

Taking into account these semantic and pragmatic correspondences which scholars have proposed to hold between both of these aspectual properties of eventualities, expressed with the Simple Past in English and the verbal tense used in French, two research questions can be formulated. The first is *are comprehenders able consciously to identify the boundedness and perfectivity status of eventualities?* The second is *can these pieces of aspectual information be used to predict the verbal tense used in French as the target language?*

In order to answer these two research questions, a series of scenarios and their subsequent predictions can be formulated, as given in Fig. 4.4. As with localization of eventualities with respect to S and to one another (Sect. 4.2), accessibility to consciousness points to the participants' ability consciously to carry out the task in an accurate manner. Hence, the degree of accessibility to consciousness of [±boundedness] and [±perfectivity] will be inferred from inter-annotator agreement rates. Previous studies have suggested that Aktionsart and Aspect differ with respect to their nature of encoding: conceptual for the former, and procedural for the latter. High rates of inter-annotator agreement, signalling high accessibility, are expected for the former, and low rates of inter-annotator agreement, signalling low accessibility, are expected for the latter.
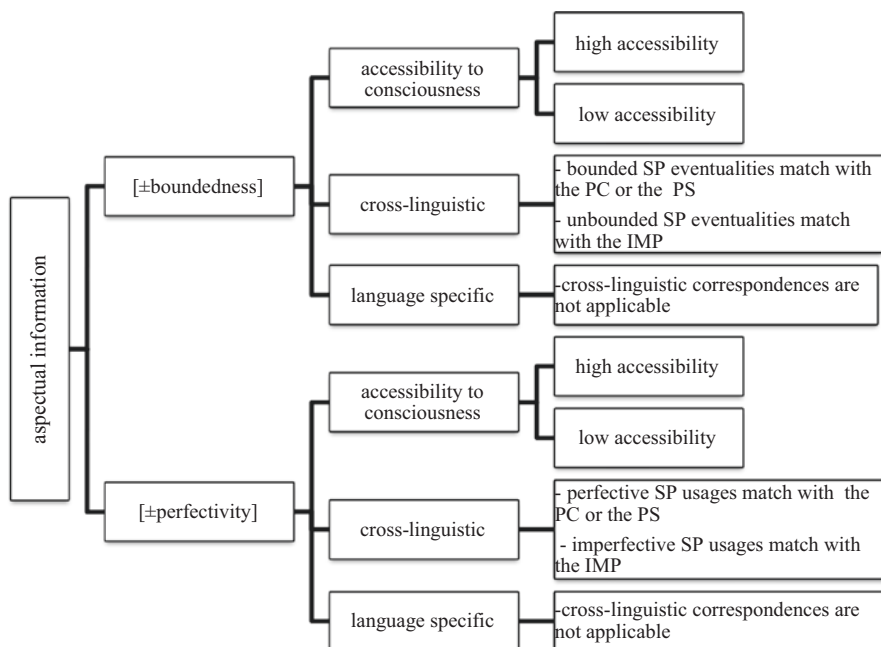
Fig. 4.4 Possible scenarios and their predictions regarding aspectual information from verbal tenses

From a cross-linguistic perspective, robust cross-linguistic correspondences are expected for each feature. This means that the data will indicate that, in the French data, frequently bounded Simple Past eventualities match with the Passé Composé or Passé Simple, and unbounded Simple Past eventualities match with the Imparfait. Similarly, in the French data, perfective Simple Past usages match with the Passé Composé or Passé Simple, and imperfective Simple Past usages match with the Imparfait.

4.3.2 The Simple Past and the [±Boundedness] Feature

Participants

A previous pilot experiment with the same feature showed that judging lexical aspect required a certain level of theoretical knowledge, and that training did not manage to improve their results. In order to have reliable data annotated with the [± boundedness] feature, two research peers were asked to participate in this experiment. They were not native speakers, but were fluent in spoken and written English,

Table 4.13   Linguistic tests for the [±boundedness] feature

Test	Bounded eventualities	Unbounded eventualities
in/for adverbials	*in* adverbials	*for* adverbials
Homogeneity	−	+
Entailment with progressive	−	+

and used English as professional language.[6] They were not paid for their participation in the experiment.

Procedure and Material

The material used is the clean data resulting from the experiment presented in Sect. 4.2.7: that is, 435 items containing Simple Past tokens. Participants received annotation guidelines, consisting of the definition of the bounded and unbounded eventualities, their descriptions according to their behaviour in the three linguistic tests provided in Table 4.13, as well as two examples for each category. Bounded situations are situations which have attained their natural endpoint, as in example (477), where the running of the one-mile race is finished. The same true of situations which do not have a natural endpoint, but which are viewed as finished, as in example (478). Unbounded situations are situations which have not attained their natural endpoint, as in example (479), where the running of the one-mile race is not finished. The same is true of situations like example (480), where living in Paris does not have a natural endpoint.

(477)   Max ran the one-mile race.
(478)   I have lived in Paris from June to December 1998.
(479)   Max is running the one-mile race.
(480)   I have lived in Paris.

Evaluation of inter-annotator agreement rate was performed with the Ҡ coefficient. In terms of cross-linguistic evaluation, the labelled items were compared to a reference baseline, containing the tenses used for the translation of the Simple Past into French, from the French part of the parallel corpus.

Results

The results are provided in Table 4.14. Judges agreed on the label for 401 items (92%) and disagreed on 34 items (8%). The agreement rate corresponds to a Ҡ value of 0.84. All 34 disagreements were resolved in the experiment's second phase, consisting of a discussion between the two judges, corresponding to a Ҡ value of 1. The Ҡ values of both phases of annotation indicate that the judges understood the annotation guidelines and that their judgments were reliable. The data contains 236 Simple Past tokens, judged to be bounded, and 199 judged to be unbounded: that is, 54% and 46% respectively.

---

[6] For more accurate results, this experiment could be carried out with native speakers in further research.

Table 4.14 Boundedness for Simple Past: Annotator 1 and Annotator 2

		Annotator 2		
		Bounded	Unbounded	Total
Annotator 1	Bounded	210	8	218
	Unbounded	26	191	217
Total		236	199	435

Table 4.15 Boundedness for the Simple Past: annotators and reference

		Annotators		
		Bounded	Unbounded	Total
Reference	Passé Composé/Passé Simple	208	28	236
	Imparfait	47	152	199
Total		255	180	435

From a cross-linguistic perspective, the data containing agreements from both annotation rounds (435 items) were investigated and analysed in relation to the reference translation, defined according to the parallel corpus. The results are provided in Table 4.15. They show that bounded eventualities expressed with a Simple Past correspond to translation by a Passé Composé or Passé Simple, and unbounded eventualities expressed with a Simple Past correspond to translation by an Imparfait, for 360 items (82%). Using a chi-square test, this correspondence is shown to be statistically significant (Chisq 182.62, df = 1, $p < .001$). This correlation, shown in Fig. 4.5, is intermediately strong having a Phi-coefficient of 0.661.

The association plot in Fig. 4.6 shows the contribution to the overall significative chi-square of every cell. The black rectangles above the dashed line, indicating observed frequencies exceeding expected frequencies, correspond to the bounded type of situations positively correlated with the Passé Composé/Passé Simple value of the Target tense dependent variable, and to the unbounded type positively correlated with the Imparfait value of the dependent variable. The grey rectangles below the dashed line, indicating observed frequencies smaller than expected frequencies, correspond to the lack of correlation between unbounded situations and the Passé Composé/Passé Simple, and between bounded situations and the Imparfait.

To sum up, this experiment showed that the Simple Past is compatible with both bounded and unbounded eventualities, and that this is observable in natural data. In this experiment, the two judges had a very high agreement rate. According to Wilson and Sperber (1993) description of the cognitive foundations of the conceptual/procedural distinction, the information dealt with in this experiment is conceptual. From a cross-linguistic point of view, unbounded situations are most frequently correlated with an imperfective form, whereas bounded situations correlate with a simple past/compound past form in the target language. This correlation is statistically significative. Therefore, one could expect that the [± boundedness] feature is a
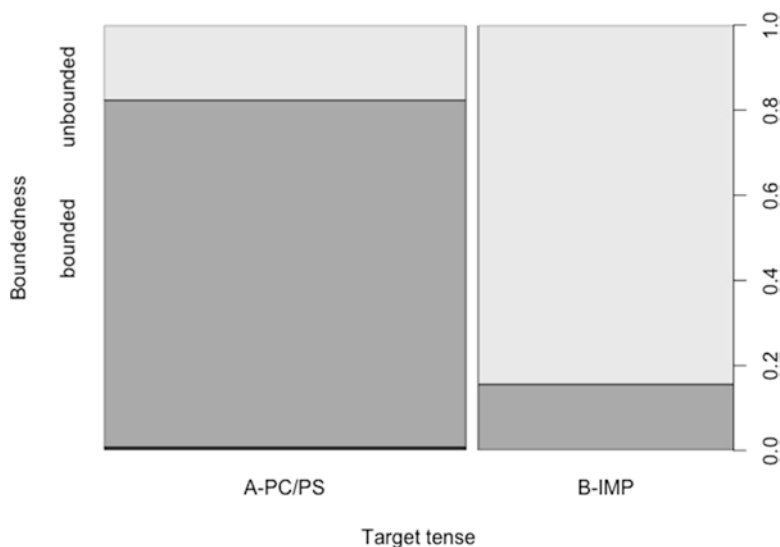
Fig. 4.5   Correlation between boundedness and target tense

Fig. 4.6 Association plot
for boundedness and target
tense: residuals
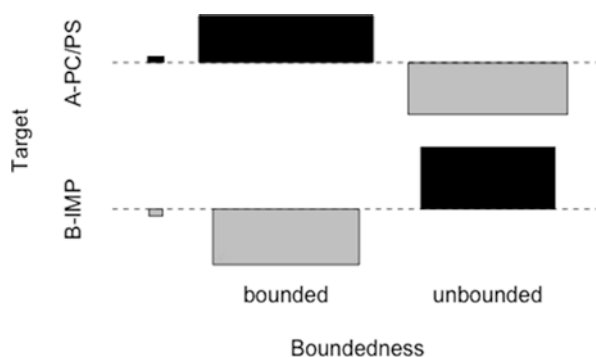
significant factor in predicting the verbal tense used in the target language. This will
be investigated in a multifactorial analysis (see Sect. 4.4).

4.3.3   The Simple Past and the [±Perfectivity] Feature

The [±perfectivity] feature was assessed in two ways. The first was to carry out an
annotation experiment, in which participants were asked consciously to identify the
perfective and imperfective usages of the English Simple Past. The second was to
make use of the translation of the English data into Serbian in order to identify the
two aspectual categories in Serbian and totransfer to the English initial source data.

Participants

The participants in the annotation experiment were two English native speakers from the United Kingdom. They were the same participants from Experiment 3, in which Simple Past tokens were annotated with the [±narrativity] feature. Their participation in the experiment was paid.

Procedure and Material

The material used consisted of 62 items containing Simple Past tokens, chosen randomly from the data annotated in Experiment 3—more specifically, from the 22% of cases where the judges' label did not correspond to the verbal tenses used in the target language in the translation corpus. The participants received annotation guidelines, consisting of the definition of the perfective and imperfective viewpoints, as well as two examples for each category. Perfective situations are viewed as finished, and the situation as a completed whole, as in example (481), where the letter was finished when John entered the president's office. Imperfective situations are viewed as being in progress, and the situation is not completed, as in example (482), where the letter was not finished when John entered the president's office.

(481)   John entered the president's office. The president *wrote* a letter.
(482)   John entered the president's office. The president *was writing* a letter

A training session was carried out using 13 items, followed by a collective discussion, where each judge had to 'think aloud' his/her decisions.

Results

The two judges agreed on the label for 41 items (66%), and disagreed on 21 items (33%). The agreement rate corresponds to a K value of 0.32. Disagreements were not resolved after the discussion between the two judges. The results of this experiment show that the data annotated with the [±perfectivity] feature is not reliable. In order to have reliable data annotated with this feature, another method was used.

Translation and Cross-Linguistic Transfer of Properties

A native speaker translated the data, consisting of 435 items containing Simple Past tokens, into Serbian. The translator was a linguistics student from the University of Geneva, and a native speaker of Serbian. Participation in the experiment was paid. Grammatical aspect was identified in Serbian for each item, and transferred to the initial English source according to the cross-linguistic transfer of properties method. The Simple Past was labelled as perfective for 204 items (47%), and as imperfective[7] for 231 items (53%).

---

[7] For seven items, the translator was free to choose between perfective and imperfective, both aspects being possible. The verbs which occurred in these sentences are *to promise, to spend, to reproach, to organize, to despise, to stay* and *to try.* All these verbs express atelic situations.

Table 4.16 Perfectivity for the Simple Past: annotation by translation and baseline

		Annotation through translation		
		Perfective	Imperfective	Row total
Baseline	PC/PS	144	36	180
	IMP	60	195	255
Column Total		204	231	435
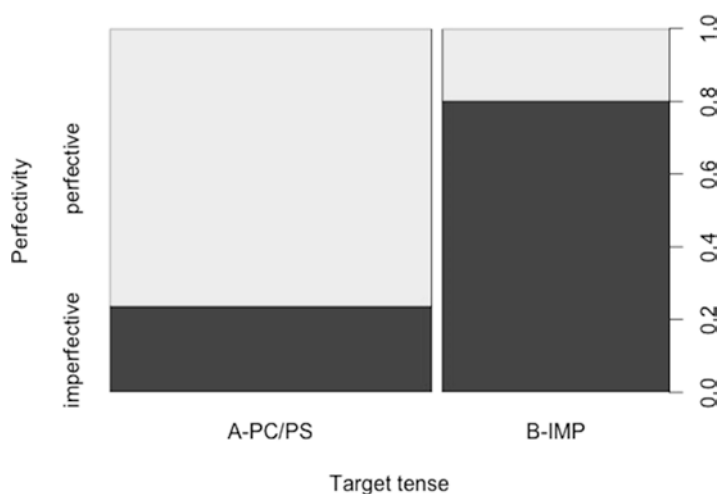
Fig. 4.7 Correlation between perfectivity and target tense

Table 4.16 presents the results of the contrastive analysis between the value of Aspect and the verbal tense used in French. It shows that the perfective viewpoints expressed with a Simple Past correspond to a translation by a Passé Composé/Passé Simple, and imperfective viewpoints expressed with a Simple Past correspond to a translation by an Imparfait for 339 items (78%). Using a chi-square test for independence, this correspondence is shown to be statistically significant (Chisq 132.86, df = 1, $p < .0001$). This correlation, shown in Fig. 4.7, is intermediately strong having a Phi-coefficient of 0.557.

The association plot in Fig. 4.8 shows the contribution to the overall significative chi-square of every cell. The black rectangles above the dashed line, indicating observed frequencies exceeding expected frequencies, correspond to the perfective viewpoint positively correlated with the Passé Composé/Passé Simple, and to the imperfective viewpoint positively correlated with the Imparfait. The grey rectangles below the dashed line, indicating observed frequencies smaller than expected frequencies, correspond to the lack of correlation between the imperfective viewpoint and the Passé Composé/Passé Simple, and between the perfective viewpoint and the Imparfait.

Firstly, the experiment described in this chapter has shown that native speakers of English have little ability consciously to evaluate the meaning of Aspect, opera-
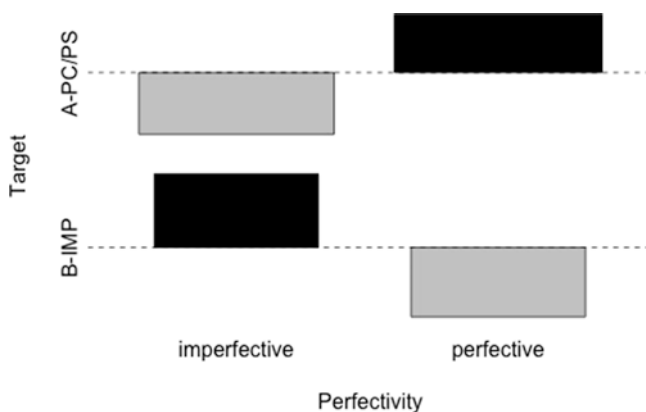
Fig. 4.8 Association plot for perfectivity and target tense: residuals

tionalized in this research as the [±perfectivity] feature. The difficulty of consciously evaluating the type of viewpoint provides strong empirical evidence for the procedural nature of this feature, which is described as not easily accessible to consciousness. When speakers do not have conscious access to the instructions encoded by linguistic items, this information can be found elsewhere. Based on parallel corpora, the novel cross-linguistic transfer of properties technique was used in order to reveal procedural information for English verbs, which is expressed morphologically in Slavic languages.

Secondly, translation data annotated with the [±perfectivity] feature were analysed cross-linguistically. The results pointed to the strong correlation between perfective usages of the Simple Past and the Passé Composé/Passé Simple, and between imperfective usages of the Simple Past and the Imparfait. Another finding is the existence of less frequent cases, such as imperfective usages of the Simple Past and the Passé Composé/Passé Simple, and perfective usages of the Simple Past and the Imparfait.

4.4   A Generalized Mixed Model with Tense, Aspect and Aktionsart

The results of the experiments from this chapter showed that the English Simple Past, on the one hand, and the French Passé Composé/Passé Simple and Imparfait, on the other, are correlated when it comes to three types of encoded information: the narrativity feature (i.e. temporal and causal relations); Aspect; and Aktionsart. As such, the Simple Past is used both for bounded and unbounded situations, presenting them from a perfective or an imperfective viewpoint, having narrative or non-narrative interpretations. Cross-linguistic analysis of translation corpora revealed

that different combinations of these features correspond to translations into French either by an Imparfait or a Passé Compsé/Passé Simple.

Multifactorial statistical analyses were performed to investigate the relationships between the [±narrativity], [±boundedness] and [±perfectivity] features in predicting the verbal tenses used in the target language. In this section, I provide the results of the multifactorial analyses, performed with the statistical program R, and their interpretation.

The data used in multifactorial analyses consists of 435 items containing annotated Simple Past tokens for which the following information is known:

a. the verbal tense used in the target language
b. the verb in the source language in the infinitive
c. the stylistic register
d. for each item in the source language, the value of the [±narrativity], [±boundedness] and [±perfectivity] features

The dependent variable is a binary categorical variable—i.e. the verbal tense used in the target language, comprising 255 occurrences of the Passé Composé/Passé Simple and 180 occurrences of the Imparfait. The independent variables were classified as fixed predictors (the [±narrativity], [±boundedness] and [±perfectivity] features) and random predictors (the verb and the stylistic register). The three fixed predictors are correlated as shown by the two-by-two figures below (Figs. 4.9, 4.10 and 4.11). The Perfectivity and Boundedness correlation is statistically significant (Chisq 224.57, df = 2, $p < .05$), corresponding to a Cramer's V value of 0.469. The Perfectivity and Narrativity correlation is statistically significant (Chisq 95.71, df = 1, $p < .05$), corresponding to a Cramer's V value of 0.469. Finally, the Narrativity and Boundedness correlation is statistically significant (Chisq 147.28, df = 2, $p < .05$), corresponding to a Cramer's V value of 0.582.

Figure 4.12 presents the distribution of the data regarding the three fixed predictors established. It shows that there are two main tendencies, and that all combinations are possible for the Simple Past. The first main tendency is that the perfective viewpoint is associated with bounded situations in narrative contexts, and the second is that the imperfective viewpoint is associated with unbounded situations in non-narrative contexts.

Fig. 4.9 Correlation between perfectivity and boundedness
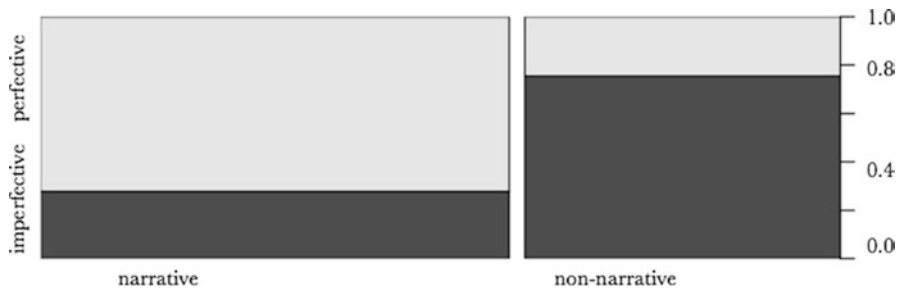
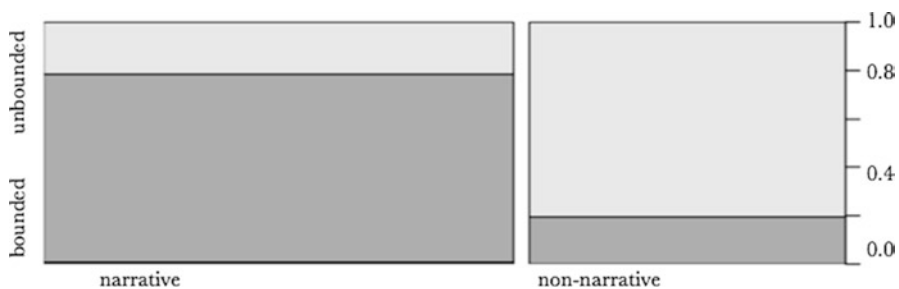**Fig. 4.10** Correlation between perfectivity and narrativity

Fig. 4.11 Correlation between boundedness and narrativity
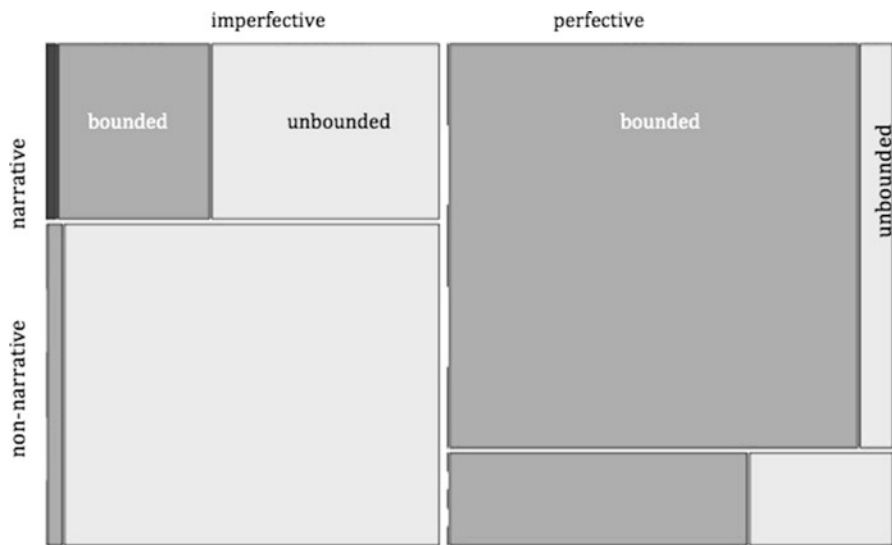
Fig. 4.12 Mosaic plot of the data with three fixed predictors: narrativity, perfectivity and boundedness

The order of the predictors for finding the best model (i.e. the balance between high within-dataset accuracy and high predictive accuracy for new data) was calculated with the Step function. An ANOVA performed on the results of the Step function is provided in Table 4.17. It can be seen that there are four significative predictors, one significative interaction (indicated by the ':' colon symbol) between Aktionsart and narrativity, and one almost significative interaction (between Aktionsart and Aspect).

Following the standard stepwise procedure which aims to adhere to Occam's razor, a maximal model was built—i.e. the model which includes all fixed and random predictors and their interactions. Secondly, other models were built by iteratively deleting the least relevant predictor. Finally, an ANOVA was performed on all the models, and the most effective model with the highest number of degrees of freedom was retained. The model best fitting the data is the model that considers the three fixed predictors and the interaction between boundedness and narrativity, as well as one random predictor, the verb. Table 4.18 provides the results of the best fitting model, and shows that narrativity and perfectivity, as well as the interaction between lexical aspect and narrativity, are statistically significant factors when predicting the verbal tense used in the target language.

Moreover, perfective viewpoint is negatively correlated with the Imparfait, whereas narrative usages of the Simple Past are positively correlated with the Imparfait. Moreover, bounded situations in non-narrative contexts are also negatively correlated with the Imparfait. This interaction is seen in Fig. 4.13. This model's predictive force when applied to new data is 0.83.

The results of the multifactorial analyses described in this section point to the cross-linguistic correlations between contextual usages of a verbal tense in the

Table 4.17 Order of predictors and their *p* value

Predictor	Df	Chi-square *p*
Boundedness	2	<.0001
Narrativity	1	<.0001
Perfectivity	1	0.001
Boundedness:Narrativity	1	0.03
Boundedness:Perfectivity	1	0.08

Table 4.18 Results of the mixed model

Fixed factors	P value
Boundedness	0.968
Narrativity	<.0001 ***
Perfectivity	0.004 **
Boundedness:Narrativity	0.04 *

The number of * signals the level of significance: *** highly significant, ** very significant, * significant
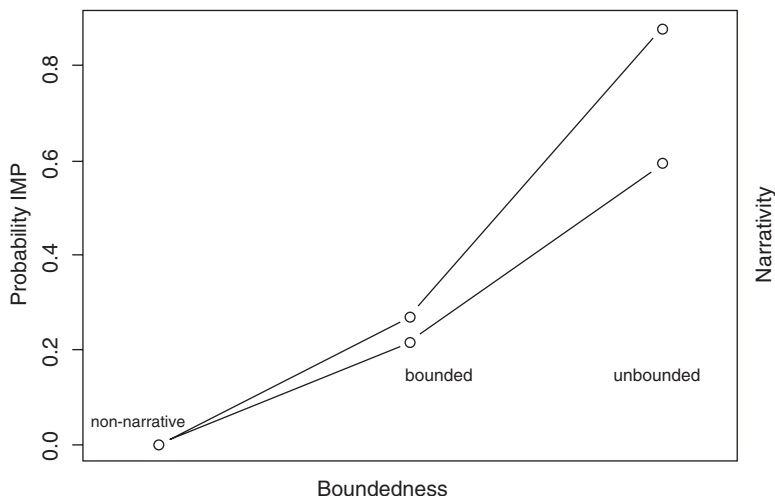
Fig. 4.13 Interaction boundedness*narrativity

source language and the corresponding verbal tenses used in a target language. A mixed model fitting the data indicated that there are three significative factors for predicting the verbal tense in a target language. The Imparfait can be predicted according to the procedural feature encoded by Tense, operationalized as the [±narrativity] feature, the procedural feature encoded by Aspect, operationalized as the [±perfectivity] feature, and, thirdly, the interrelation between the procedural feature [±narrativity], which constrains the interpretation of conceptual information encoded by Aktionsart, operationalized as the [±boundedness] feature. My suggestion is that humans treat temporal information from these three sources in a coherent manner. In particular, these linguistic data point to *temporal cohesion*, established at the level of the discourse. I will tackle this matter in Chap. 5. With respect to the addressee's cognitive faculties involved in the interpretation process, my suggestion is that comprehenders treat this temporal interpretation in a coherent manner, and that one can therefore speak about *cognitive temporal coherence.* This notion will be discussed in more detail in Chap. 6.

The predictive force of the model when applied to new data, at 0.83, illustrates that there is a share of the variability, when dealing with human language, which can neither be predicted nor modelized.[8] This share may be explained by the speaker's personal choices, as well as the translator's personal choices. When it comes to the variability that can be predicted, some specifications can be made. Four fixed factors and two random factors (i.e. stylistic register and the verb itself) have been considered in this mixed model. Other factors that might be studied are the conceptual difference between past and non-past, the speaker's subjective viewpoint, and the

---

[8] This indicates the lack of expectation of a deterministic linguistic model, and of the suggestion that there might be a share of variability due to the speaker's personal preference regarding, for example, the choice between a Passé Composé or a Passé Simple.

usage of the English progressive. The first was not included in this model, because all the verbal tenses from the target language are past time verbal tenses. The second one—to be precise, subjectivity—does not seem to be a type of information to which comprehenders have conscious access (Grisot 2017c). Finally, the third factor should be considered in future research, since it partly shares the same semantic and pragmatic domain as the Imparfait.

4.5 Summary

This chapter was dedicated to describing annotation experiments carried out in order to investigate how comprehenders consciously judge a series of characteristics linked to the encoded and inferred meanings of Tense, Aspect and Aktionsart. I have suggested that dealing with annotation data raises a certain number of issues, such as how to measure inter-annotator agreement rates, how to ensure the reliability of the data, and how to interpret the results. Following the proposal made in Grisot (2017a), in this chapter I used a chance-corrected statistical notion, the K coefficient, to measure inter-annotator agreement rate, and interpret high vs. low rates as indicative of high vs. low degrees of the experimental information's accessibility to consciousness. Additionally, according to Wilson & Sperber's cognitive foundations of the conceptual/procedural distinction (1993/2012), I expected to find systematically different behaviour among native speakers when they consciously evaluated these two types of encoded information—therefore, that conceptual meaning is available to conscious thought. For this reason, annotating conceptual information is expected to be a rather easy task, resulting in high inter-annotator agreement rates. Procedural meaning is more difficult to evaluate consciously than conceptual information is; as such, annotating procedural information is expected to be a more difficult task than judging conceptual information, resulting in medium inter-annotator agreement rates.

For these experiments, I have formulated a series of hypotheses based on previous research, and I have discussed their predictions in terms of accessibility to conscious thought and their cross-linguistic vs. language-dependent status. Two series of experiments were carried out. The first series targeted the category of Tense in English, French, Romanian and Italian, and the description of its meaning using Reichenbachian coordinates. The second series focused on temporal information, as conveyed by Aktionsart on one hand and Aspect on the other.

The experiments in Sect. 4.2 showed two systematic patterns. When participants deal with the localization of eventualities with respect to S—that is, in the past or non-past (present or future)—they indicate the ease of the task, and have high rates of inter-annotator agreement. When they deal with the localization of one eventuality with respect to another, they express the greater difficulty of the task, and have lower rates of inter-annotator agreement. Similarly, the experiments from Sect. 4.3 revealed the same patterns with respect to Aktionsart and Aspect. Again, these

results were interpreted as indicating the conceptual nature of Aktionsart and the
procedural nature of Aspect.

Finally, in Sect. 4.4, I reported the results of a generalized mixed model, built on
the English-French data previously annotated with the [±narrativity], [±bounded-
ness] and [±perfectivity] features. This analysis aimed to investigate the relation
between these features when predicting the verbal tenses used in the target lan-
guage. This mixed model indicated that the pieces of information from Tense (that
is, the [±narrativity] feature) and Aspect (that is, the [±perfectivity] feature), as well
as the interaction between Aktionsart (that is, the [±boundedness] feature) and
Tense (again the [±narrativity] feature), are statistically significant factors when
predicting the verbal tense used in the target language. In other words, cross-
linguistically speaking, the three cohesive ties which this research considers model
83% of the temporal information expressed in a discourse, and allow the prediction
of the verbal tense form to be used in a target language. Based on these results, in
the next chapter I will propose a pragmatic model of temporal cohesive ties, and a
cross-linguistically valid reanalysis of verbal tenses built on this model.

Chapter 5
A Pragmatic Model of Temporal Cohesive Ties

5.1 The *Highly Discriminatory* Model of Temporal Reference

Sections 4.2 and 4.3 described the experimental work carried out to investigate temporal reference, and the main cohesive ties contributing to its expression and processing in discourse. Corpus work revealed the absence of one-to-one cross-linguistic correspondences between verbal tenses. One of the divergences identified is the English Simple Past translation divergence. The analyses of bilingual and multilingual parallel corpora showed that the four verbal tenses most frequently used to translate the Simple Past into French, Italian and Romanian are three verbal tenses expressing past time (the compound past, the simple past and the imperfective), as well as the present tense. The question that arose regarded the linguistic and non-linguistic factors which explain this cross-linguistic variation. Experimental work revealed that, when interpreting a text, hearers take into consideration temporal information originating from several sources, and treat them as a coherent whole. Drawing from the literature available, several possible factors were defined and tested in the experimental work, using offline experiments involving linguistic judgement tasks regarding:

- The temporal localization of eventualities with respect to the moment of speech S;
- The temporal relations existing between eventualities, which can be either implicit or expressed explicitly by temporal connectives, operationalized as the [±narrativity] feature;
- The aspectual viewpoint of the eventuality, operationalized as the [±perfectivity] feature;
- The temporal information inherent to the eventuality (i.e. the lexical aspect of the verb phrase, to which temporal adverbials make a significant contribution), operationalized as the [±boundedness] feature.

Analysis of the results of the experimental work led to several conclusions. Firstly, the temporal localization of eventualities with respect to S is conceptual information encoded by Tense. Verbal tenses can therefore be classified as locating $E < S$ (i.e. pastness) or $E \geq S$ (non-pastness). Secondly, temporal relations existing between eventualities is procedural information encoded by Tense, which is the functional head of the sentence. This is a binary feature, whose value is determined pragmatically in every context, according to linguistic and non-linguistic factors. Thirdly, temporal information inherent to the verb phrase is conceptual information, and its value is computed contextually, according to the lexical aspect of the verb and other factors influencing it, such as temporal adverbials, countable/uncountable noun phrases and grammatical aspect.

In order to account for these conclusions, I propose a theoretical cross-linguistically valid reanalysis of temporal reference, which is empirically and experimentally supported. This cross-linguistic model is called the *Highly Discriminatory* model of temporal reference (HD), and aims to discriminate between the categories and principles that play a role in determining temporal reference, regardless of the language at which we look. One peculiarity of the HD model of temporal reference is the *granularity* of its features. It consists of medium-grained features, which are general enough to be applicable to a large range of phenomena linked to temporal reference in several languages, and precise enough to be theoretically accurate. Additionally, these features answer the requirement of Natural Language Processing tools to be implemented automatically, while being able to explain the various usages of verbal tenses and their translation. It is not just that two of the features included in the HD model (the [±narrativity] and [±boundedness] features) were successfully implemented for automatic processing; their implementation in Natural Language Processing and their application to Statistical Machine Translation produced significant improvements in these systems' results—improvements which represent an empirical, indirect and yet robust validation of these features (Meyer et al. 2013; Grisot and Meyer 2014; Meyer 2014; Loáiciga and Grisot 2016; cf. Chap. 7).

For Moeschler (1998b, 159), determining the temporal reference of an eventuality therefore requires virtual and actual temporal and lexical references:

> Un événement se caractérise par sa nature (c'est un événement de tel ou tel type, courir, manger, pleuvoir, etc.), par ses participants (agent ou patient), par ses circonstances spatio-temporelles (il s'est produit à un moment et dans un lieu donné) et par ses relations à d'autres éventualités, événements ou états. En d'autres termes, un événement est la projection complète, saturée, d'une référence temporelle virtuelle (temps verbal) sur une référence lexicale virtuelle (prédicat), combinée aux références actuelles des arguments de la phrase.[1]

---

[1] 'An event is characterized by its nature (it is an eventuality of such and such a type, *run, eat, rain*, etc.), by its participants (agent or patient), by its spatiotemporal circumstances (it takes place at a certain moment and in a certain place), and by its relations to other eventualities (events or states). In other words, an eventuality is a complete and saturated projection of a virtual temporal reference (a verbal tense) onto a lexical virtual reference (a predicate), combined with actual references of the arguments of the verb phrase.' (my translation)

In other words,

- Virtual temporal reference is provided by Tense, by temporal coordinates E, R and S.
- Actual temporal reference is provided by the contextual saturation of temporal coordinates E, R and S.
- Virtual lexical reference is provided by the aspectual class of the verb (i.e. state, activity, accomplishment and achievement).
- Actual lexical reference is provided by the predicate and the arguments of the verb phrase, and determined contextually.

My assumption is that this picture represents only part of a larger image. I suggest that the global interpretation of temporal reference at the discursive level is determined by the linguistic means existent in a language on the one hand, and by their ad hoc inferential contextual saturation on the other. Fig. 5.1 provides a possible model of the functioning of temporal reference in discourse.

An initial distinction is proposed between the linguistic means typically used by tensed and tenseless languages. Tensed languages, such as the languages studied in this research, make use of TAM markers, namely *tense, aspect* and *mood*. In morphosyntactic terms, in the Minimalist program, these are *interpretable* features (Chomsky 1995, 2000; Cowper 2005): [±past] Tense, [±perfective] Aspect and [±realis] Mood, where the past, imperfective and irrealis are the marked forms (i.e. sentences are interpreted as perfective, non-past and realis in the absence of overt
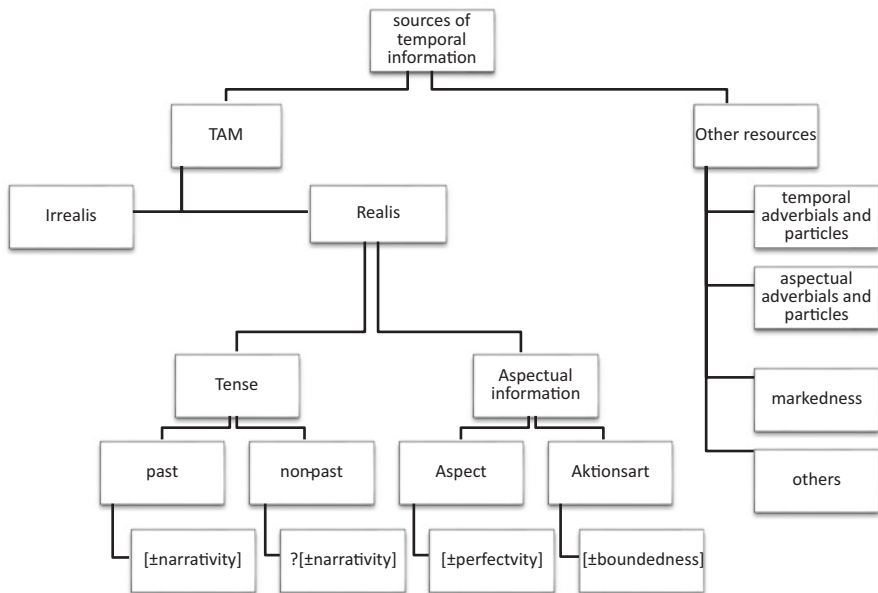
Fig. 5.1 Sources of temporal information

Fig. 5.2 Syntactic structure of an aspectual functional head ASP
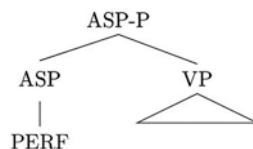
markers indicating the contrary). Sentences in tensed languages have Infl (i.e. from Inflection, following Chomsky 1957, 1965) as their functional head (consisting of Tense and Agreement features).

Languages differ in terms of how they make use of the features. For example, it has been suggested that Romance languages have two separate projections of Infl— T-P (i.e. Tense phrase) and ASP-P—whereas English has only one, as argued by Giorgi and Pianesi (1997) for Italian and English, and Cowper (2005) for Spanish and English. In tenseless languages, like Mandarin Chinese, the speaker and the hearer make use of means of expressing temporal reference other than the Tense branch; the Aspect branch and the Other Resources branch are much more developed than they are in tensed languages. Lin (2012, and previous research) argued that sentences in tenseless languages have in their syntactic structure an aspectual functional head ASP, which plays the same role that the Tense head does in a tensed language. The aspectual head ASP-P can be perfective or imperfective, as shown in Fig. 5.2 for a perfective ASP-P.

According to Tonhauser (2015, 140), aspectual marking (i.e. both Aspect and Aktionsart) is implicated in temporal reference in Mandarin Chinese in two ways: (i) 'it mediates the temporal relation of the topic time [i.e. reference time in Reichenbachian terms] of one clause to that of the other', and (ii) 'leads to default inferences about the temporal localization of the topic time relative to the utterance time' (i.e. moment of speech S in Reichenbachian terms). For C. Smith (2008), in Mandarin Chinese, Aspect encodes the relation between reference time R and event time E (an idea initially suggested in Tedeschi & Zaenen 1981): for example, the *-le* perfective indicates that E = R, and the *-guo* perfective indicates that E < R. The relation between S and R is pragmatically inferred from Aktionsart (i.e. bounded vs. unbounded situations).

As is argued by Relevance Theory, during the general comprehension procedure, the hearer establishes temporal reference while determining the explicature of the utterance. This is a subtask which takes place in parallel with the determination of the implicated premises (also called contextual hypotheses) based on the context and of the implicated conclusions, which satisfy the hearer's expectations of relevance. This means that information provided by the other two sub-tasks is continually used for revision or elaboration of the task at hand while the utterance unfolds. Tense, Aspect and Aktionsart encode procedural and conceptual information, which guides the interpretation process either by contributing to or by constraining the content expressed. Conceptual information most often represents a pro-concept TIME which must be adjusted contextually, in the form of an ad hoc concept. Procedural information, on the other hand, operates at two levels: syntactic computation, and pragmatic interpretation. The layers of temporal meaning are summarized in Table 5.1.

Table 5.1 Layers of temporal meaning

Relevance-theoretic level	Conceptual/procedural information	Temporal reference	Inferential status	Truth-conditionality status
Explicature	Conceptual (contribution)	E/S; Aktionsart	Inferential	Truth-functional
	Procedural (constraining)	Narrative vs. non-narrative (via R) Perfective vs. imperfective		

Firstly, inflectional morphemes (temporal and aspectual) contribute to the content of the proposition expressed:

- The temporal localization of an eventuality with respect to S must be specified at the level of the explicature. It represents inferential and truth-functional content.
- The type of eventuality or Aktionsart with respect to its actual realization is inferentially processed at the level of the explicature: the [±boundedness] feature.

Secondly, the presence of inflectional morphemes (temporal and aspectual) in a sentence constrains the interpretative process:

- Tense instructs the hearer to order eventualities temporally. The result of this inference is an explicature, and it is truth-functional content.
- Aspect instructs the hearer to identify the speaker's viewpoint of the eventuality expressed. The result of this inference is an explicature, and it is truth-functional content.

The layered representation of temporal meaning established here is based on conceptual information contributing to the truth-conditional content of an utterance, and on procedural information constraining the formulation of the explicature and implicatures associated with an utterance. With respect to the temporal structure of an utterance/discourse:

- The hearer makes hypotheses at the explicit level about location of the eventuality or series of eventualities in Realis or Irrealis.
- If the Realis pathway is chosen, the hearer makes hypotheses about the contextual values of Tense and Aspect.
- As far as Tense is concerned, the hearer makes a hypothesis about location with respect to S: past ($E < S$) or non-past ($E \geq S$).
- If the past time path is selected, a second hypothesis is made about the temporal localization of an eventuality with respect to another eventuality, operationalized as the [±narrativity] feature.
- As far as Aspect is concerned, the hearer makes hypotheses about the possible contextual values of grammatical viewpoints.
- As far as Aktionsart is concerned, the hearer makes hypotheses about the actual realization of (a)telicity.

This model contrasts with the proceduralist view of verbal tenses (de Saussure 2003, 2011; Aménos-Pons 2011). According to the proceduralist view, verbal tenses encode procedural information, which acts at two levels: that of the explicature, via type 1 procedural information; and that of the implicature, via type 2 procedural information. De Saussure (2003, 219) notes:

> Les temps verbaux orientent l'interprétation à plusieurs niveaux, mais dans les développements récents de la théorie de la Pertinence par les chercheurs genevois, l'hypothèse qui a été retenue et mise à l'épreuve stipule que les temps verbaux ont pour rôle premier de permettre la fixation de la référence temporelle. Les autres dimensions représentationnelles ("résultat dans le présent" pour le passé compose ou "expression d'un point de vue" pour l'imparfait) ne sont que des conséquences du processus général qui consiste à attribuer à un énoncé une référence temporelle selon le calcul que demande le temps verbal, calcul qui se fait sur une sémantique constante.[2]

In other words, the primary role of verbal tenses is to establish temporal reference, which is the 'temporal moment, in the hearer's consciousness, at which the truth-conditions of the eventuality are verified' (de Saussure 2003, 179, my translation); thus, they encode constraints on the explicature. Other forms of interpretative content triggered by verbal tenses, such as the resultative state relevant at S for the compound past, represent constraints on the formulation of implicatures (be they implicated premises or implicated conclusions).

The temporal sequencing phenomenon is, for de Saussure (2003), the result of the algorithm set up during the comprehension procedure, in which the hearer must determine a temporal relation holding between mental representations of eventualities. Thus, one must first explain the temporal sequencing phenomenon in order to explain temporal reference. This is because 'formulating an algorithm – a procedure – for calculating temporal sequencing implies providing the temporal reference of a process, as it is being processed, by connecting it to that of another process' (p. 183, my translation). Put another way, determining temporal reference at the explicature level depends on determining the temporal sequencing of eventualities, which is seen as a purely pragmatic phenomenon.

As for the role played by Aspect and Aktionsart in determining temporal reference (as understood by de Saussure) and temporal sequencing phenomena, the proceduralist view insists on the essential role played by Aspect, and the reduced contribution of Aktionsart. For example, when processing the sentences in (483) and (484), from de Saussure (2003, 179), the hearer does not determine a temporal interval, lasting from a few seconds in the former to a few hours in the latter, but a punctual and bounded cognitive representation of the eventuality. This is mainly due to the assumption that the Passé Simple is a perfective verbal tense, and this

---

[2] 'Verbal tenses guide the interpretation at several levels, but in the recent developments of Relevance Theory by researchers from Geneva, the hypothesis retained and tested stipulates that the main role of verbal tenses is to allow the fixing of temporal reference. The other representational dimensions ('resultative state in the present' for the compound past or 'the expression of a point of view' for the imperfect) are only the consequences of the general process, which consists in attributing temporal reference to an utterance according to the calculation required by the verbal tense, a calculation based on constant semantics.' (my translation)

overrules the inherent temporal information given by the situation type (achievement in (483) and activity in (484)).

(483)   La bombe *explosa*.
        'The bomb exploded.'
(484)   Frédéric et Marie-Hélène *emplirent* la piscine.
        'Frédéric and Marie-Hélène filled the pool.'

In (485), containing the telic eventuality *courir le 1500 mètres* 'run the 1500 meters' (accomplishment), the hearer builds an unbounded cognitive representation, due to the Imparfait. De Saussure argues that the Imparfait imposes an imperfective reading of eventualities, despite their type (state, activity, accomplishment or achievement).

(485)   Luc *arriva* au stade. Augustin *courait* le 1500 mètres.
        Luc arrive.PS at the stadium. Augustin run.IMP the 1500 meters
        'Luc arrived at the stadium. Augustin was running the 1500 meters.'

Therefore, it is Aspect rather than Aktionsart, defined in terms of telicity, which seems to play an important role in determining the temporal sequencing of eventualities (the contrary has been argued by Dowty 1986, who proposed a model of temporal information in the discourse based on Aktionsart). For de Saussure, it is clearly necessary to dissociate the ontological classification of eventualities (Aktionsart) from the mental representation of eventualities, which seems to be independent of the type of eventuality itself, and dependent on Aspectual viewpoint.

In conclusion, based on the corpus-based contrastive and experimental work discussed in this book, I propose a slightly different view of temporal reference. First of all, the hearer deals with temporal information that might be provided by various sources at the explicature level (Mood, Tense, Aspect, Aktionsart, temporal adverbials, temporal connectives, and world knowledge, such as the knowledge that *being sick* is generally previous to and the cause of *going to the doctor*). In this book, temporal information—such as the localization of eventualities with respect to the moment of speech and to one another—falls under the label of *temporal reference*. In tensed languages, it is suggested that this is encoded by the category of Tense at two levels (conceptual and procedural), where in languages that do not have the category of Tense, it is expressed by way of Aspect, Aktionsart, Mood, etc. A feature common to both the HD model of temporal reference and de Saussure's procedural-ist view of temporal reference is that the various sources of temporal information are dealt with not at the purely linguistic level but at the cognitive level of mental representations. For example, Aktionsart is dealt with not in terms of its virtual lexical reference (ontological features such as telicity) but its actual lexical reference, determined contextually in terms of boundedness (cf. Sect. 1.2.2).

The empirical research described in this work dealt with two branches: the *tense* branch, expressing past time reference, and the *aspect* branch, applied to verbal tenses expressing past time reference. It focused on three verbal tenses in particular:

the simple past; the compound past; and the imperfective. Due to the specific applied purpose of this research regarding machine translation, there are other verbal tenses expressing past time reference which were not considered, such as the pluperfect, the present and the English past progressive. As for the *tense* branch expressing non-past time reference, I have discussed the simple present in four languages as they are outlined by classical grammars (cf. Sect. 1.1.4). In this research, this verbal tense was not tested experimentally with respect to the procedural [±narrativity] feature.

5.2 Tense: A Mixed Conceptual-Procedural Temporal Category

5.2.1 The Notion of Context

In this section, I would like to discuss the notion of *context*, which is an essential element of the model developed in this book. Before defining context as it is used in this research, and the role it plays in determining temporal reference, I would like to establish a series of definitions and usages of this notion in semantics and pragmatics. The notion of context is generally used in the literature with three senses: the actual discourse event, involving the speaker and the hearer; the linguistic content of the verbal exchange with syntactic and prosodic structures; and finally, the structure of the information that is presupposed and/or conveyed by the interlocutors in an exchange (Roberts 2004, 197–198). Despite the fact that researchers often tend to focus on only one of the three senses, these three characterizations of discourse context are not mutually exclusive. For semanticists, the context is seen as consisting of a set of objectively *true mental representations* which interlocutors share during communication (for example, Kratzer's *conversational background*, developed within the framework of Possible Worlds Semantics for the analysis of modal constructions; Kratzer 1977, 2012); for pragmaticists, on the other hand, context is a more flexible and subjective notion[3] referring to *assumptions* rather than true facts about the world (for example, Relevance Theory's mutual cognitive environment or context consisting of a set of assumptions).

---

[3] Grice (1989, 65) speaks about *common ground* as the presumed background information shared by participants in a conversation. This notion was used by Stalnaker to analyse presuppositions. For him, *common ground* is reducible to *common belief*: 'The common beliefs of the parties to a conversation are beliefs they share, and that they recognize that they share: a proposition φ is common belief of a group of believers if and only if all in the group believe that φ, all believe that all believe it, all believe that all believe that all believe it, etc.' (Stalnaker 2002, 704). As pointed out by Blochowiak (2014a, b, 67), the proponents of Relevance Theory have criticized Stalnaker's notion of *common ground* on two points: (i) it is cognitively improbable, because the conditions required for the construction of the common ground impose a regression *ad infinitum*; and (ii) it is an unnecessary and undesirable condition for communication, which does not explain misunderstanding and errors in communication.

In this research, the notion of context is defined as encompassing the *cotext* and the *background.* More precisely, the cotext refers to (i) the actual discourse event involving the speaker and the hearer, and (ii) the linguistic content of the verbal exchange which has syntactic and prosodic structures. I will refer to this with the capital letter C.

Regarding background information, I adopt Blochowiak's (2014b) notion of *pragmatic background*, which relies on Kratzer's conversational background with respect to its technical formalization, and on the relevance theoretic notion of context with respect to its flexibility and cognitive plausibility. For Blochowiak, the pragmatic context is *a set of propositions believed or known to be true by the speaker in a given situation*, where a proposition can be attributed a truth-value (Blochowiak 2014b, 58). More formally (Blochowiak 2014b, 59),

> A proposition p belongs to a background of a speaker s at time t if and only if the speaker s believes at time t that p is true.

In other words, the propositional pragmatic background (or just *background*, as Blochowiak suggests) of a speaker *s* is the set of all propositions believed by *s* at time *t* to be true. In any situation, the background of any speaker is a structured set consisting of several classes of propositions. Blochowiak distinguishes between *general* propositions (also called *generalized propositions* or *laws*) and *individual* propositions. Generalized propositions include generic statements, as in (486) and (487), general rules which are law-like statements about some general truth, as in (488), and abnornic laws which are exceptions from the law-like rules, as in (489).

(486)   The oak tree was destroyed by extensive ship construction in England. (Blochowiak 2014b, 25)

(487)   Birds fly. (Blochowiak 2014b, 25)

(488)   All French nouns form their plural by adding *s*. (Blochowiak 2014b, 28)

(489)   All French nouns form their plural by adding *s* unless they end in *al* (except *bal, carnaval*), or in *eu* or in *au*, or in *ou* (except *pneu, genou*, etc.) or *x* or *z* or *s*. (Blochowiak 2014b, 28)

Within the class of individual propositions, she distinguishes between *regular* and *random* propositions. Regular propositions refer to states of affairs described as being regular (such as states of affairs predicted by causal rules, purposive rules, psychological rules concerning human actions, biological rules, etc.) or random (referring to states of affairs which cannot be predicted by rules such as those mentioned above).

The background consisting of these two types of propositions (generalized and individual propositions) can be complemented by different sorts of cognitive attitudes, such as epistemic, evidential, bouletic, etc. Following Kratzer's classification of different kinds of conversational backgrounds, Blochowiak defines four types of such backgrounds (Blochowiak 2014b, 60), which I will simplify as follows:

- Doxastic background: the set of propositions speaker *s* believes at *t*
- Epistemic background: the set of propositions speaker *s* knows at *t*
- Evidential background: the set of propositions speaker *s* has evidence of at *t*
- Bouletic background: the set of propositions speaker *s* wants at *t*

In a given situation, the speaker has a general background, which comprises all she knows, believes, wishes, has evidence of, etc. at a certain moment. We can refer to this general background, consisting of the sum of all propositions from all backgrounds, with the capital letter B.

As noted above, the notion of context, as it is understood and used in this research, encompasses the notions of cotext and of background. Therefore, the context in which the speaker interprets an utterance can be formally described as:

(490)   ConText = {C, B}

My understanding of the notion of context does not differ from that proposed by Relevance Theory, and defended by Assimakopoulos (2017). ConText is a cognitive construct consisting of a set of assumptions pertaining to C and B, which is (i) selected during the interpretation process, rather than determined in advance of it, and (ii) expanded during the interpretation process, when the expectation of relevance is satisfied or abandoned.

5.2.2 Reichenbachian Coordinates: E and S

Before detailing my understanding of the conceptualist view of Tense via contextual saturation of E and S, I would like to discuss the notions of *variable* and *saturation* in formal semantics (Fregean semantics, following Heim and Kratzer 1998) and in pragmatics (discursive pragmatics, following Moeschler and Reboul 1994). The notions of *variable* and *saturation* come from Frege's idea of compositional semantics. For him,

> Statements in general, just like equations or inequalities or expressions in Analysis, can be imagined to be split up into two parts; one complete in itself, and the other in need of supplementation, or 'unsaturated'. Thus, e.g., we split up the sentence 'Cesar conquered Gaul' into 'Cesar' and 'conquered Gaul'. The second part is 'unsaturated' – it contains an empty place; only when this place is filled up with a proper name, or with an expression that replaces a proper name, does a complete sense appear. Here too I give the name 'function' to what this 'unsaturated' part stands for. In this case, the argument is Cesar. (Frege 1948, in Heim and Kratzer 1998, 3)

Hence, for Frege, unsaturated meanings are functions, which take arguments. As a process, saturation consists in the application of a function to its arguments. In set theory (Heim and Kratzer 1998, section 1.3), functions are sets of a certain kind, where a *set* is a collection of objects, which are called *members* or *elements*. A set can also be defined by *abstraction*, which means specifying a *condition* which is to be satisfied by all and only all the elements of the set to be defined. For example,

(491)   Let A be the set of all cats.
(492)   Let A be the set which contains exactly those x such that x is a cat.
(493)   A := {x : x is a cat}

The notations in (492) and (493) (to be read as 'the set of all x such that x is a cat') defines the same set as (491) by abstraction: the condition to be satisfied by all and only all the elements of the set is to be a cat. The letter x does not stand for a particular object, but functions as a kind of place-holder or *variable*. To determine if a particular object is a member of A, one has to replace the name of the candidate object—let's say Minette—in the condition 'x is a cat'. If the statement is true, then the candidate object, Minette, is a member of the set A (Minette $\in$ A).

Having discussed their formal semantic usage, I will now turn to the usage of the notions notions *saturation* and *variable* in discourse pragmatics (following Moeschler and Reboul 1994). According to Milner (1982, in Moeschler and Reboul 1994, 501), a linguistic expression has three dimensions, which in combination allow it to be identified: its phonological form; its lexical meaning; and its grammatical category. If one of these dimensions is absent or insufficient, the following principle applies: 'an incomplete linguistic expression must be able to receive the dimensions it needs' (Milner, in Moeschler and Reboul 1994, 502). This principle refers to the process of *saturation*, which is, as argued by Milner, a pragmatic process drawing on the discursive context and/or the linguistic cotext. For example, in case of pronominal anaphorical reference compared to deictic pronominal reference, the sources of information necessary for the saturation process are not the same for the two types of pronominal reference. More precisely, saturating an anaphorical pronoun draws on the cotext, whereas saturating a deictic pronoun draws on the discursive context. In this book, the process of saturation involved in reference assignation is understood as targetting the relation between a linguistic expression and a non-linguistic entity—i.e. a mental representation, where mental representations are the interface between linguistic entities and world entities (Reboul 2000).

In Relevance Theory, the notion of *saturation* is a 'linguistically mandated completion', which concerns pragmatic developments of the logical form necessary to derive the explicit content of an utterance (Carston 2004, 637). For Carston, saturation is a more widely manifest process than the simple finding of values for overt indexicals, such as pronouns. She suggests that saturation takes place for words such as *better, same, too, enough*, etc.

(494)   a. Paracetamol is better. [than what?]
        b. It's the same. [as what?]

Similarly, Relevance Theory has rejected Ducrot's notion of *variable* (Anscombre and Ducrot 1983) used to refer to linguistic meaning, which is the result of a purely linguistic analysis of phrases. Linguistic meaning as a variable must be saturated during the subsequent pragmatic analysis, which takes place in the context. For Anscombre and Ducrot, these variables represent schematic linguistically encoded

procedures concerning the possible usages of the language[4]. Ducrot's integrated pragmatics predicts a clear-cut border between the linguistic and the pragmatic levels of analysis. Relevance Theory has shown that pragmatic processes already take place at the level of the linguistic analysis (cf. the relevance-theoretic notion of explicature), and that the border is more flexible than Ducrot predicts.

I would like now to present the way in which I use the notions of *saturation* and *variable* in this research. I make three suggestions: (i) the Reichenbachian temporal coordinates E, S and R are temporal variables; (ii) their configuration is saturated in the ConText; and (iii) their configuration takes place at the conceptual level.

According to the first suggestion, the event moment, the speech moment and the reference moment are variables or place-holders for actual temporal moments (be they moments or intervals). (495) is read as 'Let E be the set of all *e* such that *e* is an event moment'; (496) is read as 'Let S be the set of all *s* such that *s* is a reference moment'; and (496) is read as 'Let R be the set of all *r* such that *r* is a reference moment'.

(495) $E := \{ e: e$ is an event moment$\}$
(496) $S := \{ s: s$ is a speech moment$\}$
(497) $R := \{ r: r$ is a reference moment$\}$

In other words, in the ConText, a series of temporal moments is available: either an event moment belonging to the set E; a speech moment belonging to the set S; or a reference moment belonging to the set R. To interpret an utterance, the hearer must determine in the ConText the configuration of these coordinates (their temporal precedence or simultaneity). In particular, as I will be arguing below, the configuration between E and S takes place at the conceptual level, whereas the configuration between E and R takes place at the procedural level. I suggest a *mixed conceptual-procedural* view of Tense, according to which the hearer makes use of pragmatic inferences in order to recover the speaker's meaning with respect to the temporal localization of eventualities. This takes place on two levels: the ad hoc narrowing of the pro-concept TIME by way of the *contextual saturation of two Reichenbachian coordinates,* the variables E and S; and relating eventualities with respect to one another (that is, the [±narrativity] feature making use of the R coordinate).

This mixed view of Tense is compatible with the relevance-theoretic vision that a linguistic expression may encode both types of information, and that they are not therefore mutually exclusive. This view has been put forward for discourse markers (Fraser 2006), connectives (Moeschler 2002a for French *et* "and" and *parce que* "because"; de Saussure 2011 and Blochowiak 2014b for *parce que* "because"), temporal adverbials (Wilson 2011 for *then*), illocutionary adverbials (Fraser 2006) and referring expressions (Scott 2011), among others. As pointed out by Scott (2011),

---

[4] However, for Ducrot and Anscombre, utterances do not communicate states of affairs in the world but acts (such as promises, assertions, argumentations, orders, etc.), and linguistic meaning is *auto-référentiel* 'self-referential', which means that understanding the meaning of an utterance is equal to understanding the type of act it performs.

during the relevance-theoretic comprehension procedure, the hearer makes use of conceptual and procedural information encoded by referring expressions in order to determine an utterance's explicit and implicit content. Firstly, the hearer makes use of the conceptual information of the referring expression to rule out those potential referents which are not intended by the speaker. For example, in (498) and (499), the conceptual conditions imposed by referential expression are *primitive reptiles*, which narrows the set of potential referents to include only (sets of) referents which are both primitive and reptile. Moreover, the procedural information encoded by the determiner further narrows the set to include only definite (i.e. identifiable) groups of primitive reptiles (Scott 2011, 193). The difference in acceptability between (498) and (499) lies at the implicit level—i.e. the type of implicature the hearer is encouraged to make. The complex determiner in *these N* encodes a contrast between a proximal and a non-proximal referent/group of referents, which is not available with the definite determiner in *the N*.

(498)   A restudy of pareiasaurs reveals that *these primitive reptiles* are the nearest relatives of turtles. (Gundel and Mulkern 1998: 27)

(499)   ?A restudy of pareiasaurs reveals that *the primitive reptiles* are the nearest relatives of turtles. (Gundel and Mulkern 1998: 27)

The proposal of a mixed conceptual-procedural view of Tense is based on the following arguments. The first is linked to the cognitive foundations of the conceptual/procedural distinction proposed by Wilson and Sperber (1993), and the parallel between this distinction and the *declarative/procedural* model (DP) of the contribution of memory to language (Ullman et al. 1997; Ullman 2004). This parallel can be established with respect to the behaviour and functions of conceptual information/declarative memory on the one hand, and procedural information/procedural memory on the other. The second argument is the relevance-theoretic description of the conceptual and procedural distinction as *contributing* vs. *constraining* the interpretative process.

The first argument relates to the highly striking commonalities between the conceptual/procedural distinction and Ullman's DP model, which provide a better understanding of conceptual and procedural types of information, allowing us to formulate hypotheses regarding the cognitive processing of linguistic expression, encoding one or both types of information. Some of these common features have already been discussed in the literature (such as Wilson & Sperber's cognitive foundations of this distinction), whereas others have yet to be integrated into a relevance-theoretic model. These three commonalities are as follows: firstly, conceptual information learnt by the declarative system is consciously or explicitly recollected; secondly, that procedural information and procedural memory are generally not consciously accessible (although when the rules themselves are rendered explicit, they help to guide the processing of the utterance); thirdly, the declarative and procedural memory systems depend on distinct neural systems, but their regular interactions form a dynamically interacting system. Consequently, one would expect that a single expression could be dealt with by both the declarative and the procedural systems. As a result, it can encode both conceptual and procedural types of information.

The prediction based on first commonality was tested and validated in the experiment reported in Sect. 4.2.2, in which native speakers of French were provided with sentences in which the verb occurred in the infinitive form. Their task was to determine contextually the tensed form for each of the two conditions: past ($E < S$), and non-past ($E \geq S$). All of the participants correctly provided either a past time or a non-past time verbal tense, for both artificial data ($Ҡ = 1$) and natural data ($Ҡ = .80$). This very high agreement rate is due to the fact that this information, which is conceptual, is consciously and explicitly recollected from the memory according to the information available in the ConText. In (500) and (501), the hearer finds in the ConText a series of temporal moments which belong to the E set and the S set.

(500)   Mon voisin aime jouer au casino. Il a tout perdu. Il est en dépression
        car il (être) très riche.
        'My neighbor loves to play at the casino. He lost everything. He is
        depressed because he (to be) very rich'.
(501)   Mon voisin est propriétaire de sa maison, d'un chalet à la montagne et
        d'une très belle voiture. Il (être) très riche.
        'My neighbor owns a house, a chalet in the mountains and a very
        beautiful car. He (to be) very rich.'

Based on background information (the individual regular proposition, which is to say the causal and temporal sequencing relation between *be rich – lose everything – be depressed*), the hearer determines in (500) that the localization of the eventuality *be rich* is in the past: $E < S$. In (501), the background provides a different individual regular proposition, the causal relation between *be rich – own several houses and beautiful cars*, according to which the hearer determines that the localization of the eventuality *be rich* is in the non-past: $E \geq S$. As I have already argued in Chap. 4, as well as in Grisot (2017a), this experiment indicated that speakers have no difficulty consciously evaluating the localization of eventualities with respect to the moment of speech. These high $Ҡ$ values of 0.80 for natural data and 1 for built examples suggest that this information is highly accessible to conscious thought, and easily conceptualized. According to Wilson & Sperber (1993/2012), this type of behaviour corresponds to conceptual meaning. Dealing with this kind of information is not cognitively costly, because it points to concepts that speakers have already acquired and deal with in every utterance: the localization of eventualities in the past or in the present. As I will discuss in Sect. 5.2.3, this systematic behaviour of native speakers contrasts with the cases when they consciously deal with information that has a procedural nature. When participants evaluate procedural meaning encoded by a linguistic expression, the procedure is automatically executed, regardless of contextual assumptions. This procedure leads to a specific pragmatic inference, whose result depends on the contextual assumptions formulated. Consciously evaluating this type of meaning, which is not available to consciousness, is a rather difficult task for annotators. This is shown by their systematic behaviour when judging procedural information: the inter-annotator agreement rates are moderate.

The second argument is purely theoretical, and is based on the description of conceptual and procedural types of information as respectively contributing to and constraining the interpretation of utterances. For example, Nicolle (1998, 4) argues that tense markers impose constraints on the determination of temporal reference, and thus "may be characterized as exponents of procedural encoding, constraining the inferential processing of conceptual representations of situations and events". Concerning the status of the temporal coordinates, de Saussure and Morency (2012) argue that tenses encode instructions on how the eventuality is to be represented by the hearer according to the positions of temporal coordinates. As such, they consider that temporal localization with the help of S, R and E is of a procedural nature, thus defending a *fully procedural* view of Tense (cf. Nicolle 1997, 1998; Moeschler 1994, 1998a, b; Moeschler et al. 1998; Aménos-Pons 2011, de Saussure 2003, 2011).

In the following paragraphs, I will argue that location according to temporal coordinates does not constrain inferential processing, but contributes to the propositional content of the utterance. In essence, the proposal is as follows. Contextual saturation of the configuration of the Reichenbachian variables E and S is performed at the conceptual level, in order to determine the propositional form of the utterance. Contextual knowledge necessary during this task within the relevance-theoretic interpretative procedure comes from the ConText (as defined in Sect. 5.2.1). It is essential to remember that the sub-tasks of the relevance-theoretic interpretative procedure are performed in parallel. This means that the hearer's hypothesis about the intended contextual assumption (corresponding to the contribution of the ConText) and intended contextual implication may be "revised or elaborated as the utterance unfolds" (Wilson and Sperber 2004, 621).

Wilson and Sperber (1993, 151) argue that conceptually encoded information contributes either to explicatures (to the proposition expressed and to high-level explicatures) or to implicatures, whereas procedurally encoded information represents constraints, either on explicatures (to the proposition expressed and to high-level explicatures) or on implicatures (cf. Sect. 2.3.2). They argue for the idea that, during the interpretation process, the hearer builds conceptual representations and uses encoded procedures to manipulate them. A conceptual representation differs from other types of representations in that it has logical properties and truth-conditional properties. The sentence in (502) has the logical form in (503), and the propositional form in (504). They argue that the logical form, recovered by decoding, and the propositional form, recovered by a combination of decoding and inference, are conceptual representations.

(502)   Peter told Mary that he was tired.
(503)   x told y at t_i that z was tired at t_i.
(504)   Peter Brown told Mary Green at 3.00 pm on June 23 1992 that Peter Brown was tired at 3.00 pm on June 23 1992.

The hypothesis advanced here is that the configuration of the temporal coordinates S and E is conceptual information acting as *pro-concepts* (Wilson 2011, Sperber and Wilson 1998). Pro-concepts are semantically incomplete: they are conveyed in a given utterance, and have to be worked out contextually by a pragmatic enrichment process, similar to lexical-pragmatic processes. The pro-concept TIME can be specified, by way of narrowing, in the ad hoc concepts of pastness (i.e. $E < S$) and of non-pastness[5] ($E \geq S$). Tense encodes this base semantic and conceptual information, and is contextually worked out according to the ConText. Due to repeated and constant activation of the same ad hoc concept, certain verbal tenses became specialized such that they activate the concept of pastness, where the specialization of others activated the concept of non-pastness (a similar account of interjections is given by Padilla Cruz 2009). For example, the classically described 'verbal tenses expressing past time', such as the compound past, simple past, imperfect and pluperfect, have undergone this specialization for the ad hoc concept of pastness. However, this does not stop a verbal tense from making reference to another time, or no time at all, if contextual information directs it.

This temporal information is not defeasible—i.e. unable to be cancelled in a given ConText. Consider Wilson and Sperber's example (1993, 157) in (502), and the propositional form in (504). I add to this propositional form the information that the eventualities of *saying* and *being tired* took place before the moment when the sentence was uttered. The extended propositional form would be something like the one given in (505). This temporal information cannot be cancelled, nor contradicted, as shown by the incompatibility in the given ConText with the adverbs *now* and *tomorrow*, in (506) and (507), as well as the compatibility with the adverb *yesterday*, in (508).

(505)   Peter Brown *told* Mary Green at 3.00 pm on June 23 1992 (a moment before the present moment/in the past) that Peter Brown was tired at 3.00 pm on June 23 1992 (a moment before the present moment/in the past).

(506)   *Peter Brown *told* Mary Green at 3.00 pm on June 23 1992 which is now (a moment contemporary with the moment of speech)/tomorrow (a moment which is after the moment of speech) that Peter Brown was tired at 3.00 pm on June 23 1992 which is now/tomorrow.

(507)   *Now/tomorrow*, Peter *told* Mary that he was tired.

(508)   *Yesterday*, Peter *told* Mary that he was tired.

The contextual values and the relation between S and E (i.e. $E < S$ for past and $E \geq S$ for non-past) are pragmatically determined in the ConText. As suggested above, the pro-concept TIME is specified by narrowing to an ad hoc concept accord-

---

[5]As with lexical pragmatics, where, for example, the pro-concept OPEN may be specified to numerous ad hoc concepts (e.g. open a can, open a door, open a bank account, open a file, etc.), one can image that the pro-concept TIME can be narrowed to express more specific categories of temporal remoteness (such as in Bantu languages, cf. Comrie 1985), omnitemporality (E holds *before*, *at* and *after* S) and atemporality. A future study investigating this matter empirically (with corpus-based study) and experimentally is necessary.

ing to contextual linguistic and non-linguistic information. Therefore, in an appropriate ConText, a verbal tense may convey a different ad hoc concept than that for which it has become specialized. In certain ConTexts, the simple present may locate the event in the past (E < S), as shown in (509), (510), (511) and (512). These cases correspond to what the literature calls the historical present[6].

(509)   En 1789, le peuple de Paris *prend* la Bastille. (Riegel et al. 1994)
        In 1789, people from Paris take.3SG.PRES the Bastille.
        'In 1789, people from Paris took the Bastille.'
(510)   In armonia con questo giudizio, Andreotti *compie* con regolarità,
        a Firenze, dove era nato il 15 marzo 1924, gli studi medi...
        (Bertinetto 1986)
        According to this opinion, Andreotti carry out.3SG.PRES regularly
        in Florence, where born.PC on 15th of March 1924, his medical studies
        'According to this opinion, Andreotti regularly carried out his medical
        studies in Florence, where he was born on 15th of March 1924.'
(511)   Ieri *am fost* la Ploiești. *Am mers* cu trenul. În compartiment, *văd* o figură
        cunoscută. (Zafiu 2013)
        Yesterday go.1SG.PC to Ploiești. I go.1SG.PC by train. In the compartment,
        I see.1SG.PRES a familiar face
        'Yesterday I went to Ploiești. I went by train. In the compartment I saw
        a familiar face.'
(512)   I couldn't believe it! Just as we arrived, up *comes* Ben and *slaps* me
        on the back as if we'*re* life-long friends. 'Come on, old pal,' he *says*,
        'Let me buy you a drink!' I am telling you, I nearly fainted on the spot.
        (Quirk et al. 1985)

If we consider example (513), and imagine two different ConTexts, the distance on the timeline between E and S—even if S = E for present tenses—is contextually adjusted according to world knowledge. In the first ConText, a husband and wife are at home, he upstairs and she downstairs; he calls her, and she answers (513). In the

---

[6]A different approach to the historical present is provided by Schlenker (2004). Following Banfield (1982) and Doron (1991), he suggests that the notion of *context of speech* should be split in two subtypes: *context of thought,* and *context of utterance.* For Schlenker, the context of thought is the point at which the thought originates, and it includes a thinker, a time of thought and a world of thought. The context of utterance, on the other hand, is the point at which the thought is expressed, and it includes a speaker, a hearer, a time of utterance and a world of utterance. He argues that this distinction is particularly relevant in Free Indirect Discourse (FID) and narrations in the historical present. Schlenker's claim is that: (i) in ordinary discourses, the context of utterance and the context of thought are identical, and correspond to the actual context of speech; (ii) in FID, the context of utterance and the context of thought are different, the actual context being the context of utterance; and (iii) in narrative present sequences, the actual context is the context of thought, and the context of utterance is presented as having its time coordinate in the past. Moreover, he argues that tenses and pronouns depend on the context of utterance, while other indexicals depend on the context of thought. Tenses and pronouns are variables whose domains of reference are determined by the grammatical features they carry, such as gender, person and tense.

second ConText, the wife has an hour's ride from work to home; he calls her to see when she is coming back home, and she answers (513). The distance between E and S lies somewhere between immediately and 2–3 minutes in the first ConText, and a few minutes and an hour (or even more) in the second.

(513)   J'*arrive*!
        I arrive.1SG.PRES
        'I am coming!'

Another example is the compound past in Romance languages, which allows for reference to both past and future time. In (514), the French Passé Composé, which is specialized to express the ad hoc concept of pastness, locates the eventuality of *finishing* prior to S. In (515), on the other hand, the hearer builds an ad hoc concept of non-pastness making use of linguistic information, in particular the temporal adverb *tomorrow,* and therefore the utterance expresses reference to future time (i.e. E > S). Since the building of the ad hoc concept and the computation of the instructional content, operationalized as the [±narrativity] feature, are simultaneous cognitive processes, the hearer can readjust his initial hypotheses during the interpretative process.

(514)   J'*ai fini* mon livre.
        I finish.1SG.PC my book
        'I *finished* my book.'
(515)   *Demain*, j'*ai fini* mon article.
        Tomorrow I finish.1SG.PC my article
        'Tomorrow, I *will have finished* my paper.'

The corpus-based contrastive analysis discussed in Chap. 3 provided evidence that translating conceptual information leads to little cross-linguistic variation, whereas translating procedural information is source of substantial variation. This quantitative feature makes use of Moeschler's et al. (2012) suggestion that conceptual information is easily translatable, whereas procedural information is far harder to translate. This suggestion is linked to the fact that conceptual information represents concepts that are constituents of the language of thought, and therefore language-independent. According to this observation, it is to be expected that translating conceptual information leads to a small degree of variability in the target language(s), whereas translating procedural information leads to a high degree of variability. In Grisot and Costagliola (2014), and in Sect. 3.4, it was shown that verbal tenses expressing past time are used to translate the English Simple Past into three Romance languages in more than 70% of cases (73% in French, 72% in Italian and 83% in Romanian) whereas the simple present is used in fewer than 8% of cases (8% in French, and 5% in Italian and Romanian). Hence, choosing between the two possible ConTextual values of the pro-concept TIME is straightforward.

    To sum up, in the HD model of temporal reference, the category of Tense encodes the broad pro-concept TIME. Each verbal tense in a language is constantly used to make reference to past or non-past (a distinction also recognized in neurolinguistics,

see Sect. 6.4) and thus becomes specialized to these ad hoc concepts. In other situations, a verbal tense does not have a temporal interpretation. My hypothesis is that the procedural information encoded by Mood (i.e. realis vs. irrealis) constrains the building of the ad hoc concept. In all cases, the hearer is led to make inferences regarding the ad hoc conceptual meaning of a verbal tense, and these are constrained by the procedural types of information encoded by Tense and Aspect. Section 5.2.3 is dedicated to the procedural information encoded by Tense.

5.2.3   [±Narrativity] and Reichenbachian R

The procedural information encoded by verbal tenses helps the hearer to access the right contextual hypotheses, conforming to the communicative and cognitive principles of relevance, to arrive at the intended cognitive effects (Wilson and Sperber 1998). Carston (1998) points out that, under normal conditions, discourse material is presupposed to be relevant and, when information is not explicitly given, it is filled in. The linguistic content of utterances is thus enriched in the interpretive process. In this case, the basic temporal localization of the eventuality (E/S) is complemented by procedural information. In (516), Binnick (2009), following Grice[7] (1989), argues that the material in brackets is implicit. The sentence in (516) is an example of temporal ordering, and thus the procedural feature [±narrativity] of the Simple Past is active.

(516)   He took off his boots and [*then*] got into bed.

The [±narrativity] feature makes reference to the MCPM (*mixed conceptual-procedural model*) of verbal tenses (Moeschler et al. 2012; Grisot and Moeschler 2014; Moeschler 2016), according to which verbal tenses have robust conceptual semantics given by the configurations of Reichenbachian coordinates and by three procedural hierarchical features: [±narrative] > [±subjective] > [±explicit]. Experimental work carried out in this research, and in Grisot (2017b), has allowed me to refine this model, by partly validating and partly challenging the theoretical assumptions behind it. The challenges are twofold. The first relates to the nature of R: either conceptual, together with E and S in the MCPM model, or procedural, together with the [±narrativity] feature in the HD model of temporal reference. The second relates to the nature of the [±subjective] feature: either procedural in the MCPM model, or pragmatic in Grisot (2017c). I will first discuss the [±subjective] feature, and the reasons for which it is not included in the HD model of temporal reference, and then come back to the [±narrativity] feature as it is understood and used in the MCPM and HD models.

---

[7] Binnick's example is a typical example of conversational implicatures (in the terms of Grice 1989) that follow the maxim "Be orderly". Carston (1998, 2002) and Sperber and Wilson (1986/1995) treat this content as pragmatically determined aspects of what is said, and thus as an explicature. See Blochowiak (2014a, b) for a presuppositional account of temporal and causal connotations of 'and'.

Grisot (2017c) reports an experimental study on the recognition of the [±subjective] feature for verbal tenses by native speakers of English (the Simple Past) and French (the Passé Composé, Passé Simple and Imparfait), and for (grammatical) Aspect by native speakers of Serbian. When annotators deal with subjectivity and its triggering by verbal tenses and Aspect (that is, one of C. Smith's 2003 linguistic sources of subjectivity), it was found that they are not able to identify this feature using these cues. They have inter-annotator agreement rates close to those expected to occur by chance.

In particular, three English native speakers judged occurrences of the Simple Past with respect to the [±subjectivity] feature, and had an agreement rate corresponding to a mean Ҁ value of 0.0508 (corresponding to the mean of the Ҁ values for each pair of the three annotators). This Ҁ value shows that the annotators did not agree to an extent beyond what might be expected by chance. In the experiment on French, a total of 105 native speakers participated. The mean Ҁ value for the inter-annotator agreement rate between the five annotators was 0.29. All three verbal tenses analysed were judged as having subjective and non-subjective usages. The Imparfait was judged as subjective in 64% of cases, the Passé Composé in 33% of cases, and the Passé Simple in 56% of cases. Three Serbian annotators had a mean Ҁ value of 0.40. In the agreement data, the imperfective viewpoint was more frequently judged as subjective (76%) over non-subjective (24%), whereas the perfective viewpoint was more frequently judged as non-subjective (54%) over subjective (41%). These low Ҁ values for English and French verbal tenses indicate that the information about the speaker's perspective is not encoded by verbal tenses, and depends on the contextual assumptions that the hearer may formulate. As for Serbian, subjectivity seems easier to identify when grammatical aspect is expressed morphologically than when it is not. However, these three experiments show that subjectivity seems to be a heterogeneous phenomenon, which is interpreted at the global level, and which is not directly triggered by the categories of tense and aspect. Based on this evidence, my suggestion was that comprehenders identify subjectivity—defined as the speaker's viewpoint, psychological perspective, and perceptions—using a general pragmatic inference. In other words, no evidence for a procedural nature of the [±subjective] feature was found.

As shown in Sect. 1.1, the notion of *narrativity* has already been used in the literature by numerous scholars and, more importantly, in various frameworks. For example, Labov and Waletzky (1967) argued that two sentences which are interpreted as being temporally successive form a narrative text. In DRT, Kamp and Rohrer (1983) argued that certain verbal tenses, such as the French Passé Simple, impose a narrative (i.e. temporal progression) interpretation of the discourse where they occur. In SDRT, discourse segments can be linked by discourse relations, such as *narration*, which is the default coherence relation. Narration involves sentences where the textual order matches the temporal order of eventualities in the real world. Finally, Smith (2003) uses the notion of *narrative discourse mode*[8], defined accord-

---

[8] The *narrative* discourse mode is a type of *temporal* discourse mode (besides report and description), in contrast to atemporal discourse modes (informative, argument-commentary). The

ing to aspectual criteria, in particular the type of eventualities expressed (events and states), and interpretation semantic principles. All these usages of the *narrativity* notion have in common the temporal progression interpretation of the discourse. However, they propose dissimilar explanations of how this interpretation is carried out. In this book, the *narrativity* notion only partly shares with other frameworks the idea of temporal progression interpretation. Instead, a different explanation of how hearers arrive at this interpretation is suggested. In this research, the [±narrativity] feature is meant to model both forward and backward temporal inferences triggered by verbal tenses, as well as simultaneous temporal relations. In other words, verbal tenses encode procedural information instructing the hearer to determine the feature's contextual value—i.e. positive or negative.

In Moeschler et al. (2012) and Grisot and Moeschler (2014), four arguments were given in favour of the procedural nature of this feature. Firstly, the [±narrativity] feature is information that constrains the inferential phase of constructing explicatures. Rather than contributing, it constrains the construction of the propositional content of the utterance (Wilson and Sperber 1998, Binnick 2009, Escandell-Vidal and Leonetti 2011). Secondly, temporal sequencing is a discourse property: it needs at least two eventualities for the [±narrativity] feature to be active. Procedural content provides information on how to manipulate conceptual representations, corresponding to more than one discourse entity. If a tense has a narrative usage, it means that as soon as its reference time is set, it is used to construct the temporal reference of the next event, and thus time advances. Binnick (2009) pointed out the role of verbal tenses in discourse coherence as temporal anaphors (discourse interpretation depends on the identification of their antecedents). In example (517), the Simple Past of the verb *take* (i.e. *took*) is bound by that of the verb *leave* (i.e. *left*). Time advances in a narrative sequence, because the R point of one eventuality is located just after the preceding one.

(517)   John left home early. He took the subway.

Thirdly, temporal sequencing can only be paraphrased with difficulty (as is true of conceptual representations for which synonyms can be more easily found), but it can be rendered explicit with the help of temporal connectives, such as *and, then, afterwards* or *because*. And fourthly, the [±narrativity] feature is information inaccessible to consciousness, resulting in low agreement rates among annotators.

The MCPM model is a *discursive* model: if the [±narrativity] feature is positive, then a procedure of temporal ordering calculus is initiated. A verbal tense has a narrative usage (i.e. there is temporal progression from one eventuality e_1 to another

---

narrative mode makes use of two types of discourse entities: states and events. Smith (2003) and Dowty (1982, 1986) propose two principles that are involved in the interpretation of verbal tenses in the narrative mode. Firstly, if a sentence expresses a bounded event, the reference moment R increases from R_n to R_{n+1}, and the verbal tense expresses temporal progression. Secondly, if the eventuality expressed is not a bounded event (and is therefore a state), then R does not change, and the verbal tense is used anaphorically.

eventuality e_2, therefore $R_1 \rightarrow R_2$), as in (518), or a non-narrative usage (i.e. there is no temporal progression from one eventuality e_1 to another eventuality e_2, therefore e_2 has the same R_1), as in (519).

(518)   Erkshine *rose* from his seat, and going over to a tall inlaid cabinet,
         that stood between the two windows, unlocked it, and *came back*
         to where I was sitting, carrying a small panel picture set in an old
         and somewhat tarnished Elizabethan frame. (Literature Corpus)
(519)   It was enough for her that he *appeared* to be amiable, that he *loved*
         her daughter, and that Elinor *returned* the partiality. (Literature Corpus)

The identification of the reference time R is either linguistically triggered (by a verbal tense form or temporal adverb, for example) or pragmatically inferred by the hearer according to contextual and world knowledge. This procedure of temporal ordering calculus is not a default procedure, as Asher and Lascarides (2003) state, but it is triggered by the activation of the [±narrativity] procedural feature. Generally speaking, I would like to suggest that verbal tenses do not encode one of the two possible values of this feature by default, as is assumed by de Saussure (2003), for example. He suggested that the French Passé Simple encodes the narrative value by default, whereas the Imparfait is not specified to provide this instruction, which means that the [±narrativity] procedural feature is not applicable for the Imparfait. According to the model developed in this book, the category of Tense encodes this feature, and, as a consequence, all verbal tenses encode it: they trigger the procedure of contextually determining the narrative or non-narrative interpretation. Regarding speakers' usage, a verbal tense may be more frequently associated with one or another of the possible values without necessarily encoding it. For example, in literary texts, the Passé Simple is frequently used to express temporal progression. However, I argue that this information is not linguistically encoded by the Passé Simple. My suggestion is confirmed by the results of a self-paced reading experiment, in which participants read sequences of sentences expressing temporal progression, in which either the Passé Simple or the Passé Composé was used (Grisot and Blochowiak 2017; cf. Chap. 6). If the Passé Simple encoded temporal progression, where the Passé Composé was undetermined with respect to this feature, then we would expect to find a statistically significant difference between these two verbal tenses in terms of processing costs. The results of this experiment did not provide evidence favouring this hypothesis. In contrast, the results seem to support the suggestion made in this book, according to which the two possible values of the [±narrativity] procedural feature encoded by Tense are contextually determined.

The MCPM model is determined by the requirement to disambiguate usages of the English Simple Past and to improve its translation into French. Consider example (520), with an isolated Simple Past, and example (521), containing the target sentence and its cotext. With respect to its translation into a target language, the isolated token is ambiguous. In (521), the second sentence introduces another eventuality, and the two eventualities are temporally and causally related. According to the model, the English Simple Past has a narrative usage, and is translated into

French by a Passé Simple/Passé Composé, as in (522) and (523). In (524), on the other hand, the second sentence introduces an eventuality that takes place simultaneously. The R period of the first Simple Past occurrence includes the R moment of the second eventuality. According to the model, the Simple Past has a non-narrative usage, and is translated into French by an Imparfait, as in (525).

(520)   John *slept*.
(521)   John *slept*. He got rest.
(522)   Jean *a dormi*.   Il s'est reposé.
        John sleep.3SG.PC. He get rest.3SG.PC.
(523)   Jean *dormit*.   Il se reposa.
        John sleep.3SG.PS. He get rest.3SG.PS.
(524)   John slept. He had a dream.
(525)   Jean *dormait*.   Il fit un rêve.

John sleep.3SG.IMP. He have.3SG.PS a dream.

Further research was carried out in order to test empirically the theoretical assumptions suggested in Moeschler et al. (2012). In this book, Sects. 4.2.3–4.2.6 describe the experiments carried out for French, English, Italian and Romanian verbal tense. The experiments carried out on multilingual data confirm Grisot and Moeschler's (2014) model, and validate it for two additional Romance languages, Italian and Romanian.

Wilson and Sperber (1993) make the prediction that language users do not have conscious access to procedural information encoded by linguistic expressions. However, when the instructions themselves are rendered explicit, they help to guide the processing of the utterance. The offline experiments on the [±narrativity] feature supplied supplementary empirical evidence in favour of its procedural nature. Native speakers who were asked consciously to evaluate the temporal localization of eventualities with respect to one another showed difficulty in doing this task. Inter-annotator agreement rates ($К$ values of 0.41 for Italian, and 0.42 for English, French and Romanian) indicate that language users are able to identify this feature beyond the level of chance, albeit not to the extent of the higher agreement rates expected for information which is consciously accessed with ease. In other words, the [±narrativity] feature is identified in four languages with great difficulty when accessed consciously, but not when the encoded instruction is rendered explicit, by a connective for example. Experiment 3 indicated that the judges' agreement rate was improved ($К = 0.91$) when they were asked to insert a connective (such as *and* and *and then*) when possible, in order to make explicit the temporal sequencing interpretation of the excerpt they were judging.

Each of the languages considered exhibits its own language-specific behaviour for the [±narrativity] procedural feature. My hypothesis is that this is linked to the aoristicization process (Squartini and Bertinetto 2000) undergone by the compound past. That is to say, the compound past is subjected to a change from a pure perfect (as it remains in Spanish and Portuguese) to an aorist (the value of simple

past)[9]. The Romance languages considered in this research—French, Italian and Romanian—find themselves at a different point in the aoristicization process. In particular, the Romanian compound past is more advanced than the Italian compound past, which in turn is more advanced than the French compound past. The [±narrativity] feature is meant to capture the instruction to relate one eventuality temporally to another (i.e. temporal and causal sequencing vs. temporal simultaneity). The Imparfait most often exhibits non-narrative values in Romance languages.

In addition, an important variability was identified with respect to the usage of specific verbal tenses expressing past time, which can be discriminated according to the procedural information encoded by the category of Tense. In particular, the English Simple Past was translated into French by the Passé Composé (34%), Imparfait (23%) and Passé Simple (16%). Similar values were found for Italian (33%, 17% and 22% respectively) and Romanian (49%, 15% and 18%).

Corpus analysis showed that the compound past is more frequently used in Romanian than in Italian and French. Additionally, experimental work indicated that it is perceived and judged by native speakers to be narrative more often in Romanian than in Italian and French. As for the simple past, corpus analysis showed that its usage frequency decreases in the three languages considered, being used less frequently in Romanian than in Italian and French. Experimental work did not show significant differences in judgment between the three languages.

English presents a different pattern, mainly because the Present Perfect did not develop aorist functions, as the compound past in Romance languages did. In addition, the Simple Past has narrative and non-narrative usages with comparable percentages (60% narrative and 40% non-narrative, as shown in Sect. 4.2.7). The English Past Progressive form was not considered in the analysis, due to its infrequency in the corpus (only 1%, cf. Sect. 3.2.1).

These empirical findings show that the [±narrativity] procedural feature is a language-independent feature with language-specific behaviour. The results of the annotation experiments of the data used in this research are summarized in Table 5.2.

In other words, there is cross-linguistic variation between the individual verbal tenses which encode this instruction and its contextual values. My prediction is that, for example, a narrative usage of the Simple Past can be translated into a target language by a narrative usage of a verbal tense, be it simple past, compound past, imperfect (i.e. the so-called narrative imperfect) or even simple present (i.e. the historical present), as shown in examples (526)-(529), where the first is the original text in English, followed by its translations[10] into French, Italian and Romanian respectively. In these texts, the Simple Past form with a narrative usage is translated by a narrative imperfect in French, and a narrative simple past in Italian and Romanian.

---

[9] In future work, the [±narrativity] feature should be tested for the Spanish and Portuguese simple past, compound past and imperfect. My prediction is that it will produce a very different pattern for the compound past. In particular, it might be judged as non-narrative more frequently than narrative, due to the fact that it does not undergo the aoristic drift of the compound past in French, Italian and Romanian.

[10] The examples come from parallel corpora (cf. section 3.4) consisting of texts translated by professional translators.

Table 5.2 The [±narrativity] feature and its cross-linguistic realization by each verbal tense considered

Language	Verbal tense	Narrative	Non-narrative
English	Simple Past	59%	41%
French	Passé Simple	**92%**	8%
	Passé Composé	**77%**	23%
	Imparfait	16%	**84%**
Italian	Passato Remoto	**96%**	4%
	Passto Prossimo	**88%**	12%
	Imperfetto	16%	**84%**
Romanian	Perfectul Simplu	**93%**	7%
	Perfectul Compus	**83%**	17%
	Imperfectul	19%	**81%**

(526) But when the Rabbit actually took a watch out of its waistcoat-pocket
and looked at it and then hurried on, Alice started to her feet, […]
and, burning with curiosity, she ran across the field after it and
was just in time to see it pop down a large rabbit-hole, under the hedge.
In another moment, down *went* Alice after it!

(527) Cependant, lorsque le Lapin tira bel et bien une montre de la poche
de son gilet, regarda l'heure, et se mit à courir de plus belle, Alice se
dressa d'un bond, […]. Dévorée de curiosité, elle traversa le champ en
courant à sa poursuite, et eut la chance d'arriver juste à temps pour le
voir s'enfoncer comme une flèche dans un large terrier placé sous la haie.
Un instant plus tard, elle y *pénétrait* à son tour.

(528) Ma quando il Coniglio trasse un oriuolo dal taschino del panciotto, e vi
affissò gli occhi, e scappò via, Alice saltò in piedi, […] e divorata dalla
curiosità, traversò il campo correndogli appresso, e giunse proprio a tempo
di vederlo slanciarsi in una spaziosa conigliera, di sotto alla siepe. In un
altro istante, giù Alice *scivolò*.

(529) Dar când iepurele, imediat după asta, scoase din buzunarul veste un ceas,
îl privi şi începu să se grăbească, Alice sări în picioare […] şi, arzând de
curiozitate, o luă la fugă peste câmp după el chiar la timp pentru a-l putea
vedea sărind într-o gaură de iepure mare de sub gardul viu. Într-o clipă
Alice *sări* după el.

Other factors, such as Aspect and Aktionsart, influence the choice of the verbal
tense in a target language, as in examples (530)-(533), where the first is the original
text in English, followed by its translation into French, Italian and Romanian respec-
tively, from the JRC corpus. Experimental work with respect to Aspect and
Aktionsart showed that the perfective aspect and the bounded type of situations
correlate significantly with the simple and compound past, whereas the imperfective
aspect and the unbounded type of situations correlate with the imperfect.

(530)   The field experiment [...] It was accompanied by measurements at four
        fixed stations, with 15 mobile units, with an aircraft and balloons
        and *included* model calculations on the basis of a detailed emission inventory.

(531)   L'expérience sur le terrain [...] Elle a été accompagnée par des mesures
        dans quatre stations fixes et avec 15 unités mobiles, un avion et des
        ballons et *prévoyait* des calculs par modèle sur la base d'un inventaire
        détaillé des émissions.

(532)   L'esperimento sul campo [...] è stato accompagnato da misurazioni
        in quattro stazioni fisse, con l'ausilio di quindici unite mobili, un aereo
        e palloni aerostatici, e *ha incluso* calcoli di modello sulla base di un
        inventario dettagliato delle emissioni.

(533)   Experimentul de teren […] a fost însoţit de măsurători la patru staţii fixe,
        cu 15 unităţi mobile, cu un avion şi baloane şi *a inclus* calcule conform
        unui model bazat pe un inventar detaliat al emisiilor.

In (531), the French translator made use of the verb *prévoir* 'to foresee, to antici-
pate, to envisage', which is atelic and unbounded in this context, and chose the
Imparfait. In Italian and Romanian, the translators made use of the same verb, as in
English *to include*, which is telic and bounded in this context, and chose the com-
pound past. As far as the value of the [±narrativity] procedural feature is concerned,
in these texts the Simple Past and the verbal tenses used in the target language have
non-narrative value (i.e. the eventualities *accompany* and *include* are temporally
simultaneous). This value is manifested by the imperfect in French, and by the com-
pound past in Italian and Romanian.

5.3   Aktionsart and Aspect

In Sect. 1.1, I discussed the semantics of Aktionsart and Aspect, indicating that
Aspect expresses information about the way in which the eventuality is presented,
as perfective or imperfective, where Aktionsart expresses the inherent properties of
the eventuality type, dividing eventualities into states, activities, accomplishments
and achievements (Vendler 1957, 1967). These four aspectual classes can be
described in terms of ontological features as telicity, durativity and dynamicity. In
the literature, it has been argued that they are inherent properties of not the eventual-
ity but the verb phrase (i.e. the verb and its arguments).

Previous research has pointed out the role played by these two categories in the
temporal interpretation of a discourse. As far as temporal sequencing is concerned,
aspectual theories (such as Dowty 1986) have suggested that it depends on the lexi-
cal aspect of the eventuality. However, there are numerous counterexamples that
weaken the aspectual hypothesis. Using a pragmatic framework, de Saussure (2003,
and previous research) argued that only Aspect and Tense play a role in determining
temporal reference and temporal sequencing, because they encode procedural

instructions constraining the interpretative process. In addition, he suggests that where there is a conflict between an atelic eventuality and a perfective verbal tense (in other words, between Aktionsart and Aspect), the hearer builds a bounded conceptual representation of that atelic eventuality.

The question that arises at this point of the discussion regards the nature of the information encoded by these two aspectual categories. Žegarac (1991) was the first to discuss the status of the information encoded by grammatical aspect within a relevance theoretic framework—that is, whether it is conceptual or procedural information. As far as Aktionsart is concerned, Žegarac (1991, 44) points out that Vendler's time schemata (i.e. states, activities, achievements and accomplishments) are assumed to be universal but realized differently in individual languages (see also Smith 1986). Aspect, unlike Aktionsart, is not related to inherent temporal properties of situation types, but expresses the speaker's viewpoint of the situation described.

Žegarac proposes a fine-grained analysis of both grammatical aspect (oppositions such as *simple* vs. *progressive* in English and *perfective* vs. *imperfective* in Slavic languages) and lexical aspect by looking at individual verbs in English and Serbian/Croatian. His contrastive analysis determines the following general conclusions: viewpoint aspect (i.e. Aspect) encodes procedural information constraining the explicit content of the utterance, whereas situation aspect (i.e. Aktionsart) represents conceptual information contained in the entries of verbs in the mental lexicon. With respect to the *simple* vs. *progressive* opposition in English, he suggests that the simple aspect is underdetermined for the sense of completion or entirety, which characterizes the perfective aspect in Slavic languages (p. 187). The sentences in (534) and (535), from Žegarac (1991, 187), provide evidence that the eventuality expressed by a Simple Past may continue up to present, and even beyond. They therefore indicate that the sense of completion with the Simple Past is not determined by its encoded aspectual information, but contextually.

(534)   John *ran* for several hours this morning, and, for all I know, he
        may still be running.
(535)   -How did Susan spend the morning? -She *worked* on Peter's paper
        all morning and she is still working on it.

The progressive on the other hand, encodes the instruction to instantiate (i.e. single event) the property denoted by a stative verbal predicate, as in (536), and to present the eventuality expressed as being incomplete, as in (537). Imperfective verbs in Serbian allow for two interpretations in English, corresponding to either the progressive or the simple past, as in example (538), from Žegarac (1991, 184–185).

(536)   He *is being* stupid to act like this.
(537)   He *was running* when the tram stopped.
(538)   *Radi.*
        Work.IMPERF
        'He/she works/is working.'

Imperfective verbs in Serbian retain the [-complete] feature in *when*-clauses, whereas aspectually unmarked verbs can have either a perfective or an imperfective interpretation, as illustrated by the contrast between (539) and (540) (Žegarac 1991, 185). The sentence in (539) is understood as conveying the idea that the discussion took place after the analyzing had finished, whereas the sentence in (540) conveys that the answering took place as the problem was talked about. He points out that the example in (540) strongly supports the view that the imperfective aspect grammaticalizes the feature [-complete].

(539)   Kad su *analizirali* problem, *raspravljali* su o mnogim pitanjima.
         When they analyze.UNSPECIFIED_ASP the problem, discuss.IMPERF
         a lot of questions.
(540)   Kad su *govorili* o tom problemu, *odgovarali* su na mnoga pitanja.
         When they discuss.IMPERF about the problem, they answer.IMPERF
         a lot of questions

As such, the aspectual categories of English and Serbian are comparable categories, which can be explained in terms of the grammaticalization of *completion* and *instantiation*. The progressive of English and the imperfective of Serbian grammaticalize the lack of completion—in other words, the instruction to build an unfinished (in the sense of lack of completion) representation of the eventuality. The perfective aspect in Serbian encodes completion, whereas the simple aspect in English is unspecified with respect to this feature. Furthermore, both the progressive and the perfective indicate indexically to a particular event instantiating the property denoted by the verbal predicate (i.e. Aktionsart), whereas the imperfective and the simple do not. Žegarac's cross-linguistic analysis illustrates that the procedural information encoded by Aspect is both language independent and exhibits language specificities.

Based on Žegarac's pioneering investigation of the pragmatics of grammatical Aspect, it is currently assumed in Relevance Theory that this category encodes procedural information constraining the interpretative process by imposing the speaker's viewpoint on the eventuality. To be more precise, the perfective aspect constrains the hearer to build a completed representation of the eventuality denoted by the verb—in other words, a single whole with highlighted boundaries. As noted above, Žegarac proposes that the perfective aspect indicates indexically to a particular event instantiating the property denoted by the verbal predicate. In (541), the Present Perfect conveys that the eventuality of having breakfast is completed, and makes reference to a particular instance of having breakfast, in principle at some relatively proximate time in the past. The analysis for (542) is similar, except that the eventuality took place at some time further in the past. The difference in meaning between the two utterances with respect to the period of time between E and S follows from the communicative principle of relevance.

(541)   I *have had* breakfast.
(542)   I *have been* to Tibet.

   The imperfective aspect constrains the hearer such that he builds an unfinished representation of the eventuality—in other words, he focuses on the internal structure of the situation, or on a moment other than the initial or final boundaries. For example, in the sentence in (543), the progressive instructs the hearer to build an unfinished representation of the raining event, and makes reference to a particular event instantiating the property denoted by the verb. In contrast, the SP in (544) locates the eventuality of raining at some time in the past without making reference to a particular instance of raining (Žegarac 1991, 155).

(543)   It *was raining*.
(544)   It *rained*.

   As such, Aspect encodes procedural information which constrains the explicit content of an utterance. Aspect imposes constraints on Aktionsart: these conceptual representations are viewed from the speaker's point of view as being completed or not. This idea is also advanced by Escandell-Vidal and Leonetti (2011, 92), who argued that Aspect encodes procedural information on how to construct the internal representation of the eventuality considered. They give the example of the progressive marker in English, which indicates that the event has to be viewed as an incomplete action in progress at a specific time. The category of Aspect presents the features proposed by Wilson and Sperber (1993) for procedural information: inaccessible to consciousness, and unavailable by way of conscious thought in languages when not expressed morphologically. In addition, these features are difficult to translate, as shown by the lack of one-to-one correspondence between English and Serbian, or English and French, for example.

   The experimental work described in this section confirmed these theoretical assumptions. Two annotators were asked to evaluate Simple Past items with respect to perfective vs. imperfective viewpoint, and they agreed in 63% of cases, which corresponds to a к of 0.32. This к value is beyond chance, but nonetheless below the threshold of reliable data (around 0.6). This result shows the difficulty judges have in deciding on the type of viewpoint from which the eventuality was expressed; as a result, it points to the procedural nature of the [±perfectivity] feature. As far as the interpretation process is concerned, my suggestion is that hearers assign, by an inferential procedure, a contextual value of the [±perfectivity] feature, and this takes place at the level of the explicature. In other words, the [±perfectivity] feature represents procedural information constraining the formulation of the utterance's explicature. Due to the need for reliable annotated data with this feature when training an automatic classifier, another method was used in this research: the cross-linguistic transfer of properties based on translation corpora.

   As for Aktionsart, Žegarac (1991, 222) suggested that the different behaviour of state verbs and event verbs may be captured by 'meaning postulates' or inference rules contained in the logical entries of the concepts denoted by these verbs. In other words, Aktionsart is of a conceptual nature, and *duration* (from the ontological feature of durativity) is a primitive. Similarly, Moeschler (2002a, b) suggested that lexical aspect encodes conceptual information, and gave several arguments to this

end. The first argument is linked to the fundamental assumptions of Relevance Theory. Relevance Theory is a representational theory stating that cognitive operations involve the manipulation of conceptual mental representations. These conceptual representations contain propositional content, i.e. information from nouns, verbs, adjectives, etc. On the other hand, functional categories encode procedural information on how to manipulate these conceptual representations. This initial parallel between lexical category/conceptual information and functional category/procedural information was refined according to empirical work, which supplied evidence against a one-to-one correspondence[11]. In addition, Moeschler et al. (2012) point out that Aktionsart has logical properties, and contributes to the propositional content of an utterance. Escandell-Vidal and Leonetti (2011, 92) suggest that durativity and dynamicity are formal linguistic traits involved in the description of situation classes in all natural languages.

In an utterance, the inherent temporal features of the eventuality combine with the instructions provided by Aspect. When they match—as in (545), where there is a dynamic telic situation and a progressive Aspect—the hearer builds a mental representation of a dynamic event in progress. In (546), in contrast, Aktionsart and Aspect do not match, as a progressive marker is applied to a stative predicate. The human brain processes these two types of information, and the hearer builds a mental representation of a dynamic situation in progress—i.e. John is behaving like a silly person in a particular situation. This phenomenon is known as *aspectual coercion* (Moens & Steedman 1988).

(545)   John is eating his sandwich.
(546)   John is being silly.

Another example is the imperfect in Romance languages. In Spanish, for example, as Escandell-Vidal and Leonetti (2011, 93) note, the imperfect encodes the instruction to view the eventuality as atelic or unbounded. Therefore, it combines most frequently with states and activities. When it combines with telic eventualities, there is an adjustment in the interpretation[12]. This can be expressed, for example, as a habitual or ingressive reading of the sentence. Escandell-Vidal and Leonetti's proposal for this phenomenon is that the procedural information encoded by Aspect is rigid and imposes a meaning adjustment on Aktionsart. This adjustment is inferential, and takes place at the level of the propositional explicature.

Based on these studies, Relevance Theory currently assumes that Aktionsart represents conceptual information that is subject to the constraints imposed by procedural information. Aktionsart has logical properties, and contributes to the propositional content of an utterance (Moeschler et al. 2012). Scholars have identified the distinctive ontological features of aspectual classes cross-linguistically,

---

[11] For connectives, see Zufferey 2012; Blochowiak 2014a, 2015a and Moeschler 2015 for theoretical accounts. For verbal tenses, see Grisot and Moeschler 2014; Grisot 2015.

[12] This phenomenon is investigated in semantics as *coercion* (for example, de Swart 1998, 2003, 2011).

pointing to their language-independent character. In addition, Aktionsart presents the qualitative features proposed by Wilson and Sperber (1993) for conceptual information: speakers have easy access to lexical aspect, and can consciously reflect on it, as it represents easily graspable concepts (as shown in Sect. 4.3.2).

Again, the experimental work described in this section confirmed these theoretical assumptions. Two annotators were asked to evaluate Simple Past items with respect to one distinctive ontological feature of Aktionsart—that is, boundedness. Scholars have shown that Aktionsart is sensitive to both Tense and Aspect, and therefore it was operationalized as the [±boundedness] feature. Judges were asked to evaluate Simple Past items with respect to bounded vs. unbounded situations, and they agreed in 92% of cases, which corresponds to a K of 0.84. The disagreements were resolved in a second round of the experiment. This K value is beyond the chance value, and also beyond the threshold of reliable data. This result signals the ease which with judges decided on the type of eventuality using three linguistic tests. These results point to the conceptual nature of the [±boundedness] feature, which contributes to the explicatures of the utterance, and has truth-conditional value. As far as the interpretation process is concerned, the hearer assigns a contextual value of the [±boundedness] feature by way of an inferential procedure.

5.4 Revisiting Verbal Tenses According to the HD Model

Building on the procedural pragmatic approach of French verbal tenses (Moeschler et al. 1998; Moeschler 2000a, b, 2002b; de Saussure 2003), the HD model of temporal reference assumes that verbal tenses underdetermine the speaker's communicated content. The hearer must therefore inferentially recover the speaker's intended meaning with respect to temporal reference, which is defined broadly. However, the HD model moves away from previous accounts of verbal tenses in two regards. The first is the focus on the need to discriminate between the lexical and grammatical categories, commonly referred to by the generic notion of *verbal tense*, which are Tense, Aspect and Aktionsart. The second is the defence of a dualistic view of Tense: it encodes temporal information at the conceptual and procedural levels. The HD model predicts that Tense, Aspect and Aktionsart are parameters considered by the hearer during the interpretative process, and that the human mind tends to treat these parameters in a coherent manner.

Based on this model, several predictions can be made for individual verbal tenses in English, French, Italian and Romanian. They all share the following features, representing the common *tertium comparationis* required to enable their contrastive analysis:

- Their meaning is underdetermined and must be worked out contextually.
- They encode conceptual and procedural information, operationalized as the *past/non-past* distinction, which makes use of temporal coordinates E and S, and the [±narrativity] feature.

- They express the category of Aspect, operationalized as the [±perfectivity] feature.
- They apply to all types of eventualities, operationalized as the [±boundedness] feature.

The cross-linguistic investigation carried out in this book showed not only that these parameters are operationalized differently in each language, but also that they receive values which change from one context to another.

Traditionally, the French Passé Simple, Passé Composé and Imparfait are described as expressing reference to past time (for the Imparfait, only in its temporal interpretations). Numerous approaches aim to explain the difference between them, namely the classical, aspectual, anaphoric, textual and pragmatic approaches. Among the pragmatic approaches, procedural pragmatics—initiated by de Saussure (2000)—argued that these verbal tenses have descriptive and interpretative usages, the latter triggered by the combination of semantic and pragmatic temporal procedures with contextual assumptions. The Passé Simple, Passé Composé and Imparfait encode instructions that guide the interpretative process. The main assumption is therefore that verbal tenses are underdetermined, and that their meaning is determined inferentially according to the instructions encoded by Tense and Aspect for each of these tenses. Accounts of the Présent generally argue that it expresses reference to present time ($E = S$), as well as past time in its historical usage. This research accounts for the Présent from a theoretical point of view, principally with respect to its opposition to the Passé Composé, the Passé Simple and the Imparfait, established by the conceptual information $E = S$ vs. $E < S$.

5.4.1   Conceptual Information

The Passé Simple, Passé Composé and Imparfait encode conceptual information in the form of a pro-concept TIME, which can be operationalized as the localization of E with respect to S. These three verbal tenses share the same conceptual meaning, most frequently expressed as the ad-hoc concept $E < S$ (i.e. *pastness*). Like the English Simple Past, the hearer contextually builds an ad-hoc concept, which specifies the temporal localization of an eventuality with respect to S. All three coordinates, E, S and R, are variables saturated contextually according to linguistic and non-linguistic knowledge. R accounts for the instruction encoded by Tense to locate eventualities with respect to one another (i.e. the [± narrativity] feature).

The Passé Simple, Passé Composé and Imparfait share conceptual information not only monolingually but cross-linguistically (i.e. with the English Simple Past, as well as the simple past, compound past and imperfect in Italian and Romanian). The analysis of translation corpura described in Sect. 3.4 indicated that there is little cross-linguistic variation for the conceptual content of the English Simple Past—that is, reference to past time. In particular, past time tenses are used a target language in more than 72% of cases, while the Présent is used only in 5% of cases. At this level

of the content, the Passé Simple, Passé Composé and Imparfait are interchangeable. In actual usage, procedural information and computability with Aspect and Aktionsart provide supplementary information, and reduce the number and types of cases when the Passé Simple, Passé Composé and Imparfait are interchangeable.

The main assumption is that the Présent contrasts with the Passé Simple, Passé Composé and Imparfait with respect to their conceptual information. While the former tenses most frequently instantiate an ad hoc concept $E < S$, the Présent most frequently instantiates an ad hoc concept $E = S$. The results of the experiment from Sect. 4.2.2, which tested whether native speakers provide the correct verbal tense in a given context, indicated that there is no ambiguity for participants when providing a verbal form expressing reference to past or present time. This experiment provided evidence that the conceptual information encoded by verbal tenses—that is, past vs. non-past—is determined contextually, and that the agreement between the participants produced high $\textit{K}$ values: 1 for artificial data, 0.80 for natural data, and 0.86 for all the data.

Considering that the meaning of a verbal tense is worked out in relation to its conceptual and procedural information, there are cases where the Présent is interchangeable with the Passé Simple, Passé Composé and Imparfait—i.e. in their narrative usage. This usage of the Présent is the *Présent Historique* 'historical present'. In this circumstance, the hearer uses contextual information to build an ad hoc concept $E < S$ for the Présent. At this point in the discussion, a question arises: what allows the shift from $E = S$ to $E < S$, and thus from Présent to Présent Historique? The literature has suggested that the shift is linked to the notion of *subjectivity* and Free Indirect Discourse (Benveniste 1966; Banfield 1982; Schlenker 2004; Moeschler 2014; cf. Reboul et al. 2016 for a critical investigation of these proposals). Moeschler (2014) argued that subjectivity is a pragmatic feature of natural language, and that the Présent Historique triggers two pragmatic effects: temporal sequencing [+narrative]; and subjectivity [+subjective][13]. As for its semantics, the Présent Historique may be described by a configuration of the Reichenbachian temporal coordinates E, R and S. There are two possibilities that permit reference to past time. The first is $E = R < S$, which also corresponds to the Passé Simple; the second is $E < R = S$, which also corresponds to the Passé Composé. Moeschler's suggestion is to dissociate the tripartite configuration into three pairs of relations: E&R; R&S; and the inferred relation E&S. For the Présent Historique, the situation is as follows (2014, 7):

> Dans le Présent Historique, si E est cotemporel à R (E = R), la seule contrainte de R est qu'il soit distinct de S (R ≠ S). […] Ce qui est encodé linguistiquement dans le Présent Historique est la relation entre E et R, à savoir E = R. La disjonction R ≠ S est inférée pragmatiquement sur la base des traits pragmatiques [±narratif] et [±subjectif].[14]

---

[13] It is worth noting that, in Grisot (2017a), I provide experimental evidence that these two features are of a different nature: procedural for the former, and purely pragmatic for the latter.

[14] 'For the Présent Historique, if E is contemporaneous with R (E = R), the only constraint on R is that it must be different from S (R ≠ S). […] What is linguistically encoded in the Présent Historique is the relation between E and R, i.e. E = R. The disjunction R ≠ S is inferred pragmatically on the basis of the pragmatic features [±narrative] and [±subjective].' (my translation)

In other words, a context allowing narrative and subjective pragmatic features permits the shift from inferring E = S with the Présent to inferring E < S via R ≠ S with the Présent Historique. This description explains the lack of interchangeability between the Présent Historique and the other three French verbal tenses expressing reference to past time. Firstly, the Présent Historique is not interchangeable with the Passé Simple, with which it shares the [±narrativity] feature, because the Présent Historique is compatible with a subjective perspective. Secondly, the Présent Historique is not interchangeable with the Passé Composé, because it requires the disjunction R ≠ S. Finally, the Présent Historique is not interchangeable with the Imparfait, which has been described as a subjective verbal tense (as discussed in Sect. 1.1.2) because it combines [±narrativity] and [±subjectivity] features.

The suggestion I make in this book is that ad hoc concept of pastness (E < S) is contextually constructed according to cues like temporal adverbials and world knowledge. This ad hoc concept is complemented by the [±narrativity] feature, determining the localization of eventualities with respect to one another. The [±narrativity] feature represents procedural information encoded by Tense, validated experimentally with the Passé Simple, Passé Composé and Imparfait. Future research should investigate how the [±narrativity] feature behaves with the Présent and its usages, like the Présent Historique, among others.

5.4.2   Procedural Information

For the [±narrativity] feature, for example, the situation in English is quite different from that of the Romance languages, as shown in Table 5.3[15], reiterating Table 5.2 from Sect. 5.2.3. A Fisher's Exact Probability test shows that the difference between the English Simple Past and each of the verbal tenses used in a target language is statistically significant ($p < .05$). One of the reasons for this is that, in the Romance languages investigated, the compound past began the aoristicization process, whereas the English Present Perfect remained a perfect, with resultative and non-narrative usages. Consequently, it is only in the Romance languages that there is competition between the simple past and the compound past forms when operationalizing narrative contexts. In addition, the imperfect in Romance is not specialized for non-narrative usages, and only has a partial correspondence with the imperfective aspect. An accurate understanding of this requires an empirical and experimental comparison between the English progressive and the imperfect in Romance.

For the Romance languages above, these numbers indicate that Italian and Romanian are more advanced than French in the aoristicization process: 88% for the Italian Passato Prossimo and 83% for the Romanian Perfectul Compus, compared to 77% for the French Passé Composé. The difference between French and the other two Romance languages is shown to be statistically significant by a Fisher

---

[15] The values written in bold signal the highest frequency associations between verbal tense and values of the narrativity feature.

Table 5.3 [±Narrativity] feature in English and Romance

Language	Verbal tense	Narrative	Non-narrative
English	Simple Past	59%	41%
French	Passé Simple	**92%**	8%
	Passé Composé	**77%**	23%
	Imparfait	16%	**84%**
Italian	Passato Remoto	**96%**	4%
	Passato Prossimo	**88%**	12%
	Imperfetto	16%	**84%**
Romanian	Perfectul Simplu	**93%**	7%
	Perfectul Compus	**83%**	17%
	Imperfectul	19%	**81%**

Exact Probability test ($p < .05$). The difference between Italian and Romanian is not statistically significant.

The procedural information encoded by the Passé Simple, Passé Composé and Imparfait is operationalized in this research as the [±narrativity] feature. Experiments from Sects. 4.2.3 and 4.2.4 investigated the behaviour of these three verbal tenses with respect to the [±narrativity] feature. The literature states that the Passé Simple and Passé Composé are more often used in narrative discourses, whereas the Imparfait is used in non-narrative discourses where it expresses background information. These observations received different types of explanations. One suggested explanation came from the procedural pragmatics framework (de Saussure 2003), according to which all verbal tenses encode uniquely procedural information. This framework makes a number of assumptions: by default, the Passé Simple encodes the instruction for temporal progression; the Imparfait instructs the hearer to build an unsaturated P variable within the event (which will be contextually saturated either as R or as a moment of consciousness C); and finally, the Passé Composé has a base value where it locates the eventuality prior to S ($E < S$), and two contextual values distinguished by the position of R ($R = E$ in its *anteriority* usage, and $R = S$ in its *resultative* usage).

According to the model put forward in this book, I suggest that the Passé Simple, Passé Composé and Imparfait encode procedural information, operationalized as the [±narrativity] feature—that is, they instruct the hearer to determine if the eventualities expressed are temporally related. A positive value for this feature indicates a narrative usage of the verbal tense in question, whereas a negative value for this feature indicates a non-narrative usage of the verbal tense. This hypothesis was tested in the experiment in Sect. 4.2.5. The results of this experiment showed that judges clearly recognized a primary narrative usage for the Passé Simple (92%), but did not make the same clear judgment for the Passé Composé (77%), nor for the expected non-narrative primary usage of the Imparfait (77.5%). This result opened the door to further finer-grained research: an annotation experiment on the Imparfait with the [±narrativity] feature, which was carried out in the experiment in Sect. 4.2.4. In this experiment, the Imparfait was categorized as non-narrative in 90% of cases, and as narrative in 10% of cases.

Table 5.4 [±Perfectivity] and [±Boundedness] in English and French

Language		Perfective	Imperfective	Bounded	Unbounded
English	Simple Past	46.9%	53.1%	48.3%	43.9%
French	Passé Simple/ Passé Composé	**33.1%**	8.3%	**47.8%**	34.9%
	Imparfait	11.2%	**44.8%**	10.8%	**41.4%**

5.4.3   Aspect and Aktionsart

The empirical work carried out in this research revealed differences between English and French[16]. With respect to the [±perfectivity] feature, the difference between English and French is statistically significant, both for the simple and compound past, and for the imperfect (with a Fisher Exact Probability test result of $p < .05$). As for the [±boundedness] feature, only the difference between the simple past and the imperfect is statistically significant (with a Fisher Exact Probability test result of $p < .05$). In this research, no experiments were carried out with aspectual information for Italian and Romanian verbal tenses (Table 5.4).

French scholars have assumed that the Passé Simple and Passé Composé are perfective (Martin 1971; Tahara 2000) whereas the Imparfait is imperfective (Martin 1971; Guillemin-Flescher 1981; Vetters 1996, among others), even if in some cases it can remain underdetermined with respect to Aspect. According to the model developed in this research, all verbal tenses in Romance and English provide information about Tense and Aspect as they are applied to Aktionsart. In other words, each verbal tense expresses temporal localization (i.e. Tense) and the speaker's viewpoint (i.e. Aspect) of eventualities (i.e. Aktionsart).

In this research, the relation between Tense and Aspect for French verbal tenses was not investigated directly. It is possible, however, to make some observations based on the results from Sect. 4.3.3, carried out on data randomly selected from a translation corpus. This experiment used Simple Past items, which were translated into Serbian, where Aspect is morphologically expressed. The results of this experiment showed that, in 78% of cases, the perfective viewpoints expressed with a Simple Past were translated by a Passé Composé or Passé Simple, and imperfective viewpoints expressed with a Simple Past were translated by an Imparfait. In 22% of cases, the reverse combination of features occurs: perfective viewpoints expressed with a Simple Past are translated by an Imparfait, and imperfective viewpoint expressed with a Simple Past are translated by a Passé Composé or Passé Simple.

From these results, I assume that each of these verbal tenses is not perfective or imperfective by default, as the literature suggests. According to the model suggested in this book, Tense combines with Aspect, and all four combinations are possible: *narrative perfective*, as in (547); *narrative imperfective*, as in (548), where the lexical paraphrase *être en train de* 'be+*ing*' explicitly expresses the imperfective viewpoint; *non-narrative perfective*, as in (549); and *non-narrative imperfective*, as in

---

[16]The total values for each verbal tense should be considered per feature: [±perfectivity] and [±boundedness].

(550)[17]. There are, however, some combinations which are more frequent than others, and these are associated with one verbal tense or another. For instance, the narrative perfective combination is more frequently associated with the Passé Composé and the Passé Simple, whereas the non-narrative imperfective is more frequently associated with the Imparfait.

(547)   Il *toqua*   à la porte et *entra*   dès qu'il y   *eut*
        une réponse.
        He knock.3SG.PS at the door and enter.3SG.PS as soon as it there
        have.3SG.PS an answer.
        'He knocked at the door and entered as soon as there was an answer.'
(548)   Dans son rêve, il *était en train de* chercher sa sœur. Ensuite
        il s'*arretait* et l'*appelait* de toutes ses forces.
        In his dream, he be.*ing*.3SG.look   his sister. Then,
        he stop.3SG.IMP and call.3SG.IMP with all his strength.
        'In his dream, he looked for his sister. Then he stopped
        and called her with all his strength.'
(549)   Marie *ferma*   les yeux et   s'*imagina* être une princesse.
        Mary close.3SG.PS her eyes and imagine.3SG.PS to be a princess
        'Mary closed her eyes and imagined she was a princess.'
(550)   Marie entra dans la chambre. Jean *était en train de* la chercher et il
        l'*appelait* par son prénom.
        Mary enter.PS the room. John be.3SG.*ing* look for her
        and he call.3SG.IMP by her name.
        'Mary entered the room. John was looking for her and was
        calling her name.'

Similar observations can be made with respect to the relation between Tense and Aktionsart. In this research, this relation was not investigated directly for French verbal tenses. The experiment from Sect. 4.3.2 targeted the usage of the Simple Past with telic and atelic situations, which were operationalized in terms of [±boundedness]. The cross-linguistic analysis of the results of this experiment indicated that, in 82% of cases, bounded eventualities expressed with a Simple Past are translated by a Passé Composé or a Passé Simple, and unbounded eventualities are translated by an Imparfait. In 18% of cases, Simple Past unbounded eventualities are translated by a Passé Composé or a Passé Simple, and Simple Past bounded eventualities are translated by an Imparfait. Consequently, the French Passé Composé and Passé Simple can express unbounded eventualities, as in (551), and the Imparfait can express bounded eventualities, as in (552). In other words, each verbal tense can be associated with either type of eventuality. Some correlations, however, are more frequent than others, such as bounded eventualities expressed with a Passé Composé or a Passé Simple, and unbounded eventualities expressed with an Imparfait.

---

[17] The four combinations are easier to grasp in aspect-prominent languages, where Aspect is morphologically expressed. Additionally, the non-narrative interpretation of (549) and (550) is shown by the fact that *et* 'and' cannot be replaced by *et ensuite* 'and then', which would explicitly mark the temporal sequential interpretation.

(551)   Il *a* toujours *été* très poli.
        He be.PC always very polite
        'He has always been very polite.'
(552)   Il *atteignait* le sommet quand l'orage commença.
        He reach.IMP the top of the mountain when the storm begin.PS
        'He was reaching the top of the mountain when the storm began.'

These conclusions are inferred according to the analysis of translation corpora (from a tense-prominent language into an aspect-prominent language). The *cross-linguistic transfer of properties* method was used to transfer aspectual information from Serbian to the English Simple Past. Further experimental investigations on French data should be carried out to validate these conclusions, and to determine whether or not the Passé Composé, Passé Simple and Imparfait are associated by default with either of the values of the [±boundedness] feature.

In the light of these results, I would like to make a few suggestions. My first suggestion is that the [±narrativity] feature accounts for Harris' (1982) and Squartini and Bertinetto's (2000) hypothesis on the aoristicization process undergone by the compound past in Romance languages (except Portuguese and Spanish). Their suggestion is that the compound past undergoes a change from a true perfect towards an aorist, and that this scalar process is visible for the compound past in French, Italian and Romanian (see discussion in Sect. 1.1.3). My assumption is that the perfect aspect (such as the English Present Perfect and the compound past in Portuguese and Spanish) correlates with the non-narrative value of the [±narrativity] procedural feature, whereas the aorist (such as the simple past form in French, Italian and Romanian) correlates with the narrative value of this feature. If this were true, the Present Perfect and the Spanish compound past would be judged in an annotation experiment to have non-narrative usages more frequently than narratives ones. On the other hand, the French, Italian and Romanian compound past would have narrative usages more frequently than non-narratives ones.

The experiments on French, Italian and Romanian confirmed the scalar orientation of these languages in the aoristicization process. In particular, the Passé Composé was judged as narrative in an average of 71% of cases, the Passato Prossimo in 88% of cases, and the Perfectul Compus in 83% of cases. The difference between French and the other two Romance languages is statistically significant. However, the difference between Italian and Romanian is not statistically significant. These results raise two issues with respect to Squartini and Bertinetto's aoristicization scale. They suggest that Italian is not as advanced in the aoristicization process as French (i.e. standard French and standard Italian), underlining at the same time that there is a significant regional difference in Italian (north vs. centre vs. south). The results of experiments carried out in this research show that, in contrast to Squartini and Bertinetto's prediction, Italian is more advanced in this process than French. In other words, the Passato Prossimo is further along the path toward an aorist-like verbal tense than the Passé Composé is. This result might indicate that the Passato Prossimo continues to evolve in the aoristic drift in a man-

ner different from French. The Passato Prossimo was judged as narrative by speakers of Italian from the southern part of Italy in 86% of cases. Consequently, it is interpreted as having a perfective function (i.e. non-narrative) in only 14% of cases. Squartini and Bertinetto suggest that Italian and French precede Romanian on the aoristicization scale (cf. Sect. 1.1.3). According to their scale, a higher percentage of narrative usages is expected for the Perfectul Compus than for the Passé Composé and the Passato Prossimo. The results of experiments carried out in this research confirm the relation between French and Romanian. As for the relation between Italian and Romanian, the observed difference between the two languages is not statistically significant (83% in Romanian vs. 88% in Italian).

My second suggestion relates to the compound past and its description in the French literature, according to which it has a base value where it locates the eventuality prior to S (E < S), and two contextual values distinguished by the position of R (R = E in its *anteriority* usage, as in (553), and R = S in its *resultative* usage, as in (554)). I would argue that the base value corresponds to its conceptual content, which is shared with the simple and the compound past. The two pragmatic values reflect the contextual value given by the [±narrativity] procedural feature encoded by this verbal tense, a value inferred from contextual information.

(553)   Hier, j'*ai perdu* ma clef   et j'*ai dormi*   à l'hotel.
        Yesterday, lose.1SG.PC my key and I sleep.1SG.PC at the hotel
        'Yesterday, I lost my key and I slept at the hotel.'
(554)   *As*-tu *trouvé*   ta clef?
        Aux you find.2SG.PC your key?
        'Have you found your key?'

Thirdly, the French literature assumes that the Passé Simple encodes the instruction for temporal progression by default, and that this instruction is blocked if contextual information allows it to be. My suggestion is that the simple past encodes the instruction to determine a contextual value of the [±narrativity] procedural feature, but does not impose the narrative value. The results of the annotation experiment from Sect. 4.2.3 indicated that the Passé Simple was judged to have a narrative usage in 92% of cases, as in (555), and non-narrative in 8% of cases, as in (556).

(555)   Marie *étudia*   jour et nuit.   Elle *réussi* tous ses examens.
        Mary study.3SG.PS day and night. She pass.3SG.PS all her exams.
        'Mary studied day and night. She passed all her exams.'
(556)   Bianca *chanta* le recitative et   Ygor l'*accompagna* au piano.
        Bianca sing.3SG.PS the recitative and Ygor accompany.3SG.PC her
        on the piano
        'Bianca sang the recitative and Ygor accompanied her on the piano.'

As pointed out in Sect. 5.2.3, whether or not the Passé Simple encodes the narrative value of the [±narrativity] procedural feature by default must be addressed by experimental work on online processing. If tested in an online experiment with a

self-paced reading task, the predictions for the two possibilities—i.e. narrative by default vs. encoding the instruction to assign a contextual value to the [± narrativity] feature—are the following:

- If the Passé Simple encodes the narrative interpretation by default, then non-narrative interpretations should produce longer reading times.
- If the Passé Simple encodes the instruction to assign a contextual value to the [± narrativity] feature, then narrative and non-narrative interpretations should produce similar reading times.

In Grisot and Blochowiak (2017, Sect. 6.3), we used an online self-paced reading experiment to test the role played by the Passé Simple when processing a series of events that are to be interpreted sequentially—that is, temporal progression. This was compared to cases in which the Passé Composé was used. According to the procedural account of verbal tenses, the Passé Simple instructs the comprehender to order the events temporally, whereas the Passé Composé does not. The consequent prediction is that reading times for the segments in which the Passé Simple is used will be significantly shorter than those for the segments in which the Passé Composé is used. The results of the two experiments carried out (cf. Sects. 6.3.4 and 6.3.5) did not provide evidence of a significant difference in the meaning of these two verbal tenses with respect to temporal progression. In order to validate the [±narrativity] feature experimentally, further research should complement Grisot and Blochowiak's (2017) study by investigating the role played by these verbal tenses to express temporal regression, as well. Furthermore, in order to validate the cross-linguistic status of this feature experimentally, online processing experiments need to be carried out for simple and compound forms in a series of languages, such as other tense-prominent languages (Romance languages, English and other Germanic languages) and aspect-prominent languages (Slavic languages).

Fourthly, the literature assumes that the Imparfait encodes a null directional instruction, as in (557), where it expresses a situation holding before the situation introduced with the Passé Simple. Under pressure from contextual information, the null directional instruction can be changed into an instruction for temporal ordering, especially for the narrative Imparfait, as in (558) (see for example de Saussure (2003), as discussed in Sect. 1.1.2). In (558), the adverbial *une seconde plus tard* provides the Imparfait with the reference point required, and the Imparfait allows temporal sequencing.

(557) Paul *entra* dans le bar.   Marie *buvait* un café.
       Paul enter.3SG.PS in the bar. Mary drink.3SGIMP a coffee
       'Paul entered the bar. Mary was drinking a coffee.'
(558) Paul *entra* dans le bar.   Une seconde plus tard, Marie *partait*.
       Paul enter.3SG.PS in the bar. One second later, Mary leave.3SG.IMP
       'Paul entered the bar. One second later, Mary left.'

I suggest that, as with the Passé Simple, the Imparfait does not encode a null directional instruction by default. On the contrary, it encodes the instruction to determine a

contextual value of the [±narrativity] procedural feature. This theoretical position will be verified experimentally in future work. My prediction would be that narrative and non-narrative usages of the Imparfait will result in similar reading times.

Finally, my proposition is that the simple past, compound past and imperfect are interchangeable only when they share—besides conceptual information—procedural information. For example, the Passé Simple, Passé Composé and Imparfait are interchangeable in their narrative usages, not only in French but also cross-linguistically, as shown below. Example (559) is the original text written in English, where a Simple Past form is used; example (560) is its translation into French, where a narrative Imparfait is used; example (561) is its translation into Italian, where a narrative Passato Remoto is used; and finally, example (562) is its translation into Romanian, where a narrative Perfectul Simplu is used. The narrative Imparfait used in (560) could be replaced with a narrative Passé Simple, as in (563), or a narrative Passé Composé, as in (564).

(559)   But when the Rabbit actually took a watch out of its waistcoat-pocket and looked at it and then hurried on, Alice started to her feet, […] and, burning with curiosity, she ran across the field after it and was just in time to see it pop down a large rabbit-hole, under the hedge. In another moment, down *went* Alice after it!

(560)   Cependant, lorsque le Lapin tira bel et bien une montre de la poche de son gilet, regarda l'heure, et se mit à courir de plus belle, Alice se dressa d'un bond, […]. Dévorée de curiosité, elle traversa le champ en courant à sa poursuite, et eut la chance d'arriver juste à temps pour le voir s'enfoncer comme une flèche dans un large terrier placé sous la haie. Un instant plus tard, elle y *pénétrait* à son tour.

(561)   Ma quando il Coniglio trasse un oriuolo dal taschino del panciotto, e vi affissò gli occhi, e scappò via, Alice saltò in piedi, […] e divorata dalla curiosità, traversò il campo correndogli appresso, e giunse proprio a tempo di vederlo slanciarsi in una spaziosa conigliera, di sotto alla siepe. In un altro istante, giù Alice *scivolò*.

(562)   Dar când iepurele, imediat după asta, scoase din buzunarul veste un ceas, îl privi şi începu să se grăbească, Alice sări în picioare […] şi, arzând de curiozitate, o luă la fugă peste câmp după el chiar la timp pentru a-l putea vedea sărind într-o gaură de iepure mare de sub gardul viu. Într-o clipă Alice *sări* după el.

(563)   Un instant plus tard, elle y *pénétra* à son tour.

(564)   Un instant plus tard, elle y *a pénétré* à son tour.

However, according to Grisot & Moeschler's model (2014), one would argue that only the narrative Imparfait provides a subjective perspective of the eventuality expressed. This brings into discussion the notion of subjectivity, which was accounted for experimentally in Grisot (2017c). In this paper, I show that native speakers of French have difficulties consciously accessing the [±subjectivity] feature. The agreement rate goes no higher than a Ҟ value of 0.3. This value remains

constant, whether two or more judges participate in the experiment. When the agreements are analysed, they indicate that French verbal tenses expressing past time are not specialized for one of the two values of the [±subjectivity] feature. Nonetheless, the Imparfait and Passé Simple are preferred when expressing the speaker's subjective perspective (64% subjective and 36% non-subjective usages for the Imparfait, and 56% subjective and 44% non-subjective usages for the Passé Simple), whereas the Passé Composé is preferred when describing a situation in a non-subjective manner (67% subjective and 33% non-subjective usages). These results do not provide evidence of a systematic subjective interpretation for the French Imparfait.

5.5   Summary

This chapter has given an account of the model of temporal reference, determined according to the cohesion ties investigated in this research. I have suggested that the global interpretation of temporal reference at the discursive level is determined by the linguistic means existent in a language on the one hand, and by their ad-hoc inferential contextual saturation on the other. In tensed languages, like English, French, Italian and Romanian, temporal reference is expressed linguistically by Tense, Aspect, Aktionsart, modality (TAM markers), temporal connectives and temporal adverbials. Linguistic expressions in general, including TAM markers, underdetermine the content communicated by a speaker, both at the level of explicature and implicatures. In the interpretation process, their meaning is worked out contextually.

In addition, a reanalysis of Tense, Aspect and Aktionsart was proposed in the light of the empirical work carried out in this research. Firstly, I proposed a mixed conceptual-procedural nature of Tense. As such, I argued that Tense encodes both conceptual and procedural information. Tense encodes a pro-concept TIME, which is semantically incomplete, inferentially worked out, and contributes to the truth-conditions of an utterance. I suggested that hearers build an ad hoc concept of pastness ($E < S$) or non-pastness ($E \geq S$), which are neuro-linguistically valid categories, according to contextual information. Tense encodes the instruction to relate eventualities temporally with respect to one another, operationalized as the [±narrativity] feature. It was argued that a verbal tense does not encode one of the values of the [±narrativity] feature by default, but instead represents a contextual value determined equally according to other parameters, such as Aspect and Aktionsart.

Furthermore, it was argued the grammatical category of Aspect represents procedural information constraining the formulation of hypotheses about the explicit content of an utterance. The [±perfectivity] feature operationalizes the speaker's viewpoint of the eventuality expressed. Verbal tenses do not correlate with one of the two possible values of the [±perfectivity] feature by default. Additionally, the category of Aktionsart represents conceptual information contributing to the truth-conditions of an utterance. This information was operationalized as the [±boundedness] feature, which represents the actual realization of an eventuality.

I pointed out the lack of a common framework which would allow a consistent contrastive comparison of verbal tenses. I proposed a cross-linguistically valid framework that would be both theoretically and empirically grounded. The features included in the model developed in this book originate in the specialized literature on the English, French, Italian and Romanian verbal systems, as well as the inflectional categories that verbs take in tensed languages. These features were validated experimentally, and the model was developed according to translation corpora, using methods such as the cross-linguistic transfer of properties. It was assumed that the English simple past in English, the Italian, French and Romanian simple and compound past and the imperfect in share conceptual meaning, as well as the instruction to relate eventualities temporally with respect to one another. This procedural information is a cross-linguistically valid feature, which the languages under consideration materialize in dissimilar ways. Using Squartini and Bertinetto's hypothesis about the aoristicization process, it was argued that there is a positive correlation between the degree of advancement of the compound past in the aoristic drift and the frequency of its narrative usages. A series of suggestions discussed in this chapter were tested and validated in the empirical work carried out in this research.

In Chap. 6, I will develop the proposal that temporal cohesion, determined at the discursive level, indicates the cognitive temporal coherence that comprehenders establish at the level of the mental representations of situations. As such, the human brain tends to treat temporal information from different sources (Tense, Aspect, Aktionsart, temporal connectives and temporal adverbials) in a coherent manner.

Chapter 6
Temporal Coherence

6.1 Coherence Relations

For Hobbs (1979, 69), coherence is the 'mortar with which extended discourse is constructed'. In other words, a discourse has structure, and this structure is provided by various types of relations that bind contiguous segments of a text, transforming that text into a whole. For example, the segments in (565), given by Hobbs (1985, 1), illustrate this postulate:

(565) (a) I would like now to consider the so-called "innateness hypothesis"
       (b) to identify some elements in it that are or should be controversial,
       (c) and to sketch some of the problems that arise as we try to resolve
       the controversy.
       (d) Then, we may try to see what can be said about the nature
       and the exercise of the linguistic competence that has been acquired,
       along with some related matters. (Chomsky, Reflections on Language,
       p. 13)

Between segments (a) and (d) there is a temporal relation, which is overly marked by *then*, linking the two topics the author wants to discuss. Clauses (b) and (c) elaborate on the first topic by breaking it into two subtopics. The additive relation between (b) and (c) is overtly marked by *and*. In discourses, numerous other types of relations can be identified, such as causal or adversative ones, as in (566) and (567) respectively.

(566) John fell because the floor was slippery.
(567) John fell but he did not hurt himself.

Many scholars have pointed out that such relations exist, and have attempted to classify them. For example, Halliday and Hasan (1976) speak about *conjunctive relations* and classify them into four main categories (*additive, temporal, causal and adversative*); Longacre (1983) speaks about *combination of predicates* or *types of paragraphs*, and distinguishes four categories (*conjoining, temporal, implication and alternation*). Hobbs (1979, 1985) speaks about *coherence relations*, and gives formal definitions for a set of relations rooted in the operations of a computational inferential system — that is, the procedures that apply to the represented data. For Hobbs, one of the crucial questions to be answered on coherence is *why is discourse coherent in the first place* (Hobbs 1985, 69). The answer he proposes resembles a pragmatic model of verbal communication, such as that proposed by Gricean and post-Gricean pragmatics (cf. Sects. 2.2 and 2.3). According to Hobbs, the function of coherence relations should be linked to the speaker's goal of communicating his ideas using the imperfect (and underdetermined) medium of language to a hearer who undergoes the comprehension process under certain processing constraints. The speaker aims to have the hearer understand him — that is, to identify his informative intention by drawing the right inferences and arriving at his intended meaning of the utterance or series of utterances. Therefore, the speaker seeks to ease the hearer's processing load by implicitly or explicitly structuring his message — or, as it might be formulated in relevance-theoretic terms, by making use of procedural expressions which specify paths to follow during the comprehension process. Likewise, the hearer will try to free himself of the load of underdetermined language, in order to construct the speaker's intended meaning contextually.

For other scholars, what helps language users to process a discourse is to connect discourse segments, by inferring coherence relations on the basis of cognitive principles. This is the proposal made by Sanders et al. (1992, 1993), who did the grounding for the *Cognitive approach Coherence Relations* (CCR). For them, an accurate classification of discourse relations must be *descriptively adequate* (it must cover various types of naturally occurring data) and *psychologically plausible* (it must be based on cognitively plausible principles).

A series of papers by Sanders and colleagues (among many others, Sanders et al. 1992, 1993; Sanders 1997, 2005; Sanders and Noordman 2000) developed the CCR framework, in which psychological plausibility is a central aspect of coherence relations. For Sanders et al. (1992, 3), coherence applies to mental representations which hearers build when they hear, process and understand a discourse. In their view, coherence relations should be considered not as discursive entities but rather as cognitive entities, as they write:

> A discourse structure approach is not necessarily restricted to descriptive analyses of discourse, because coherence relations should be considered as cognitive entities. Such a claim leads to the prediction that coherence relations and their linguistic marking affect the cognitive representation of a discourse (i.e., discourse understanding).

This prediction has been confirmed by numerous online experimental studies, from Haberlandt (1982) right up to more recent studies (among many others, Cozijn

et al. 2011; Canestrelli et al. 2013; Mak and Sanders 2013; Van Silfhout et al. 2014, 2015; Zufferey 2014; Zufferey and Gygax 2016). For example, Sanders and Noordman (2000) show through experimental work that coherence relations and their linguistic marking (explicit vs. implicit) affect text processing of expository texts, which are considered more complex and less stereotypical than narrative texts. They tested the hypotheses that, because coherence relations play a crucial role in text understanding different relations (e.g. causal vs. additive vs. contrastive) result in different mental representations, and overt marking of relations influences processing in this kind of texts. They expected overt marking to facilitate the online construction of the mental representation, because the marker makes the coherence relations between text segments explicit. Once the representation has been built, overt markers are not expected to influence later access to the representation, as in recall tasks, for example. They found that different coherence relations are processed differently. In particular, the problem-solution relation structure, which is a causal relation, was processed faster and verified faster and more accurately than the list relation, which is an additive coherence relation. Additionally, they found that overly marked relations lead to faster processing of the text segment immediately following. These results indicate that discourse relations and their explicit marking affect the processing of, building of and access to mental representations of the content given of in discourse segments.

In the CCR framework, coherence relations have two characteristics. Firstly, they satisfy the *relational* criterion, according to which a coherence relation refers to the informational surplus which it adds to the interpretation of the discourse segments in isolation (Sanders et al. 1992, 5). Additionally, because coherence relations connect mental representations of discourse segments, the meaning of the segments must be compatible with the discourse relation (be it implicit or overtly marked using a compatible connective). Secondly, coherence relations are classified following a taxonomy consisting of four primitive fine-grained features: *basic operation* (causal or additive); *source of coherence* (semantic or pragmatic); *order of segments* (basic or nonbasic); and *polarity* (positive or negative). So, the procedure of defining a coherence relation consists of (i) identifying two discourse segments S_1 and S_2 in expressing two propositions P and Q, (ii) determining whether P and Q are related by a causal or an additive relation, (iii) identifying the source of coherence as semantic (the propositional content of the segments) or pragmatic (the illocutionary content of one or both segments), (iv) detecting whether the order of P and Q is basic ($S_1 \rightarrow S_2$) or nonbasic ($S_2 \rightarrow S_1$), and (v) determining whether the relation is positive, in the sense that P or Q follow the basic order, or negative, in the sense that ⌐P or ⌐Q follow the basic order. Using this taxonomy, Sanders et al. (1992, 11) identify twelve prototypical coherence relations, of which eight are causal, and four additive, as in Table 6.1 (cf. the original paper for examples and extensive discussions of these relations).

For Sanders et al., during the language comprehension process, the hearer checks the primitives of this taxonomy, and does or does not infer a certain prototypical relation as a result. Moreover, when cognitive relations are marked linguistically, they are identified and processed faster (Haberlandt 1982). This taxonomy predicts

Table 6.1 Overview of the taxonomy and prototypical relations

Basic operation	Source of coherence	Order	Polarity	Class	Relation
Causal	Semantic	Basic	Positive	1.	Cause-consequence
Causal	Semantic	Basic	Negative	2.	Contrastive cause-consequence
Causal	Semantic	Nonbasic	Positive	3.	Consequence-cause
Causal	Semantic	Nonbasic	Negative	4.	Contrastive consequence-cause
Causal	Pragmatic	Basic	Positive	5.	Argument-claim; instrument-goal; condition-consequence
Causal	Pragmatic	Basic	Negative	6.	Contrastive argument-claim
Causal	Pragmatic	Nonbasic	Positive	7.	Claim-argument; goal-instrument
Causal	Pragmatic	Nonbasic	Negative	8.	Contrastive claim-argument
Additive	Semantic	–	Positive	9.	List
Additive	Semantic	–	Negative	10.	Exception
Additive	Semantic	–	Positive	11.	Enumeration
Additive	Semantic	–	Negative	12.	Concession

Adapted from Sanders et al. (1992, 11)

which relations are more likely to remain implicit, such as *cause-consequence*, or to be overtly marked, such as *concession*: the former follow the basic order and whereas the latter follow the nonbasic order. This prediction is based on the *causality-by-default hypothesis* (Sanders 2005), according to which hearers by default expect two segments in a discourse to be causally related. This hypothesis complements the *relational principle* mentioned above, which states that the propositional content of the segments must be compatible with the inferred relation. As such, the basic categories postulated in the CCR framework correspond to highly expected discourse relations, and are more likely to be expressed implicitly than non-basic ones.

Within the same framework, Hoek and Zufferey (2015), argue that the rate of implicitation (that is, the optionality of overt marking) of discourse relations is governed by both the listener's expectations about discourse (Segal et al. 1991; Murray 1995, 1997; Kaiser and Trueswell 2004; Rohde et al. 2006; Ferretti et al. 2009) and cognitive complexity. Segal et al. (1991) speak about the *continuity hypothesis*, which postulates that readers by default expect a discourse segment to be both causally and temporally continuous with the preceding segment. In the CCR framework, relations with a positive polarity are continuous, and those with a negative polarity are discontinuous. Hoek and Zufferey (2015), like Asr and Demberg (2012) before them, found that unexpected and discontinuous relations are overtly marked more often than expected and continuous relations. Taken together, these two hypotheses seem to describe the reality for language users accurately. However, they raise the questions of the cognitive status of temporal relations. In the CCR framework, temporality was not considered as a basic categorizing principle for two reasons. Their first reason is that temporal meaning is too dependent on the referential content of

the segments, and temporality cannot be ignored by language users whereas causality can. Their second reason is that it is not a categorizing principle as productive as causality and additivity. Since Sanders and colleagues rejected temporality as a categorizing principle for discourse relations, they did not consider it as a fundamental cognitive principle. Nevertheless, they believe that temporal relations belong to the class of additive relations. Temporal relations can be distinguished from other additive relations based on "the referential meaning of individual segments" (1992, 28). Research in psychology, and more recent annotation and processing studies, provide evidence that temporal relations do play a role in constructing mental representations of situations, and should therefore be considered as cognitive relations (cf. discussion in Sect. 6.2).

The cognitive processes that people use to infer coherence relations, and thus to establish coherence at both discursive and cognitive levels, have also been studied from a psycholinguistic perspective. Three principal models try to explain how hearers build mental models during comprehension, on the basis of whether pragmatic inferences are drawn (i) after the utterance has been processed in its entirety (Garnham and Oakhill 1985, 1996; Garnham et al. 1996), (ii) during the utterance being processed, when cues are integrated as they become available (Kintsch and van Dijk 1978; van Dijk and Kintsch 1983; Kintsch 1995, 2005), or (iii) before the utterance has been processed in its entirety, making use of expectations about upcoming discourse (Kaiser and Trueswell 2004; Rohde et al. 2006; Ferretti et al. 2009; Rohde and Horton 2014).

The last two models both make proposals that have been validated experimentally. One the one hand, Kintsch and colleagues' model of integrating cues (also called the *mental* or *situation* model) states that speakers build simple and multi-threaded mental representations of situations described in a discourse. A crucial property of these mental representations is that they are structured and coherent (Gernsbacher and Givón 195; Graesser et al. 1997). In this model, language is seen as encoding processing instructions on how to construct mental representations of the situations described (Zwaan and Radvansky 1998). (I will come back to this model in Sect. 6.4.2, in which I will speak about cognitive temporal coherence.) On the other hand, the defendants of the anticipatory model of language processing have shown that the establishment of coherence relations is sensitive to a variety of linguistic cues, including connectives (Knott and Dale 1994; Prasad et al. 2008; Asr and Demberg 2012; Koornneef and Sanders 2013; Mak and Sanders 2013), verb class and verb aspect (Koornneef and Van Berkum 2006; Kehler et al. 2008; Ferretti et al. 2009), coreference (Kehler and Rohde 2013), and the preceding coherence relation (Simner and Pickering 2005), among others.

To conclude, studies indicate that several factors should be considered when investigating coherence relations, such as the causality-by-default hypothesis, the continuity hypothesis, the hearers' expectations during language comprehension and, more generally, the cognitive complexity of coherence relations.

6.2   The Cognitive Status of Temporal Relations

Temporal relations come in several subtypes. They can be classified as *sequential chronological*, where the order of eventualities in the discourse corresponds to their chronological order as in (568), (569), (570) and (571), *sequential anti-chronological*, where the order of eventualities does not correspond to their chronological order as in (572) and (573), and *synchronous*, where the two eventualities occur simultaneously as in (574).

(568)   Mary arrived home *before* her husband called her.
(569)   Mary arrived home, *then* her husband called her.
(570)   Mary arrived home. Ø Her husband called her.
(571)   Mary had arrived home *when* her husband called her.
(572)   Mary arrived home *after* her husband called her.
(573)   Mary arrived home. Ø Her husband had called her.
(574)   Mary was just entering the house *when* her husband called her.

These examples illustrate three important aspects of temporal relations. The first is the fact that they can be expressed with or without a temporal connective, and can thus be explicit, as in (568), (569), (571) and (574), or implicit, as in (570) and (572). The second is that there is a lack of one-to-one correspondence between temporal connectives and temporal relations, as seen with the connective *when*, which can be used as a sequential anti-chronological relation, as in (571), or a synchronous relation, as in (574). The third is that verbal tenses play an important role in determining the temporal relation. For instance, the past perfect in (571) directs the interpretation towards a sequential relation, whereas the past continuous in (574) orients the interpretation towards a synchronous relation; both verbal tenses are compatible with the temporal connective *when*.

As I noted in Sect. 6.1, for Sanders et al. (1992), temporal relations say were not afforded the status of cognitive temporal relations, firstly because temporal relations do not seem to correspond to the relational principle, and secondly because temporality might not be a productive principle with respect to the taxonomy, like causality and additivity. However, Evers-Vermeul et al. (2017) argue that temporality, which is one of the prominent features determining coherence in a discourse, is a relational rather than segment-specific notion, and is cognitively plausible. In their study, they show that temporal relations meet the requirements of Sanders et al.'s (1992) taxonomy, and they adapt the annotation scheme used within this framework to account for temporal relations in addition. Evers-Vermeul et al. (2017, section 3) provide three types of evidence to determine whether temporal relations are distinct cognitive entities (compared to causal and additive relations): (i) evidence from the linguistic system; (ii) evidence from language acquisition; and (iii) evidence from language processing. Firstly, as I have shown in examples (568)-(574), there are linguistic markers that may be used to mark temporal relations overtly. As noted by Evers-Vermeul et al., citing previous work by Knott and Dale (1994) and by Stukker
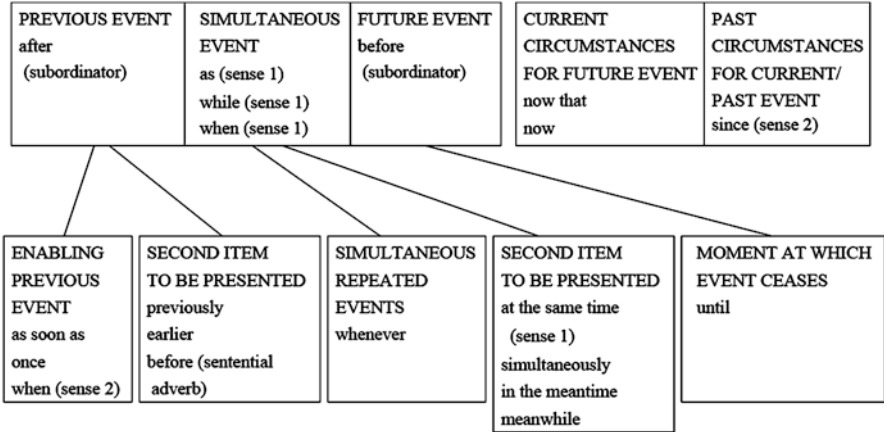
Fig. 6.1 Temporal situation. (Knott and Dale 1994, 60)

and Sanders (2012), linguistic markers are pointers to cognitive processes, such as the actual use of coherence relations to construct mental representations. Knott and Dale (1994) gather a corpus of around 200 relational cue phrases from academic articles and books. For example, relational cues to locate eventualities in time and to express temporal relations are given in Fig. 6.1.

As observed by Evers-Vermeul et al., this list of temporal relational cues exhibits two characteristics: the underspecification of these markers (that is, the connective is used to convey a relation that does not fully correspond to its encoded meaning); and their polysemy (that is, a connective can be used to express more than one coherence relation). For Evers-Vermeul et al., these characteristics do not provide evidence against the idea that temporal relations have specific linguistic markers, mainly because this is the case for markers generally considered contrastive, such as *but*, or additive markers, such as *and*. As the relevance-theoretic framework argues, underdetermination is a characteristic of language in general (cf. Sect. 2.3), and is not therefore a problem specific to temporal connectives.

Besides the linguistic markers identified by Knott and Dale, there are also the temporal categories of Tense, Aspect and Aktionsart. As I discussed in Sect. 1.1, these categories are generally considered as referential, and thus as playing a role in the location of eventualities in time. Several researchers (Reichenbach 1947; Kamp and Rohrer 1983; Partee 1973, 1984; Dowty 1982, 1986; Hinrichs 1986; Nerbonne 1986; Webber 1988; Moens and Steedman 1988) have sought to explain the temporal relations triggered by Tense by considering this category as anaphoric. The main idea is that the interpretation of temporal progression, corresponding to chronological sequential relations, is linked to the introduction of a new point of reference R, either by Tense (Reichenbach 1947; Kamp and Rohrer 1983; Nerbonne 1986) or by two of the four aspectual classes referred to as Aktionsart, namely accomplishments and achievements (Hinrichs 1986; Dowty 1986). Conversely, the interpretation of the temporal overlap of two eventualities, corresponding to synchronous temporal

relations, is linked to the use of a verbal tense which does not introduce a new R, to verbs expressed by the imperfect Aspect or/and to the use of unbounded aspectual classes, i.e. activities and states.

Additionally, Hinrichs (1986, 63), following Partee (1973), points to the richness of the relational nature of the temporal localization of events using temporal expressions. He identifies seven possible cases: *tense morpheme-tense morpheme*, as in (575); *tense morpheme-temporal adverbial*, as in (576); *temporal adverbial-temporal adverbial*, as in (577); *temporal adverbial-temporal connective*, as in (578); *tense morpheme-temporal connective*, as in (579); *temporal connective-temporal connective*, as in (580); and *temporal connective-temporal adverbial*, as in (581). In each case, the target temporal expressions are written in italics.

(575)   He *took* off his clothes, *went* into the bathroom, *took* a
        shower and *went* to bed.
(576)   They *wheeled* me into the operating room and put me under
        sedation. *Three hours later* I woke up.
(577)   *This week* I toured London. *On Thursday* I saw the Tower.
(578)   *Last Saturday when* the State Fair started, all hotel in town
        were booked.
(579)   They *ordered* two Italian salads and a bottle of Frascati. *When* the
        waiter brought the wine, they noticed that they had forgotten
        their checkbook.
(580)   *When* all the cars poured out of the parking lot *after* the concert
        was over, a big traffic jam developed.
(581)   *When* Melissa left the party, Bill left *5 min later.*

The first and fifth cases, illustrated in (575) and (579), have received the greatest amount of attention in linguistic and pragmatic studies (Kamp and Rohrer 1983; Grice 1989; Levinson 2000; Moeschler et al. 1998; 2000a, b; de Saussure 2003; Molendijk et al. 2004; Verkuyl et al. 2004; Borillo et al. 2004; Grisot and Moeschler 2014; Grisot 2015; Grisot and Blochowiak 2015, 2017, among others). To provide a comprehensive understanding of these rich interrelations among temporal relations, each of these cases should be extensively investigated. In Grisot and Blochowiak (2015, 2017) (discussed below in Sect. 6.3), we assessed the role of verbal tenses (the French Passé Composé and Passé Simple) at the same time as the role of temporal connectives (*ensuite* 'then' and *puis* 'then') as instructions for processing temporal relations. Two cases of temporal ordering were examined: first, the case when temporal ordering is undetermined (Grisot and Blochowiak 2015); and second, the case of chronological order (Grisot and Blochowiak 2017). We found that, for both cases of temporal ordering, overtly marked temporal relations demanded processing time similar to that of implicit relations. In addition to this, we did not find significant difference regarding the roles played by the Passé Composé and Passé Simple. However, offline data from acceptability experiments indicated that participants preferred the implicit versions to the explicit ones. Additionally, we found that participants preferred the occurrence of the Passé Composé with *ensuite* to *puis.* So,

based on these observations, I follow Evers-Vermeul et al. (2017) in their proposal that temporal relations have specific linguistic markers which point to their cognitive status.

The second type of evidence provided by Evers-Vermeul et al. (2017) to support the proposal that temporal relations are cognitive entities comes from language acquisition. As they note, language acquisition studies have shown that children acquire temporal connectives after additives, such as *and,* and before causals, such as *because* (Bloom et al. 1980 for English, Evers-Vermeul and Sanders 2009 for Dutch). Studies have also found a discrepancy between production and full comprehension of temporal connectives: children use temporal connectives before they are able to comprehend them fully (Bever 1970; Blything et al. 2015). Additionally, differences have been observed with respect to the various subtypes of temporal relations, following a clearly identifiable developmental path (Clark 1971). During the first stage of acquisition of temporal connectives (around the age of three), children are not able correctly to interpret the temporal order of events provided by *before* and *after*. Instead, they use the order-of-mention strategy, according to which the event mentioned first is interpreted as the event that took place first. Around the age of four, children are able correctly to interpret chronological sequential relations marked by *before*, and around the age of five they interpret correctly anti-chronological sequential relations marked by *after*. This evidence from acquisition indicates that temporal relations occupy an important place in children's language acquisition processes, that they are directly linked to the order of the acquisition of temporal connectives, and that children's comprehension of temporal relations and temporal connectives is facilitated by a chronological order of events.

The third type of evidence given by Evers-Vermeul et al. (2017) comes from data on adults' processing. Since the eighties, studies in psychology have shown that temporal information is encoded in readers' mental representations of eventualities (Mandler 1986; Zwaan 1996; Townsend 1983; Gennari 2004; van der Meer et al. 2002). Unlike children, adults are able to interpret temporal relations correctly, regardless of order of the segments. However, chronological order seems to facilitate processing, whereas anti-chronological order places more cognitive load on the brain, because it requires additional discourse-level computations (Münte et al. 1998; Ye et al. 2012; Politzer-Ahles et al. 2017). For example, it has been shown that sequential chronological temporal relations are remembered better than anti-chronological ones (Clark and Clark 1968; Townsend 1983; Baker 1978; Zwaan et al. 2001). As noted by Evers-Vermeul et al. (2017, 9) these studies show that "the temporal order of clauses affects how well the relation is encoded in the mental representation".

Scholars have also observed that temporal relations are processed differently from causal ones. For example, Mandler (1986) found that a chronological order of eventualities facilitates the processing of temporal relations, whereas it does not play an important role in causal relations. For Mandler, this difference is due to the fact that readers have prior knowledge about the relation between a cause and an effect, whereas for temporally linked eventualities, readers have to determine the relation in context. In contrast, other researchers have found similarities between

causal and temporal relations. For example, expectations that people have about relations holding between discourse segments when reading a text arise with respect to both causal and sequential temporal relations: Segal et al. (1991) and Murray (1997) argue that readers expect a sentence to be causally (canonical order) and temporally (sequential chronological) linked to its preceding context.

It might be possible that these expectations are particularly strong when comprehenders deal with narrative texts (stories or literary stories). Zwaan et al. (1995a, b) proposed an *event indexing model* to account for the reader's construction of a multithreaded situation model while reading simple stories and literary short texts. According to this model, the reader of a narrative text expects a great degree of continuity with respect to five conceptual dimensions: the protagonist, temporality, causality, spatiality and intentionality (that is, the characters' goals). This means that temporal discontinuity (that is, when the incoming event occurs much later in time, or earlier in time as in flashbacks) is less expected by the reader. There is experimental evidence that temporal discontinuities, such as anti-chronological sequential relations, impede comprehension and slow down reading times (Mandler 1986). One of the strategies writers use is overtly marking temporal discontinuities using temporal locating adverbials (such as *back at the ranch, the previous summer* or *the next morning*), temporal connectives, and the verbal categories Tense, Aspect and Aktionsart (Graesser et al. 1997).

6.3   Experimental Study on Processing Implicit and Explicit Sequential Relations

6.3.1   "Ensuite" and "Puis" as Temporal Connectives

Defining temporal connectives has proven to be a rather difficult task in the literature; consequently, there is no agreement with respect to which linguistic markers should be included in this category. For example, Gosselin (2007) proposed that a temporal linguistic marker could be included in the category of temporal connectives when it conveys *a specific temporal relation* with the previous sentence(s). According to Gosselin, French markers such as *et* 'and', *puis* 'then', *alors* 'then, so', *ensuite* 'then', *après* 'after', *plus tard* 'later', *aussitôt* 'as soon as' and *dès cet instant* 'from this moment' should be grouped under the label of *temporal connectives*. Nevertheless, as I will discuss below, this description is not generally accepted in classical grammars, such as *Le Grand Robert de la langue française* (Robert 2016) or Grevisse's *Le bon usage* (Grevisse 2016), nor by a series of other studies.

In Robert (2016), the basic usage of *ensuite* is to express *temporal succession*, as in (582), where corresponds to English *afterwards*, and in (583), where corresponds to both *then* and *afterwards*. In addition to temporal succession, *ensuite* can express spatial succession, as in (584).

(582)   On appelle aîné le premier enfant, puîné celui
        qui naît *ensuite*. (Robert 2016)
        'We call firstborn the child who is born first, younger sibling the
        one who is born afterwards.'

(583)   Paul s'est. rendu à Paris en décembre 1997. *Ensuite*, il y a habité
        pendant plus d'une année. (de Saussure 2011)
        'Paul went to Paris in December 1997. Then he lived there
        for more than a year.'

(584)   La fanfare marchait en tête, *ensuite* venait le cortège. (Robert 2016)
        'The brass band walked in front, then came the procession.'

Ensuite is described by Gosselin (2007) as a temporal connective, conveying a temporal relation of temporal succession, which excludes the relation of simultaneity (like *puis* and unlike *et*). More precisely, *ensuite* instructs the hearer to relate the final boundary of the first eventuality E_1 to the first boundary of the second eventuality E_2 by a relation of *precedence but not immediate vicinity*. In other words, there is a linguistically relevant interval between the end of E_1 and the beginning of E_2, as is the case for two other adverbs, *après* 'afterwards' and *plus tard* 'later'. Gosselin points out that this is the fundamental difference between *puis* and *ensuite*, since *puis* instructs for a relation of the *optional immediate precedence* type (i.e. the first boundary of E_2 can coincide with the second boundary of E_1).

De Saussure (2007, 2011) also argues in favour of a procedural account of *ensuite*. However, he does not follow Gosselin in his analysis that *ensuite* is a *temporal* connective, and instead argues that *ensuite* should be considered as a procedural *serial* connective rather than a temporal one. For him, the basic semantic meaning of *ensuite*, just like *d'abord* 'firstly' and *enfin* 'finally', is to order various types of elements. By way of pragmatic enrichment, the ordering of these elements can be specified to *temporal* order, as in (582)-(584), *argumentative* order, as in (585), and *discursive* order, as in (586).

(585)   Je ne sortirai pas. D'abord je suis fatigué, *ensuite* aller au restaurant est.
        la dernière chose qui me ferait plaisir. Enfin, il y a un match à la
        télé ce soir. (de Saussure 2007)
        'I will not go out. First, I am tired, then going to a restaurant is
        the last thing that would make me pleasure. Finally, there is a
        game at the TV tonight.'

(586)   Il y a plein de cas où tu dois faire une sauvegarde supplémentaire.
        D'abord, si tu ouvres un fichier reçu par email. *Ensuite*, si tu dois
        transférer le fichier à un collègue qui utilise une autre plate-forme.
        Et puis surtout, chaque fois que tu fais une modification sur le
        fichier original. (de Saussure 2007)
        'There are plenty of cases when you have to make an extra back-up.
        First, if you open a file that you received by email. Then, if you have to
        transfer the file to a colleague who uses a different platform. And then
        especially, every time when you make a modification to the original file.'

For de Saussure (2011), identifying a possible conceptual origin in diachrony, such as *suite* 'followingness' for *ensuite*, is not enough to justify the assumption that it encodes conceptual information, because all usages of *ensuite* can not be entirely predicted on the basis of this conceptual content. *Ensuite* has a temporal interpretation 'only as a specification of a broader notion of "new element in a series"' (2011, 69, 70), as in (587).

(587)   Marc a fait le repassage. *Ensuite*, il s'est. reposé sur le canapé.
         'Marc ironed. Then, he had a rest on the couch.'

The linguistically relevant interval between the end of E_1 and the beginning of E_2, identified by Gosselin (2007) as distinguishing *ensuite* from *puis*, is described by Kozlowska (1996) and de Saussure (2011) as the *non-adjacency* interpretation imposed by *ensuite*. This is shown by the acceptability of *ensuite* in (589), and its unacceptability in (588).

(588)   Le vase est. tombé. **Ensuite* il s'est. brisé.
         'The vase fell.? Then it broke.'
(598)   La fenêtre s'est. ouverte. *Ensuite*, le courant d'air s'est. engouffré.
         'The window opened. Then [afterwards but not immediately] the
         draught rushed in.'

In contrast to de Saussure's treatment of *ensuite*, Kozlowska (1996) points out that this adverb is used to link bounded telic and atelic eventualities, thus excluding states. Following Dowty (1986) — who observed that bounded eventualities are usually interpreted sequentially where unbounded ones are usually interpreted to be temporally simultaneous — Kozlowska makes the hypothesis that *ensuite* is a formal means of overtly marking chronological sequential relations. She writes[1] (1996, 255):

> *Ensuite* est directement lié à l'ordre temporel, i.e. à la progression temporelle en avant (E_1 se produit avant E_2). Par conséquent, ensuite est compatible avec les phrases traduisant de l'ordre temporel et il n'est pas compatible avec les phrases traduisant d'autres rapports temporel tel que : inversion causale, recouvrement, indétermination temporelle. Ainsi, ensuite doit être considéré comme un moyen formel de marquer l'ordre temporel.

So, as I have shown, scholars are split between accepting or rejecting *ensuite* as a member of the category of temporal connectives. A similar state of affairs is observed for *puis. Puis* is also described in classical grammars as indicating *temporal succession* (Grevisse 2016; Robert 2016; cf. Bras et al. 2001), as in (590), from Robert (2016). In this usage, *puis* corresponds to English *then* or *afterwards.*

---

[1]"*Ensuite* is directly linked to the temporal sequencing phenomenon, i.e. to forward temporal progression (E_1 takes place before E_2). Consequently, *ensuite* is compatible with utterances presenting temporal progression and it is not compatible with utterances presenting other types of temporal relations, such as: causal inversion, simultaneity, temporal indeterminacy. Therefore, *ensuite* must be considered as a formal means of marking temporal sequencing."

Succession can also be understood with respect to a spatio-temporal dimension, thus expressing it from the *view of an observer* (Robert 2016), as in (591).

(590)   Dieu nous prête un moment les prés et les fontaines […] Puis il nous les retire. Il souffle notre flamme. (V. Hugo, Les rayons et les Ombres)
        'God lends us for a moment the meadows and the fountains […] Then he takes them back. He blows out our flame.'

(591)   En bas, des fleurs rouges, jaunes […] puis c'étaient les jasmins, les glycines. Puis voici une lande. La forêt… et puis un damier de plaines.
        'Below, red, yellow flowers […] then there were the jasmines, the wisteria. Then here is a moor. The forest […] and then a tartan of fields.'

As noted by Bras et al. (2001), citing classical grammars, the notion of temporal succession can disappear, and be replaced by the meaning of *logical succession*. In this case, the meaning of *puis* corresponds to the English *besides* or *moreover* as in (592).

(592)   On trouvait à Yonville qu'il avait des manières comme il faut. Il écoutait raisonner les gens mûrs […] Puis il possédait des talents.
        (Flaubert, Madame Bovary)
        'People from Yonville thought that he had manners as it should be. He used to listen to mature people reasoning […] Besides he was talented.'

Certain scholars, such as Hansen (1995) and Reyle (1998), have suggested that the meaning and the discursive function of *puis* have evolved from the basic temporal value to the enumerative and argumentative value, and that the temporal interpretation is only inferred by default in narrative contexts (cf. discussion in Bras et al. 2001). Bras et al. (2001) argue against this proposal, pointing to the fact that when *puis* links to past events expressed with *puis*, other temporal interpretations (such as simultaneity or temporal regression) are not possible. For them, *puis* is an adverbial marking temporal succession which acts, syntactically speaking, as a temporal connective. For others as well, such as Gosselin (2007) and de Saussure (2007), *puis* can be considered, semantically speaking, as a temporal connective that marks the temporal succession of an utterance with respect to the following utterance.

6.3.2   *Hypotheses and Predictions*

In Grisot and Blochowiak (2015, 2017), we investigated implicit and explicit underdetermined and chronological sequential relations holding between discourse segments in which the Passé Composé or Passé Simple was used. The explicit relations were overtly marked using *ensuite* and *puis*. This is illustrated in examples (593)-(594), which are the French translations of the English sentence given in (595), and in examples (596)-(599), which are the French translations of (600). The first series

of past events is temporally undetermined (that is, they can either be interpreted sequentially or simultaneously), whereas the second series is interpreted sequentially.

(593)   Un homme *entra* dans le bar. Il *vit* son frère.
(594)   Un homme *est entré* dans le bar. Il *a vu* son frère.
(595)   A man entered the bar. He saw his brother.
(596)   Un homme *entra* dans le bar, il *commanda* une bière, il *alla* s'assoir au fond de la salle.
(597)   Un homme *est entré* dans le bar, il *a commandé* une bière, il *est allé* s'assoir au fond de la salle.
(598)   Un homme *entra* dans le bar, il *commanda* une bière, *ensuite/puis* il *alla* s'assoir au fond de la salle.
(599)   Un homme *est entré* dans le bar, il *a commandé* une bière, *ensuite/puis* il *est allé* s'assoir au fond de la salle.
(600)   A man entered the bar, he ordered a beer, (then) he went to sit in the back of the room.

As these examples show, a series of past events can be expressed using either the Passé Simple, as in (593), (596) and (598), or the Passé Composé, as in (594), (597) and (599). Additionally, the temporal relations can either remain implicit or be overtly marked using a temporal connective, as in (598) and (599).

As discussed in Sect. 1.1, these two verbal tenses are both described as perfective; however, the first one presents the eventuality from a past time reference point, whereas the second presents the eventuality from the present and expresses a resultative state that holds at the moment of speech. Semantic discourse theories such as DRT (cf. Sect. 2.1) have suggested that the Passé Simple and Passé Composé do not have the same role with respect to expressing temporal relations: the Passé Simple instructs the hearer to establish a sequential relation between two past events (time advances from the first event to the second), whereas the Passé Composé is undetermined (that is, it does not provide the comprehender with any information with respect to the sequential relations between past events).

The two temporal connectives encode similar but not identical procedural meanings (cf. Sect. 6.3.1). The procedural meaning of *ensuite* is to construct a precedence, but not a sequential relation of immediate vicinity (in other words, there is a gap between the final boundary of the first event and the initial boundary of the second event) (Gosselin 2007). In contrast, the procedural meaning of *puis* is to construct an optional sequential relation of immediate precedence (in other words, there might be a gap between the two events). Taking into account these semantic and pragmatic differences between the Passé Composé and Passé Simple on the one hand, and between *ensuite* and *puis* on the other hand, the first two research questions can be formulated: *What is the role of the verbal tense in processing temporal relations?* and *Is there an interaction between verbal tenses and temporal connectives?*
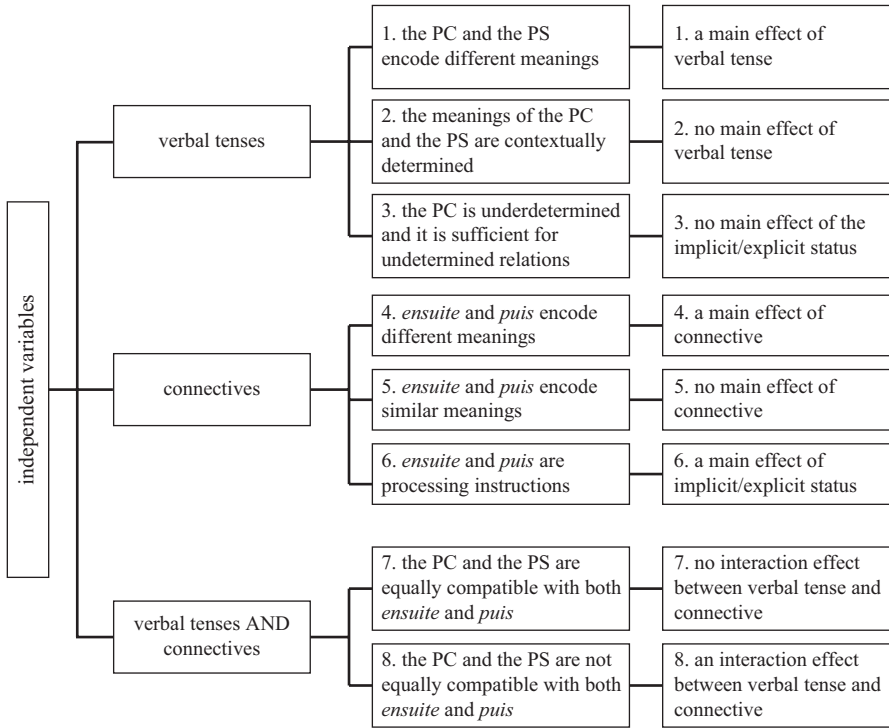
```
                          ┌─────────────────────┐   ┌─────────────────────┐
                          │ 1. the PC and the PS│   │ 1. a main effect of │
                          │ encode different    │   │ verbal tense        │
                          │ meanings            │   │                     │
                          └─────────────────────┘   └─────────────────────┘
        ┌──────────────┐  ┌─────────────────────┐   ┌─────────────────────┐
        │              │  │ 2. the meanings of  │   │ 2. no main effect of│
        │ verbal tenses│  │ the PC and the PS   │   │ verbal tense        │
        │              │  │ are contextually    │   │                     │
        └──────────────┘  │ determined          │   └─────────────────────┘
                          └─────────────────────┘
                          ┌─────────────────────┐   ┌─────────────────────┐
                          │ 3. the PC is under- │   │ 3. no main effect of│
                          │ determined and it is│   │ the implicit/       │
                          │ sufficient for      │   │ explicit status     │
                          │ undetermined        │   │                     │
                          │ relations           │   └─────────────────────┘
                          └─────────────────────┘
```

The flowchart shows, from left:

independent variables branches into three nodes:

verbal tenses →
- 1. the PC and the PS encode different meanings → 1. a main effect of verbal tense
- 2. the meanings of the PC and the PS are contextually determined → 2. no main effect of verbal tense
- 3. the PC is underdetermined and it is sufficient for undetermined relations → 3. no main effect of the implicit/explicit status

connectives →
- 4. *ensuite* and *puis* encode different meanings → 4. a main effect of connective
- 5. *ensuite* and *puis* encode similar meanings → 5. no main effect of connective
- 6. *ensuite* and *puis* are processing instructions → 6. a main effect of implicit/explicit status

verbal tenses AND connectives →
- 7. the PC and the PS are equally compatible with both *ensuite* and *puis* → 7. no interaction effect between verbal tense and connective
- 8. the PC and the PS are not equally compatible with both *ensuite* and *puis* → 8. an interaction effect between verbal tense and connective

Fig. 6.2 Possible scenarios for the independent variables playing a role in the expression of sequential temporal relations

Finally, the third research question refers to the implicit vs. explicit status of sequential temporal relations. Previous experimental studies on connectives as processing instructions for causal and contrastive relations (Haberlandt 1982; Britton and Gernsbacher 1994; Traxler et al. 1997; Sanders and Spooren 2009; Cozijn et al. 2011; Zufferey 2014; Cain and Nash 2011; Canestrelli 2013; Canestrelli et al. 2013) have found that connectives facilitate the processing of the immediately following region when their meaning correlates with the meaning of the discourse region processed. So, the third research question is: *Do these two temporal connectives have the same impact on processing as causal and contrastive connectives?*

In order to answer these three research questions, a series of scenarios can be formulated, with subsequent predictions regarding main and interaction effects between these independent variables. The notion of *effect* (main and interaction) refers to significantly shorter or longer reading times for the target segment in a given experimental condition (for online experiments), and to significantly lower or higher acceptability rates for experimental items in a given condition (for offline evaluation experiments). The scenarios and their subsequent conditions are summarized in Fig. 6.2.

The first set of hypotheses and predictions concerns the meanings of the verbal tenses tested, and their role in the expression of temporal relations. Firstly, the Passé Composé and Passé Simple encode different procedural content regarding sequential relations: the Passé Composé is undetermined with respect to sequential relations, whereas the Passé Simple instructs the hearer to establish a default sequential relation (Kamp and Rohrer 1983; de Saussure 2003). This scenario leads to the prediction that when comprehenders need to handle a series of past events that should be understood sequentially, we would expect a main effect for the verbal tense variable. Shorter reading times should be measured when expressed using the Passé Simple than when expressed using the Passé Composé. Secondly, the meanings of the Passé Composé and Passé Simple are contextually determined (Moeschler 2000a, b, 2002b; Moeschler et al. 2012; Grisot and Moeschler 2014). Consequently, when comprehenders need to handle a series of past events that should be understood sequentially, we would expect no main effect for the verbal tense variable. In other words, no difference in reading times is expected when past events are expressed with the Passé Composé or Passé Simple. This would equally be the case for undetermined series of past events, for which both sequential and simultaneous temporal relations are likewise possible.

The second set of hypotheses and predictions regards the roles of *ensuite* and *puis* as temporal connectives which can be used to mark sequential temporal relations overtly. Firstly, temporal connectives are processing instructions, as previously found for causal or contrastive connectives. In other words, processing a temporal relation is facilitated by the connective, unlike when the temporal relation is implicit. As such, we would expect a main effect of the explicit/implicit status of the temporal relation to take the form of short reading times and higher acceptability rates when the temporal relation is overtly marked, compared to when it is implicit. This would be the case both for undetermined and sequential temporal relations. The subsequent prediction is that we would expect a main effect of the connective, due to the fact that this difference in meaning is relevant for the cognitive processing of sequential temporal relations. Secondly, *ensuite* and *puis* are both sequential temporal connectives with similar meanings, which result in similar effects for the cognitive processing of sequential temporal relations. So, if this is the case, we would not expect a main effect of the connective. Thirdly, these two connectives have been described as having different meanings, at the level of a fine-grained semantic analysis: precedence but not immediate vicinity (i.e., there is a gap between the final boundary of the first event and the initial boundary of the second event) for *ensuite*; and optional immediate precedence (the final boundary of the first event might be the same as the initial boundary of the second event) for *puis* (Kozlowska 1998b; de Saussure 2003; cf. Sect. 6.3.1).

The third set of hypotheses concerns the co-occurrence of verbal tenses and temporal connectives. Firstly, one can assume that the Passé Composé and Passé Simple are equally compatible with both *ensuite* and *puis*. In this case, we would expect no effect of interaction between the independent variables of verbal tense and connective. In other words, we do not expect to find either of the two verbal tenses behaving differently when combined with *ensuite* than when combined with *puis*.

Secondly, we could expect that, due to fine-grained meaning distinctions, the Passé Composé and Passé Simple are not equally compatible with both *ensuite* and *puis*. Consequently, we expect an interaction effect between the independent variables of verbal tense and connective.

The hypotheses issued from these possible scenarios have been tested by Grisot and Blochowiak (2015, 2017) in two series of experiments on the role played by the connective *ensuite*, and one series of experiments on the role played by the connective *puis*. In the online self-paced reading experiments, reading times were measured on the segment immediately following the connective, which was an entire sentence consisting of subject, verb and object. More recently, in Grisot and Blochowiak (to appear) similar experiments were carried out and reading times were measured on smaller target regions, that is on the subject-verb region and on the object region separately. This measurement resulted into more fine-grained results and analyses. The reader may refer to Grisot and Blochowiak (to appear) for a discussion of these hypotheses and prediction based on this second type of analysis.

6.3.3   *"Ensuite", the Passé Composé and Undetermined Temporal Relations: A Self-Paced Reading Experiment*

Our aim in this experiment, from Grisot and Blochowiak (2015), was to test whether the connective *ensuite* is useful for disambiguating indeterminate temporal relations — that is, forcing the sequential interpretation of examples, as in:

(601)   [Les enfants ont décoré le sapin]$_P$. [Maman a préparé des bons gâteaux.]$_Q$
         The children decorate.PC the Christmas tree. Mum cook.
         PC delicious biscuits.
         'The children decorated the Christmas tree. Mum cooked
         delicious biscuits.'
(602)   [Les enfants ont décoré le sapin]$_P$, [*ensuite*] [maman a préparé des
         bons gâteaux.]$_Q$
         The children decorate.PC the Christmas tree, then mum cook.
         PC delicious biscuits.
         'The children decorated the Christmas tree, then mum cooked
         delicious biscuits.'

The participants were 48 undergraduate students from the Faculties of Humanities of the Universities of Geneva and Neuchâtel in Switzerland (42 females, mean age: 22.47, range: 18–32). All participants were native speakers of French, studying French language and literature, or language sciences. Their participation in the experiments was voluntary and they were not paid for their participation.

We used 10 experimental items per condition, similar to those from examples (601) and (602), and 10 fillers similar to (603). For every experiment item, the target segment was the Q segment. There were three experimental conditions: the implicit condition P.Q; the explicit condition P*ensuite*Q; and the control condition Q. The task was to judge if the situation described was plausible (like the experimental items in (601) and (602)) or implausible (like the filler in (603)).

(603)   [Paul est. parti pêcher au lac]$_P$. [Les poissons ont bu. sa bouteille de vin.]$_Q$
        'Paul went fishing. The fish drank his bottle of wine.'

Each group saw only one condition. The experimental items and the filler were presented with E-prime, in a random order. Participants answered on the keyboard by pressing one key for plausible and another key for implausible. The experiment consisted of a training phase using 4 experimental items and 4 fillers, followed by the genuine experimental phase. Participants' accuracy was assessed according to their responses with respect to the experimental items (i.e. correct) and the fillers (i.e. incorrect).

The mean reading times for the target segment Q in each of the three experimental conditions are reported in Table 6.2.

A one-way ANOVA was performed in order to check for an effect of the condition (between-subjects factor) on the RT of the target segment. A statistically significant effect of the condition on RT was found for the control condition ($F(2,44) = 3.255$, $p < .05$). Both the mean RT for the implicit condition PQ and for the explicit condition P*ensuite*Q were longer than those for the control condition Q. The difference between conditions PQ and P*ensuite*Q was not statistically significant, as Fig. 6.3 shows.

The results indicate that the target segment Q without cotext (the control condition) is processed faster than in a cotext, given by the previous sentence P in the implicit condition and by the previous sentence P and the connective *ensuite* in the explicit condition. Additionally, the presence of the connective does not produce a facilitation effect by reducing the processing time of the target segment.

These results confirmed prediction 3, given in Fig. 4.4. Firstly, it was shown that *ensuite* does not produce a facilitation effect where the hearer would be prevented from having to choose between the sequential and simultaneous interpretations by instructing him to choose the former over the latter. In other words, this experiment did not provide evidence in favour of a procedural account of this connective, in the sense of encoding instructions that constrain the hearer in the comprehension process (cf. the theoretical discussion in Sect. 2.3.2). Secondly, similar reading times

Table 6.2 Reading times for the target segment in each condition

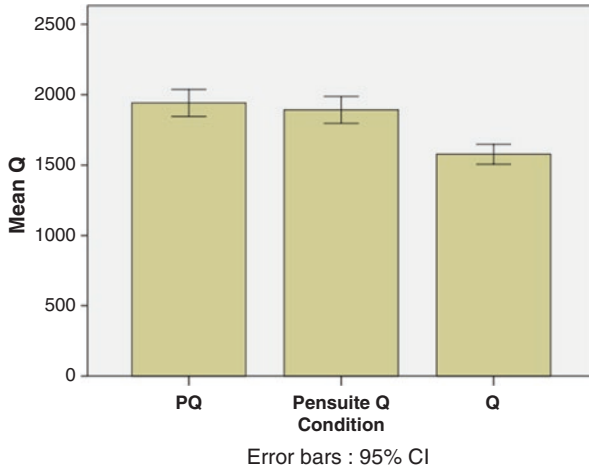| Condition	Minimum	Maximum	Mean	Std. Deviation
PQ	754	4284	1941.12	703.242
P*ensuite*Q	813	4118	1891.77	685.999
Q	727	4200	1576.14	529.31

Fig. 6.3 Mean RT for the target Q segment in the three conditions

were measured for the implicit and explicit conditions. This could indicate that the verbal tense is a sufficient cue to determine the temporal relation between two events, because it encodes the instruction "relate E_1 to E_2". This means that this relation does not necessarily have to be overtly marked. I suggest that, if this was not the case, the PQ condition would have been read slower than the P*ensuite*Q condition. Thirdly, the differences between the control condition Q and the P*ensuite*Q and PQ conditions were statistically significant. This result might indicate that the processing of a sentence is shorter out of cotext than in a cotext, be it PQ or P*ensuite*Q. This is mainly because there is no relation to calculate (instructed by the verbal tense or by the temporal connective). So, the sentence is processed faster than in the other two conditions.

6.3.4   "Ensuite", the Passé Composé, the Passé Simple and Sequential Temporal Relations

In Grisot and Blochowiak (2017), we presented two experiments carried out on chronological sequential relations holding between segments in which the Passé Simple or Passé Composé is used. We tested the online processing and offline acceptability of implicit and explicit sequential relations.

Participants in these two experiments were 41 s- and third-year students from the University of Neuchâtel (35 females, mean age: 22.53, range 19–31). All partici-

pants were native speakers of French, studying language sciences or speech therapy. Their participation in the experiments was part of their activity for one class in linguistics, and they were not paid for their participation. These participants took part in this experiment (online), and in the offline evaluation experiment immediately afterwards.

For the online experiment, participants were divided into two groups. One group saw the *explicit* condition, in which the temporal relation was made explicit by the connective *ensuite*, as in (604). The second group saw the *implicit* condition, in which the temporal relation was implicit, as in (605). This distribution gave rise to an inter-subject analysis.

(604)   [Agnes *a joué* du piano][1], [*ensuite*][2] [elle *a rangé* sa
        bibliothèque][3], [et après][4] elle est.
        allée promener son chien.][5]
        'Agnes played the piano, then she tidied up her bookcase, and then
        she walked her dog.'
(605)   [Agnes *a joué* du piano.][1] [Elle *a rangé* sa
        bibliothèque.][2] [Elle *est allée* promener son chien.][3]
        'Agnes played the piano. She tidied up her bookcase.
        She walked her dog.'

All the sentences were created with two different versions of the initial sentence: in one, the verbal tense used was the Passé Composé, and in the other the Passé Simple. The sentences were distributed into two lists containing one version of the initial sentence, in either the Passé Simple or Passé Composé. Each list contained a total of 16 items and 14 fillers having the same structure as the items. Each participant saw only one list. This distribution gave rise to an intra-subject analysis.

In the explicit condition, the critical segment was segment 3 – the segment immediately following the target connective (*ensuite*). Segments 4 and 5 were wrap up segments, intended to avoid a critical reading time measure at the end of an item, which cretes an effect due to the end of the task. In the implicit condition, the critical segment was segment 2, which was identical to the critical segment in the explicit condition. The reading times were measured for the critical segments and were compared between the two conditions. Additionally, the critical segments in the Passé Simple and Passé Composé were compared using an intra-subject analysis.

Experiments were designed with the E-prime software. The different segments appeared on the screen one after another upon pressing the space bar, each disappearing from the screen as the readers went on to the next. This design allowed the participants to read each segment individually, and stopped them pressing the space bar in order to see all the segments before starting to read. Having read the series of 5 segments (in the explicit condition) or the series of 3 segments (in the implicit condition), participants had to answer the likelihood question by pressing one key for *likely* and another key for *unlikely* to record their answers.

Table 6.3 Reading times for the target segment in each condition- *ensuite*

VT	Implicitness	Minimum	Maximum	Mean	Std. Deviation
Passé Composé	Explicit	660	2926	1600.5	530.449
	Implicit	520	3461	1588.2	556.864
Passé Simple	Explicit	717	3408	1650.53	597.196
	Implicit	579	3769	1663.72	583.466

The mean reading times for the target region, in each of the four experimental conditions, are reported in Table 6.3.

A mixed ANOVA performed on Log10 mean values showed no main effect of the within-group variable *Verbal Tense* (*VT*) ($F(1,39) = 2.641$, $p > .05$, $\eta^2 = .063$), nor an interaction effect of *Verbal Tense*Implicitness* ($F(1,39) = .076$, $p > .05$, $\eta^2 = .002$). In other words, Log10 mean reading times for the Passé Composé in the explicit condition ($M = 3.19$, $SD = .098$) are comparable with those in the implicit condition ($M = 3.19$, $SD = .105$). Similarly, the Log10 mean reading times of the Passé Simple in the explicit condition ($M = 3.21$, $SD = .086$) are comparable with those in the implicit condition ($M = 3.21$, $SD = .113$). This can be seen in Fig. 6.4.

For the offline experiment, sentences from the online experiment were presented in four variants, corresponding to the four experimental conditions from the previous experiment: Passé Composé implicit; Passé Simple implicit; Passé Composé explicit; and Passé Simple explicit. These conditions were created by manipulating two within-group factors, *Verbal Tense* and *Implicitness*. To create the explicit version of the items, the connective *ensuite* was used to mark the sequential temporal relation overtly. There were no fillers used in this experiment. Participants were told that they would have to participate in a second experiment, in which they would see the same sentences as the previous experiment, and that each sentence would occur in four variants. The 16 groups of four variants (corresponding to the 16 items from the online experiment) were distributed into two lists. Each list contained 8 groups of sentences, and each participant saw one of the two lists. Participants were asked to rate the acceptability of each variant on a 4 point Likert scale. They were allowed to use each of 4 values of the Likert scale only once within each group of sentences.

In order to analyze the data, we calculated the median value for each variant across all the participants who saw that variant. Values were organized according to condition, resulting in 16 observations per condition. The results are shown in the bar chart in Fig. 6.5.

A repeated measures ANOVA was performed, to test whether the differences between several mean median values of the dependent variable (the participants' acceptability judgments) depended on the independent variable tested: the status of the temporal relation and the verbal tense. The various groups of mean values of the dependent variable were formed by the within-group factors *Verbal Tense* and *Implicitness*.
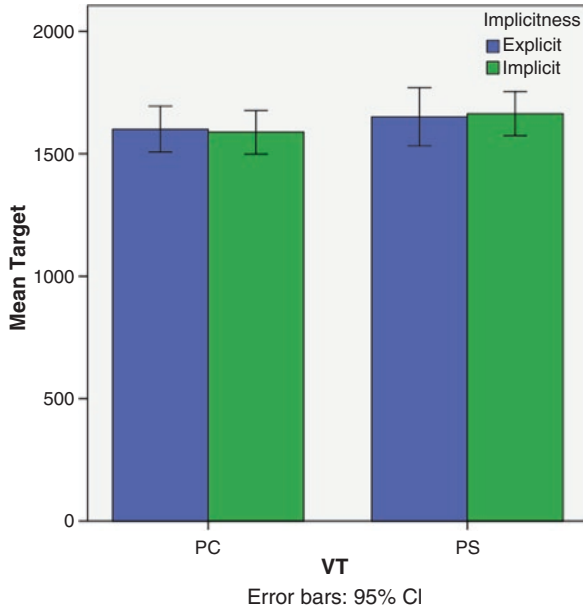
Fig. 6.4 The Passé Composé and the Passé Simple in the explicit (using *ensuite*) and implicit conditions

The results of the ANOVA showed a significant main effect of the *Implicitness* factor ($F(1, 15)$, 30.533, $p < .05$, $\eta^2 = .671$), according to which the variants where the temporal relation was implicit were scored higher ($M = 3.078$, $SE = .101$) than those where it was overtly marked using *ensuite* ($M = 2.047$, $SE = .103$). The factor *Verbal Tense* was not statistically significant ($F(1, 15)$, 2.047, $p > .05$, $\eta^2 = .120$), and nor was the interaction *Verbal Tense*Implicitness* ($F(1,15)$, 1.337, $p > .05$, $\eta^2 = .082$). These results indicate that participants prefer the sequential temporal relation to remain implicit, but do not show a preference when the Passé Composé or the Passé Simple is used.

The results of these two experiments on *ensuite*, the Passé Composé, the Passé Simple and their role in the expression of sequential temporal relations from Sect. 6.3.3 provided evidence for predictions 1 and 4, given in section Fig. 6.2. The results of the online experiment showed no main effect of the explicit/implicit status of the temporal relation. In other words, *ensuite* does not produce a facilitation effect with respect to marking a sequential temporal relation overtly. This result is in line with the findings of the previous experiment, in which undetermined relations were tested, and confirms prediction 1. One of the scenarios was that this temporal connective encodes procedural content which constrains the hearer in the comprehen-
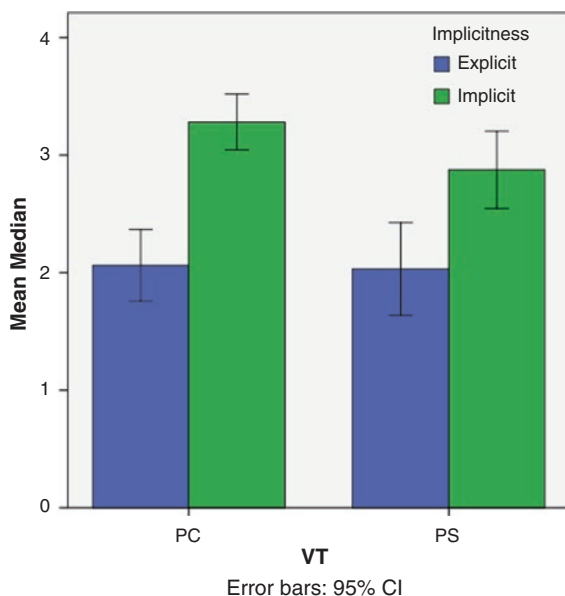
Fig. 6.5   The mean median values in the four conditions – *ensuite*

sion process, by signalling the speaker's intended interpretation with respect to the type of temporal relation. Evidently, this seems not to be the case when it comes to the online processing of sentences. In contrast, in the offline experiment, a main effect of the *Implicitness* factor was found, according to which participants preferred the sequential temporal relation to remain implicit over its overt marking by *ensuite*. According to these results, prediction 4 and its subsequent scenario need to be adjusted. In particular, a main effect of the implicit/explicit status of the temporal relation was only found in the offline acceptability tasks, in which participants did not prefer the explicit versions of the experimental items tested. This means that the presence of *ensuite* is consciously perceived as less acceptable, but this does not seem to play a role in terms of processing discourse segments.

Another result of this experiment is that no main effect of the *Verbal Tense* variable was found: the observed mean differences in reading times of the target segment between the Passé Composé and Passé Simple were not statistically significant. As with the online data, the Verbal Tense factor was not statistically significant in the offline acceptability experiment. These findings validate prediction 1, according

to which the meanings of the Passé Composé and Passé Simple are contextually determined, and invalidate scenario 1, according to which the different meanings of these two verbal tenses play significant roles in terms of processing and conscious acceptability tasks. These outcomes are at odds with the assumptions made by previous theoretical studies of French verbal tenses, according to which significant meaning differences exist between the Passé Composé and Passé Simple (cf. the discussions in Sects. 1.1.1, 1.1.3, 2.1 and 2.3.3). That is to say, the Passé Simple is a perfective verbal tense whose meaning can be described using the configuration of Reichenbachian temporal coordinates E = R < S, and which instructs the hearer to establish a sequential temporal relation. The Passé Composé, on the other hand, is a perfect verbal tense, whose meaning can be described using the configuration of Reichenbachian temporal coordinates E < R = S, and which guides the hearer towards the identification of a resultative state relevant at S.

In contrast, Moeschler et al. (2012) and Grisot (2015) advance the hypothesis that the meanings of the Passé Composé and Passé Simple are contextually determined at two levels. The first level is conceptual — that is, building an ad hoc concept regarding the localization of an event with respect to S (cf. the discussion in Sect. 5.2.2). This was confirmed in the annotation experiment described in Sect. 4.2.2, in which participants had to identify the localization of de-temporalized events expressed with verbs in their infinitive form in the past or non-past (present or future). The second level is procedural — that is, using R to locate events with respect to one another (cf. the discussion in Sect. 5.2.3). This property of the Passé Composé and Passé Simple, termed *narrativity*, was tested in the annotation experiment discussed in Sect. 4.2.2, in which it was shown that they both allow sequential and simultaneous temporal relations (corresponding to their narrative and non-narrative usages respectively).

6.3.5   *"Puis", the Passé Composé, the Passé Simple and Sequential Temporal Relations*

In Grisot and Blochowiak (2017), we also presented two experiments in which the connective *ensuite* was replaced with *puis*. The experimental design, the procedure and the experimental items were practically the same, with the exception of the target connective. For both series of experiments, the verbal tense was a within-subjects variable, and implicitness a between-subjects variable. The participants were not the same, but the two groups had similar mean ages and educational backgrounds.

For the *puis* experiment, participants were 43 s- and third-year students from the University of Neuchâtel (38 females, mean age: 20.93, range 19–25). All participants were native speakers of French, studying language sciences or speech therapy. As before, their participation in the experiments was part of their activity for one class in linguistics, and they were not paid for their participation. These participants

Table 6.4 Reading times for the target segment in each condition- *puis*

Implicitness	VT	Minimum	Maximum	Mean	Std. Deviation
Explicit	Passé Composé	628	4450	1846.35	803.097
	Passé Simple	602	4068	1791.05	832.172
Implicit	Passé Composé	758	4326	1932.66	735.521
	Passé Simple	754	4227	1771.38	786.168

took part in the online experiment, and, immediately afterwards, in the offline evaluation experiment.

The mean reading times for the target region in each experimental condition are reported in Table 6.4.

A mixed ANOVA performed on Log10 mean values showed no main effect of the within-group variable *Verbal Tense* ($F(1,41) = 3.305$, $p > .05$, $\eta^2 = .075$), nor an interaction effect of *Verbal Tense*Implicitness* ($F(1,41) = .691$, $p > .05$, $\eta^2 = .017$). In other words, Log10 mean reading times for the Passé Composé in the explicit condition ($M = 3.22$, $SD = .112$) are comparable with those in the implicit condition ($M = 3.25$, $SD = .111$). Similarly, the Log10 mean reading times of the Passé Simple in the explicit condition ($M = 3.21$, $SD = .119$) are comparable with those in the implicit condition ($M = 3.21$, $SD = .132$). This can be seen in Fig. 6.6.

For the offline experiment, sentences from the online experiment were presented in four variants, corresponding to the four experimental conditions from the previous experiment: Passé Composé implicit; Passé Simple implicit; Passé Composé explicit; and Passé Simple explicit. These conditions were created by manipulating two within-group factors, *Verbal Tense* and *Implicitness*. To create the explicit version of the items, the connective *puis* was used to mark the sequential temporal relation overtly.

The median value for each variant was calculated across all participants who saw that variant. Values were organized according to condition, resulting in 16 observations per condition.

A repeated measures ANOVA was performed, to test whether the differences between several mean median values of the dependent variable (the participants' acceptability judgments) depended on the independent variable tested: the status of the temporal relation and the verbal tense. The various groups of mean values of the dependent variable were formed by the within-group factors *Verbal Tense* and *Implicitness*.

The results of the ANOVA did not show a main effect of the *Implicitness* factor ($F(1, 15)$, $.522$, $p > .05$, $\eta^2 = .034$), nor of the factor *Verbal Tense* ($F(1, 15)$, 1.588, $p > .05$, $\eta^2 = .096$). In other words, the variants in which the temporal relation was implicit received scores similar to the variants in which it was overtly marked using *puis* ($M = 2.594$, $SE = .112$ and $M = 2.438$, $SE = .075$ respectively). Similarly, the variants in which the Passé Composé was used received scores similar to the variants in which the Passé Simple was used ($M = 2.422$, $SE = .075$ and $M = 2.609$, $SE = .085$ respectively). Furthermore, the interaction *Verbal Tense*Implicitness* was not statistically significant ($F(1,15)$, $.769$, $p > .05$, $\eta^2 = .049$). These results indicate
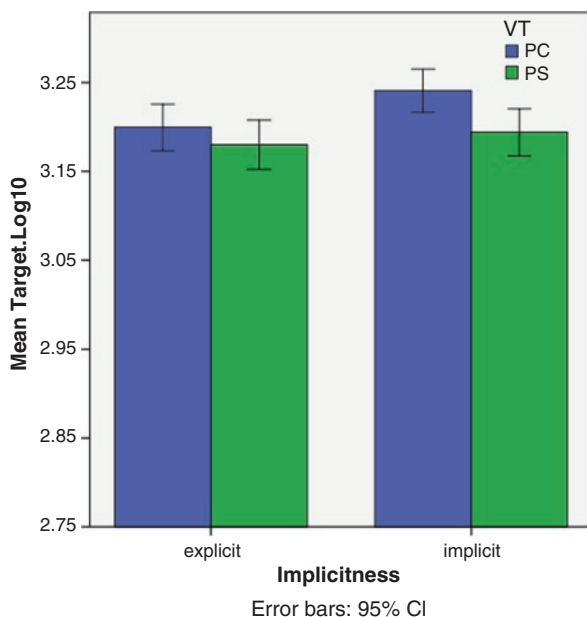
Fig. 6.6 The Passé Composé and the Passé Simple in the explicit (using *puis*) and implicit conditions

that participants did not show a preference, be it for the explicit vs. implicit cases or for the Passé Composé vs. the Passé Simple.

The results of the two experiments on *puis*, the Passé Composé, the Passé Simple and their role in the expression of sequential temporal relations from Sect. 6.3.5 are in harmony with the outcomes of the experiments on *ensuite* and its role in the online processing of sequential relations, and differ with respect to offline acceptability evaluation. As before, we did not find a main effect of the *Verbal Tense* variable in this experiment. As such, the results of the previous experiment were replicated with respect to the roles of these two verbal tenses in the expression of sequential temporal relations; this confirms scenario 2, which posits that the meaning of verbal tense is contextually determined. As with the experiments on *ensuite*, in processing data the *Implicitness* factor was not statistically significant, therefore invalidating scenario 4 (Fig. 6.7). As will be indicated below, this conclusion is confirmed by the results of the mixed ANOVA performed on processing data.

Differences between the two connectives emerged in offline acceptability data. Where *ensuite* indicated a main effect of *Implicitness*, it was not true for *puis*. This
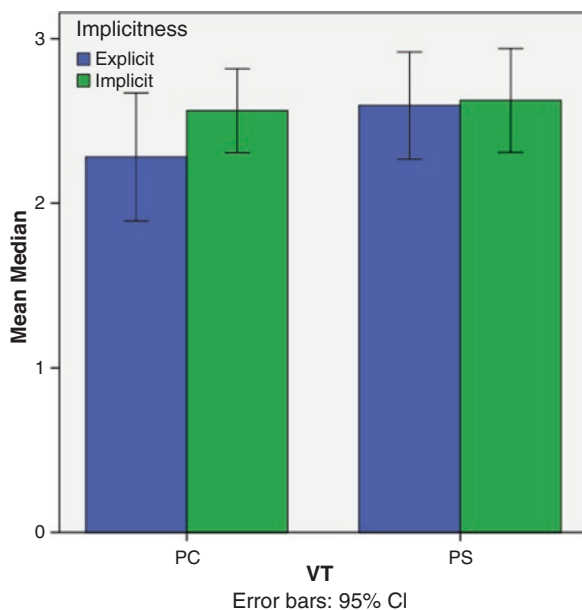
Fig. 6.7 The mean median values for the four conditions – *puis*

means that participants preferred the implicit versions of the experimental items when the explicit versions used *ensuite*, but did not show this preference when *puis* was used. This outcome seems to support scenario 6, which theorizes that these two connectives have different meanings. This assumption is confirmed by the results of the mixed ANOVA performed on evaluation data, as I will show below.

6.3.6 "Ensuite" and "Puis"-Mixed Statistical Analysis

In order to investigate the predictions formulated in Sect. 6.3.1 with respect to the role of both *ensuite* and *puis*, as well as their occurrence with the Passé Composé and Passé Simple, two mixed ANOVA analyses were performed. The first concerned the processing data from the experiments carried out on *ensuite* and *puis*, and the second concerned the acceptability rating data from experiments carried out on *ensuite* and *puis*. These analyses are possible because of two common characteristics. Firstly, exactly the same items were used in these two groups of experiments

(with the exception of the connective). Secondly, the two groups of participants in these experiments were part of a larger group, whose members had comparable ages and educational backgrounds (native speakers of French, who were second- and third-year students studying language sciences or speech therapy at the University of Neuchâtel).

The mixed ANOVA performed on the processing data aimed to test whether the differences between several mean values of the dependent variable (the reading times of the target segment) depended on the independent variables tested. The various groups of mean values of the dependent variable were formed by the between-group factor *Implicitness* with two levels (explicit and implicit), the between-group factor *Connective* with two levels (*ensuite* and *puis*), and the within-group factor *Verbal tense* with two levels (Passé Composé and Passé Simple).

The results of the mixed ANOVA did not show a significant effect of the within-group factor *Verbal tense* ($F(1, 80)$, .350, $p > .05$, $\eta^2 = .004$), nor of the interaction *Implicitness*Verbal Tense* ($F(1,80)$, .279, $p > .05$, $\eta^2 = .003$), There is a significant effect of the interaction *Connective*Verbal Tense* ($F(1,80)$, 5.688, $p < .05$, $\eta^2 = .066$), according to which the Passé Composé is easier to process when it occurs with *ensuite* ($M = 3.19$, $SD = .098$) than when it occurs with *puis* ($M = 3.22$, $SD = .112$). This effect does not apply to the Passé Simple when it occurs with *ensuite* ($M = 3.21$, $SD = .086$) compared to when it occurs with *puis* ($M = 3.21$, $SD = .119$), as can be seen in Fig. 6.8.

This mixed ANOVA analysis confirmed the previous conclusions, according to which the Passé Composé and Passé Simple do not trigger significant differences in mean reading times for the target segment. Additionally, no significant interaction effect was found between *Implicitness* and *Verbal Tense.* This suggests that the mean reading times for both the Passé Composé and Passé Simple do not significantly differ between cases where the temporal relation is implicit and cases where it is explicitly marked using a connective. Furthermore, the interaction effect *Verbal Tense*Connective* was significant, pointing to different behaviour of the verbal tense depending on the connective with which it occurs. In particular, the Passé Composé is easier to process when it occurs with *ensuite* than when it occurs with *puis*. As for the Passé Simple, its combination with *ensuite* or *puis* results in similar processing costs. This finding provides evidence for fine-grained semantic/pragmatic differences between *ensuite* and *puis*. The gap between the final boundary of event$_1$ and the initial boundary of event$_2$ seems to play a role in terms of the processing of events when they are expressed using the Passé Composé. This outcome supports scenario 7, and validates its subsequent prediction. However, this difference in meaning doesn't seem to be generalizable, since we did not find a main effect of the variable *Connective*. As such, scenario 5 is partially validated, and needs to be adjusted to take into consideration the interaction effect *Verbal Tense*Connective*.

The mixed ANOVA performed on the acceptability data also aimed to test whether the differences between several mean median values of the dependent variable (the participants' acceptability judgments) depended on the independent variable tested. The various groups of mean values of the dependent variable were
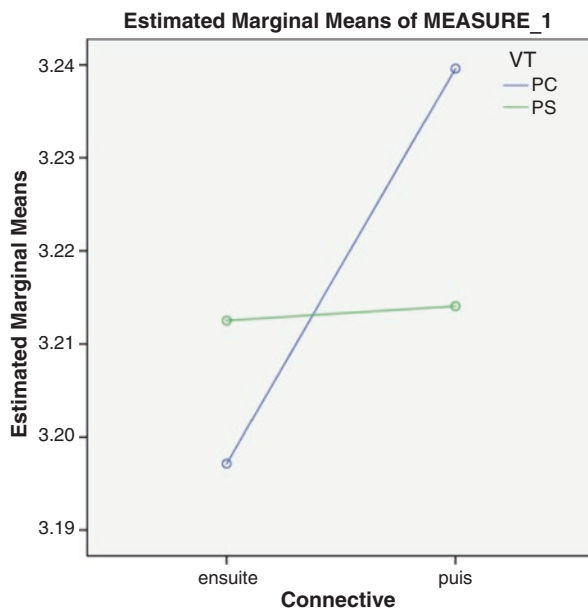
Fig. 6.8   The effect of *Connective*Verbal Tense* in processing data

formed by the within-group factors *Verbal tense* and *Implicitness*, and the between-groups factor *Connective* with two levels (*ensuite* and *puis*). The results of the mixed ANOVA showed a significant main effect of the *Implicitness* factor ($F(1, 30)$, 17.273, $p < .05$, $\eta^2 = .365$), according to which the variants where the temporal relation was implicit were scored higher ($M = 2.836$, $SE = .056$) than the variants where it was overtly marked ($M = 2.242$, $SE = .076$). In contrast, the factor *Verbal Tense* was not statistically significant ($F(1, 30)$, .021, $p > .05$, $\eta^2 = .001$), suggesting that the variants in which the Passé Composé was used received scores similar to the variants in which the Passé Simple was used ($M = 2.547$, $SE = .058$ and $M = 2.531$, $SE = .061$ respectively).

A significant interaction effect between *Connective*Implicitness* was found ($F(1, 30)$, 9.378, $p < .05$, $\eta^2 = .238$), according to which the cases in which *ensuite* was used to mark the temporal relation overtly were rated lower ($M = 2.047$, $SE = .108$) than the cases in which *puis* was used ($M = 2.438$, $SE = .108$). Additionally, the cases in which the implicit variants were compared to variants overtly marked using *ensuite* were rated higher ($M = 3.078$, $SE = .107$) than the cases in which they
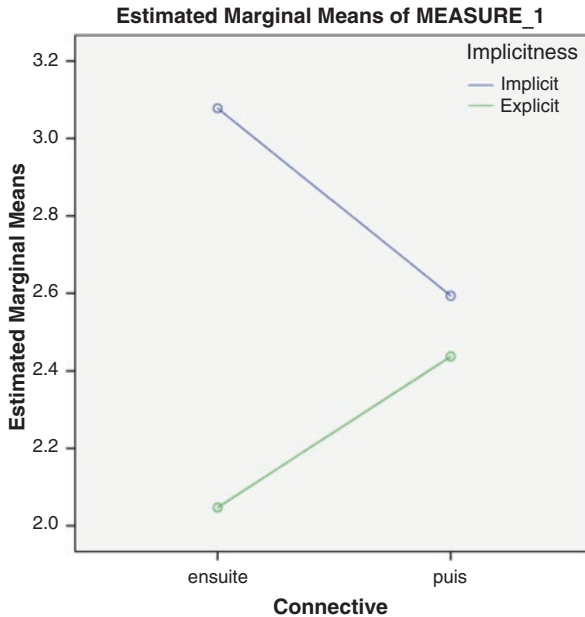
Fig. 6.9 The interaction effect *Connective*Implicitness* in acceptability data

were compared to variants overtly marked using *puis*, as shown in Fig. 6.9. In other words, if participants have to mark a sequential relation overtly, they prefer to do it with *puis*. Also, they rate implicit relations higher when they are in opposition to overtly marked relations using *ensuite* than when they are in opposition to overtly marked relations using *puis*.

Furthermore, a tendency towards significance was found for the interaction *Connective*Verbal tense* ($F(1, 30)$, 3.627, $p = .06$, $\eta^2 = .108$), according to which participants rated the Passé Composé occurring with *ensuite* ($M = 2.672$, $SE = .081$) higher than with *puis* ($M = 2.422$, $SE = .081$), and the Passé Simple occurring with *ensuite* ($M = 2.453$, $SE = .086$) lower than with *puis* ($M = 2.609$, $SE = .086$). This can be seen in Fig. 6.10.

This mixed ANOVA analysis reveals discrepancies between processing and conscious evaluation. Where the lack of main effect of *Verbal Tense* found in the mixed analysis on processing data discussed above is confirmed, a main effect of *Implicitness* was found in the offline data, according to which participants prefer implicit sequential temporal relations. Additionally, the offline data confirm the preference for the Passé Composé to occur with *ensuite* over *puis*, as measured in
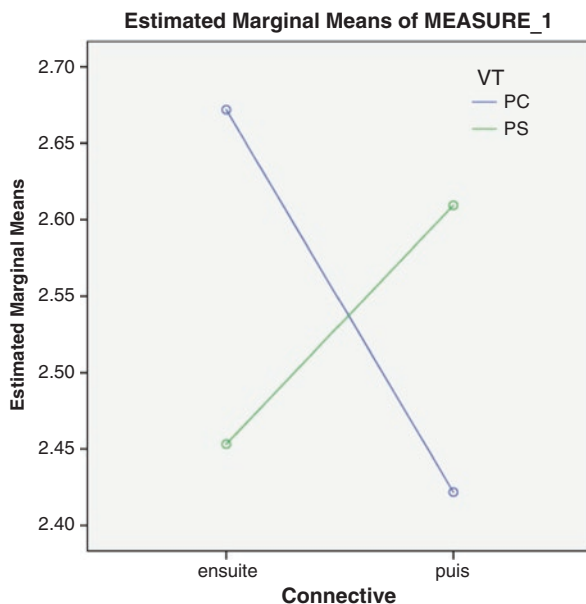
Estimated Marginal Means of MEASURE_1

Fig. 6.10   The interaction effect *Connective*Verbal tense* in acceptability data

terms of shorter mean reading times. So, the shorter mean reading times are trans-
lated into the offline tasks as higher acceptability rates. These findings support
scenario 8 and its subsequent prediction of an interaction effect between the verbal
tense and the connective. Moreover, this mixed ANOVA revealed a significant
interaction effect between *Connective*Implicitness,* according to which partici-
pants prefer to use *puis* to mark sequential relations overtly. This unpredicted out-
come might indicate that it is more accurate to consider *puis* as a temporal sequential
connective than *ensuite*.

Generally, the results of the processing data indicate that the reading times of the
target segment were not influenced, either by the verbal tense or by the connective.
Also, segments with the Passé Composé were easier to process when it occurred
with *ensuite* than when it occurred with *puis*. In contrast, the Passé Simple did not
show this kind of preference. As for the offline evaluation with acceptability task,
participants preferred sentences in which the temporal relation is implicit. This
applies to both the Passé Composé and Passé Simple. However, if the temporal rela-
tion is explicit, they prefer when it is overtly marked using *puis*. Finally, participants

showed a tendency to prefer the Passé Composé occurring with *ensuite* and the Passé Simple with *puis*.

These results can be interpreted with respect to two issues. The first is that these results confirm the psycholinguistic findings that comprehenders have expectations about relations holding between segments when reading a text, which bias their inferential decisions during comprehension (Segal et al. 1991; Murray 1997; Sanders 2005; Asr and Demberg 2012). The second is that certain contextual cues raise comprehenders' expectations of the upcoming discourse relation, and therefore, the preference for implicitness. For example, Rohde and Horton (2010) have shown in an eye tracking experiment that a sentence in which a consequence is expressed by an implicit causality verb (such as adore, inspire, humiliate) raises the expectation of a causal explanation in the following segment. For Levy and Jaeger (2007), this extra cue for a causal relation increases the possibility of omitting the causal connective and having an implicit causal relation. They proposed the *Uniform Information Density* hypothesis, according to which humans tend to spread information evenly across an utterance or series of utterances, thus reducing or omitting optional material when the information is highly predictable (Levy and Jaeger 2007; Frank and Jaeger 2008; Jaeger 2010). Similarly, Kehler et al. (2008) have shown that the grammatical aspect of the verb plays a role in determining the expected temporal relation: perfective bias for sequential temporal relations, and progressive for synchronous relations. In the experiments from this chapter, the presence of supplementary cues raises expectations regarding discourse relations, and therefore the preference for implicitness — that is, for content to be inferred instead of explicitly expressed by the speaker. For temporal relations, the relevant linguistic cues are verbal tenses and grammatical aspect (that is, the perfective/imperfective aspects).

These expectations affect sequential chronological temporal relations and canonical causal relations (cause – consequence). Where hearers expect segments to be presented chronologically, two immediate consequences for the cognitive processing of these temporal relations can be identified. Firstly, expected relations are claimed to be easier to process than unexpected relations, such as reverse causal and sequentially non-chronological temporal relations. Secondly, highly expected relations may be left implicit, in that comprehenders prefer passages with the connective omitted rather than included. As pointed out by Asr and Demberg (2012), at the level of discourse relations, this would mean that unexpected relations are more frequently expressed explicitly than expected ones. Rendering an expected relation explicit would be redundant, and therefore costlier for processing. The results of our experimental work on sequential chronological relations confirm Asr and Demberg's prediction.

The second regards the relevance-theoretic notion of procedural meaning, described in the literature as having the role of constraining the inferential phase of the interpretative process by signalling the most relevant interpretative path (that is, accessing the appropriate contextual assumptions to obtain the interpretation intended by the speaker). Accordingly, connectives such as *then*, or French *ensuite* and *puis*, instruct the hearer to order mental representations of eventualities chronologically, whereas connectives such as *before/avant que* instruct for an anti-

chronological temporal order between two eventualities. Based on these descriptions, we would expect connectives to guide the hearer in every case where the connective is used. However, this is not the case. Connectives facilitate processing only when their instruction is compatible with the content communicated in the discourse; when this is not the case, the presence of the connective increases the cognitive effort (Canestrelli et al. 2013; Zufferey et al. 2015). The results of the experiments described in this book indicate that the facilitating effect caused by the procedural content of discourse connectives may be cancelled when comprehenders have higher expectations which bias their inferential process. Consequently, comprehenders prefer highly expected relations to be expressed implicitly rather than marked overtly. However, as we will discuss below, this seems to depend on the temporal connective used.

Thirdly, in terms of psycholinguistic models of comprehension, the pragmatic approach to temporal relations advanced in this book corresponds to a model in which the interpretation process is incremental (e.g. Gibbs 2002; Koornneef and van Berkum 2006), allowing for the integration of cues as they become available. In relevance theoretic terms, the comprehension process consists of several subtasks that take place in parallel. More precisely, the logical form encoded by an utterance containing incomplete conceptual representations is dealt with by the inferential process in three ways: constructing the explicit content via decoding, disambiguation, reference resolution and other pragmatic enrichment processes (e.g. narrowing and loosening); constructing an appropriate hypothesis about the intended contextual assumptions; and constructing an appropriate hypothesis about the intended contextual implicatures (Wilson and Sperber 2004, 615). Wilson and Sperber point out that there is no sequential order in which these subtasks of the comprehension process take place, as comprehension is an online process. As they take place in parallel, the resulting hypotheses are, if needed, revised or elaborated as the utterance unfolds. According to this framework, linguistic expressions encoding procedural information, such as connectives and verbal tenses among others, play a crucial role because they guide the comprehender in this process by directing him towards the speaker's intended meaning.

6.4   What Is "Cognitive Temporal Coherence"?

Based on previous proposals that coherence relations are cognitive entities and relate mental representations of discourse segments, I propose the notion of *cognitive temporal coherence*. I suggest that hearers integrate temporal information provided not only by various temporal cohesion cues, such as Tense, Aspect, Aktionsart, temporal connectives, but also by temporal adverbials, such as *yesterday, last/next year, in 2010* etc., into the mental representations that they build for discourse segments. So, in order to describe the notion of cognitive temporal coherence, I will give two types of argument. Firstly, the categories of Tense, Aktionsart and Aspect are cognitively relevant, whereas the generic notion of *verbal tense* (as used in

linguistic and pragmatic studies, cf. Sect. 1.1 and Chap. 2) is not (Grisot, submitted). Secondly, drawing on the psycholinguistic account of coherence, according to which mental representations of discourse segments are structured and coherent (Givón 1995; Graesser et al. 1997), I propose that the cohesion ties investigated in this book are pointers to this temporal mental coherence which speakers establish during the comprehension process of utterances. I will develop these two types of arguments below.

6.4.1 Temporal Cohesion Ties Are Cognitively Motivated

In Grisot (submitted), I argue that the generic notion of *verbal tense* is not cognitively motivated, mainly because it is a generic notion used to refer to single underlying temporal and aspectual categories. A cognitively motivated linguistic category is a category that plays a role in language processing, and in the construction and storage of mental representations. More specifically, the experimental manipulation of a cognitively motivated category produces an effect — that is, a change in the participant's behaviour — which is observable and measureable (Rossi 1997). Observable measures such as reaction times, reading times, answers to questionnaires, pragmatic or grammatical judgments, the choice of an image, eye movements, etc., often indicate the cognitive processes at work as utterances are dealt with.

In Chap. 4, I discussed a series of offline experiments in which native speakers were asked to judge the meaning of these categories. Cross-linguistically, the results have shown that participants were able to evaluate and judge their meanings consciously, but the rate of inter-annotator agreement varied as a function of the type of encoded meaning (that is, procedural or conceptual). The experiments from Sect. 4.2 indicated that Reichenbachian coordinates accurately describe the meaning of Tense and its functions at the conceptual and procedural levels. In particular, the results of these experiments clearly showed that two systematic patterns arise when participants are asked consciously to evaluate the contribution of verbal tenses to the interpretative process. The first is the ease of the task and the high rate of inter-annotator agreement when dealing with the past/non-past distinction. The second is the greater difficulty of the task and the lower rates when dealing with the temporal ordering of eventualities. As noted in Sect. 4.1, based on Wilson and Sperber's (1993, 2012) cognitive foundations of the conceptual/procedural distinction, these two patterns are explained in terms of Tense encoding both conceptual information (the past/non-past distinction via the E/S configuration) and procedural information (the localization of eventualities with respect to one another, making use of the R coordinate, and corresponding to the temporal relations holding between eventualities) (cf. detailed discussion in Sect. 5.1). Similar patterns were found when participants dealt with aspectual information. The experiments from Sect. 4.3 revealed that aspectual information related to the actual realization of Aktionsart — that is, boundedness — is easily accessible to consciousness, and results in high levels of inter-annotator agreement. In contrast, consciously identifying grammatical perfec-

tive or imperfective viewpoint is a more difficult task, and results in lower levels of inter-annotator agreement. As with Tense, based on Wilson and Sperber's (1993, 2012) cognitive foundations of the conceptual/procedural distinction, I have argued in Sect. 5.1 that the categories of Aktionsart and Aspect are encoded at the conceptual and procedural levels of language meaning respectively. During the comprehension process, Aspect imposes constraints on Aktionsart: the conceptual representations of eventualities are viewed from the speaker's point of view as completed or in progress.

Furthermore, a considerable number of studies in psychology, psycholinguistics and neurolinguistics have shown that Tense, Aspect and Aktionsart have an impact at the cognitive level. Research has shown that these categories are processed online, that they determine the construction of the ongoing and subsequent mental representations, that they influence perception and the memory of events, that they bias the interpretation of a series of events, and that they become dysfunctional in cases of brain damage (for example, Radvansky et al. 1998; Todorova et al. 2000; de Vega et al. 2004; Therriault and Raney 2007 and Dery and Koenig 2015 for Aktionsart; Carreiras et al. 1997; Magliano and Schleich 2000; Stavrakaki and Kouvava 2003; Rohde et al. 2006; Pickering et al. 2006; Ferretti et al. 2009; Madden and Ferretti 2009 and Mozuraitis et al. 2013 for Aspect; Mandler 1986; Segal et al. 1991; Murray 1997; Gibbs and Moise 1997; Radvansky et al. 1998; Bastiaanse 2008 and Bastiaanse et al. 2011 for Tense, regarding the localization of eventualities with respect to S and to one another).

These studies argue that, during comprehension, hearers build mental models of situations (Johnson-Laird 1983; cf. the discussion in Radvansky et al. 1998; Zwaan and Radvansky 1998) exploiting linguistic, pragmatic and general world knowledge (Glenberg et al. 1987). These mental models of situations are simple and multi-threaded mental representations of situations described in a discourse. Mental models have a series of properties. First, they are multidimensional, in that they are temporal, spatial and referential. Second, they are coherent: each mental representation is integrated with the previous one, allowing the hearer to draw temporal and causal inferences, among others (Givón 1995; Graesser et al. 1997). Third, mental models are dynamic: they are updated and adjusted when necessary, depending on the new information processed during the hearing of auditory stimuli or the reading of written stimuli. Fourth, mental representations are stored in the memory, and accessed at a later point when they are needed. In this model, language is seen as encoding processing instructions on how to construct mental representations of the situations described (Zwaan and Radvansky 1998).

Several researchers have shown that Aspect constrains the construction of mental representations of situations in several ways. Firstly, Magliano and Schleich (2000) tested the influence of grammatical aspect on the interpretation of a series of situations: English native speakers read stories in which the target eventuality was expressed with the progressive, such as *was changing a tire* or, with the perfective, *changed a tire*. This target eventuality was followed by three other eventualities, which could be understood as taking place either during or after the target situation. The results indicated that eventualities expressed by the imperfective aspect are

understood as ongoing at the moment of speech, whereas eventualities expressed by the perfective aspect are understood as completed. Magliano and Schleich have also found that general world knowledge about situations, such as their duration, interacts with the information from Aspect, and in particular with the imperfective aspect. Their experiments revealed that situations with a long duration, such as *writing a novel*, are more frequently understood as ongoing at the moment of speech than short situations, such as *write a letter*. This effect is observed later in the story, and thus not immediately after the target situation. In other words, the effect of a situation's duration on the interpretation of a series of situations is visible later during processing. In addition, the influence of the imperfective aspect on the duration of situations persists longer in memory than that of the perfective aspect. These observations indicate that comprehenders take into account the various types of information they receive, and build a coherent multithreaded structure of mental representations of situations.

Secondly, it has been shown that the imperfective aspect influences the activation of information stored in the working memory: situations expressed using the imperfective are more active and more accessible than those expressed using the perfective (Magliano and Schleich 2000). This also applies to the accessibility of people or characters in a story, entities, instruments, locations or various characteristics of situations (Carreiras et al. 1997; Madden and Zwaan 2003; Ferretti et al. 2007). Thirdly, Aspect also represents a linguistic cue regarding the expectations that comprehenders have for the continuation of a story. This was found to be true in relation to several phenomena, such as reference and coreference resolution (Rohde et al. 2006; Ferretti et al. 2009), and relative clause processing (Rohde et al. 2011). For example, participants in Rohde et al.'s study (2006) read sentences that included verbs of transfer presented in either their perfective or imperfective form, followed by ambiguous pronouns that could refer either to the Source or the Goal referent, as in example (606). The results demonstrated that participants proposed a significantly higher number of Goal continuations after a sentence including the perfective aspect than after one with the imperfective. This effect was confirmed by Kehler et al. (2008), who even found it with sentences that did not provide the ambiguous pronoun, as shown in (607).

(606)   John $_{\text{SOURCE}}$ handed/was handing a book to Bob $_{\text{GOAL.}}$ He ……….
(607)   John $_{\text{SOURCE}}$ handed/was handing a book to Bob $_{\text{GOAL.}}$

Other studies have explored the role of aspectual classes in constructing mental representations of situations, as well as the interaction between Aktionsart and Aspect taking the form of aspectual coercion. For example, Piñango et al. (1999, 2006) and Todorova et al. (2000) demonstrated that coercion is cognitively costlier than the construction of a mental representation of a situation whose inherent temporal information is compatible with the constraints imposed by Aspect. For example, the verb *hop* in (608), which is ontologically an achievement, is not directly compatible with an adverb like *until*. The iterative interpretation is built through

coercion. In contrast, no coercion is required for the activity expressed by the verb *glide* in (609) to occur with the adverb *until*.

(608)   The insect hopped effortlessly until it reached the far end of the garden
        that was hidden in the shade.
(609)   The insect glided effortlessly until it reached the far end of the garden
        that was hidden in the shade.

Piñango et al. (1999, 2006) had participants listen to sentences which either needed or did not need coercion, as in (608) and (609) respectively. As participants heard these sentences, they were also required to make a lexical decision about a word presented on the screen. This second task was supposed to compete with the primary comprehension task. They found significantly longer lexical decision times when the concomitant sentence required aspectual coercion than when it did not. Todorova et al. (2000) also found that it is aspectual coercion which is cognitively costly, and not the iterative interpretation of achievements such as *hopped*.

Other studies have found that comprehenders are particularly attentive to fine-grained ontological properties of eventualities, such as *duration, telicity* and *boundedness*. For example, Therriault and Raney (2007) examined how duration-related inconsistencies influenced processing time and processing strategies set up by comprehenders when building multithreaded mental representations of the situations described in a narrative text. They found that readers encode the durations of events online, and regularly monitor them. They are able to detect temporal inconsistencies between the expected and given durations, such as *Sally brushed her teeth for 3 min* compared to *Sally brushed her teeth for 30 min.* Processing these types of temporal inconsistencies is cognitively costlier than processing situations consistent with the expected duration. In another study, Yap et al. (2009) demonstrated that compatibility between telic eventualities expressed using the perfective aspect, and between atelic eventualities expressed using the imperfective aspect, facilitates processing in terms of reading times and accuracy of answers. More recently, Dery and Koenig (2015) explored the roles of boundedness and event complexity in determining the temporal relations holding between eventualities, corresponding to what they call *the temporal update* of mental representations of situations. They found that bounded eventualities more frequently trigger sequential temporal relations than unbounded ones (Magliano and Schleich 2000; Madden and Zwaan 2003). Additionally, they tested Dowty's (1986) hypothesis, according to which a series of two states will be interpreted simultaneously rather than sequentially (cf. Sect. 2.1). They demonstrated that Dowty's hypothesis is too coarse-grained to be accurate, and propose that finer-grained distinctions, such as *temporary* vs. *permanent* states, are necessary in order to investigate the role of Aktionsart in the expression of temporal relations. Indeed, they found that temporary states are much more likely to trigger sequential temporal relations than permanent states do. For them, this is due to the fact that temporary states are more easily represented as bounded than permanent states are.

The cognitive foundation of the category Tense has also received the attention of scholars, who have mainly focused on two lines of research. The first is the localization of eventualities with respect to the moment of speech, and the second is the localization of eventualities with respect to one another. Sections 5.2.3 and 6.2 were dedicated to the latter, and showed that this information plays a role in language processing, and in the construction and storage of the mental representations of situations. When comprehenders of various languages are asked to consciously evaluate this information, they systematically have difficulty carrying out this task. Nevertheless, they succeed, with inter-annotator agreement rates above the level of chance. As for processing, it has been shown that fine-grained distinctions between chronological and anti-chronological sequential relations are cognitively relevant. Specifically, chronological relations are cognitively less costly than anti-chronological ones (Mandler 1986; Segal et al. 1991; Murray 1997; Asr and Demberg 2012). Furthermore, it was found that comprehenders prefer overtly marked chronological sequential relations in offline evaluation tasks, but no difference was found between implicit and explicit relations in terms of processing (Grisot and Blochowiak 2015, 2017).

As for the localization of eventualities with respect to S (that is, the past/non-past distinction), several studies have shown that reference to past time using grammatical morphology is severely impaired in agrammatic aphasia,[2] whereas reference to present and future are spared by comparison. Several explanations have been suggested for this phenomenon, such as the *Tree-Pruning Hypothesis* (Friedmann and Grodzinsky 1997; Friedmann 2008), which makes use of a syntactic hierarchy of inflection nodes, the *Impaired Interpretable Features* model (Nanousi et al. 2006; Varlokosta et al. 2006), which is based on Chomsky's (1995) distinction between the *interpretable* and *uninterpretable* features of functional categories, the *Tense Underspecification Hypothesis* (Wenzlaff and Clahsen 2004, 2005), and the *PAst DIscourse LInking Hypothesis* (PADILIH) (Bastiaanse 2008; Bastiaanse et al. 2011). The neurolinguistic PADILIH model builds on previous analyses of Tense as an anaphoric device (Kamp 1979; Hinrichs 1986; Kamp and Rohrer 1983, Partee 1973, 1984; Nerbonne 1986; Webber 1988; and also, from a syntactic approach, Avrutin 2000, 2006; Zagona 2003, 2013). Zagona (2003) suggested that reference to present time should be considered as a kind of 'binding relation', based on the fact that temporal coordinates S, R and E are simultaneous. In the case of reference to past time, on the other hand, temporal coordinates do not coincide. Zagona argues in favour of a discourse linking relation between S, R and E regarding reference to

---

[2] Aphasia is a type of language disorder caused by the dysfunction of certain area of the brain. The dysfunction is due to brain damage caused most commonly by heart stroke or head injury. The area and extent of brain damage determines the type of the aphasia. Two main types of aphasia (which subsume several more specific types) are recognized: Broca's aphasia (also known as non-fluent or agrammatic aphasia) and Wernicke's aphasia (also known as fluent aphasia). Damage to Broca's area is associated with impairment of the ability to speak, with language becoming sporadic and agrammatic. Patients suffering from fluent aphasia produce speech without any grammatical problems, but cannot convey their meaning (Wernicke's area being responsible for language comprehension), and thus their comprehension is severely deficient.

past time. As far as reference to the future is concerned, Zagona (2013) argued that it is a subclass of the present, and therefore not discourse linked. Based on a series of experiments, Bastiaanse (2008) and Bastiaanse et al. (2011) observed that reference to the past is discourse linked not only when expressed by Tense but by periphrastic verb forms ('has walked') as well. Their suggestion is that reference to past time by verb inflection generally requires discourse linking, and is expected to be impaired in agrammatic speakers, due to the more complex forms. It has been shown (Faroqi-Shah and Dickey 2009) that reference to the past by verb inflection produces longer reaction times than verb forms referring to the present.

Further evidence for the discourse linking nature of past reference comes from event-related brain potential (ERP) and behavioural (reaction time and acceptability rating) data, from Dragoy et al.'s study (2012). Their study was designed to focus on the processing of time reference violations in which verbal tenses do not match a time frame previously set by the adverbial: a past time adverbial followed by a present time verbal tense, as in (610), and a present time adverbial followed by a past time verbal tense, as in (611).

(610)   De kelner   die *zonet*   de peper   malt   krijgt geen fooi.
        The waiter who *just before* the pepper grind.PRES gets   no   tip.
        *'The waiter who is just before grinding the pepper doesn't get a tip.'

(611)   De kelner   die *nu*   de peper   malde   krijgt geen fooi.
        The waiter who *now* the peper grind.PAST gets   no   tip.
        *'The waiter who now ground the pepper doesn't get a tip'.

Dragoy et al.'s research aimed to develop Baggio's (2008) findings on the link between temporal and pronominal reference. Baggio's study proved that processing present time reference marked on the verb in a past time reference context is accompanied by the same ERP effects as processing locally bound pronouns. Consequently, Dragoy and colleagues designed a study of the processing of past and present tense in incongruous contexts, hypothesizing that they rely on different neural processes. They investigated three types of measures: evoked brain responses (ERP); reaction times; and acceptability judgments. Brain responses evoked by time reference violations were explored according to several measures:

- P600 wave produced by the brain when it detects a morphosyntactic locally bound anomaly (usually 600 ms after the target word onset).
- N400 wave produced by the brain when it detects a lexical, semantic or conceptual anomaly (usually 400 ms after the target word onset).
- Left Anterior Negativity (LAN) wave produced by the brain when it processes a rule-governed compositional parsing of complex forms across linguistic domains, including both morphology and syntax (usually occurring during 300–500 ms after the target word onset).
- Numerous negative waves (other than N400) produced by the brain when it has difficulty finding a discourse-linked referent (for expressions such as ambiguous words, pronouns).

In terms of the results of Dragoy et al.'s study, the main findings can be summarized as follows. The analysis of the ERP data supports the idea that distinct neural areas process references to past and to present time, as signalled by different brain reaction patterns. The processing of a past time context disrupted by a present tense verb produced a P600 response triggered by the targeted verb.[3] In contrast, the processing of present time context disrupted by a past time verb did not produce an immediate brain response. However, both past and present time reference produced sentence final negativity, which is a typical response to referential violations in general. Moreover, this ERP data is linked to behavioural data. Investigation of reaction times shows that present time reference violations by past tense verbs were detected later than past time references violated by present tense verbs, which produced an immediate P600 response. Furthermore, the acceptability rating showed that relative clauses with an adverb referring to the present and a verb referring to the past are considered less unacceptable than sentences with a past time context disrupted by a present tense verb. When a continuation of the relative clause is provided, participants find it easier to coerce the present time adverbial/past tense verb combination into a meaningful sentence than the past time adverbial/present tense verb combination. Dragoy and colleagues interpret the participants' willingness to wait for further contextual information before judging the relative clause as unacceptable to be an indication of the discourse-linking view of past tense processing. They point out that participants notice the violation of the present/past context with a past/present tense verb, but respond to it in a qualitatively different manner. This response is showed by the negativity wave in ERP elicited by the end of the sentences.

Dragoy et al.'s study provided new evidence for the theoretical suggestion that time reference expressed by verbal inflections involves processing similar to pronominal reference (Partee 1973; Webber 1988), and that past time and present time reference involve different neural processes, a dissociation observed in both healthy and aphasic participants (Bastiaanse 2008; Bastiaanse et al. 2011; Faroqi-Shah and Thompson 2007). Moreover, this study supports Zagona's (2003) suggestion that present tense processing requires the establishment of bound co-reference with the speech time (local binding, i.e. the present tense is deictic), while past tense processing requires the establishment of co-reference with another event time (discourse-linking, i.e. the past tense is anaphoric).

An important question that arises at this point of the discussion is whether these patterns of processing past and present time reference are directly linked to the processing of Tense, or are independent, and can therefore be observed in tenseless languages. Qiu and Zhou (2012) and Bastiaanse et al. (2011) investigated this ques-

---

[3] Similar results were found by Steinhauer and Ullman (2002), who only investigated past time reference disrupted by a present time tense, in sentences such as *Yesterday, I sail Diane's boat to Boston*. They found that tense disagreement elicited a LAN wave (300–500 ms after the verb onset) followed by a P600 wave. In a later study with a similar design, Newman et al. (2007) reported LAN and P600 effects occurring for disruptions with regular verbs, but only P600 for irregular verbs.

tion. Qiu and Zhou (2012) designed a study with features like those of Dragoy et al. (2012); they investigated brain responses to disagreements between a temporal context set by a temporal adverbial[4] (*jiangyao* 'to be going to' for future time reference, and *cengjing* 'in the past' for past) or by the aspectual particle *guo* and temporal noun phrases, as in examples (613), (615) and (617).

(612)   *Next month* the United Nations V + ***jiangyao/will*** dispatch a special
          investigation team.
(613)   **Last month* the United Nations V + ***jiangyao/will*** dispatch a special
          investigation team.
(614)   *Last month* the United Nations V + ***ceinging/***dispatch*ed* a special
          investigation team.
(615)   **Next month* the United Nations V + ***ceinging/***dispatch*ed* a special
          investigation team.
(616)   *Last month* the United Nations V***-guo/***dispatch*ed* a special
          investigation team.
(617)   **Next month* the United Nations V***-guo/***dispatch*ed* a special
          investigation team.

Temporal marking in Chinese has to rely on either lexical semantics and discourse principles (in the case of temporal adverbials) or morphosyntactic processing (e.g. suffixation of verbs by the aspectual particle *–guo*). The authors found similar patterns for time reference disruptions in Chinese as those found for tensed European languages. Disagreements between noun phrases and temporal adverbials or the aspectual particle produced a P600 wave signalling the morphosyntactic violation, and an additional N400 wave only for the temporal adverbials, due to their lexical nature. Moreover, a sustained negativity effect was found after the targeted words and the final words for all types of temporal markers, interpreted as the brain's attempt to correct errors and create a coherent representation of the sentence.

Bastiaanse et al. (2011) also argued that impairments regarding reference to past time occur not only in the Tense morphology of tensed languages but also in tenseless languages, such as Chinese. Bastiaanse and colleagues designed a study where three typologically different languages were compared (Chinese, which expresses time reference by aspectual information; Turkish, which has very complex verb inflection paradigms; and English, which has a combination of free and bound morphemes), testing reference to past, present and future time. They used sentence production tasks and comprehension assessments, and tested healthy and Broca's aphasia patients. The healthy speakers from the control group all attained the maximum possible score (i.e. normal scores). Their findings regarding the production and comprehension of aphasic patients can be summarized as follows:

---

[4] According to Qiu and Zhou (2012), Chinese verbs can be combined with temporal adverbs and a small number of aspectual particles to establish temporal reference. Temporal adverbials and aspectual particles must agree with noun phrases to provide temporal reference.

Firstly, in all languages, the agrammatic speakers were impaired when producing the grammatical forms for reference to the past. English and Turkish speakers performed significantly worse for past than for present and future reference. Chinese speakers performed well for sentences which did not require a specific time reference, but poorly for past, present and future reference. The authors assume that this is due to the fact that aspectual adverbs are not obligatory, unlike English and Turkish verb inflection. A qualitative analysis of Chinese production shows that the aspectual adverb was most often omitted (the sentence remaining grammatical when a lexical adverb expressing the time frame also occurs); when included, the past (*le*) and future (*yao*) adverbs were substituted by the present marker *zai*.

Secondly, as far as production is concerned, there was no significant difference between the two tensed languages: speakers performed similarly, regardless of the complex verb inflection paradigm in Turkish and the use of periphrastic forms in English. Finally, in all languages, the agrammatic patients were impaired in terms of comprehension of sentences containing reference to the past. This was significantly worse than comprehension of sentences containing present time reference. The comprehension of future morphology is significantly worse than present time reference, but better than past time reference, for all patients (though for the Turkish patients, the difference between past and future was quite close to the significance threshold).

As such, Bastiaanse et al. (2011) showed that agrammatic speakers exhibit performance patterns that are the same for all three languages: past time reference is more impaired than present reference; past reference is as impaired as — or more impaired than —future reference; and future reference is more impaired than present reference. They suggest that these data should be interpreted at the morphosemantic interface: temporal information about the event moment relative to the moment of speech must be encoded (in production) and decoded (in comprehension) grammatically. In other words, temporal localization by the relation of E to S is encoded information both in tensed and tenseless languages. Other studies using aphasiological data indicate that not only is past time reference worse than present time reference, but perfective aspect is also more impaired than imperfective aspect in agrammatic aphasia (Nanousi et al. 2006; Stavrakaki and Kouvava 2003). These studies suggest that the aphasia-related impairment of grammatical expressions for past and/or event completeness occurs regardless of the category conveying the temporal localization of eventualities (Tense and/or Aspect), and of the type of linguistic expressions (inflexions, auxiliaries, free or bounded morphemes), as Dragoy and Bastiaanse point out (2013, 114).

Additionally, studies in neurolinguistics have also pointed to similar deficits linked to Aspect and its interaction with Tense. Dragoy and Bastiaanse's (2013) study of Russian aphasic patients investigated the hypothesis suggested in Bastiaanse et al. (2011) that verb forms expressing reference to past time or conveying perfective semantics are more impaired than verb forms expressing reference to the nonpast or conveying imperfective semantics, for both production and comprehension. Dragoy and Bastiaanse (2013) point out that Tense, Aspect and Aktionsart deeply intertwined in Russian in Russian. They note that Russian children strongly prefer

to use perfectives to refer to past time, and imperfectives to refer to the present, as suggested by Gagarina (2004).

Dragoy and Bastiaanse tested the following hypotheses: (i) past forms are more impaired than present forms (according to PADILIH); (ii) the production of perfective verbs is more impaired than that of imperfective verbs; and (iii) due to the interaction between time reference and aspect in Russian, non-past time reference is advantageous only for imperfective verbs, and past-time reference for perfective ones. They used sentence completion tasks and tested aphasic patients (both fluent/Wernicke's aphasia and non-fluent/Broca's aphasia). Their results showed a significant main effect of temporal reference (as predicted by PADILIH). There was no significant effect for Aspect alone (invalidating the second hypothesis), but there was a significant interaction of Tense and Aspect. In particular, reference to the non-past is better preserved than reference to the past, but only for imperfective verbs; in contrast, for perfective verbs, reference to the past is better preserved than reference to the non-past.

6.4.2 Coherent Mental Representations

As I will show below, Kintsch and colleagues' psycholinguistic model of discourse comprehension (Kintsch and van Dijk 1978; van Dijk and Kintsch 1983; Kintsch 1995, 2005) fits perfectly with the relevance-theoretic cognitive pragmatics approach to language comprehension (Sperber and Wilson 1986, 1998; Wilson and Sperber 1993, 2004; Blakemore 1987, 2002; Escandell-Vidal et al. 2011; Wilson 2011). According to both of these approaches, the comprehender's task can be considered as constructing a mental representation of the information provided by the speaker, using oral or written types of verbal communication. This mental representation is integrated with the comprehender's existing knowledge, beliefs and intentions. Kintsch and colleagues make the distinction between the mental representation of the text itself (named a *textbase*) and the representation of the situation described by the text and integrated into the comprehender's previous knowledge (named a *situation model*). In this research, I am particularly interested in the latter, and I will argue that temporality is one of the dimensions of the situation model that the hearer monitors and shapes in a coherent manner during comprehension, making use of various linguistic and world knowledge cues.

For both the psycholinguistic and relevance-theoretic approaches, the mental representation built consists of a series of propositions consisting of conceptual representations (Sperber and Wilson 1998) forming an interrelated network,[5] and which are manipulated in accordance to the procedural cues provided by linguistic expressions, such as pragmatic and logical connectives, the grammatical categories

---

[5] The relations in this network depend in part on the content of the text itself (or the oral input), and in part on the semantic and associative relations between the concepts stored in the mental lexicon as well as general world knowledge, both stored in the comprehender's long-term memory.

of tense, aspect and mood, modality, evidentiality and referential expressions, among others (Givón 1989, 1995; Blakemore 1987, 2002; cf. Escandell-Vidal et al. 2011). These processing instructions are useful for the construction of a coherent mental representation of a text. For example: referential expressions and pronouns serve to construct a referentially coherent representation; causal connectives such as *because, thus* and *so*, causal conceptual rules such as *push-fall*, and causal reasoning[6] serve to construct a causally coherent representation; and the categories of Tense, Aspect and Aktionsart, as well as temporal connectives such as *then, before* and *when*, serve to construct a temporally coherent mental representation of a text.

According to the HD model of temporal reference, described in Sect. 5.1, the category of Tense both contributes to and constrains the construction of mental representations. On the one hand, by way of its conceptual content (that is, the localization of eventualities in the past vs. non-past) it contributes to constructing the conceptual mental representations; on the other hand, by way of its procedural content (that is, the localization of eventualities with respect to one another), it constrains the manipulation of conceptual mental representation by instructing to the comprehender to determine the exact relation (chronological sequential, antichronological sequential, simultaneous or indeterminate). Furthermore, aspectual information from Aktionsart and Aspect also contributes to and constrains the construction of mental representations respectively: Aktionsart provides the type of eventuality to be included in the conceptual mental representation (state, activity, achievement or accomplishment), whereas Aspect constrains this process by instructing the comprehender to represent the eventuality as completed or in progress. Finally, the speaker may choose to use temporal connectives to mark overtly the temporal relation he intends to establish between the mental representations of eventualities; he may also, however, choose to communicate the temporal relations implicitly. In the latter case, the hearer will have to infer the relation according to other linguistic cues and world knowledge.

Phenomena like aspectual coercion and certain usages of verbal tenses, such as the *futural Passé Composé*, the *historical present* or the *narrative* Imparfait (cf. Sects. 1.1 and 2.3), clearly indicate that comprehenders deal with apparent linguistic inconsistencies in a coherent manner, by deriving less frequent but completely plausible interpretations. Comprehenders make the effort to resolve apparent inconsistencies because of the presumption of relevance of utterances. As demonstrated by Yap et al. (2009), comprehenders prefer (in terms of processing effort) compatible co-occurrences (for example, between the temporal adverbial and the verbal tense, or between the telicity status of a situation and the grammatical aspect). However, they are able to interpret incompatible co-occurrences, albeit at a higher cognitive cost, which might be explained by their need to establish temporal coherence between the pieces of information provided by linguistic cues.

So, my proposal is that conceptual and procedural types of information are key notions for successful language comprehension, which requires the recognition of the speaker's intended meaning and its coherent representation at the cognitive

---

[6] For an extensive research of causality, *why*s and *because*s, see Blochowiak (2014b).

level. As Hobbs (1979) and Sperber and Wilson (1986); Wilson and Sperber (2004) argue, the speaker aims to have the hearer understand him, and the hearer aims to identify the speaker's intended meaning. Coherence ties that may encode conceptual or procedural information — or both of them — are cues which will help the speaker and the hearer in their tasks. Of course, the cues which will direct the hearer towards the intended meaning are selected by their contextual relevance (as it is understood in the relevance-theoretic framework; cf. Sect. 2.3.1). In order to acquire coherence at the mental level, these linguistic cues must be cognitively motivated. As I argued in Sects. 6.2 and 6.4.1, temporal categories and temporal relations have cognitive foundations, and are therefore pointers towards cognitive temporal coherence.

6.5 Summary

In this chapter, I have tackled the notion of *temporal coherence*, and more specifically of *cognitive* temporal coherence. To do so, I have given arguments in favour of the cognitive status of coherence relations in general, and of temporal relations in particular. Building on Hobb's (1979, 1985), Sanders et al.'s (1992, 1993) and Evers-Vermeul et al.'s (2017) cognitive approach to discourse relations, I have argued that temporal relations are cognitively motivated for two reasons. The first is because they affect processing and language acquisition. The second is because the linguistic categories triggering them (Tense, Aspect and Aktionsart), along with temporal connectives and temporal adverbials, are themselves cognitively motivated, as has been found by numerous experimental studies carried out in psychology and neurolinguistics.

I discussed three online and two offline experiments, assessing the role of *ensuite* in the expression of sequential and indeterminate temporal relations holding between events expressed with the Passé Composé and Passé Simple, the role of *puis* in the expression of sequential relations, and the occurrence of these connectives with these verbal tenses (Grisot and Blochowiak 2015, 2017). Differences and similarities were found between online processing and offline acceptability judgments. Firstly, the participants' preference for implicit relations in the offline task does not seem to translate into a facilitation of the processing of sentences which are not linked with a temporal connective. Secondly, the lack of main effect of the verbal tense seems to be common to both processing and offline acceptability judgments. As such, there is evidence for the cognitive status of temporal relations, and for the fine-grained distinction between chronological, anti-chronological, synchronous and undetermined types of configuration. Nevertheless, further research is required in order to explore the rich interrelations between the various temporal expressions, as well as to determine the exact role for processing language of temporality as a cognitive principle, the causality-by-default hypothesis, the continuity hypothesis, and comprehenders' expectations during text comprehension.

The notion of cognitive temporal coherence was principally linked to the coherence established in the multithreaded mental representations that we build during language comprehension (Gernsbacher and Givón 195; Graesser et al. 1997). In this model, language is seen as encoding processing instructions on how to construct mental representations of the situations described (Zwaan and Radvansky 1998). According to the HD model of temporal reference, described in Sect. 5.1, the category of Tense both contributes to and constrains the construction of mental representations. Furthermore, aspectual information from Aktionsart and Aspect also contributes to and constrains the construction of mental representations respectively: Aktionsart provides the type of eventuality to be included in the conceptual mental representation (state, activity, achievement or accomplishment), whereas Aspect constrains this process by instructing the comprehender to represent the eventuality as completed or in progress. In this research, the role of the [±narrativity] and the [±boundedness] features in processing and translating temporal information was also tested, using automatic tools and machine translation systems. I will discuss this application in the next chapter.

Chapter 7
Application to Natural Language Processing and Machine Translation

Check for updates

7.1 Temporal Cohesion Ties and Automatic Processing of Language

7.1.1 Natural Language Processing

Computational linguistics (CL), natural language processing (NLP) and machine translation (MT) are domains whose perspective on natural language is different from that of linguistic fields such as semantics, pragmatics and syntax. Their general purpose is to recreate automatically what humans naturally create—that is, produce and understand language. In neurolinguistics and psycholinguistics, there is a strong relation between linguistics and CL, NLP and MT. In particular, the automatic processing of language bases its models on linguistic theories qualitatively describing the functioning of human language, as well as on large quantities of data and the frequent behaviour of linguistic expressions. Language models developed in CL, NLP and MT find patterns of linguistic expressions and semantic interdependencies, allowing researchers to generalize behaviour, such as the parallel between temporal and pronominal reference suggested by Partee (1973) and further developed within the CL framework by Webber (1988). Well-known works on discourse structure and lexical aspect, such as Dowty (1979, 1986), Moens and Steedman (1987, 1988), Steedman (1997) and Moens (1987), among many others, were created within CL framework.

In the past few years, the literature on the processing of temporal reference has focused on issues such as event ordering (events relative to one another), time stamping (i.e. the temporal anchoring of a situation) and the generation of words expressing temporal relations for individual languages, usually for English. In this section, I will describe three principal existing studies in the NLP field related to temporal information. The first is a computational model of the semantics of Tense

and Aspect (Passonneau 1988). The second is a model for processing and automatically annotating temporal information in discourse, namely the TimeML annotation scheme model proposed for English by Pustejovsky and colleagues (2005a, b), and adopted by Bittar (2010) for French. The third is Li et al.'s (2001, 2004) model for processing Chinese.

Passonneau (1988) describes a processing system called PUNDIT, which processes references to situations and the intervals over which they hold using an algorithm that integrates the analysis of verbal tenses (i.e. Tense) and aspectual information (i.e. Aspect and Aktionsart). The algorithm was developed for English texts. Information from Tense and Aspect (perfective/perfect[1] or progressive) as well as temporal adverbials such as *before, after* and *when* is used to derive three complementary pieces of information:

- Determine whether the situation is associated with the realis or irrealis world. Different processes are needed, according to whether the situation refers to actual or potential time.
- Determine the internal temporal structure of the predicated situation—i.e. the inherent temporal information of the verb phrase—as one of three situation types: *state, process* and *transition event* (the third referred to as achievement and accomplishment in Vendler's terminology).
- Determine the temporal localization of the actual situation with respect to the moment of speech/text production, or to the times of other situations, with the help of Reichenbachian temporal coordinates E, R and S.

The internal temporal structure of a situation consists of one or more intervals. Each interval is characterized by two features, *kinesis* and *boundedness*. Kinesis pertains to the internal structure of an interval, and can be *stative* or *active*. Stative kinesis signifies that "each subinterval is equivalent to any other subinterval with respect to the asserted situation" (Passonneau 1988, 47). Processes and transition events have active kinesis involving change from one subinterval to another. Boundedness relates to whether or not an interval is bounded, and constrains the manner in which the situations are located in time (i.e. temporal reference). The intervals associated with states are inherently unbounded, although they can become bounded by an appropriate temporal adverbial. Processes (activities in Vendler's terms) are generally unbounded, and can become unspecified for boundedness if the verb is progressive. In (618), the time shown by the clock is interpreted as falling within the unbounded interval of *ringing*, but in (619), where the verb is not progressive, it can be interpreted as marking the inception of the process or roughly locating the entire process (Passonneau 1988, 47).

(618)   The alarm was ringing at 8 am.
(619)   The alarm rang at 8 am.

---

[1] The model uses the term *perfect* to refer to the English Present Perfect and Past Perfect verbal forms. Perfect verbal forms (*relative* in Reichenbach's terms) have an R distinct from E.

Table 7.1 Module 3: temporal localization

Parameter	Value	Rules
Perfect	Yes	E < R
	No	E = S
Tense	Past	R < S
	Present	R = S

These temporal pieces of information are assembled in a context-dependent compositional semantics framework. Passonneau points out the complexity of computing temporal information from several sources, since the contribution of each distinct component can depend upon co-occurring elements. Her suggestion is a model of extracting temporal information by separating temporal analysis into distinct tasks, each task targeting one type of temporal input. Each task provides input for the next stage of analysis, and this must be provided as explicitly as possible to avoid conflicting with the subsequent processing. The algorithm for the temporal analysis of an inflected verb contains three modules. The first module computes the actual time (realis) from temporal information provided by Aspect, Aktionsart and Tense. Only realis sentences are considered for further analysis. The second module derives the inherent temporal structure of the situation from two temporal parameters, lexical aspect and progressive aspect. The output of the second module—that is, an explicit representation of the situation's temporal structure and the event time—is sent to the third module, which derives the temporal localization of the situation from the last two parameters, perfect verbal form and tense. Temporal localization is established with the help of Reichenbachian temporal coordinates. However, the model diverges from Reichenbach, primarily by distinguishing between the event time and the temporal structure of a situation (Passonneau 1988). Module three is illustrated in Table 7.1.

The possible combinations of the values of all the parameters considered are provided in Table 7.2. A situation is thus located in time in reference to the parameters of Aspect, Aktionsart and Tense, and its interpretation depends on this temporal localization. The Simple Present locates unbounded temporal structure coinciding with S, while processes and transition events do not refer to the actual moment of speech of the utterance, as shown by the interpretation of (620). The Simple Past locates the event time of any temporal structure prior to S. However, each temporal structure provides differences in interpretation regarding the surroundings of the event time. Perfect verbal forms provide more supplementary information than simple forms, specifically about the relation between R and E.

(620)   The pump operates.

To the best of my knowledge, Passonneau's account of temporal information in discourse is the first model to integrate semantic information from several linguistic sources. Another semantic account of temporal information, called the Specification

Table 7.2 Possible combinations of temporal localization of situations

Tense	Aspect	Stative	Process	Transition event	Location
Present	Simple	Unbounded	Not actual time	Not actual time	E = S = R
	Perfect	Unbounded	Unspecified	Unspecified	E < R = S
	Progressive	Unbounded	Unbounded	Unbounded	E = S = R
Past	Simple	Unbounded	Unspecified	Bounded	E = R < S
	Perfect	Unbounded	Unspecified	Bounded	E < R < S
	Progressive	Bounded	Unbounded	Unbounded	E < R = S

Language TimeML, was developed in the AQUAINT[2] programme. TimeML is a semantic annotation framework for temporal information in discourse, and provides guidelines for trained humans who carry out the annotation (Pustejovsky et al. 2005a, b).[3] TimeML was designed to address four issues regarding temporal information:

- Temporal localization of situations (identification and anchoring in time)
- Ordering of situations with respect to one another (lexical and discourse ordering)
- Dealing with contextually underspecified temporal expressions (such as *last week* or *2 weeks before*)
- Dealing with the persistence in time of situations

TimeML considers all temporal objects in a discourse, broadly grouped into *temporal expressions* (adverbials and connectives) and *events*. The class of *events,* which includes *inflected verbs* and *event nominals*, is a generic term used for verbs describing various types of states and events. It makes reference to Reichenbach's (1947) description of verbal tenses, Vendler's (1957, 1967) aspectual classes, the distinction between *lexical* and *grammatical* aspect, and Bach's (1986) notion of *eventualities*. The annotation language consists of a set of *basic tags* for expressing events, explicit temporal expressions and function words, and a set of *links* between the annotated elements, which have different types, such as *temporal, subordination* and *aspectual*.

The <EVENT> tag is used to annotate both inflected verbs (predicative and non-predicative tenses) and events expressed by nouns. Verbal tenses are expressed in terms of a combination of Tense (with a choice between *present*, *past* and *future*) and Aspect (with a choice between *progressive, perfective, progressive-perfective* and *none*). Verbs are categorized into seven classes: *reporting, perception, aspectual,*

---

[2] The AQUAINT programme is a dedicated effort to improve the performance of question answering systems using free text available on the Web. An important aspect of this research is its access to information from text by way of content rather than keywords. It aims to create a specification language to identify events and temporal expressions in text.

[3] The TimeML framework adopts XML as formal language, and provides a formalized markup language called ISO-TimeML, with a systematic means of extracting and representing temporal information. The annotation framework's specification and guidelines are available at http://timeml.org/site/publications/specs.html

states, demanding an action, demanding a state and *occurrences.* These classes are relevant due to the type of relation (link) they require. The tag <TIMEX3> is used to mark up explicit temporal expressions referring to *day times, dates, durations* and *sets.* The tag <SIGNAL> is used to annotate function words, which indicate how temporal objects are to be related to one another. Signals are generally: temporal prepositions (*on, in, at, from, to, before, after, during,* etc.); temporal conjunctions (*before, after, while, when*, etc.); and special characters ("-" and "/" in temporal expressions denoting ranges, such as *September 4–6, April 1999/July 1999*, etc.).

The tags <TLINK>, <SLINK> and <ALINK> serve to capture the different types of relations existing between two events (in the broad sense used in this framework), and between an event and an explicit temporal expression. These links can have a *temporal* nature (such as *before, after, includes, simultaneous, during, identity,* etc.), a *subordination* nature (such as *evidential, factive, counter-factive, conditional,* etc.) and an *aspectual* nature (such as *initiates, culminates, terminates, continues,* etc.).

Example (621) shows a sentence and its interpretation in TimeML, paraphrased in the following terms: the temporal adverb *today* is annotated with the tag TIMEX3, which expresses a date and has the identification tag t32; there is a temporal link with the value *before* between the event number 2 from the sentence and this adverbial, shown by the TLINK tag at the end of the formal description. Two events are mentioned in the sentence: the first is expressed by the verb *learned* (which is described as a reporting verb, expressing past tense); the second is expressed by the verb *has taken* (which is described as an occurrence verb, expressing present tense and the perfective aspect). This kind of annotation, carried out by trained humans, allows the explicitation of temporal information that is implicit at the discourse level.

(621)   Finally, today we learned that the space agency has finally taken a gian leap forward.
        Finally today,we learned that the space agency has finally taken a giant leap forward.

The metadata markup language TimeML is therefore a formal framework which integrates three types of semantic temporal information: (i) the temporal anchoring of situations with respect to S and R; (ii) the temporal ordering of situations relative to one another, both intrasententially and in discourse; and (iii) the semantics of underspecified temporal expressions, by integrating them in the overall interpretation of the discourse. Corpora manually annotated with the TimeML language are useful tools for finer-grained analyses of temporal information. TimeML is an important example of the efforts made by researchers to integrate temporal information from several sources, and to make explicit the various types of relations existing between situations. However, as I have argued in Sect. 2.3, temporal information cannot be processed according to linguistic or semantic sources alone.

Both Passonneau's model and TimeML are models developed for tensed languages, such as English and French. Li et al. (2001, 2004) developed a model for processing temporal reference in Chinese. They report on a computational model

based on machine learning algorithms. The core model consists of a set of rules combined with a set of linguistic features for the purpose of temporal relation resolution. The linguistic features used are Chinese words which can function as temporal indicators—time words (e.g. *year, month)*, time position words (e.g. *a few days ago*), temporal adverbs (e.g. *lately, recently),* auxiliary words and verbs, aspectual markers (e.g. *le, zhe* and *guo*), prepositions and special verbs, among others. Temporal relations are described in terms of E, R and S (Reichenbachian coordinates). The TICS system (Temporal Information-extraction from Chinese Sources) receives financial texts as input, analyses each sentence one by one in order to extract temporal information, and represents each piece of information in a concept frame. All concept frames are linked according to the temporal relations holding between events. This model points out NLP models' need to identify temporal relations holding between eventualities, in order to have accurate results.

To sum up, in this section I have discussed three NLP studies on the automatic processing of temporal information at the discursive level, and shown that automatic systems make use of temporal information from various linguistic sources: verbal tenses, grammatical and lexical aspect, the location of eventualities with respect to Reichenbachian coordinates E, R and S, temporal adverbials, and other linguistic markers, especially relevant in tenseless languages.

7.1.2   *Machine Translation*

In the MT field, two main types of automatic translation systems exist: *rule-based* and *statistical* systems. Rule-based systems were the first to be created in the 1970s, such as the 'pioneer' Systran company (currently a hybrid between rule-based and statistical system), the Logo company, and the MT system developed at the University of Montréal for weather forecast translation. In the 1980s, important research was carried out on the English/Japanese language pair, while the subsequent German Verbmobil project in the 1990s had some success in speech-to-speech translation (for a more detailed discussion, see Meyer 2014, Chapter 1). For these systems, a large set of lexical and/or syntactical rules had to be written by linguists and manually implemented. As pointed out by Meyer (2014), this costly procedure made it hard to adapt these systems to other language pairs, directions of translation, or stylistic registers. The functioning of rule-based systems is designed to have three levels. The first and bottom level consists of translation word-by-word, with the possible re-ordering of words. At the second and middle level, the system operates at the syntactic level via transfer rules, implemented on syntax trees, from a source language to a target language. The third and most complex level is creating by building an *interlingua*, which is a 'completely language-independent semantic representation of the source text's meaning' used to generate the target text directly (Meyer 2014, 4). However, building the interlingua proved to be a very problematic task because of the difficulty of integrating world and domain knowledge.

As a result, most of the research on MT throughout the 1990s focused on statistical systems. In SMT, where there is no rule-based processing, the goal of the system is to learn the correct translations of words, phrases and sentences from large corpora translated by humans—i.e. parallel corpora that nowadays exist in several languages, such as EuroParl (Koehn 2005). The most common SMT system is the *phrase-based* system,[4] which is the product of several components, none of which involves linguistic knowledge. The first component is a *phrase translation model,* trained on aligned (both at sentence- and word-level) parallel corpora, which computes translation probabilities for all sequences of words in the source text. The second is a *language model*, which specifies the probability of the string of words considered by the SMT system, as well as syntactic and lexical information of the target language—in other words, estimating how much a candidate translation conforms to fluent target language. The third is the *reordering model*, which predicts the changes in word order between the two languages. In order to produce a translation, these components are combined during the decoding process. Here, a decoding algorithm combines the translation options, creating several hypothesis translations, and ultimately chooses the best one according to the language model and the reordering model (Koehn 2010).

The functioning of an SMT system can be described in three stages. The first is the *training* stage, in which the system learns the most likely correspondences, reordering the chunks of words from parallel corpora. The second is the *tuning* stage, in which the system is trained on a much smaller text, ideally of the same register as the target text, in order to optimize the language pairs identified in the first stage. The third is the *testing* stage, in which a new text is handed to the system for translation. In this stage, the system tries to find the most likely phrase pairs, and recombines these hypotheses based on probability scores from the translation and the language model available. One of the most often used, freely accessible statistical MT systems is Google Translate.

Other attempts to improve the results of SMT systems were mainly made to include linguistic information in the system itself. Two of them were to create hybrid systems using both linguistic rules and statistical methods (such as Systran, Reverso and Linguatec), and to use additional knowledge within the SMT paradigm. For the latter, researchers proposed *factored translation models* (Koehn and Hoang 2007), which are usually used to add morphological, semantic or pragmatic information. This information is provided to the system via annotation of the parallel data. The training data is enriched with the desired linguistic information, and is automatically annotated by a *classifier*. A classifier is a tool that makes use of

---

[4] SMT systems use word or phrase alignment algorithms to align the words of a sentence in two languages, the source and the target. There are four types of alignment (Samardzic 2013, 94–95): (i) *one-to-one* (when corresponding single words are identified, i.e. pairs of words); (ii) *one-to-null* (used to describe words that occur in one language where no correspondent can be found in the other language); (iii) *one-to-many* (when one word in a language corresponds to several words in the other language); and (iv) *many-to-many* (when no single word is an alignment unit). The first three types are called word-based alignments; the last is called phrase-based alignment.

machine learning algorithms,[5] usually according to human-annotated data, taking data items and placing them in one of the available classes. One type of classifier is the *maximum entropy* (MaxEnt) classifier, which can be built with the Stanford Classifier Package (Manning and Klein 2003). The underlying principle of maximum entropy is that, when assigning a class where there is no external knowledge, one should prefer uniform distributions, and thus assign the considered classes uniformly. Annotated data used to train these classifiers provide external knowledge, thereby informing the automatic labelling technique where to be minimally nonuniform (i.e. where not to provide uniform distributions of the tags). Iterative application of the classifier result in automatically labelled or annotated texts with the features considered. The classifier plays a crucial role in an SMT system, because it automatically produces tags that increase the probability that a certain string of words in a target language is the correct translation. For this reason, much work has been done on the construction of the classifiers, such as the research carried out in the COMTIS and MODERN Swiss research projects (cf. Introduction, footnote 1), which focused on Western European tense-prominent languages. I will discuss this research in Sect. 7.2.

A series of studies in MT have focused on the automatic translation of temporal information in general, and of verbal tenses in particular. Most of them (such as Olsen et al. 2001, Ye et al. 2006, 2007) are on the Chinese/English pair of languages, due to the typological differences between the two languages (tenseless for the former and tensed for the latter). Olsen et al. (2001) and Ye et al. (2006) aimed to improve machine translation from Chinese to English; Ye et al. (2007) were interested in machine translation from English to Chinese. The different strategies used to encode temporal information in English and Chinese are challenging for the automatic translation of tense and aspect. Ye and colleagues point out that neither wordbased alignment nor phrase-based alignment can capture the mapping between the tense markers in English (morphemes) and the aspect markers of the corresponding Chinese verbs (lexemes). For example, when Chinese aspect is marked, it takes the form of a separate word, such as the *le* marker, which aligns poorly with English tensed verbs, and so the aspectual information is dropped. As a result, instead of producing (622), SMT systems produce the sentence in (623), using the infinitive form of the verb and, in this case, with a different lexical choice (Loáiciga and Grisot 2016, 8).

(622) Wo ji   le   yi   feng   xin   gei   ta
      I   send PERF one QUANTIFIER letter to/for he
      'I sent him a letter.'
(623) Wo xie   yi   feng   xin   gei   ta.
      I   write one QUANTIFIER letter to/for he
      'I write him a letter.'

---

[5] Samardzic (2013, 112) explains that the data which machine learning algorithms take as input are considered as *experience*. A computer programme "learns from experience" if its performance with respect to a task improves with experience—i.e. by dealing with the data.

Olsen et al. (2001) used information about Aktionsart—in particular, the *telicity* ontological feature—in order to predict whether the verbal tense expresses reference to present or past time in the target language, English. They built a system (interlingua model) which allows them to obtain reliable lexical information associated with each verb. Their hypothesis is that Chinese sentences with a telic aspect will translate into English as past tense, and those without the telic aspect as present tense. Their system is tested on a 72 verb test set, matched against a human reference translation. The results are given in terms of accuracy, or correct translations. While the baseline system (unware of telicity) reached 57% correct translations, a second system which uses the telicity property of verbs reached 76% correct translations. Furthermore, a third system, built using telic information alongside other linguistic information such as Aspect and adverbials, reached 92% accuracy. Their system is highly deterministic, with a fixed correspondence +*telic* → reference to *past*, −*telic*→ reference to *present*. However, this deterministic correspondence might not applicable to other pairs of languages, and the identification process of telic verbs relies heavily on their particular system's lexicon, making it difficult to implement in different systems.

Ye et al. (2006) built a classifier that generates tense marking in English. The classifier learns the mapping between English and Chinese from a set of features provided by a training set of data. Since the purpose of the SMT system is to translate into English, they used features of English to predict tense marking. Their main argument is that NLP work must aim to build systems that follow the mechanisms of the human brain, in order to optimize their performance. In their words (2006, 50):

> The bottleneck in Artificial Intelligence is the unbalanced knowledge sources shared by human beings and a computer system. Only a subset of the knowledge sources used by human beings can be formalized, extracted and fed into a computer system.

The features based on knowledge shared with human beings are called *latent features*. Olsen et al. (2001) illustrated the value of latent features by showing how lexical aspect or the telicity of the verb phrase improve the translation of temporal reference from Chinese to English. Ye et al. (2006) used several surface features (formal features) and two latent knowledge sources, namely *telicity* as proposed by Olsen et al. (2001), and *event ordering* as implemented in the TimeML annotation scheme. The surface features used to generate tense markers in English are (2006, 50):

- The type of speech act.
- The syntactic structure in which the current verb is embedded.
- The occurrence of temporal adverbials and aspectual markers.
- The distance in number of characters between the current and the previous verb, and whether the two verbs are in the same clause or not.

The two latent features are assumed to be used by human beings in tense resolution (though psycholinguistic and neurolinguistic studies have only recently begun to investigate them). Information about the lexical aspect is used in terms of *telicity*

(i.e. the verb's ability to be bound within a certain time span) and *punctuality* (i.e. punctual verbs, or achievements in Vendler's terms). The authors point out that a verb's telicity value is context-dependent. The second latent feature concerns the temporal relations holding between eventualities. The authors defined temporal relations in terms of precedence, inclusion, overlapping and lack of temporal relation. As such, they used human-annotated data with these two latent features. The classifier trained on surface and latent features had significantly better results (83.4% accuracy) than the classifier trained only on surface features (75.8%) and the classifier trained only on latent features (80%).

Ye et al. (2006) provided evidence that lexical aspect and the temporal relations holding between eventualities are significant factors in predicting verbal tenses in a target language. In this research, specifically in Sect. 4.4, I suggest a model that uses several latent features, such as Aspect, Aktionsart, and temporal and causal relations holding between eventualities (grouped under the [±narrativity] feature encoded by Tense) to predict the verbal tense in several target languages. The advantage of the research presented in this book, compared to previous models for SMT, is that all features are captured automatically.

Ye et al. (2007) report the building of a classifier that generates aspectual markers in Chinese: *le, zhe*, *guo,* and NULL when none of the three occurs. Since the purpose of the SMT system is to translate into Chinese, the features used to predict aspect marking correspond to both English and Chinese. Five surface features and one latent feature (2007) were used:

- Syntactic features, which can influence the verb's tendency to take an aspectual marker.
- Positional features, indicating that the occurrence of a verb with another can influence the verb's tendency to take an aspectual marker.
- Signal lexeme features, indicating that the aspectual markers considered present certain lexical occurrence patterns (for example, with some auxiliary words and not with others).
- A phonological feature, indicating that aspectual markers are incompatible with idioms that have four Chinese characters.
- An English verbal tense feature, indicating that verbal tenses play the same role as aspectual information in Chinese, i.e. expressing temporal reference.
- Lexical aspectual features, pointing to the theoretical assumption that the inherent features of the verb phrase play an important role in establishing temporal reference.

Verbal tense in English and lexical aspect have been manually annotated. The classifier's performance was significantly better than a simple classifier, which always assigns the most frequent aspect marker (which is *le*). All features used to predict aspectual markers in Chinese were significant, but behaved differently for each of the three aspectual markers considered. For example, the lexical aspectual features was only significant for the prediction of the aspectual marker *zhe*, whereas the English verbal tense feature was significant for predicting the occurrence of *le* and NULL. These two studies involving the translation from and into Chinese, a

tenseless language, point to the fact that dividing temporal information from Tense, Aspect and Aktionsart and using it as latent features is useful for improving the translation of a text with respect to temporal reference.

Work on the English-French pair of languages has been done by Loáiciga et al. (2014), as well as Meyer et al. (2013), and Loáiciga and Grisot (2016). Loáiciga et al. (2014) automatically identified all English and French verb phrases in EuroParl, which is a large parallel and aligned corpus. They then automatically annotated the verb phrases on both sides of the corpus with one of 12 verbal tenses, indicating reference to present, future or past time. The annotation allowed them to map and to measure the distribution of tense translation between the languages. They found that the ambiguity of the translation of the English Simple Past into the French Passé Composé, Imparfait, Passé Simple and Présent is statistically significant ($p < 0.05$).

Using this automatically annotated corpus, the authors present two SMT experiments on disambiguating the translation of the English Simple Past into French. Firstly, the parallel and aligned corpus is used to annotate the English verb with the French tense automatically. For example, if the verb *ran* is translated as *courait*, an *imparfait* label is used; if a second instance of the same verb is translated as *a couru*, then a *passé composé* label is used. They trained an SMT system on this annotated corpus, securing an increase of 0.50 BLEU[6] points over a baseline with no French verb tense labels.

In a second experiment, the authors used the corpus to train a classifier of French verb tenses using features from the English component only. In other words, the information regarding the French verb tense is not used, and tense labels are instead predicted. In Loáiciga and Grisot (2016), we point to the fact that this classification task is not trivial, since it involves nine classes corresponding to nine verbal tenses (all four *future* and *conditional* tenses of the original 13 tenses were grouped together into one single class) inferred from the source language. Results vary significantly depending on the particular verbal tense, ranging from an F1 score[7] of 0.16 for the Passé Simple to 0.46 for the Imparfait, 0.77 for the Passé Composé and 0.92 for the Présent. Finally, they provide the SMT system with the French tense labels produced by the classifier, and therefore prone to error. This second system

---

[6] The BLEU score (Bilingual Evaluation Understudy; Papineni et al. 2002) counts the overlap in terms of matching number of words and n-grams between the candidate translation and one or more reference translations. The more matches there are for 4-, 3-, 2- and 1-grams in a candidate translation compared to its reference, the higher the BLEU score. The values of the score range from 0 to 100, where the latter indicates identical translations. The existing SMT systems usually have scores between 11-33 BLEU points. BLEU is accepted as the best metric in terms of matching human judgments of translation quality, especially when averaged over a large quantity of text.

[7] The metrics used in computational linguistics to evaluate classification results are: *accuracy* (percentage of correctly classified instances); *precision* (percentage of correctly classified instances among correctly identified instances); and *recall* scores (percentage of correctly classified instances over all instances) (Meyer 2014, 50). Precision and recall correspond to Type I and Type II errors in statistics, and are used (their harmonic mean) to determine the F1 score, which ranges from 0 (worst score) to 1 (best score).

performance increased by 0.12 BLEU points over the baseline. They note that the quality of the translation was determined to a great extent by the quality of the classifier for each particular verbal tense. For example, for translating the Imparfait and the Subjonctif, the second system (tense-aware) was much better than the baseline, whose results did not exceed statistical predictions based on the parallel corpora.

7.2   The Automatic Classification of [±narrativity] and [±boundedness]

One of the purposes of this research was to improve the results of a statistical machine translation (SMT) system when it comes to the translation of verbal tenses. Current SMT systems have difficulties in choosing the correct verb tense translations, because these depend on a wider-range context than SMT systems consider. SMT systems aiming to model intersentential relations, such as the temporal information conveyed by Tense, Aspect and Aktionsart, require large numbers of annotated corpora, with semantic and pragmatic information to be used in the training phase of the statistical system.

Large amounts of annotated data can either be produced manually or automatically. Unfortunately, manual annotation of large amounts of data is time consuming, and very expensive. For these reasons, manual annotation is usually performed on smaller amounts of data. As for automatic annotation, one can choose to use existing automatic tools dealing with temporal information in the discourse, such as the TimeML markup language, or to build a *classifier*. A classifier is trained on a small amount of annotated data, and learns the annotation scheme by way of machine-learning algorithms. The classifier is used thereafter to annotate large amounts of data, necessary for the SMT system.

At this point of the discussion on the type of data, one issue that is worth mentioning regards the trade-off between using a small quantity of accurate data (generally human-annotated or human-post-edited) on the one hand, and using a large quantity of imperfect data on the other hand. Large quantities of imperfect data can be used in so-called *on-line* and *unsupervised learning* (i.e. the system learns all the patterns emerging from the data), and are very useful in binary classifications for unambiguous cases. However, for ambiguous (and also underspecified) cases, which are difficult to classify, the usefulness of large quantities of imperfect data is limited. In such cases, human intervention is generally required in order to reach an accurate judgement. As such, small accurate quantities of data are necessary, especially for the classification of difficult cases, and are used in so-called *supervised* learning. This is the case for the annotation experiments with [±narrativity] and [±boundedness] features reported in this chapter. The choice of one of the two types of data depends on the task, and the two methods can be used to complement one another.

In the COMTIS and MODERN projects, two classifiers were built in order to annotate data automatically with labels learnt from human-annotated texts. The first classifier automatically annotates texts with the [±narrativity] feature (Grisot and Meyer 2014; Meyer 2014). The second classifier deals with the [±boundedness] feature (Loáiciga and Grisot 2016). Human annotation experiments with these two features were described in Sects. 4.2.7 and 4.3.2. I will describe the automatic annotation experiments in Sect. 7.2. Several SMT systems were built, trained on the data annotated by the two classifiers. The results of the MT experiments provided in Sect. 7.2.2 show that SMT systems which are aware of the linguistic information provided by annotation experiments (i.e. information about the temporal ordering of eventualities and about lexical aspect) translate verbal tenses more accurately, and make better lexical choices (Meyer et al. 2013; Loáiciga and Grisot 2016).

7.2.1   Automatic Annotation Experiments

In Sect. 7.1.2, I spoke about SMT systems targeting the English-Chinese pair of languages (Ye et al. 2006; Ye et al. 2007). In these studies, the classification results were not embedded in an SMT system, and the classifier classes were the actual verbal tenses. In Grisot and Meyer (2014) and Meyer et al. (2013), we use classification as a means of enhancing an SMT system with knowledge about the [±narrativity] feature in order to produce better choices of verbal tense when translating from English into French. In Loáiciga and Grisot (2016), we use knowledge about a pragmatic component of lexical aspect, the [±boundedness] feature, in order to produce better choices of verbal tense in French. These two features are two essential features from the HD model of temporal reference (Chap. 5).

The data used in the automatic annotation experiments consist of 435 English Simple Past items, initially used in the annotation experiments described in Sect. 4.2.7 with the [±narrativity] feature, and in Sect. 4.3.2 with the [±boundedness] feature. A classifier was built for each of these features, and trained on the human-annotated data. For each classifier, a series of surface features was considered.

7.2.1.1   Annotation of the [±narrativity] Feature

The training data contained 257 narrative and 178 non-narrative English Simple Past items (a total of 435). The performance of the classifier was tested on a smaller sub-portion of the corpus which had previously been annotated manually, with the same stylistic genre distribution, consisting of 118 items of the English Simple Past: 75 instances of narrative, and 43 of non-narrative. Surface features were obtained from syntactic and part of speech (POS) parsing of the verbs occurring in the experimental items, using Charniak and Johnson's constituent parser (2005), and temporal analysis of the text with the TimeML parser (Verhagen and Pustejovsky 2008). The surface features used were the following:

- Neighbouring verb word forms.
- The position of the verbal tense in the sentence.
- The POS tags of all the words in the sentence.
- The syntactic tree structure of the sentence.
- Temporal markers (such as *while, since, weeks/days after or before, subsequently, repeatedly* and the like) from a hand-made list of 66 temporal discourse markers, inspired by the temporal connectives annotated in the Penn Discourse Treebank (Prasad et al. 2004, 2008)
- The types of temporal marker (from TimeML), such as temporal *simultaneity* or *sequencing* for temporal markers, *infinite, participle* or *future* for the class of verbal tense, and *perfective* or *imperfective* for the grammatical aspect.

With these features, a MaxEnt classifier, built with the Stanford Classifier package (Manning and Klein 2003), achieves an F1 score of 0.72 (the weighted mean of precision and recall). Out of the 118 test instances, the classifier correctly annotates 90 items, corresponding to 76.3%. Moreover, the κ value for the agreement between the classifier and the reference is 0.46. The classifier was then used to label automatically the Simple Past verbal tenses in the English component of a large parallel corpus necessary to train an SMT.

In order to test the classifier's performance further, Meyer (2014, 76) reports that the disagreements occurring in the manual annotation experiment (cf. Experiment 3) were resolved by directly inferring the narrative/non-narrative labels from the verbal tense occurring in the French component of the parallel corpus in a deterministic manner: a Passé Simple or Passé Composé correlates with a narrative label, and an Imparfait with a non-narrative label. When trained on such data, the classifier only achieves an F1 score of 0.71, and has a κ of 0.43 in the test set, even though it was trained on more data than before. This confirms two points: the first is the score range that can be expected when trying to classify narrativity automatically, which is 0.46; the second is that narrativity cannot be correlated with French verbal tenses in a deterministic one-to-one correspondence.

In addition, Meyer (2014, 76) reports the construction of another classifier—the CRF model (Lafferty et al. 2001)—which labels narrativity in sequence with other tags, such as part-of-speech (POS) tags. The CRF uses the two preceding POS tags as features to label the next POS tag in a sequence of words. The same training set of 435 sentences as used above was POS-tagged using the Stanford POS tagger (Toutanova et al. 2003), and the tags of VBD given for Simple Past verbal tenses were replaced with narrativity labels from manual annotation. The same procedure was applied for the 118 sentences used for testing the performance of the classifier. The CRF classifier had a lower performance than the MaxEnt classifier: its correct labelling of narrativity only reached an F1 score of 0.36, with a negative κ value signalling a weak inverse correlation.

According to Meyer (2014), the performance of the MaxEnt classifier was boosted by the temporal and semantic features used as surface features, such as the manually created list of temporal connectives, and the type of temporal markers taken from TimeML (temporal *simultaneity* or *sequencing* for temporal markers,

infinite, participle or *future* for the class of verbal tense, and *perfective* or *imperfective* for the grammatical aspect). We can therefore conclude that this information is useful for enhancing narrative and non-narrative usages of verbal tenses, because they relate to the ConText in which the [±narrativity] procedural feature must be determined.

7.2.1.2   Annotation of the [±boundedness] Feature

As before, the Stanford Maximum Entropy package (Manning and Klein 2003) was used to build a MaxEnt classifier. The training data contained 435 Simple Past occurrences, judged by human annotators as bounded or unbounded in the experiment from Sect. 4.3.2. As such, the training data contained 236 bounded and 199 unbounded instances. In this experiment, the *cross-validation* method was used to determine the training and the testing data. This method consists in automatically splitting the data into several equal sub-parts (ten in this case, therefore a tenfold cross-validation). The classifier is trained iteratively on nine parts, and its performance is tested on the tenth part. Finally, the classifier's performance is calculated as the average of the results it had for each of the ten iterations.

This experiment used several additional features resulting from the annotation experiments described in Sects. 4.2.7 and 4.3.3, and from human editing of the data. Since this is a fully supervised classification partially fed with features known to be pertinent for the task, its results are expected to be a measure of the maximum success rate for this particular task. Two classes of features were used to enhance the classifier: syntactic and temporal features. Manually annotated features resulted from the human annotation experiments (the 435 Simple Past occurrences annotated in Sects. 4.2.7 and 4.3.3), indicated by a * symbol. For the automatically generated features, the dependency parser of Bohnet et al. (2013) from MateTools was used on the English component of the corpus to produce POS tags and dependency labels.

The syntactic features are as follows (Loáiciga and Grisot 2016):

- Simple Past token*: Simple Past instances to be classified, identified manually.
- Infinitive form*: the non-finite form of the English Simple Past.
- Grammatical aspect*: a binary feature, originating from the translation of the corpus into Serbian and its recovery by the cross-linguistic transfer of properties method, with two values (perfective and imperfective, cf. Sect. 4.3.3).
- French verbal tense*: identified in the French part of the translation corpus by the translation spotting technique.
- Position in the sentence: refers to the ordinal position of the English Simple Past verb in the sentence.
- POS-tags of the English Simple Past token: these distinguish between active voice Simple Past verbs, such as *went* (VBD), compound active voice Simple Past verbs such as *did go* (VBD + VB), and passive voice Simple Past verbs, such as *was taken* (VBD + VBN).

- The head and its type: this refers to the syntactic head of the verb to classify, along with its POS-tag.
- Children dependencies: these indicate the dependency relation of the three nearest children of the English SP verb.
- Children POS-tags: these indicate the POS-tags of the three nearest children of the verb. With this and the previous feature, we expect to capture some of the linguistic reflexes of aspect, such as the presence of *in* prepositional phrases (e.g. *in 2 months*) for bounded eventualities.

The temporal features are as follows:

- Temporal markers (such as *while, since, weeks/days after or before, subsequently, repeatedly* and the like) from a hand-made list of 66 temporal discourse markers, inspired by the temporal connectives annotated in the Penn Discourse Treebank (Prasad et al. 2004, 2008)
- The types of temporal marker (from TimeML), such as temporal *simultaneity* or *sequencing* for temporal markers, *infinite, participle* or *future* for the class of verbal tense, and *perfective* or *imperfective* for the grammatical aspect).
- The [±narrativity] feature*: issued from human annotation experiments.

With these features, the classifier hits an F1 score of 0.89 for the bounded class, and 0.87 for the unbounded class, and has 88% accuracy. These scores indicate the classifier's very good performance. These results are partially explained by the features taken from the human annotations, signalled by the * symbol. The most informative features, in descending order, are: grammatical aspect; verbal tense used in French; narrativity; and the infinitive form of the verb in English. Of these features, grammatical aspect and narrativity (as well as boundedness with respect to its interaction with narrativity) also turned out to be significant in the mixed model adjusted to predict the verbal tense used in the target language (cf. Sect. 4.4).

In Loáiciga and Grisot (2016), we point out that, even if all features are pertinent and linguistically motivated, they are not error-free. Those generated using an automatic tool in particular may introduce some noise, although the general performance of the parser used is very good. The gold (human) annotation of the bounded and unbounded labels was not perfect. The Ҡ value for the inter-annotator agreement rate in Experiment 4 was 0.84, which is already much higher than in Experiment 3, on the [±narrativity] feature.

In Loáiciga and Grisot (2016), we present a second experiment, in which certain surface features were generated automatically from raw data, such as the Simple Past token, the infinitive form, the position in the sentence, the POS tags of the verbs, and the POS tags of their arguments (the verb phrase). Three features originating from the human-annotated data were not used in this experiment: the [±narrativity] feature; grammatical aspect; and French verbal tense. Since human-annotated data is costly and time-consuming, this second experiment aimed to test whether the classifier has reliable results if it is trained only on automatically extracted surface features, which might have errors. Consequently, the results of this experiment are expected to give a realistic impression of the quality of detecting boundedness in a

large corpus using automatically generated features and a small quantity of annotated data (the only annotation being the gold prediction class) for training.

In the previous experiment, a MaxEnt classifier was built. The dependency parser of Bohnet et al. (2013) and the TreeTagger (Schmid 1994) producing POS-tags and lemmas were used on the English component of the corpus. With automatically-generated features, the classifier hits an F1 score of 0.84 for the bounded class and 0.79 for the unbounded class, with 82% accuracy. The results represent the average classification using ten-fold cross-validation. Compared to the first experiment, these scores still represent reliable results, and they show that both the bounded and the unbounded category are more difficult to predict solely according to automatically generated features. The difference of approximately 8% for each category between the results of the two classifiers is shown to be statistically significant by a two-sided t-test (τ (434) = 7.28, $p < .05$) This result can be interpreted in terms of the quality of human-annotated data compared to automatically generated data, which contains a percentage of errors. Nevertheless, the second classifier was still able to learn how to discriminate between bounded and unbounded Simple Past occurrences in a satisfactory manner.

For a more precise image of the importance of using linguistic information for SMT systems, Loáiciga and Grisot (2016) set a baseline based on the random distribution of bounded and unbounded labels in the corpus, 54% for the former and 46% for the latter (cf. the experiment from Sect. 4.3.2). A random sample with resampling of 435 bounded/unbounded labels was generated, with probabilities of 0.54 and 0.46 respectively. The random labels obtained were compared to the human-annotated corpus, in order to compute precision, recall and F-score. The random sample has an F1 score of 0.56 for the bounded class and 0.47 for the unbounded class, and has 54% accuracy. The results of both the classifier using human-annotated features (experiment 1) and the classifier using only automatically-generated features (experiment 2) are significantly better than this random sample (τ (434) = −76.71, $p < .05$ and τ (434) = −57.05, $p < .05$ respectively), which further indicates that the prediction results are solid. The comparison of results is given in Fig. 7.1.

To judge the predictive power of each of the features involved, feature ablation for each of the experiments was performed. We compared the performance of the classifier trained on human-annotated features to its performance when each feature is subtracted (one at the time) from the model. For each feature removal round, we used ten-fold cross validation and calculated the F-score for each class. The results showed that the interaction of the features was dependent on the class to be predicted. For example, grammatical aspect and narrativity seem only to be important for the unbounded class. This finding confirms the results of the multi-factorial analysis carried out in Sect. 4.4, in which the interaction between narrativity and boundedness was a statistically significant factor for predicting the verbal tense in the target language. The verb's POS tags seem to be more informative for the bounded class. However, the adverbs and the infinitives are the features with the most predictive power for both classes. The knowledge about the French verbal tense, the position of the verb (main or subordinate clause) and the verb's children dependencies are less informative than the other features.
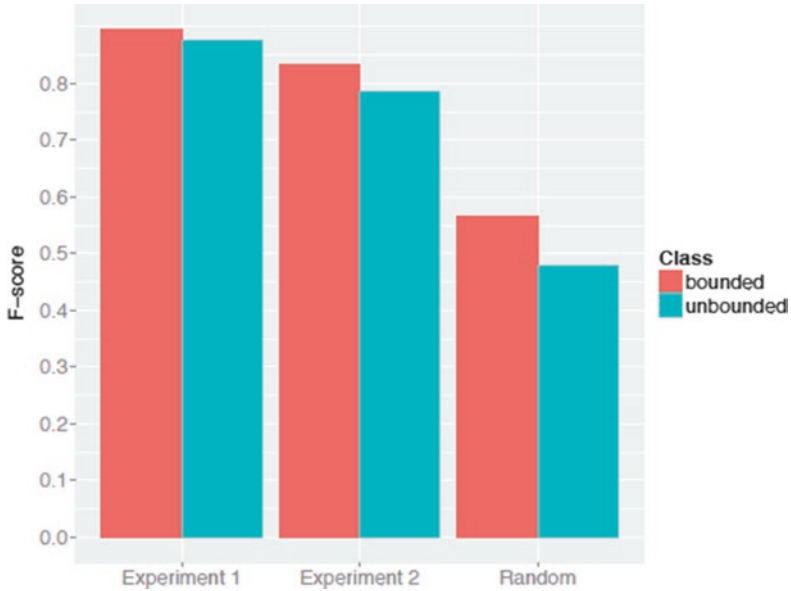
Fig. 7.1 Comparison of results in the three classification experiments

In conclusion, the three NLP experiments described in this section indicated that the [±narrativity] and [±boundedness] features are both identifiable automatically, but that the former is more difficult than the latter. This difference points to the differences in their nature: procedural for the [±narrativity] feature, and conceptual for the [±boundedness] feature. These differences are visible both in both the human and automatic processing of language.

7.2.2   Machine Translation Experiments

The classifiers presented above were built with the purpose of automatically annotating large amounts of data, necessary for the training of SMT systems. Below, I will describe machine translation experiments performed with SMT systems aware of the [±narrativity] feature (Meyer et al. 2013; Meyer 2014) and the [±boundedness] feature (Loáiciga and Grisot 2016).

7.2.2.1   MT Experiments with the [±narrativity] Feature

One key question that arose at this point of the research was how to provide an SMT system with the linguistic information conveyed by the labels given by the classifier. Two methods were tested:

- Concatenation of the label with the Simple Past verb form, considered as a new word to be translated, as in example (625), containing an input sentence for the SMT system in which the concatenation is shown by the '-' symbol.
- Use of factored translation models, which allow for any linguistic annotation to be considered as an additional feature, next to the basic features of the phrase-based models, as in example (626), containing an input sentence for the SMT system, in which the factorization is shown by the '|' symbol.

To evaluate the gain that the [±narrativity] feature brings to the quality of the translation performed by an SMT system, three systems were built using a 5-gram language model. The first, called the baseline system, is a statistical system trained on plain text input, without verbal labels, as in (624). The second, called the tagged system, is a statistical system using a phrase-based translation model, trained on plain text input containing narrativity labels concatenated on the verb, as in (625). The third, called the factored system, is a statistical system using a factored translation model and trained on texts, where each Simple Past occurrence has a narrativity label whereas all the other words have a |Null label, as in (626), where the Null labels were omitted for legibility (from Meyer 2014, 109).

(624) Baseline SMT: On Wednesday the ČSSD declared the approval of the next year's budget to be a success. The people's party was also satisfied.

(625) Tagged SMT: On Wednesday the ČSSD declared-*Narrative* the approval of the next year's budget to be a success. The people's party was-*Non-narrative* also satisfied.

(626) Factored SMT: On Wednesday the ČSSD declared|*Narrative* the approval of the next year's budget to be a success. The people's party was|*Non-narrative* also satisfied.

To label the SMT data, no manual annotation was used. In the first stage, the actual Simple Past occurrences were identified using the Stanford POS tagger (Toutanova et al. 2003). These tags were replaced by the narrativity labels provided by the MaxEnt classifier, previously built and presented in Sect. 7.2. As pointed out by Meyer (2014), both of the automatic tools used (the POS tagger and the MaxEnt classifier) are prone to errors, which in the end lead to translation errors. However, the challenge was in finding evaluation methods that would allow for the acknowledgment of SMT improvement with respect to the baseline, despite the noisy training and testing data.

As such, for the labelling of the data with the [±narrativity] feature, the MaxEnt classifier described in Sect. 7.2 was used to annotate data for training (in which the system learns the most likely correspondences and re-orders the chunks of words) from the EuroParl corpus (Koehn 2005), containing 321,577 sentences originally written in English and translated into French. Among these sentences, 66,143 instances of Simple Past were identified by the POS tagger used. The classifier labelled 30,452 narrative Simple Past occurrences, and 35,691 non-narrative Simple Past occurrences. For tuning (in which the system trains on a much smaller text in

Table 7.3 Evaluation of
SMT systems aware of the
[±narrativity] feature

Translation model	BLEU	TER
Baseline	21.4	61.9
Tagged	21.3	61.8
Factored	21.6*	61.7*

order to optimize the language pairs identified in the first stage), the Newstest 2001
tuning set (made available by the Workshop on Machine Translation: www.statmt.
org/wmt12) was used, containing 1401 automatically labelled Simple Past instances,
of which 807 were narrative and 594 were non-narrative. For testing (in which a
new text is handed to the system for translation), the Newstest 2010 data were used,
containing 1156 automatically labelled Simple Past instances, of which 621 were
narrative and 535 were non-narrative. The SMT system was created using Moses
SMT toolkit (Koehn et al. 2007), and applied a 5-gram language model over the
entire French component of EuroParl.

The results of the three SMT systems were evaluated using two measures: BLEU
and TER. As noted in Sect. 7.1.2, the BLEU score counts the overlap in terms of
matching number of words and n-grams between the candidate translation and one
or more reference translations. The more matches there are for 4-, 3-, 2- and 1-grams
in a candidate translation compared to its reference, the higher the BLEU score. The
values of the score range from 0 to 100, where the latter indicates identical transla-
tions. The TER measure, for Translation Error Rate (Snover et al. 2006), computes
the number of edits (called edit-distance) required to transform a candidate transla-
tion into one of its references. The smaller the edit-distance is, the lower the score—
thus, the better the translation. Table 7.3 provides the results of the evaluation of the
SMT systems in terms of BLEU and TER scores. The factored model improves
performance over the baseline by +0.2 BLEU and −0.2 TER (since smaller scores
represent better translation), and these differences are shown to be statistically sig-
nificant at a 95% level of confidence, $p < .05$ according to a t-test (signalled by the
* in the table).

Meyer et al. (2013) explain that the lower scores of the tagged model may be due
to the sparsity of the data—i.e. verbal forms were altered by concatenation with the
narrativity label. As for the small improvement of the factored model, this can be
explained by the fact that the narrativity feature improved the translation of the
verbal tense alone, and that the translation of the other words in the sentence is
unchanged compared to the baseline. So, only a small fraction of the words in the
test data are changed, corresponding only to Simple Past occurrences.

A human evaluation of the performance of baseline and factored systems was
also performed on the 207 first instances of Simple Past. Bilingual evaluators
(English and French) scored the translation by looking at the source sentence and its
reference translation from the parallel corpus. The scoring was based on the follow-
ing criteria: the correctness of the narrativity label, and the improvement of the lexi-
cal choice, the choice of verbal tense and the choice of the verb phrase, compared to
the baseline system. Human evaluation revealed that the narrativity feature helped

Table 7.4 Human evaluation of verb translations into French, comparing the factored model against the baseline

Criterion	Rating	N.	%	Δ
Labeling	Correct	147	71.0	
	Incorrect	60	29.0	
Verbal tense	Better	35	17.0	
	Same	157	75.8	+9.7
	Worse	15	7.2	
Lexical choice	Better	19	9.2	
	Same	176	85.0	+3.4
	Worse	12	5.8	

the factored system to generate more accurate French verbal tenses in 10% of cases, and to have better lexical choices for verbs in 3.4% of cases, as shown in Table 7.4. The Δ values show the clear improvement of the narrativity-aware factored translation model.

For example, the input English sentence in (627) was translated by the baseline system as in (628), and by the factored system as in (629). The Simple Past *looked* is translated by the baseline system as *considérés* (an infelicitous lexical choice, past participle form, and wrong number agreement), whereas the factored system translates it as *semblait* (a better lexical choice, the Imparfait verbal tense, and correct agreement in number).

(627)   Tawa hallae looked|*Non-narrative* like many other carnivorous dinosaurs.
(628)   Tawa hallae *considérés* comme de nombreuses autres carnivores dinosaures.
(629)   Tawa hallae *semblait* comme de nombreux autres carnivores dinosaures.

Another issue identified by the human evaluation process concerns cases where the factored model performed worse than the baseline system. Some of these cases are due to errors in the POS tagging used to find the Simple Past instances to be labelled. For example, for passive forms of the verb such as *was born*, the auxiliary and the past participle were identified as two separate verbal entities, which were tagged separately: *was* as non-narrative, and *born* as narrative. This introduced noise and errors in the automatic annotation process. Moreover, the factored translation model seems to operate at the local level, despite the pragmatic nature of the [±narrativity] feature. Meyer et al. (2013) suggest that, to widen the context captured by the translation model, one possibility would be to label the entire verb phrase in hierarchical or tree-based syntactical models. Overall, the factored system produces better translations of the Simple Past verb phrase in 9% of cases, compared to the baseline system.

The improvement in translation presented here is important because it points out that it is useful to add pragmatic knowledge about the temporal relations holding between eventualities. However, this numerical value depends on the classifier's performance, which produces reliable but imperfect results (70% correctly labelled

Simple Past occurrences). Recall that the classifier's performance is similar to that of humans, as showed in Experiment 3 for English, and Experiments 8, 9 and 10 for Italian, Romanian and French respectively. According to the HD model of temporal reference, the [±narrativity] feature indicates procedural information which humans cannot easily access by conscious thought. The performance of the classifier indicates that the upper limit found for humans is the same as for machines.

It could be hypothesized that the classifier's better performance would increase the translation quality as well. This was found for the [±boundedness] feature, whose automatic identification accuracy reached an F1 score of around 0.88, as discussed in Sect. 7.2. Below, we will discuss the MT experiments with this feature.

7.2.2.2   MT Experiments with the [±boundedness] Feature

Another series of MT experiments targeted the [±boundedness] feature, in order to assess how much a system enhanced with boundedness knowledge improves the translation of the English Simple Past into French. Phrase-based SMT systems often generate only the most frequent translation possibility, the Passé Composé, as the default. The goal of these SMT experiments was to provide a system with bounded/ unbounded labels in order to boost the other three tenses, improving the verbal tense translation choice.

Given that there is no data set annotated with this aspectual information sufficiently large to train an SMT system, the corpus was automatically annotated with the [±boundedness] feature, using the classifier described in Sect. 7.2. The data were taken from the MultiUN corpus, a corpus of translated documents from the United Nations, provided by Eisele and Chen (2010). All English Simple Past occurrences are identified and labelled as either bounded or unbounded automatically. The training data consisted of 350,000 sentences (134,421 Simple Past instances), the tuning data consisted of 3000 sentences (1058 Simple Past instances), and the testing data consisted of 2500 sentences (1275 Simple Past instances).

Loáiciga and Grisot (2016) report that the Moses Toolkit (Koehn et al. 2007) was used to build two systems: a baseline without boundedness labels, and an aspect-aware system with such labels. Both systems are phrase-based models with identical composition, trained, tuned and tested on the data described above, and use a 3-gram language model built using KenLM (Heafield 2011) and trained on over ten million sentences of French monolingual data, taken from the 2015 Workshop on Machine Translation (Bojar et al. 2015).

As with the MT experiments on the [±narrativity] feature, the boundedness labels are combined with the SMT system using a factored model (Koehn and Hoang, 2007). Instead of the standard text, the system is trained on annotated text of the form shown in (630). The example shows an input sentence labelled by the classifier as follows: the verb receives an *unbounded* label, whereas all other words from the sentence receive a Null label.

Table 7.5 Evaluation of SMT systems aware of lexical aspect

System	BLEU test set	BLEU SP subset
Baseline	31.75	30.05
Aspect-aware	32.73	31.63

(630)   Max ran for an hour.
        Max|NULL ran|UNBOUNDED for|NULL an|NULL hour|NULL.

As in the case of the narrativity classifier, no single factor entirely determines the translation of a verb—i.e. there is no exact correspondence between a label and a verbal tense in French. For instance, a *bounded* label does not necessarily lead to a translation into French by a Passé Composé. Instead, various factors are considered when estimating the translation probabilities computed over the entire parallel corpus.

The performances of the two translation systems were evaluated with the BLEU measure, computed across all the sentences in the test set, as well as the sentences containing a Simple Past only. The results provided in Table 7.5 indicate that the factored system using the lexical aspect labels led to an increase of 0.98 points. When computing the BLEU score for the sentences with Simple Past verb phrases only, there was a difference of 1.58 points. These scores reflect an improvement in the quality of the translation of Simple Past occurrences. On the one hand, these increments suggest that the method does not degrade the general translation quality of all the other words in the sentence; on the other hand, they suggest that it does not change the Simple Past translations already estimated to be adequate by the baseline model. Loáiciga and Grisot (2016) points out the importance of this result, given that the boundedness-aware system only targets Simple Past occurrences and not all the words in the sentence.

This score may be further analysed using the bootstrap resampling significance test (Koehn 2004). This test estimates the difference in performance of one SMT system in comparison to another. The output of the lexical aspect-aware translation system was compared to the output of the baseline SMT, in terms of the translation of the same 300 sentences. For each sentence in each sample, a BLEU score was computed. The analysis of the 300 BLEU scores showed that, in 50% of the sentences, the BLEU scores of the aspect-aware system are higher than the scores of the baseline system. In other words, at least one English Simple Past verb was better translated by the aspect-aware system than by the baseline system.

Automatic metrics and statistical tests do not give any further indications of the particular qualitative differences in the translation of verbal tenses between the outputs. To overcome this, a human evaluation of the performances of the two systems and of the performance of the classifier was carried out on 200 randomly selected instances of the Simple Past. The classifier correctly identified the Simple Past instances in 91% of cases, and correctly annotated them as bounded or unbounded situations in 65% of cases. In general, the bounded class seems more difficult to

predict than the unbounded class. The manual evaluation also revealed that several verbs which usually express one-time events, like *ask*, *request*, *result*, *adopt*, *add* or *call*, were treated as though they had a duration which is much less common. Finally, several instances of the same verb appeared repeatedly, and the same classification error was thus repeated: for example, *was* labelled as bounded.

For the factored SMT system, compared to the baseline system, human evaluation indicated a better translation of Simple Past instances into French in 25% of cases, a similar translation in 54% of cases, and a degraded translation in 21% of cases. The cases of similar translation can be explained by the fact that the baseline system itself performed well, since it provides Passé Composé translations by default, and the distribution of the verbal tenses used in the translation into the target language is highly skewed in favour of the Passé Composé. Therefore, the improved cases are those where an Imparfait was used in the reference, and the aspect-aware system correctly translated a Simple Past by an Imparfait. For example, the input English sentence in (631) was translated as (632) by the baseline system, as (633) by the factored system aware of boundedness, and as (634) by a professional translator, the reference translation coming from the parallel corpus.

(631)   The vice-chairman of the ODS, Petr Nečas *said* that the concept of an interim government supported by the ČSSD, ODS, and Green Party, *was* evidently no longer working.

(632)   Le vice-président, de l'ODS Petr Nečas, *dit* que le concept d'un gouvernement intérimaire soutenu par les ČSSD, ODS, et parti vert, *a* apparemment aucune *fonctionne* plus.

(633)   Le vice-président, de l'ODS Petr Nečas, *a déclaré* que le concept d'un gouvernement intérimaire soutenu par les ČSSD, ODS et aux verts, *était* manifestement, de ne plus travailler.

(634)   Le porte-parole de l'ODS Petr Nečas *a déclaré* que l'idée d'un cabinet administratif soutenu par le ČSSD, l'ODS et le Parti des verts ne *fonctionnait* manifestement plus.

The first Simple Past, *said*, was labelled by the classifier as *bounded*, and the second Simple Past, *was*, as *unbounded*. Both verbal tenses were translated with a Présent by the baseline system. The factored model instead produced the same verbal tenses as the reference: Passé Composé for the first Simple Past and Imparfait for the second. The 21% of examples which were degraded were possible outcomes, given that these translations are possible outcomes of the factored model's non-deterministic disposition. This result is also directly linked to the results of the bounded/unbounded labelling: correct labels entail twice as many improved translations.

Overall, the factored system produces better translations than the baseline. An improvement can also be observed if the two factored systems (i.e. one aware of temporal information, and the other aware of lexical aspect) are compared. The aspect-aware SMT system produced better translations than the narrativity-aware SMT system (15%). This is mainly due to the better performance of the classifier

producing boundedness labels than the classifier producing narrativity labels. The second reason is the better identification of correct instances of the Simple Past. This was due to the use of the POS tagger, improved with a series of rules. Recently, other methods have been suggested, such as direct document-level translation (Hardmeier et al. 2012; Hardmeier 2014). This method consists in a completely different strategy of translation, in which the decoding algorithm itself is modified to process the text as a whole. This type of method does not need to place additional annotations or labels in the input text, as we have done here. Both methods have proved their efficiency in comparison to a baseline system.

To conclude, I would like to point out the importance of the granularity of the linguistic features. To be usable, linguistic features must be medium-coarse grained. In other words, features which are too fine-grained are either insufficiently capable of explaining the variation in the data, or they are not implementable. For example, the mixed statistical model based on the manually annotated corpus of 435 sentences (cf. Sect. 4.4) shows that the French verbal tense in the target language is significantly determined by the interaction between the narrativity status and the lexical aspect of English verbs. This theoretical insight is unfortunately very difficult to model in NLP, and to apply in SMT. This is an important issue to be investigated in further research. In Loáiciga and Grisot (2016), we make two suggestions for using the information about the interaction between narrativity and boundedness. A classifier could be built to predict the narrativity and boundedness at the same time—i.e. a four class task (+narrative +bounded, +narrative −unbounded, −narrative +bounded, and −narrative +unbounded). The factored model would thereafter have one factor. Another solution would be to train two classifiers, one for narrativity and another for boundedness. This would produce two pairs of independent labels, and thus two different factors in the factored model. It should be tested whether or not diluting the information in such a way would still add knowledge to the system, since the distributions may result in insufficient data.

7.3 Summary

My aim in this chapter was to show that the role of Tense and Aktionsart in language processing was also validated from NLP and MT perspectives. Research on the automatic processing of temporal reference has focused in the past few years on issues such as event ordering (events relative to one another), time stamping (i.e the temporal anchoring of a situation) and generation of words expressing temporal relations for individual languages, usually for English. Some of the most influential studies are those demonstrating that Tense is an anaphoric category (Partee 1973, 1984) and Webber (1988), as well as exploring the role played by Aktionsart in determining discourse structure (Dowty 1979, 1986; Moens and Steedman 1987, 1988; Steedman 1997; Passonneau 1988). As for tenseless languages, such as Mandarin Chinese, it was shown that the most relevant temporal indicators are temporal adverbials, aspectual markers, special verbs and prepositions (Li et al. 2001,

2004). In the field of MT, Ye et al. (2006) used telicity and event ordering to generate verbal tenses when translating from Chinese to English.

Meyer et al. (2013), Meyer (2014) and Loáiciga and Grisot (2016) have shown that these two properties—operationalized as the [±narrativity] and [±boundedness] features—also significantly improve the results of SMT systems when the source and the target languages are tensed languages. In particular, they have shown that these two features can be automatically identified in raw data by classifiers which have been previously trained on human-annotated data. When these classifiers are integrated into an SMT system, the translation is better than that of a baseline system, in terms of lexical choices and inflection choices for verbs.

Not only can the medium-coarse grained features proposed—i.e. [±narrativity] and [±boundedness]—be implemented successfully, their implementation in NLP and application to MT produced significant improvements in the results of the automatic systems. As such, these ameliorations provide an indirect but solid empirical validation of the theoretical model proposed in Chap. 5.

Conclusion

This book had two objectives: first, to present a comprehensive discussion of the linguistic expression of temporal reference, and in particular of Tense, Aktionsart and Aspect as cohesive ties; and second, to put forward and test an innovative proposal regarding the role of these temporal cohesive ties in establishing temporal coherence at the discursive and cognitive levels. To meet these objectives, I have discussed existing accounts of Tense, Aktionsart and Aspect as constituents of the generic verbal forms known as *verbal* tenses (Chap. 1). Classical accounts of *verbal tenses* in English, French, Italian and Romanian (the simple past, the imperfect, the compound past and the simple present) provided by grammars have attempted to describe their meanings and contextual usages without discriminating between the sources of the temporal information these verbal tenses provide.

A review of the formal semantic-discursive and pragmatic accounts of verbal tenses and their role in the expression of temporal reference—that is the localization of eventualities with respect to S and to one another—lead to the conclusion that the relevance-theoretic distinction between conceptual and procedural types of information is an appropriate tool to describe the types of encoded meaning of Tense, Aktionsart and Aspect, and their contribution to the construction of the speaker's intended meaning (Chap. 2). Wilson and Sperber (1993/2012) proposed that conceptual information is accessible to consciousness, can be reflected on, and represents easily graspable concepts, whereas procedural information is inaccessible to consciousness, unavailable by way of conscious thought and resistant to conceptualization. Their proposal formed the basis for the interpretation of the results of several annotation experiments, in which the meanings of Tense, Aktionsart and Aspect were tested (Chap. 4). The results of these experiments clearly showed that two systematic patterns arise when participants are asked consciously to evaluate the contribution of verbal tenses to the interpretative process. The first is the ease of the task, and the high rate of inter-annotator agreement when dealing with the past/non-past distinction. The second is the greater difficulty of the task and lower rates when dealing with the temporal ordering of eventualities. Similar patterns were

found when participants deal with aspectual information. That is, aspectual information related to the actual realization of Aktionsart—i.e. boundedness—is easily accessible to consciousness, and results in high levels of inter-annotator agreement. In contrast, consciously identifying grammatical perfective or imperfective viewpoint is a more difficult task, and results in lower levels of inter-annotator agreement.

The data used in these experiments were mainly naturally occurring data originating from bilingual and monolingual translation corpora (Chap. 3). The cross-linguistic analysis of these corpora revealed several translation divergences for the English-French and French-English pairs of languages, of which the most demanding is the translation of the English Simple Past into French. The features tested in the annotation experiments carried out were exploited as possible factors to predict the verbal tense used to translate a Simple Past into French in a generalized mixed model. This multifactorial analysis of the data revealed that the different sources of temporal information in discourse are substantially correlated, and have significant interactions. Specifically, the occurrence of a verbal tense can be predicted according to the contextual values of the [±narrativity], [±boundedness] and [±perfectivity] features. For example, all combinations of features are possible for the English Simple Past. Nevertheless, two principal tendencies were observed. The first principal tendency is for perfective viewpoint to be associated with bounded situations in narrative contexts, whereas the second is for imperfective viewpoint to be associated with unbounded situations in non-narrative contexts. As for the French Passé Composé/Passé Simple and Imparfait, the best predictive model provides two statistically significant factors and one interaction: the procedural types of information encoded by Tense and by Aspect, and the interaction between Aktionsart and procedural information encoded by Tense (Chap. 4).

The new proposal regarding the role of these temporal cohesive ties in establishing temporal coherence at the discursive level consists of the *Highly Discriminatory* model of temporal reference, which discriminates between the categories and principles that play a role in determining temporal reference, regardless of the type of language explored—tensed, tenseless or mixed (Chap. 5). From the perspective of a pragmatic theory of human comprehension of language, temporal reference in discourse is established according to three components: Tense, Aktionsart and Aspect. The temporal coordinates S, R and E combine with the predicate's Aktionsart and contribute to the explicature of the utterance, whereas the procedural information encoded by Tense and Aspect constrain the formulation of contextual hypotheses and implicated conclusions. The hearer makes use of all three components in order to recover the speaker's meaning—that is, her overtly intended content. Based on the experimental work described in Chap. 4, I have suggested a holistic interpretation of temporal information from various sources, and proposed that temporal coherence takes place both at the discursive and cognitive levels. In the discourse, one can identify *temporal cohesion* at the local level among temporal information from Tense, Aspect and Aktionsart, and *temporal coherence* at the global level (that is, between two utterances), which makes reference to temporal coherence relations.

The notion of temporal coherence is understood in cognitive terms, and understood as *cognitive temporal coherence* (Chap. 6). Following Hobbs (1979, 1985), Sanders et al. (1992, 1993) and Evers-Vermeul et al. (2017), I have argued that temporal relations are cognitively motivated for two reasons. Firstly, temporal relations affect both processing (Mandler 1986; Segal et al. 1991; Murray 1997; Grisot and Blochowiak 2015, 2017) and language acquisition (Clark 1971; Evers-Vermeul et al.'s 2017). Using online self-paced reading experiments and offline acceptability task experiments, I have shown that sequential chronological relations are processed equally quickly when they are implicitly expressed by the verbal tense alone (Passé Composé or Passé Simple) compared to when they are overtly marked by a temporal connective. However, offline data from acceptability experiments indicated that participants preferred the implicit versions to the explicit ones. As for the role of the verbal tense, no significant difference regarding the Passé Composé and Passé Simple was found. Furthermore, Mandler (1986) found that discourses in which time regresses (i.e. anti-chronological sequential relations) are costlier in terms of processing effort than discourses in which time progresses (i.e. chronological sequential relations).

Secondly, I have argued that the generic notion of *verbal tense* is not cognitively motivated, mainly because it is a generic notion used to refer indistinctively to its underlying temporal and aspectual categories. A cognitively motivated linguistic category is a category which plays a role in language processing, in the construction and the storage of mental representations. In particular, the linguistic categories triggering temporal relations (Tense, Aspect and Aktionsart), along with temporal connectives and temporal adverbials, are cognitively motivated themselves, as found by numerous experimental studies carried out in psychology, psycholinguistics and neurolinguistics. These studies have shown that Tense, Aspect and Aktionsart have an impact at the cognitive level. Research has shown that these categories are processed online, that they determine the construction of the ongoing and subsequent mental representations, that they influence the perception and memory of events, that they bias the interpretation of a series of events, and that they become dysfunctional in case of brain damage.

I have also linked the notion of temporal cognitive coherence to the coherence established within multithreaded mental representations which comprehenders build during language comprehension (Gernsbacher and Givón 1995; Graesser et al. 1997). Temporality is one of the dimensions of the constructed mental representations which the hearer monitors and shapes in a coherent manner during comprehension, making use of various linguistic cues (Tense, Aktionsart, Aspect, temporal connectives, temporal adverbials, etc.) and world knowledge. Phenomena like aspectual coercion and certain usages of verbal tenses, such as the *futural Passé Composé*, the *Présent Historique* or the *narrative* Imparfait, clearly indicate that comprehenders treat apparent linguistic inconsistencies in a coherent manner by deriving less frequent but completely plausible interpretations.

From the beginning, the research in this book had an applicative purpose, which was to improve the coherence of the results of statistical machine translation systems (the COMTIS and MODERN research projects). This this research was

successfully applied in the Natural Language Processing and Machine Translation fields (Chap. 7), and was implemented by Thomas Meyer, Andrei Popescu-Belis and Sharid Loáiciga. The natural language processing application is linked to the building of the MaxEnt classifier, which was trained on the human-annotated data with the [±narrativity] and [±boundedness] features (Chap. 4), and which used this learned information, alongside other syntactic and temporal features, to annotate raw data automatically with the same features. Since classifiers had good rates of accuracy, the resulting automatically annotated data were used to train statistical machine translation systems. Two statistical machine translations systems were built, one trained on data annotated with the [±narrativity] feature (Meyer et al. 2013; Meyer 2014) and the other trained on data annotated with the [±boundedness] feature (Loáiciga and Grisot 2016). The results of the systems which are aware of these two types of temporal information are significantly better than those of the systems which were not trained on the annotated data, in terms of choice of verb and of verbal tense.

This book therefore made a case for the role of Tense, Aktionsart and Aspect as cohesive ties encoding conceptual and/or procedural information expressing temporal reference at the sentential, inter-sentential and cognitive levels, and also opened up many new directions of study to explore in future work. In this research, I focused primarily on past time reference as is expressed by verbal tenses such as the simple past, the imperfect, the compound past, and the historical present. Sporadic discussions were included on present time reference. Further research should explore in more detail temporal reference to the present and the future, and refine the model put forward in this book. Additionally, other verbal tenses, such as the past perfect, the past and the present progressive will allow for a more precise account of the interaction between Tense and Aspect.

In Chap. 6, I extended the domain of the linguistic expression of time by investigating the role of temporal connectives in the expression of chronological temporal relations. A second target for future investigation is therefore to examine implicit anti-chronological temporal relations and the connectives used to mark them overtly, such as *avant que* and *avant de* "before", as well as connectives such as *quand* "when" which can be used for both synchronous and sequential temporal relations. The study of these fine-grained types of temporal relations and their overt marking using connectives is necessary for a more accurate comprehension of the role of temporality at the cognitive level. A future subject of study of the linguistic expression of time might include the contribution made by temporal adverbials—such as *yesterday, last year, tomorrow* or *in 2 weeks*—in determining temporal reference, for both the localization of eventualities with respect to the moment of speech S, and for establishing temporal relations. Last but not least, addressing Aspect as it is morphologically expressed in aspectual languages, such as Slavic languages, as well as aspectual particles, such as *–le* and *–guo* in Mandarin Chinese (Sun and Grisot, n.d.), will extend the *Highly Discriminatory* model of temporal reference put forward in this book (Chap. 5), and render it more accurate.

Another issue which requires further research is the relevance-theoretic conceptual/procedural distinction. This book has provided evidence that a linguistic

expression can encode both conceptual and procedural types of information, and that consciously evaluating these two types of information systematically results in high inter-annotator agreement rates for the former and moderate inter-annotator agreement rates for the latter (Chap. 4). This is the first attempt to propose a quantitative measure of encoded conceptual and procedural information. In Grisot (2017a), I apply this measure to purely pragmatic information in addition to conceptual and procedural information, and propose an interpretative scale of inter-annotator agreement rates measured with the К coefficient or with other similar coefficients. In particular, high inter-annotator agreement rates (> 0.7 К values) indicate that the information dealt with in the experiment is conceptual, moderate rates (0.4–0.7 К values) indicate that the information dealt with is procedural, and low inter-annotator agreement rates (> 0.4 К values) indicate that the information dealt with is purely pragmatic. Further work needs to be done to control for other factors which might influence inter-annotator agreement rates, such as inter-individual variation, the formulation of annotation guidelines, the order of the items, the length of the items, etc. Additionally, further research is needed to validate the indicative thresholds for the К-like coefficients experimentally, and to complement this offline investigation with the online study of the cognitive operations involved when dealing with conceptual, procedural and pragmatic types of meaning.

To conclude, this book has presented new insights into the issue of temporal reference at both the discursive and cognitive levels, and has proven the importance of exploring language comprehension issues from an empirical, experimental and cognitive perspective in order to develop comprehensive pragmatic-cognitive models. This book has specific implications in the field of relevance-theoretic pragmatics with respect to the conceptual/procedural distinction, its empirical and experimental approach and to the possible dual nature of linguistic expressions. More generally, it indicates the need to adopt an empirical approach (both corpus-based and experimental data) for the purpose of formulating and validating theoretical pragmatic models, as well as to endorse methodologies and theoretical findings from different fields involving the study of language (semantics, pragmatics, psychology, psycholinguistics, neurolinguistics, contrastive linguistics, natural language processing and machine translation, to name but a few) in order to shed new light on issues about language.

Appendix: Description of the Corpora and Their Sources

Bilingual Data: Literature Register

1. *The portrait of Mr. W. H.,* O. Wilde, French translation by J. Gattgno, Editions Gallimard, 2000. Electronic version and bilingual alignment by C. Grisot.
2. *Sense and sensibility*, J. Austen, French translation available on http://www.gutenberg.org/. Bilingual alignment by C. Grisot. Retrieved on 30–04–2011.
3. *Le petit prince*, A. St. Exupery. Available at http://srogers.com/books/little_prince/contents.asp. Bilingual alignment by C. Grisot. Retrieved on 30–04–2011.
4. *Cinq semaines en ballon*, J. Verne, Ch. 1. Corpus built by the FORELL laborytory in collaboration with Philippe Rivière. Available at www.cabal.rezo.net. Retrived on 30–04–2011.
5. *Vingt mille lieues sous les mers*, J. Verne, Ch. 1. Corpus built by the FORELL laborytory in collaboration with Philippe Rivière. Available at www.cabal.rezo.net. Retrived on 30–04–2011.

Bilingual Data: Journalistic Register

6. *News Commentaries.* Translation corpus built for the International Workshop on Spoken Language and Translation. Available at http://iwslt2010.fbk.eu/node/34. Retrived on 30–04–2011.
7. *Time Magazine.* Corpus built by the FORELL laborytory in collaboration with Philippe Rivière. Available at www.cabal.rezo.net. Retrived on 30–04–2011.
8. *Presseurop* Website. http://www.presseurop.eu/fr. Bilingual alignment by C. Grisot. Retrieved on 30–04–2011.
9. *Le monde diplomatique*. Corpus built by the FORELL laboratory in collaboration with Philippe Rivière. Available at www.cabal.rezo.net. Retrived on 30–04–2011.

Bilingual Data: Legislation and EuroParl Registers

10. *The JRC-Acquis Multilingual Parallel Corpus.* Built by J. Tiedemann (2009, 2012). Available at http://opus.lingfil.uu.se/JRC-Acquis.php Retrieved on 30–04–2011.
11. *EuConst Corpus.* Built by J. Tiedemann (2009). Available at http://opus.lingfil. uu.se/EUconst.php Retrieved on 30–04–2011.
12. *EuroParl* Corpus. Built by Philipp Koen (2005, 2012). Available at www.opus. lingfil.uu.se/ Retrieved on 30–04–2011.

Multilingual Data:

13. *Alice in Wonderland*, L. Carol (e-book). French translation by Henry Bué (e-book), Italian translation by Pietrocola-Rossetti (e-book), Romanian translation by Popescu Bogdan (e-book). Multilingual alignment by M. Costagliola and C. Grisot. Retrived on 30–03–2013.
14. *Presseurop* Website. http://www.presseurop.eu/fr. Multilingual alignment by M. Costagliola and C. Grisot. Retrieved on 30–09–2013.
15. *EuConst Corpus.* Built by J. Tiedemann (2009). Available at http://opus.lingfil. uu.se/EUconst.php Retrieved on 30–09–2013.
16. *EuroParl* Corpus. Built by Philipp Koen (2005). Available at http://www.statmt. org/europarl/. Retrieved on 30–09–2013.

References

Aickin, M. (1990). Maximum likelihood estimation of agreement in the constant predictive probability model, and its relation to Cohen's kappa. *Biometrics, 46*, 293–302.

Aijmer, K., & Altenberg, B. (1996). Introduction. In K. Aijmer, B. Altenberg, & M. Johansson (Eds.), *Languages in contrast: Papers from a symposium on text-based cross-linguistic studies, Lund, 4–5 march 1994*. Lund: Lund University Press.

Allen, R. (1966). *The verb system of present-day American English*. The Hague: Mouton.

Aménos-Pons, J. (2011). Cross-linguistic variation in procedural expressions: Semantics and pragmatics. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 235–266). Bingley: Emerald Group Publishing.

Anscombre, J.-C., & Ducrot, O. (1983). *L'argumentation dans la langue*. Bruxelles: Editions Mardaga.

Ariel, M. (1994). Interpreting anaphoric expressions: A cognitive versus a pragmatic approach. *Journal of Linguistics, 30*(01), 3–42.

Arnauld, A., & Lancelot, C. (1660). *Grammaire générale et raisonée*. Genève: Slatkine Publishers.

Artstein, R., & Poesio, M. (2008). Inter-coder agreement for computational linguistics. *Computational Linguistics, 34*(4), 555–596.

Asher, N., & Lascarides, A. (2003). *Logics of conversation*. Cambridge: Cambridge University Press.

Asr, F. A. T. O., & Demberg, V. E. (2012). Implicitness of discourse relations. In *Proceedings of COLING* (pp. 2669–2684). Mumbai.

Assimakopoulos, S. (2017). Context in relevance theory. In J. Blochowiak, C. Grisot, S. Durrlemann-Tame, & C. Laenzlinger (Eds.), *Formal models in the study of language* (pp. 221–242). Cham: Springer.

Atlas, J. D., & Levinson, S. C. (1981). It-clefts, informativeness and logical form: Radical pragmatics. In P. Cole (Ed.), *Radical pragmatics* (pp. 1–62). New York: Academic.

Avrutin, S. (2000). Comprehension of discourse-linked and non-discourse-linked questions by children and Broca's aphasics. In *Language and the brain: Representation and processing* (pp. 295–313). San Diego: Academic.

Avrutin, S. (2006). Weak syntax. In K. Amunts & Y. Grodzinsky (Eds.), *Broca's region* (pp. 49–62). New York: Oxford University Press.

Baayen, R. H. (2008). *Analyzing linguistic data*. Cambridge: Cambridge University Press.

Bach, E. (1986). The algebra of events. *Linguistics and Philosophy, 9*(1), 5–16.

Baggio, G. (2008). Processing temporal constraints: An ERP study. *Language Learning, 58*(s1), 35–55.

Baker, L. (1978). Processing temporal relationships in simple stories: Effects of input sequence. *Journal of Verbal Learning and Verbal Behavior, 17*(5), 559–572.

Baker, M. (1993). Corpus linguistics and translation studies: Implications and applications. In M. Baker, G. Francis, & E. Tognini-Bonelli (Eds.), *Text and technology: In honour of John Sinclair* (pp. 233–253). Amsterdam: John Benjamins.

Baker, M. (1995). Corpora in translation studies: An overview and some suggestions for future research. *Targets, 7*(2), 223–243.

Banfield, A. (1982). *Unspeakable sentences: Narration and representation in the language of fiction*. Boston: Routledge & Kegan Paul.

Barsalou, L. W. (1987). The instability of graded structure: Implications for the nature of concepts. In U. Neisser (Ed.), *Concepts and conceptual development: Ecological and intellectual factors in categorization* (pp. 101–140). Cambridge: Cambridge University Press.

Bastiaanse, R. (2008). Production of verbs in base position by Dutch agrammatic speakers: Inflection versus finiteness. *Journal of Neurolinguistics, 21*(2), 104–119.

Bastiaanse, R., Bamyaci, E., Hsu, C.-J., Lee, J., Duman, T. Y., & Thompson, C. K. (2011). Time reference in agrammatic aphasia: A cross-linguistic study. *Journal of Neurolinguistics, 24*(6), 652–673.

Beauzée, N. (1767). *Grammaire générale, ou exposition raisonnée des éléments nécessaires du langage, pour servir de fondement à l'étude de toutes les langues*. Stuttgart: Friedrich-Fromann Verlag.

Behrens, B., & Fabricius-Hansen, C. (2003). Translation equivalents as empirical data for semantic/pragmatic theory. The case of elaboration. *Meaning through Language Contrast, 2*, 463–476.

Bennett, M., & Partee, B. (1972). *Toward the logic of tense and aspect in English*. Bloomington: Indiana University Linguistics Club.

Bennett, M., & Partee, B. H. (1978). *Toward the logic of tense and aspect in English* (Vol. 310). Bloomington: Indiana University Linguistics Club Bloomington.

Benveniste, E. (1966). Problèmes de linguistique générale. In *Gallimard*. Paris.

Berthonneau, A.-M., & Kleiber, G. (1993). Pour une nouvelle approche de l'imparfait: l'imparfait, un temps anaphorique méronomique. *Langages, 112*, 55–73.

Bertinetto, P. M. (1986). *Tempo, aspetto e azione nel verbo italiano: il sistema dell'indicativo* (Vol. 4). Firenze: Presso l'Accademia della Crusca.

Bertinetto, P. M. (1996). La distribuzione del Perfetto Semplice e del Perfetto Composto nelle diverse varieta di italiano. *Romance Philology, 49*, 383–419.

Bever, T. (1970). Bever the cognitive basis for linguistic structures - Recherche Google. In R. Hayes (Ed.), *Cognition and language development* (pp. 279–362). New York: Wiley.

Binnick, R. I. (1991). *Time and the verb: A guide to tense and aspect*. New York: Oxford University Press.

Binnick, R. I. (2009). Tense and aspect. In F. Brisard, J.-O. Östman, & J. Verschueren (Eds.), *Grammar, meaning and pragmatics* (pp. 268–288). Amsterdam: John Benjamins.

Binnick, R. I. (2012). *The Oxford handbook of tense and aspect*. Oxford: Oxford University Press.

Bittar, A. (2010). *Building a TimeBank for French: a reference corpus annotated according to the ISO-TimeML standard* (PhD Dissertation). Paris 7, Paris.

Bittner, M. (2014). *Temporality: Universals and variation*. New York: Wiley Blackwell.

Blakemore, D. (1987). *Semantic constraints on relevance*. Oxford: Blackwell.

Blakemore, D. (1992). *Understanding utterances: An introduction to pragmatics*. Oxford: Blackwell.

Blakemore, D. (2002). Relevance and linguistic meaning. In *The semantics and pragmatics of discourse markers*. Cambridge: Cambridge University Press.

Blochowiak, J. (2009). La relation causale, ses relata et la négation. *Nouveaux Cahiers de Linguistique Française, 29*, 149–172.

Blochowiak, J. (2014a). A Presuppositional account of causal and temporal interpretations of and. *Topoi*, 1–15.

Blochowiak, J. (2014b). *A theoretical approach to the quest for understanding. Semantics and pragmatics of whys and becauses* (PhD Dissertation). Université de Genève, Genève.

Blochowiak, J. (2015a). *Connectives: concepts, procedures or both*. Presented at the 48th Annual Meeting of the Societas Linguistica Europaea, University of Leiden, Netherlands.

Blochowiak, J. (2015b, June). *Logical meaning of non-logical connectives and non-logical meaning of logical connectives*. Presented at the 1st International LogPrag Workshop, Les Diablerets.

Blochowiak, J. (2017). Connectives: Order, causality and beyond. In J. Blochowiak, C. Grisot, S. Durrleman-Tame, & C. Laenzlinger (Eds.), *Formal models in the study of language* (pp. 181–197). Cham: Springer.

Bloom, L., Lahey, M., Hood, L., Lifter, K., & Fiess, K. (1980). Complex sentences: Acquisition of syntactic connectives and the semantic relations they encode. *Journal of Child Language, 7*(2), 235–261.

Blything, L. P., Davies, R., & Cain, K. (2015). Young children's comprehension of temporal relations in complex sentences: The influence of memory on performance. *Child Development, 86*(6), 1922–1934.

Bohnet, B., Nivre, J., Boguslavsky, I., Farkas, R., Ginter, F., & Hajič, J. (2013). Joint morphological and syntactic analysis for richly inflected languages. *Transactions of the Association for Computational Linguistics, 1*, 415–428.

Bojar, O., Chatterjee, R., Federmann, C., Haddow, B., Huck, M., Hokamp, C., … Turchi, M. (2015). Findings of the 2015 workshop on statistical machine translation. In *Proceedings of the 9th workshop on statistical machine translation* (pp. 1–46). Portugal: Association for Computational Linguistics, University of Lisbonne.

Boogaart, R. J. U. (1999). *Aspect and temporal ordering: A contrastive analysis of Dutch and English* (PhD Dissertation). Holland Academic Graphics, The Hague.

Borillo, A., Bras, M., Le Draoulec, A., Vieu, L., Molendijk, A., De Swart, H., et al. (2004). Tense, connectives and discourse structure. In F. Corblin & H. De Swart (Eds.), *Handbook of French semantics* (pp. 309–348). Stanford: CSLI Publications.

Bras, M. (2008). *Entre relations temporelles et relations de discours (Rapport)*. Toulouse: Université de Toulouse II-Le Mirail.

Bras, M., Le Draoulec, A., & Vieu, L. (2001). French adverbial puis between temporal structure and discourse structure. In M. Bras & L. Vieu (Eds.), *Semantic and pragmatic issues in discourse and dialogue: Experimenting with current theories*, *CRiSPI*. New York: Elsevier.

Britton, B. K., & Gernsbacher, M. A. (1994). Understanding expository text: Building mental structures to induce insights. In *Handbook of psycholinguistics* (pp. 641–674). San Diego: Academic.

Brunot, F. (1922). *La pensée et la langue: méthode, principes et plan d'une théorie nouvelle du langage appliquée au français*. Paris: Masson.

Cain, K., & Nash, H. M. (2011). The influence of connectives on young readers' processing and comprehension of text. *Journal of Educational Psychology, 103*(2), 429.

Călăraşu, C. (1992). Quelques significations des temps verbaux roumains en perspective romane (avec applications aux langues roumaine et française). *Revue Roumaine de Linguistique, 37*, 137–143.

Canestrelli, A. (2013). *Small words, big effects? Subjective versus objective causal connectives in discourse processing*. Utrecht: Netherlands Graduate School of Linguistics.

Canestrelli, A. R., Mak, W. M., & Sanders, T. J. (2013). Causal connectives in discourse processing: How differences in subjectivity are reflected in eye movements. *Language and Cognitive Processes, 28*(9), 1394–1413.

Carletta, J. (1996). Assessing agreement on classification tasks: The kappa statistic. *Computational Linguistics, 22*(2), 249–254.

Carreiras, M., Carriedo, N., Alonso, M. A., & Fernández, A. (1997). The role of verb tense and verb aspect in the foregrounding of information during reading. *Memory & Cognition, 25*(4), 438–446.

Carruthers, P. (2006). *The architecture of the mind*. Oxford: Oxford University Press.

Carston, R. (1988). Implicature, explicature, and truth-theoretic semantics. In R. Kempson (Ed.), *Mental representations: The interface between language and reality* (pp. 155–181). Cambridge: Cambridge University Press.

Carston, R. (1998). Informativeness, relevance and scalar implicature. In R. Carston & S. Uchida (Eds.), *Relevance theory: Applications and implications* (pp. 179–238). Amsterdam: John Benjamins.

Carston, R. (2002). Metaphor, ad hoc concepts and word meaning–more questions than answers. *UCL Working Papers in Linguistics, 14*, 83–105.

Carston, R. (2004). Relevance theory and the saying/implicating distinction. In L. Horn & G. Ward (Eds.), *Handbook of pragmatics* (pp. 633–656). Oxford: Blackwell Publishing.

Carston, R. (2010). Lexical pragmatics, ad hoc concepts and metaphor: From a relevance theory perspective. *Italian Journal of Linguistics, 22*(1), 153–180.

Cartoni, B., Zufferey, S., & Meyer, T. (2013). Annotating the meaning of discourse connectives by looking at their translation: The translation-spotting technique. *Dialogue & Discourse, 4*(2), 65–86.

Charniak, E., & Johnson, M. (2005). Coarse-to-fine n-best parsing and MaxEnt discriminative reranking. In *Proceedings of the 43rd annual meeting on association for computational linguistics* (pp. 173–180). New Brunswick: Association for Computational Linguistics.

Chomsky, N. (1957). *Syntactic structures*. Berlin: Walter de Gruyter.

Chomsky, N. (1965). *Aspectsof the theory of syntax*. Cambridge, MA: MIT Press.

Chomsky, N. (1995). *The minimalist program*. Cambridge, MA: MIT Press.

Chomsky, N. (2000). Minimalist inquiries. In R. Martin, D. Michaels, & J. Uriagereka (Eds.), *Step by step: Essays on minimalist syntax in honor of Howard Lasnik* (pp. 89–156). Cambridge, MA: MIT Press.

Clark, E. V. (1971). On the acquisition of the meaning of before and after. *Journal of Verbal Learning and Verbal Behavior, 10*(3), 266–275.

Clark, H. H., & Clark, E. V. (1968). Semantic distinctions and memory for complex sentences. *The Quarterly Journal of Experimental Psychology, 20*(2), 129–138.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*(1), 37–46.

Cohen, L. J., & Bar-Hillel, Y. (1971). Some remarks on Grice's views about the logical particles of natural language. In *Pragmatics of natural languages* (pp. 50–68). Dordrecht: Springer.

Comrie, B. (1976). *Aspect: An introduction to the study of verbal aspect and related problems*. Cambridge: Cambridge University Press.

Comrie, B. (1981). *The languages of the Soviet Union*. Cambridge: Cambridge University Press.

Comrie, B. (1985). *Tense*. Cambridge: Cambridge University Press.

Cowper, E. (2005). The geometry of interpretable features: Infl in English and Spanish. *Language, 81*, 10–46.

Cozijn, R., Noordman, L. G., & Vonk, W. (2011). Propositional integration and world-knowledge inference: Processes in understanding because sentences. *Discourse Processes, 48*(7), 475–500.

Curcó, C. (2011). On the status of procedural meaning in natural language. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 33–54). Bingley: Emerald Group Publishing.

Dahl, Ö. (1985). *Tense and aspect systems*. Oxford: Blackwell.

Dahl, Ö., & Velupillai, V. (2013). Perfective/imperfective aspect. In M. S. Dryer & M. Haspelmath (Eds.), *The world atlas of language structures online*. Leipzig: Max Planck Institute for Evolutionary Anthropology Retrieved from http://wals.info/chapter/65.

Davidson, D. (1967). Causal relations. *The Journal of Philosophy, 64*(21), 691–703.

Davidson, D. (1980). *Essays on actions and events*. Oxford: Clarendon Press.

de Beaugrande, R., & Dressler, W. U. (1981). *Einführung in die Textlinguistik* (Vol. 28). Tübingen: Niemeyer Tübingen.

Declerck, R. (1989). Boundedness and the structure of situations. *Leuvense Bijdragen, 78*, 275–308.

Declerck, R. (2006). *The grammar of the English verb phrase*. Berlin: Mouton de Gruyter.

de Saussure, L. (1997). Passé simple et encapsulation d'événements. *Cahiers de Linguistique Française, 19*, 323–344.

de Saussure, L. (1998a). L'approche référentielle: de Beauzée à Reichenbach. In J. Moeschler, J. Jayez, M. Kozlowska, J.-M. Luscher, L. Saussure de, & B. Sthioul (Eds.), *Le temps des événements* (pp. 19–44). Paris: Kimé.

de Saussure, L. (1998b). L'encapsulation des événements. L'exemple du passé simple. In J. Moeschler, J. Jayez, M. Kozlowska, J.-M. Luscher, L. de Saussure, & B. Sthioul (Eds.), *Le temps des événements* (pp. 245–270). Paris: Kimé.

de Saussure, L. (2000a). *Pragmatique temporelle des énoncés négatifs* (PhD thesis). Université de Genève, Genève.

de Saussure, L. (2000b). Quand le temps ne progresse pas avec le passé simple. In A. Carlier, V. Lagae, & C. Benninger (Eds.), *Passé et parfait* (pp. 37–48). Amsterdam: Rodopi.

de Saussure, L. (2003). *Temps et pertinence: éléments de pragmatique cognitive du temps*. Bruxelles: De Boeck Duculot.

de Saussure, L. (2007). L'étrange cas de puis en usages discursif et argumentatif. *Cahiers Chronos*. Retrieved from http://www.unine.ch/files/live/sites/louis.desaussure/files/shared/documents/publications/SaussurePuis.pdf

de Saussure, L. (2011). On some methodological issues in the conceptual/procedural distinction. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 55–79). Bingley: Emerald Group Publishing.

de Saussure, L. (2013). Perspectival interpretations of tenses. In K. M. Jaszczolt & L. Saussure de (Eds.), *Time, language, cognition and reality* (pp. 46–69). Oxford: Oxford University Press.

de Saussure, L., & Morency, P. (2012). A cognitive-pragmatic view of the French epistemic future. *Journal of French Language Studies, 22*, 207–223.

de Saussure, L., & Sthioul, B. (1999). L'imparfait narratif: Point de vue (et images du monde). *Cahiers de Praxématique, 32*, 167–188.

de Saussure, L., & Sthioul, B. (2005). Imparfait et enrichissement pragmatique. In P. Larivée & E. Labeau (Eds.), *Nouveaux développements de l'imparfait* (pp. 103–120). Amsterdam: Rodopi.

de Swart, H. (1998). Aspect shift and coercion. *Natural Language & Linguistic Theory, 16*(2), 347–385.

de Swart, H. (2003). Coercion in a cross-linguistic theory of aspect. In E. Francis & L. A. Michaelis (Eds.), *Mismatch: Form-function incongruity and the architecture of grammar* (pp. 231–258). Stanford: CSLI Publications.

de Swart, H. (2011). Mismatches and coercion. In C. Maieborn, K. von Heusinger, & P. Portner (Eds.), *International handbook of natural language meaning* (pp. 574–598). Berlin: Mouton de Gruyter.

De Vega, M., Robertson, D. A., Glenberg, A. M., Kaschak, M. P., & Rinck, M. (2004). On doing two things at once: Temporal constraints on actions in language comprehension. *Memory & Cognition, 32*(7), 1033–1043.

Declerck, R. (1979). Aspect and the bounded/unbounded (telic/atelic) distinction. *Linguistics, 17*(9–10), 761–794.

Declerck, R. (1986). From Reichenbach (1947) to Comrie (1985) and beyond: Towards a theory of tense. *Lingua, 70*(4), 305–364.

Declerck, R. (1991a). *A comprehensive descriptive grammar of English*. Tokyo: Kaitakusha.

Declerck, R. (1991b). *Tense in English: Its structure and use in discourse*. London: Routledge.

Degand, L., & Pander Maat, H. (2003). A contrastive study of Dutch and French causal connectives on the speaker involvement scale. *LOT Occasional Series, 1*, 175–199.

Depraetere, I. (1995a). On the necessity of distinguishing between (un) boundedness and (a) telicity. *Linguistics and Philosophy, 18*(1), 1–19.

Depraetere, I. (1995b). The effect of temporal adverbials on (a) telicity and (un) boundedness. In P. M. Bertineto, V. Bianchi, Ö. Dahl, & M. Squartini (Eds.), *Temporal reference, aspect and actionality* (pp. 43–53). Torino: Rosenberg & Sellier.

Dery, J. E., & Koenig, J.-P. (2015). A narrative-expectation-based approach to temporal update in discourse comprehension. *Discourse Processes, 52*(7), 559–584.

Doron, E. (1991). Point of view as a factor of content. In S. Moore & A. Z. Wyner (Eds.), *Proceedings of SALT* (pp. 51–64). New York: Cornell University Press.

Dowty, D. R. (1972). *Studies in the logic of verb aspect and time reference in English* (PhD Dissertation). University of Texas, Austin.

Dowty, D. R. (1979). *Word meaning and Montague grammar: The semantics of verbs and times in generative semantics and in Montague's PTQ*. Dordrecht: Kluwer Academic Publishers.

Dowty, D. R. (1982). Tenses, time adverbs, and compositional semantic theory. *Linguistics and Philosophy, 5*(1), 23–55.

Dowty, D. R. (1986). The effects of aspectual class on the temporal structure of discourse: Semantics or pragmatics? *Linguistics and Philosophy, 9*(1), 37–61.

Dragoy, O., & Bastiaanse, R. (2013). Aspects of time: Time reference and aspect production in Russian aphasic speakers. *Journal of Neurolinguistics, 26*(1), 113–128.

Dragoy, O., Stowe, L. A., Bos, L. S., & Bastiaanse, R. (2012). From time to time: Processing time reference violations in Dutch. *Journal of Memory and Language, 66*(1), 307–325.

Dry, H. A. (1981). Sentence aspect and the movement of narrative time. *Text, 1*(3), 233–240.

Dry, H. A. (1983). The movement of narrative time. *Journal of Literary Semantics, 12*(2), 19–53.

Ducrot, O. (1979). L'imparfait en français. *Linguistische Berichte Braunschweig, 60*, 1–23.

Dyvik, H. (1998). A translational basis for semantics. In S. Johansson & S. Oksefjell (Eds.), *Corpora and cross-linguistic research: Theory, method and case studies* (pp. 51–86). Amsterdam: Rodopi.

Eisele, A., & Chen, Y. (2010). MultiUN: A multilingual corpus from United Nation Documents. In *LREC* (pp. 2500–2504). University of Malta.

Escandell-Vidal, V., & Leonetti, M. (2011). On the rigidity of procedural meaning. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 81–102). Bingley: Emerald Group Publishing.

Escandell-Vidal, V., Leonetti, M., & Ahern, A. (Eds.). (2011). *Procedural meaning: Problems and perspectives*. Bingley: Emerald Group Publishing.

Evers-Vermeul, J., & Sanders, T. (2009). The emergence of Dutch connectives; how cumulative cognitive complexity explains the order of acquisition. *Journal of Child Language, 36*(4), 829–854. https://doi.org/10.1017/S0305000908009227.

Evers-Vermeul, J., Hoek, J., & Scholman, M. C. (2017). On temporality in discourse annotation: Theoretical and practical considerations. *Dialogue & Discourse, 8*(2), 1–20.

Faroqi-Shah, Y., & Dickey, M. W. (2009). On-line processing of tense and temporality in agrammatic aphasia. *Brain and Language, 108*(2), 97–111.

Faroqi-Shah, Y., & Thompson, C. K. (2007). Verb inflections in agrammatic aphasia: Encoding of tense features. *Journal of Memory and Language, 56*(1), 129–151.

Ferretti, T. R., Kutas, M., & McRae, K. (2007). Verb aspect and the activation of event knowledge. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 33*(1), 182.

Ferretti, T. R., Rohde, H., Kehler, A., & Crutchley, M. (2009). Verb aspect, event structure, and coreferential processing. *Journal of Memory and Language, 61*(2), 191–205.

Fillmore, C. J. (1992). Corpus linguistics or computer-aided armchair linguistics. In J. Svartvik (Ed.), *Directions in corpus linguistics* (pp. 35–60). Berlin: Mouton de Gruyter.

Fodor, J. A. (1983). *The modularity of mind: An essay on faculty psychology*. Cambridge, MA: MIT press.

Frank, A. F., & Jaeger, T. F. (2008). Speaking rationally: Uniform information density as an optimal strategy for language production. In *Proceedings of the cognitive science society* (Vol. 30).

Fraser, B. (2006). On the conceptual/procedural distinction. *Style, 40*(1–2), 24–32.

Friedmann, N. (2008). Traceless relatives: Agrammatic comprehension of relative clauses with resumptive pronouns. *Journal of Neurolinguistics, 21*(2), 138–149.

Friedmann, N., & Grodzinsky, Y. (1997). Tense and agreement in agrammatic production: Pruning the syntactic tree. *Brain and Language, 56*(3), 397–425.

Gagarina, N. (2004). Does the acquisition of aspect have anything to do with aspectual pairs. *ZAS Papers in Linguistics, 33*, 39–61.

Garey, H. B. (1957). Verbal aspect in French. *Language, 33*(2), 91–110.

Garnham, A., & Oakhill, J. (1985). On-line resolution of anaphoric pronouns: Effects of inference making and verb semantics. *British Journal of Psychology, 76*(3), 385–393.

Garnham, A., & Oakhill, J. (1996). The mental models theory of language comprehension. In B. Britton & A. C. Graesser (Eds.), *Models of understanding text* (pp. 313–339). New York: Psychology Press.

Garnham, A., Traxler, M., Oakhill, J., & Gernsbacher, M. A. (1996). The locus of implicit causality effects in comprehension. *Journal of Memory and Language, 35*(4), 517–543. https://doi.org/10.1006/jmla.1996.0028.

Gellerstam, M. (1996). Translations as a source for cross-linguistic studies. In K. Aijmer, B. Altenberg, & M. Johansson (Eds.), *Languages in contrast: Papers from a symposium on text-based cross-linguistic studies* (pp. 53–62). Lund: Lund Universtity Pres.

Gennari, S. P. (2004). Temporal references and temporal relations in sentence comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 30*(4), 877.

Gernsbacher, M. A., & Givón, T. (1995). *Coherence in spontaneous text* (Vol. 31). Amsterdam: John Benjamins Publishing.

Gibbs, R. W., Jr. (2002). A new look at literal meaning in understanding what is said and implicated. *Journal of Pragmatics, 34*(4), 457–486.

Gibbs, R. W., Jr., & Moise, J. F. (1997). Pragmatics in understanding what is said. *Cognition, 62*(1), 51–74.

Gilquin, G., & Gries, S. T. (2009). Corpora and experimental methods: A state-of-the-art review. *Corpus Linguistics and Linguistic Theory, 5*(1), 1–26.

Giorgi, A., & Pianesi, F. (1997). *Tense and aspect: Form semantics to Morphosyntax*. Oxford: Oxford University Press.

Givón, T. (1989). *Code, mind and context*. Chicago: Chicago University Press.

Givón, T. (1995). Coherence in text vs. coherence in mind. In M. A. Gernsbacher & T. Givón (Eds.), *Introduction: Coherence as a mental entity* (pp. 59–116). Amsterdam/Philadelphia: John Benjamins Publishing.

Glenberg, A. M., Meyer, M., & Lindem, K. (1987). Mental models contribute to foregrounding during text comprehension. *Journal of Memory and Language, 26*(1), 69–83.

Gosselin, L. (1996). *Sémantique de la temporalité en français: un modèle calculatoire et cognitif du temps et de l'aspect*. Bruxelles: Duculot.

Gosselin, L. (2007). Les séquences de connecteurs temporels: ordre et informativité des constituants. *Cahiers Chronos, 18*, 47–68.

Graesser, A. C., Millis, K. K., & Zwaan, R. A. (1997). Discourse comprehension. *Annual Review of Psychology, 48*, 163–189. https://doi.org/10.1146/annurev.psych.48.1.163.

Granger, S. (2003). The corpus approach: A common way forward for contrastive linguistics and translation studies. In S. Granger, J. Lerot, & S. Petch-Tyson (Eds.), *Corpus-based approaches to contrastive linguistics and translation studies* (pp. 17–29). Amsterdam: Rodopi.

Grevisse, M. (1980). *Le bon usage* (11th ed.). Bruxelles: De Boeck Duculot.

Grevisse, M. (2016). *Le bon usage* (16th ed.). Louvain la Neuve: De Boeck Duculot.

Grice, H. P. (1967). *William James lectures*. Cambridge, MA: Harvard University Press.

Grice, H. P. (1975). Logic and conversation. In P. Cole, & J. Morgan (Eds.), *Syntax and Semantics* (Vol. 3: Speech Acts). New York: Academic.

Grice, H. P. (1989). *Study in the way of words*. Cambridge: Cambridge University Press.

Gries, S. T. (2002). Evidence in linguistics: Three approaches to genitives in English. *The LACUS Forum, 28*, 17–31.

Gries, S. T. (2009). *Quantitative corpus linguistics with R: A practical introduction*. Oxon: Routledge.

Grisot, C. (submitted). Les temps verbaux du français donnent-ils accès à la subjectivité du locuteur ? Etude empirique. *Journal of French Language Studies.*

Grisot, C. (2015). *Temporal reference: Empirical and theoretical perspectives. Converging evidence from English and romance*. Geneva: University of Geneva.

Grisot, C. (2017a). A quantitative approach to conceptual, procedural and pragmatic meaning: Evidence from inter-annotator agreement. *Journal of Pragmatics, 117*, 245–263.

Grisot, C. (2017b). Temporal coherence in discourse: Theory and application for machine translation. In J. Blochowiak, C. Grisot, S. Durrleman-Tame, & C. Laenzlinger (Eds.), *Formal models in the study of language* (pp. 355–373). Cham: Springer.

Grisot, C. (2017c). Tense, grammatical aspect and subjectivity: An experimental study using inter-annotator agreement rates and corpus-based data. *Corpus Pragmatics*, 1–29.

Grisot, C., & Blochowiak, J. (2015). Le traitement en ligne des discours temporels: le Passé Composé et le connecteur pragmatique "ensuite.". *Cahiers de Linguistique Française, 32*, 85–102.

Grisot, C., & Blochowiak, J. (2017). *Processing implicit and explicit temporal relations: evidence from French*. Oral presentation at 50th annual meeting of Societas Linguistica Europaea, 10–13 September 2017, Zürich, Switzerland.

Grisot, C., & Blochowiak, J. (2018). Temporal connectives and verbal tenses as processing instructions: evidence from French. *Pragmatics and Cognition*. https://benjamins.com/catalog/pc

Grisot, C., & Costagliola, M. (2014). *What do translation corpora tell us about the semantics and pragmatics of tense? The case of the English preterit*. Presented at the Chronos 11, Scuola Normale Superiore, Italy.

Grisot, C., & Meyer, T. (2014). Cross-linguistic annotation of narrativity for English/French verb tense disambiguation. In *9th Edition of the Language Resources and Evaluation Conference* (pp. 963–966). Reykjavik, Island.

Grisot, C., & Moeschler, J. (2014). How do empirical methods interact with theoretical pragmatics? The conceptual and procedural contents of the English simple past and its translation into French. In J. Romero-Trillo (Ed.), *Yearbook of Corpus linguistics and pragmatics 2014: New empirical and theoretical paradigms* (pp. 7–33). Cham: Springer International Publishing.

Grivaz, C. (2012). *Automatic extraction of causal knowledge from natural language texts* (PhD Dissertation). Université de Genève, Genève.

Guenthner, F., Hoepelman, J., & Rohrer, C. (1978). A note on the passé simple. In C. Rohrer (Ed.), *Papers on tense. Aspect and verb classification* (pp. 18–36). Tüurbingen: Narr.

Guillaume, G. (1929). *Temps et verbe: théorie des aspects, des modes, et des temps*. Paris: Champion.

Guillemin-Flescher, J. (1981). *Syntaxe comparée du français et de l'anglais: problèmes de traduction*. Paris: Editions Ophrys.

Gundel, J. K., & Mulkern, A. E. (1998). Quantity implicatures in reference understanding. *Pragmatics & Cognition, 6*(1), 21–45.

Guțu-Romalo, V. (2005). *Gramatica Limbii Române (GLR)* (Vol. 1–2). București: Editura Academiei Române.

Haberlandt, K. (1982). Reader expectations in text comprehension. In J. F. Le Ny & W. Kintsch (Eds.), *Language and language comprehension* (pp. 239–249). Amsterdam: Noth-Holland.

Hall, R. A. (1964). *Introductory linguistics*. New York: Chilton Books.

Halliday, M. A. K., & Hasan, R. (1976). *Cohesion in English*. London: Longman.

Hansen, M.-B. M. (1995). Puis in spoken French: From time adjunct to additive conjunct. *Journal of French Language Studies, 5*(01), 31–56.

Hardmeier, C. (2014). *Discourse in statistical machine translation*. Uppsala: Acta Universitatis Upsaliensis.

Hardmeier, C., Nivre, J., & Tiedemann, J. (2012). Document-wide decoding for phrase-based statistical machine translation. In *Proceedings of the 2012 joint conference on empirical methods*

in natural language processing and computational natural language learning (pp. 1179–1190). Stroudsburg: Association for Computational Linguistics.

Harris, M. (1982). The 'past simple'and the 'present perfect'in romance. In *Studies in the romance verb* (pp. 42–70). London: Croom Helm.

Heafield, K. (2011). KenLM: Faster and smaller language model queries. In *Proceedings of the sixth workshop on statistical machine translation* (pp. 187–197). Stroudsburg: Association for Computational Linguistics.

Heim, I., & Kratzer, A. (1998). *Semantics in generative grammar*. Oxford: Blackwell.

Hinrichs, E. (1986). Temporal anaphora in discourses of English. *Linguistics and Philosophy, 9*(1), 63–82.

Hobbs, J. R. (1979). Coherence and coreference. *Cognitive Science, 3*(1), 67–90.

Hobbs, J. R. (1985). *On the coherence and structure of discourse* (No. CSLI-85-37). Center for the study of language and information: Stanford University.

Hoek, J., & Zufferey, S. (2015). Factors influencing the implicitation of discourse relations across languages. In *Proceedings 11th Joint ACL-ISO Workshop on interoperable semantic annotation (isa-11)* (pp. 39–45). TiCC, Tilburg center for Cognition and Communication.

Horn, L. (2004). Implicature. In L. Horn & G. Ward (Eds.), *The handbook of pragmatics* (pp. 3–28). Oxford: Blackwell.

Hornstein, N. (1990). *As time goes by*. Cambridge, MA: MIT Press.

Huddleston, R. D., & Pullum, G. K. (2006). *A student's introduction to English grammar* (2nd ed.). Cambridge: Cambridge University Press.

Hume, D. (1738). *A treatise of human nature*. London: Millar.

Imbs, P. (1960). *L'emploi des temps verbaux en français moderne*. Paris: Klincksieck.

Jaeger, T. F. (2010). Redundancy and reduction: Speakers manage syntactic information density. *Cognitive Psychology, 61*(1), 23–62.

Jaszczolt, K. (2005). *Default semantics: Foundations of a compositional theory of acts of communication*. Oxford: Oxford University Press.

Jaszczolt, K. M. (2009). *Representing time: An essay on temporality as modality*. Oxford: Oxford University Press.

Jaszczolt, K. M. (2012). Cross-linguistic differences in expressing time and universal principles of utterance interpretation. In L. Filipovic & K. M. Jaszczolt (Eds.), *Space and time in languages and cultures: Linguistic diversity* (pp. 95–122). Amsterdam: John Benjamins.

Jespersen, O. (1924). *The philosophy of grammar*. Chicago: University of Chicago Press.

Jespersen, O. (1948). *A modern English grammar on historical principles* (2nd ed., Vol. 3, Time and tense). London: George Allen & Unwin Limited.

Johansson, S. (1998). On the role of corpora in cross-linguistic research. In S. Johansson & S. Oksefjell (Eds.), *Corpora and cross-linguistic research: Theory, method and case studies* (pp. 3–24). Amsterdam: Rodopi.

Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference, and consciousness*. Cambridge, MA: Harvard University Press.

Kaiser, E., & Trueswell, J. C. (2004). The role of discourse context in the processing of a flexible word-order language. *Cognition, 94*(2), 113–147.

Kamp, H. (1979). Events, instants and temporal reference. In R. Bauerle, U. Egli, & A. von Stechow (Eds.), *Semantics from different points of view* (pp. 376–418). Amsterdam: Springer.

Kamp, H. (1981). A theory of truth and semantic representation. In P. Portner & B. Partee (Eds.), *Formal semantics-the essential readings* (pp. 189–222). Oxford: Blackwell.

Kamp, H., & Rohrer, C. (1983). Tense in texts. In R. Bauerle, C. Schwarze, & A. von Stechow (Eds.), *Meaning, use and interpretation of language* (pp. 250–269). Berlin: Walter de Gruyter.

Kamp, H., & Reyle, U. (1993). *From discourse to logic: Introduction to modeltheoretic semantics of natural language, formal logic and discourse representation theory*. Amsterdam: Springer.

Kehler, A. (1994). Temporal relations: Reference or discourse coherence? In *Proceedings of the 32nd annual meeting on Association for Computational Linguistics* (pp. 319–321). Stroudsburg: Association for Computational Linguistics. https://doi.org/10.3115/981732.981779.

Kehler, A. (2004). Discourse coherence. In L. R. Horn & G. Ward (Eds.), *The handbook of pragmatics* (pp. 241–265). Oxford: Blackwell.

Kehler, A., & Rohde, H. (2013). A probabilistic reconciliation of coherence-driven and centering-driven theories of pronoun interpretation. *Theoretical Linguistics, 39*, 1–2), 1–37.

Kehler, A., Kertz, L., Rohde, H., & Elman, J. L. (2008). Coherence and coreference revisited. *Journal of Semantics, 25*(1), 1–44.

Kennedy, G. D. (1998). *An introduction to corpus linguistics*. London: Longman.

Kenny, A. (1963). *Action, emotion and will*. London: Routledge & Kegan Paul.

Kepser, S., & Reis, M. (2005). *Linguistic evidence: Empirical, theoretical and computational perspectives*. Berlin: Walter de Gruyter.

Kintsch, W. (1995). How readers construct situation models for stories. The role of syntactic cues and causal inferences. In M. A. Gernsbacher & T. Givón (Eds.), *Introduction: Coherence as a mental entity* (pp. 139–160). Amsterdam/Philadelphia: John Benjamins Publishing.

Kintsch, W. (2005). An overview of top-down and bottom-up effects in comprehension: The CI perspective. *Discourse Processes, 39*(2–3), 125–128.

Kintsch, W., & Van Dijk, T. A. (1978). Toward a model of text comprehension and production. *Psychological Review, 85*(5), 363.

Kiparsky, P. (1968). Linguistic universals and linguistic change. In E. Bach & R. Harms (Eds.), *Universals in linguistic theory* (pp. 170–202). New York: Holt, Rinehart, and Winston.

Kleiber, G. (1993). Lorsque l'anaphore se lie aux temps grammaticaux. In C. Vetters (Ed.), *Le Temps de la phrase au texte* (pp. 115–166). Lille: Presses Universitaires de Lille.

Kleiber, G. (1994). *Anaphores et pronoms*. Bruxelles: Duculot.

Kleiber, G. (2003). Entre les deux mon coeur balance ou l'imparfait entre aspect et anaphore. *Langue Française, 138*, 8–19.

Kleiber, G., & Riegel, M. (1989). Une sémantique qui n'a pas de sens n'a vraiment pas de sens. *Linguisticae Investigationes, 13*(2), 405–417.

Kleiber, G., & Riegel, M. (1991). Sens lexical et interprétations référentielles: un écho à la réponse de D. Kayser. *Linguisticae Investigationes, 15*(1), 181–201.

Klein, W. (1992). The present perfect puzzle. *Language, 68*, 525–552.

Klein, W. (1994). *Time in language*. London/New York: Routledge.

Klum, A. (1961). *Verbe et adverbe*. Upsala: Almqvist and Wiksell.

Knott, A., & Dale, R. (1994). Using linguistic phenomena to motivate a set of coherence relations. *Discourse Processes, 18*(1), 35–62.

Koehn, P. (2004). Statistical significance tests for machine translation evaluation. In *Proceedings of the 2004 conference on empirical methods in natural language processing*.

Koehn, P. (2005). Europarl: A parallel corpus for statistical machine translation. In *MT summit* (Vol. 5, pp. 79–86).

Koehn, P. (2010). *Statistical machine translation*. Cambridge: Cambridge University Press.

Koehn, P., & Hoang, H. (2007). Factored translation models. In *EMNLP-CoNLL* (pp. 868–876).

Koehn, P., Hoang, H., Birch, A., Callison-Burch, C., Federico, M., Bertoldi, N., et al. (2007). Moses: Open source toolkit for statistical machine translation. In *Proceedings of the 45th annual meeting of the ACL on interactive poster and demonstration sessions* (pp. 177–180). Association for Computational Linguistics.

Kolaiti, P., & Wilson, D. (2014). Corpus analysis and lexical pragmatics: An overview. *International Review of Pragmatics, 6*(2), 211–239.

Koornneef, A. W., & Sanders, T. J. (2013). Establishing coherence relations in discourse: The influence of implicit causality and connectives on pronoun resolution. *Language and Cognitive Processes, 28*(8), 1169–1206.

Koornneef, A. W., & Van Berkum, J. J. (2006). On the use of verb-based implicit causality in sentence comprehension: Evidence from self-paced reading and eye tracking. *Journal of Memory and Language, 54*(4), 445–465.

Kozlowska, M. (1996). Ensuite et l'ordre temporel. *Cahiers de Linguistique Française, 18*, 243–274.

Kozlowska, M. (1998a). Aspect, modes d'action et classes aspectuelles. In J. Moeschler, J. Jayez, J.-M. Luscher, L. de Saussure, & B. Sthioul (Eds.), *Le temps des événements* (pp. 101–121). Paris: Kimé.

Kozlowska, M. (1998b). Bornage, télicité et ordre temporel. In J. Moeschler, J. Jayez, J.-M. Luscher, L. Saussure de, & B. Sthioul (Eds.), *Le temps des événements* (pp. 221–244). Paris: Kimé

Kratzer, A. (1977). What 'must'and 'can'must and can mean. *Linguistics and Philosophy, 1*(3), 337–355.

Kratzer, A. (2012). *Modals and conditionals: New and revised perspectives*. Oxford: Oxford University Press.

Krippendorff, K. (1980). *Content analysis: An introduction to its methodology* (Vol. 7). Beverly Hills: Sage.

Krzeszowski, T. P. (1990). *Contrasting languages: The scope of contrastive linguistics* (Vol. 51). Berlin: Walter de Gruyter.

Labov, W., & Waletzky, J. (1967). Narrative analysis: Oral versions of personal experience. In J. Helm (Ed.), *Essays on the verbal and visual arts*. Seattle: University of Washington Press.

Lafferty, J., McCallum, A., & Pereira, F. C. (2001). Conditional random fields: Probabilistic models for segmenting and labeling sequence data.

Lakoff, G. (1965). *On the nature of syntactic irregularity* (PhD Dissertation). Indiana University, Bloomington.

Lascarides, A., & Asher, N. (1993). Temporal interpretation, discourse relations and commonsense entailment. *Linguistics and Philosophy, 16*(5), 437–493.

Laviosa, S. (2002). *Corpus-based translation studies: Theory, findings, applications*. Amsterdam: Rodopi.

Leech, G. N. (2004). *Meaning and the English verb* (3rd ed.). London: Routledge.

Leech, G. (2005). Adding linguistic annotation. In M. Wynne (Ed.), *Developing linguistic corpora : A guide to good practice* (pp. 17–29). Oxford: Oxbow Books.

Leech, G., & Svartvik, J. (1975). *A communicative grammar of English* (1st ed.). London: Longman.

Leech, G., & Svartvik, J. (2002). *A communicative grammar of English* (3rd ed.). New York: Routledge.

Lefer, M.-A. (2009). *Exploring lexical morphology across languages: a corpus-based study of prefixation in English and French writing* (PhD Dissertation). Universtité Catolique de Louvain, Louvain.

Leonetti, M., & Escandell-Vidal, V. (2003). On the quotative readings of Spanish imperfecto. *Cuadernos de Lingüística Del IU Ortega y Gasset, 10*, 135–154.

Lepschy, A. L., & Lepschy, G. (1998). *The Italian language today* (2nd ed.). London: Routledge.

Levinson, S. C. (1983). *Pragmatics*. Cambridge: Cambridge Textbooks in Linguistics.

Levinson, S. C. (1987). Pragmatics and the grammar of anaphora: A partial pragmatic reduction of binding and control phenomena. *Journal of Linguistics, 23*(02), 379–434.

Levinson, S. C. (1989). A review of relevance. *Journal of Linguistics, 25*(02), 455–472.

Levinson, S. C. (2000). *Presumptive meanings: The theory of generalized conversational implicature*. Cambridge, MA: MIT Press.

Levy, R., & Jaeger, T. F. (2007). Speakers optimize information density through syntactic reduction. *Advances in Neural Information Processing Systems, 19*, 849.

Li, W., Wong, K.-F., & Yuan, C. (2001). A model for processing temporal references in Chinese. In *Proceedings of the workshop on Temporal and spatial information processing* (Vol. 13, p. article no. 5).

Li, W., Wong, K.-F., Cao, G., & Yuan, C. (2004). Applying machine learning to Chinese temporal relation resolution. In *Proceedings of the 42nd annual meeting on association for computational linguistics* (pp. 582–588). Stroudsburg: Association for Computational Linguistics.

Lin, J.-W. (2012). Tenselessness). In R. I. Binnick (Ed.), *The Oxford handbook of tense and aspect* (pp. 669–695). Oxford: Oxford University Press.

Loáiciga, S. (2017). *Pronominal anaphora and verbal tenses in machine translation*. Geneva: University of Geneva.

Loáiciga, S., & Grisot, C. (2016). Predicting the lexical aspect of simple past verbs for English-to-French machine translation. *Linguistic Issues in Language Technology (LiLT)*.

Loáiciga, S., Meyer, T., & Popescu-Belis, A. (2014). English-French verb phrase alignment in Europarl for tense translation modeling. In *The Ninth language resources and evaluation conference* (pp. 674–681). Reykjavik, Island.

Longacre, R. E. (1983). *The grammar of discourse*. New York: Springer Science & Business Media.

Ludlow, P. (2013). Tensism. In K. M. Jaszczolt & L. de Saussure (Eds.), *Time, language, cognition and reality* (pp. 175–192). Oxford: Oxford University Press.

Luscher, J.-M. (1998). Procédure d'interprétation du Passé Composé. In J. Moeschler, J. Jayez, M. Kozlowska, J.-M. Luscher, L. de Saussure, & B. Sthioul (Eds.), *Le temps des événements* (pp. 181–196). Paris: Kimé.

Luscher, J.-M., & Sthioul, B. (1996). *Emplois et interprétations du Passé Composé. Cahiers de Linguistique Française* (Vol. 18, pp. 187–217).

Lyons, J. (1977). *Semantics*. Cambridge: Cambridge University Press.

Madden, C. J., & Ferretti, T. R. (2009). Verb aspect and the mental representation of situations. In W. Klein & P. Li (Eds.), *The expression of time* (Vol. 3, pp. 217–231). Berlin: Mouton de Gruyter.

Madden, C. J., & Zwaan, R. A. (2003). How does verb aspect constrain event representations? *Memory & Cognition, 31*(5), 663–672.

Manea, D. (2008). Modul, Timpul. In *Gramatica limbii romane* (pp. 358–448). Bucuresti: Editura Academiei Române.

Magliano, J. P., & Schleich, M. C. (2000). Verb aspect and situation models. *Discourse Processes, 29*(2), 83–112.

Mak, W. M., & Sanders, T. J. (2013). The role of causality in discourse processing: Effects of expectation and coherence relations. *Language and Cognitive Processes, 28*(9), 1414–1437.

Mandler, J. M. (1986). On the comprehension of temporal order. *Language and Cognitive Processes, 1*(4), 309–320. https://doi.org/10.1080/01690968608404680.

Mann, W. C., & Thompson, S. A. (1986). Relational propositions in discourse. *Discourse Processes, 9*(1), 57–90.

Manning, C., & Klein, D. (2003). Optimization, maxent models, and conditional estimation without magic. In *Proceedings of the 2003 conference of the north American chapter association for computational linguistics on human language technology: Tutorials* (Vol. 5, pp. 8–8). Stroudsburg: Association for Computational Linguistics.

Margan, M. (2009). Câteva considerații asupra relației timp-aspect în limbile română și engleza. *Filologia Banatică, 1*, 49–58.

Martin, R. (1971). *Temps et aspect. Essai sur l'emploi des temps narratifs en moyen français*. Paris: Klincksieck.

McCawley, J. D. (1971). Tense and time reference in English. In C. J. Fillmore & T. D. Langendoen (Eds.), *Studies in linguistic semantics* (pp. 96–113). Dunfermline: Irvington.

McEnery, T., & Wilson, A. (1996). *Corpus linguistics*. Edinburgh: Edinburgh University Press.

McEnery, T., Xiao, R., & Tono, Y. (2006). *Corpus-based language studies*. London: Routledge.

McTaggart, J. E. (1908). *The unreality of time. Mind* (pp. 457–474).

Meyer, T. (2014). *Discourse-level features for statistical machine translation* (PhD Dissertation). EPFL and Idiap Research Institute, Lausanne and Martigy.

Meyer, T., Grisot, C., & Popescu-Belis, A. (2013). Detecting narrativity to improve English to French translation of simple past verbs. In B. Webber, A. Popescu-Belis, K. Markert & J. Tiedemann (Eds.), *Proceedings of the 1st DiscoMT workshop at ACL 2013 (51st annual meeting of the association for computational linguistics)* (pp. 33–42). Sofia, Bulgaria.

Milner, J. C. (1982). *Ordres et raisons de langue*. Paris: Seuil.

Moens, M. (1987). *Tense, aspect and temporal reference* (PhD Dissertation). University of Edinburgh, Edinburgh.

Moens, M., & Steedman, M. (1987). Temporal ontology in natural language. In *Proceedings of the 25th annual meeting on association for computational linguistics* (pp. 1–7). California, USA: Association for Computational Linguistics.

Moens, M., & Steedman, M. (1988). Temporal ontology and temporal reference. *Computational Linguistics, 14*(2), 15–28.

Moeschler, J. (1994). *Anaphore et déixis temporelles: sémantique et pragmatique de la référence temporelle*. Nancy: Presses Universitaires de Nancy.

Moeschler, J. (1998a). Ordre temporel, causalité et relations de discours: une approche pragmatique. In S. Vogeleer, A. Borillo, C. Vetters, & M. Vuillaume (Eds.), *Temps et discours* (pp. 45–64). Louvain-la-Neuve: Peeters.

Moeschler, J. (1998b). Pragmatique de la référence temporelle. In J. Moeschler, J. Jayez, M. Kozlowska, J.-M. Luscher, L. de Saussure, & B. Sthioul (Eds.), *Le temps des événements* (pp. 157–180). Paris: Kimé.

Moeschler, J. (2000a). *Le modèle des inférences directionnelles. Cahiers de Linguistique Française* (Vol. 22, pp. 57–100).

Moeschler, J. (2000b). L'ordre temporel est-il naturel? In J. Moeschler & M.-J. Béguelin (Eds.), *Référence temporelle et nominale* (pp. 71–105). Berne: Peter Lang.

Moeschler, J. (2002a). Connecteurs, encodage conceptuel et encodage procédural. *Cahiers de Linguistique Française, 24*, 265–292.

Moeschler, J. (2002b). Economy and pragmatic optimality: The case of directional inferences. *Generative Grammar Geneva, 3*, 1–20.

Moeschler, J. (2007). Discours causal, chaîne causale et argumentation. *Cahiers Chronos, 18*, 69–86.

Moeschler, J. (2012). Conversational and conventional implicatures. In H.-J. Schmid (Ed.), *Cognitive Pragmaitics* (pp. 405–436). Berlin, Boston: Mouton de Gruyter.

Moeschler, J. (2013). Is a speaker-based pragmatics possible? Or how can a hearer infer a speaker's commitment? *Journal of Pragmatics, 48*(1), 84–97.

Moeschler, J. (2014). Subjectivité et langage: l'exemple du présent historique. In B. Pavelin Lesic (Ed.), *Francontraste: L'affectivité et la subjectivité dans le langage* (pp. 29–40). Mons: Ed. du CIPA.

Moeschler, J. (2015). Argumentation and connectives. In A. Capone & J. L. Mey (Eds.), *Interdisciplinary studies in pragmatics, culture and society, perspectives in pragmatics* (pp. 405–436). Cham: Springer International Publishing.

Moeschler, J. (2016). Where is procedural meaning located? Evidence from discourse connectives and tenses. *Lingua, 175*, 122–138.

Moeschler, J., & Reboul, A. (1994). *Dictionnaire encyclopédique de pragmatique*. Paris: Seuil.

Moeschler, J., & Reboul, A. (1998). *La pragmatique aujourd'hui*. Paris: Points Essais.

Moeschler, J., Jayez, J., Kozlowska, M., Luscher, J.-M., de Saussure, L., & Sthioul, B. (1998). *Le temps des événements: pragmatique de la référence temporelle*. Paris: Kimé.

Moeschler, J., Grisot, C., & Cartoni, B. (2012). Jusqu'où les temps verbaux sont-ils procéduraux? *Nouveaux Cahiers de Linguistique Française, 30*, 119–139.

Molendijk, A. L. (1990). *Le passé simple et l'imparfait: une approche reichenbachienne*. Amsterdam: Rodopi.

Molendijk, A. (2002). La structuration logico-temporelle du texte: le passé simple et l'imparfait du français. In E. Labeau & P. Larivée (Eds.), *Les temps du passé français et leur enseignement* (pp. 91–104). Amsterdam: Rodopi.

Molendijk, A., de Swart, H., Vetters, C., Borillo, A., Bras, M., Le Draoulec, A., et al. (2004). Meaning and use of past tenses in discourse. In F. Corblin & H. De Swart (Eds.), *Handbook of French semantics* (pp. 271–308). Stanford: CSLI Publications.

Moss, P. A. (1994). Can there be validity without reliability? *Educational Researcher, 23*(2), 5–12.

Mourelatos, A. P. (1978). Events, processes, and states. *Linguistics and Philosophy, 2*(3), 415–434.

Mozuraitis, M., Chambers, C. G., & Daneman, M. (2013). Younger and older adults' use of verb aspect and world knowledge in the online interpretation of discourse. In *Discourse processes* (Vol. 50, pp. 1), 1–1),22).

Münte, T. F., Schiltz, K., & Kutas, M. (1998). When temporal terms belie conceptual order. *Nature, 395*(6697), 71.

Murray, J. D. (1995). Logical connectives and local coherence. In R. Lorch & E. O'Brien (Eds.), *Sources of coherence in text comprehension* (pp. 107–125). Hillsdale: Erlbaum.

Murray, J. D. (1997). Connectives and narrative text: The role of continuity. *Memory & Cognition, 25*(2), 227–236.

Nanousi, V., Masterson, J., Druks, J., & Atkinson, M. (2006). Interpretable vs. uninterpretable features: Evidence from six Greek-speaking agrammatic patients. *Journal of Neurolinguistics, 19*(3), 209–238.

Nerbonne, J. (1986). Reference time and time in narration. *Linguistics and Philosophy, 9*(1), 83–95.

Newman, A. J., Ullman, M. T., Pancheva, R., Waligura, D. L., & Neville, H. J. (2007). An ERP study of regular and irregular English past tense inflection. *NeuroImage, 34*(1), 435–445.

Nicolle, S. (1997). Conceptual and procedural encoding: Criteria for the identification of linguistically encoded procedural information. In M. Groefsema (Ed.), *Proceedings of the Hertfordshire relevance theory workshop* (pp. 45–56). Chelmsford: Peter Thomas and Associates.

Nicolle, S. (1998). A relevance theory perspective on grammaticalization. *Cognitive Linguistics, 9*(1), 1–35.

Noël, D. (2003). Translations as evidence for semantics: An illustration. *Linguistics, 41*(4), 757–785.

Novakov, P., & Lazović, M. (2009). Aspect and boundedness in English and Romanian. *Bucharest Working Papers in Linguistics, vxi*(2), 41–50.

Olsen, M., Traum, D., Van Ess-Dykema, C., & Weinberg, A. (2001). *Implicit cues for explicit generation: using telicity as a cue for tense structure in a Chinese to English MT system (technical report)*. College Park: University of Maryland.

Padilla Cruz, M. (2016). *Relevance theory: Recent developments, current challenges and future directions*. Amsterdam: John Benjamins Publishing Company.

Padilla-Cruz, M. (2009). Might interjections encode concepts? More questions than answers. *Lodz Papers in Pragmatics, 5*(2), 241–270.

Papineni, K., Roukos, S., Ward, T., & Zhu, W.-J. (2002). BLEU: A method for automatic evaluation of machine translation. In *Proceedings of the 40th annual meeting on association for computational linguistics* (pp. 311–318). Philadelphia: Association for Computational Linguistics.

Parsons, T. (1989). The progressive in English: Events, states and processes. *Linguistics and Philosophy, 12*(2), 213–241.

Parsons, T. (1990). *Events in the semantics of English*. Cambridge, MA: MIT Press.

Partee, B. H. (1973). Some structural analogies between tenses and pronouns in English. *The Journal of Philosophy, 70*, 601–609.

Partee, B. H. (1984). Nominal and temporal anaphora. *Linguistics and Philosophy, 7*(3), 243–286.

Passonneau, R. J. (1988). A computational model of the semantics of tense and aspect. *Computational Linguistics, 14*(2), 44–60.

Pickering, M. J., McElree, B., Frisson, S., Chen, L., & Traxler, M. J. (2006). Underspecification and aspectual coercion. *Discourse Processes, 42*(2), 131–155.

Piñango, M. M., Zurif, E., & Jackendoff, R. (1999). Real-time processing implications of enriched composition at the syntax–semantics interface. *Journal of Psycholinguistic Research, 28*(4), 395–414.

Piñango, M. M., Winnick, A., Ullah, R., & Zurif, E. (2006). Time-course of semantic composition: The case of aspectual coercion. *Journal of Psycholinguistic Research, 35*(3), 233–244.

Pit, M. (2003). *How to express yourself with a causal connective: Subjectivity and causal connectives in Dutch, German and French*. Amsterdam: Rodopi.

Politzer-Ahles, S., Xiang, M., & Almeida, D. (2017). " Before" and" after": Investigating the relationship between temporal connectives and chronological ordering using event-related potentials. *PLoS One, 12*(4), e0175199.

Poole, M. S., & Folger, J. P. (1981). A method for establishing the representational validity of interaction coding systems: Do we see what they see? *Human Communication Research, 8*(1), 26–42.

Potter, W. J., & Levine-Donnerstein, D. (1999). *Rethinking validity and reliability in content analysis*. Retrieved from http://nca.tandfonline.com/doi/abs/10.1080/00909889909365539.

Prasad, R., Miltsakaki, E., Joshi, A., & Webber, B. (2004). Annotation and data mining of the Penn discourse TreeBank. In *Proceedings of the 2004 ACL workshop on discourse annotation* (pp. 88–97). Barcelona, Spain.

Prasad, R., Dinesh, N., Lee, A., Miltsakaki, E., Robaldo, L., Joshi, A. K., & Webber, B. L. (2008). The Penn Discourse TreeBank 2.0. In *Proceedings of the 6th international conference on language resources and evaluation*. Marrakech. Retrieved from http://www.lrec-conf.org/proceedings/lrec2008/.

Prince, A., & Smolensky, P. (1993). *Optimality theory: Constraint interaction in generative grammar*. New York: Wiley.

Prior, A. N. (1967). *Past, present and future*. Oxford: Clarendon Press.

Prior, A. N. (1968). In P. Hasle, P. Ohrstrom, T. Braüner, & J. Copeland (Eds.), *Papers on time and tense* (2nd ed.). Oxford: Oxford University Press.

Prosser, S. (2013). Experience, thought, and the metaphysics of time. In K. M. Jaszczolt & L. de Saussure (Eds.), *Time, language, cognition and reality* (pp. 157–174). Oxford: Oxford University Press.

Pustejovsky, J., Ingria, B., Sauri, R., Castano, J., Littman, J., Gaizauskas, R., et al. (2005a). The specification language TimeML. In I. Mani, J. Pustejovsky, & R. Gaizauskas (Eds.), *The language of time: A reader* (pp. 545–557). Oxford: Oxford University Press.

Pustejovsky, J., Knippen, R., Littman, J., & Saurí, R. (2005b). Temporal and event information in natural language text. *Language Resources and Evaluation, 39*(2–3), 123–164.

Qiu, Y., & Zhou, X. (2012). Processing temporal agreement in a tenseless language: An ERP study of mandarin Chinese. *Brain Research, 1446*, 91–108.

Quirk, R., Greenbaum, S. L., Leech, G., & Svartvik, J. (1985). *A comprehensive grammar of the English language*. London: Longman.

Radden, G., & Dirven, R. (2007). *Cognitive English grammar*. Amsterdam: John Benjamins Publishing.

Radvansky, G. A., Zwaan, R. A., Federico, T., & Franklin, N. (1998). Retrieval from temporally organized situation models. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 24*(5), 1224.

Rebotier, A. (2009). Le Futur de l'allemand en comparaison avec les langues romanes: Esquisse d'une définition d'une catégorie translinguistique de Futur. *Faits de Langues, 33*, 69–78.

Reboul, A. (1994). L'anaphore pronominale: Le problème de l'attribution des référents. In J. Moeschler, J.-M. Luscher, & J. Jayez (Eds.), *Langage et pertinence. Référence temporelle, anaphore, connecteurs et métaphore* (pp. 105–173). Nancy: PUN.

Reboul, A. (1996). Le paradoxe de l'imperfectif: evenements, causalite et etats de faits. In R. Landheer & P. J. Smith (Eds.), *Le paradoxe en linguistique et en littérature* (pp. 39–58). Genève: Droz.

Reboul, A. (2000). La représentation des éventualités dans la Théorie des Représentations Mentales. *Cahiers de linguistique française, 22*, 13–55.

Reboul, A. (2007). *Langage et cognition humaine*. Grenoble: Presses Universitaires de Grenoble.

Reboul, A., Delfitto, D., & Fiorin, G. (2016). The semantic properties of free indirect discourse. *Annual Review of Linguistics, 2*(1), 255–271.

Reichenbach, H. (1947). *Elements of symbolic logic*. New York: Mcmillan.

Reyle, U. (1998). A note on enumerations and the semantics of puis and alors. *Cahiers de Grammaire, 23*, 67–79.

Riddle, E. (1986). The meaning and discourse function of the past tense in English. *TESOL Quarterly, 20*(2), 267–286.

Riegel, M., Pellat, J.-C., & Rioul, R. (1994). *Grammaire méthodique du français*. Paris: PUF.

Robert. (2016). Le Grand Robert de la langue française [Online version]. Retrieved October 10, 2017, from http://gr.bvdep.com/robert.asp

Roberts, C. (2004). Context in dynamic interpretation. In L. Horn & G. Ward (Eds.), *The handbook of pragmatics* (pp. 197–220). Oxford: Blackwell.

Rohde, H., & Horton, W. (2010). Why or what next? Eye movements reveal expectations about discourse direction. In *Proceedings of 23rd annual CUNY conference on human sentence processing* (pp. 18–20).

Rohde, H., & Horton, W. S. (2014). Anticipatory looks reveal expectations about discourse relations. *Cognition, 133*(3), 667–691.

Rohde, H., Kehler, A., & Elman, J. L. (2006). Event structure and discourse coherence biases in pronoun interpretation. In *Proceedings of the 28th annual conference of the cognitive science society* (pp. 697–702).

Rohde, H., Levy, R., & Kehler, A. (2011). Anticipating explanations in relative clause processing. *Cognition, 118*(3), 339–358.

Rossi, J.-P. (1997). *L'approche expérimentale en psychologie*. Paris: Dunod.

Sadock, J. M. (1978). On testing for conversational implicature. In P. Cole (Ed.), *Syntax and semantics: Pragmatics* (pp. 281–297). New York: Academic.

Salvi, G., & Vanelli, L. (2004). *Nuova grammatica italiana*. Bologna: Il Mulino.

Samardzic, T. (2013). *Dynamics, causation, duration in the predicate-argument structure of verbs: a computational approach based on parallel corpora* (PhD Dissertation). Université de Genève, Genèva.

Sanders, T. (1997). Semantic and pragmatic sources of coherence: On the categorization of coherence relations in context. *Discourse Processes, 24*(1), 119–147.

Sanders, T. (2005). Coherence, causality and cognitive complexity in discourse. In *Proceedings/ Actes SEM-05, First international symposium on the exploration and modelling of meaning* (pp. 105–114).

Sanders, T. J., & Noordman, L. G. (2000). The role of coherence relations and their linguistic markers in text processing. *Discourse Processes, 29*(1), 37–60.

Sanders, T., & Spooren, W. (2009). Causal categories in discourse–converging evidence from language use. In T. Sanders & E. Sweetser (Eds.), *Causal categories in discourse and cognition* (pp. 205–246). Berlin: Mouton de Gruyter.

Sanders, T. J., Spooren, W. P., & Noordman, L. G. (1992). Toward a taxonomy of coherence relations. Discourse Processes, 15(1), 1–35.

Sanders, T. J., Spooren, W. P., & Noordman, L. G. (1993). Coherence relations in a cognitive theory of discourse representation. *Cognitive Linguistics, 4*(2), 93–133.

Sanford, A. J., & Garrod, S. C. (1981). *Understanding written language: Explorations of comprehension beyond the sentence*. New York: Wiley.

Savic, M. D. (1979). L'uso dei tempi passati nei quotidiani pubblicati nelle lingue romanze con particolare riguardo all'italiano. *Linguistica Ljubljana, 19*, 171–197.

Schiffer, S. R. (1972). *Meaning*. Oxford: Clarendon Press.

Schlenker, P. (2004). Context of thought and context of utterance: A note on free indirect discourse and the historical present. *Mind & Language, 19*(3), 279–304.

Schmid, H. (1994). *Treetagger*. Retrieved from http://www.cis.uni-muenchen.de/~schmid/tools/TreeTagger/

Scott, K. (2011). Beyond reference: Concepts, procedures and referring expressions. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 183–203). Bingley: Emerald Group Publishing.

Segal, E. M., Duchan, J. F., & Scott, P. J. (1991). The role of interclausal connectives in narrative structuring: Evidence from adults' interpretations of simple stories. *Discourse Processes, 14*(1), 27–54.

Simner, J., & Pickering, M. J. (2005). Planning causes and consequences in discourse. *Journal of Memory and Language, 52*(2), 226–239.

Smith, C. (1986). A speaker-based approach to aspect. *Linguistics and Philosophy, 9*(1), 97–115.

Smith, N. (1990). Observations on the pragmatics of tense. *UCL Working Paoers in Linguistics, 2*, 113–146.

Smith, C. S. (1997). *The parameter of aspect* (2nd ed.). Dordrecht: Kluwer Academic Publishers.

Smith, C. S. (2003). *Modes of discourse: The local structure of texts*. Cambridge: Cambridge University Press.

Smith, C. S. (2007). Reference time without tense. In L. de Saussure, J. Moeschler, & G. Puskas (Eds.), *Recent advances in the syntax and semantics of tense, mood and aspect* (pp. 229–250). Berlin: Walter de Gruyter.

Smith, C. S. (2008). Time with and without tense. In J. Guéron & J. Lecarme (Eds.), *Time and modality* (pp. 227–249). Berlin: Springer.

Snover, M., Dorr, B., Schwartz, R., Micciulla, L., & Makhoul, J. (2006). A study of translation edit rate with targeted human annotation. In *Proceedings of association for machine translation in the Americas* (pp. 223–231). Cambridge, MA.

Sperber, D. (2005). Modularity and relevance. In P. Carruthers (Ed.), *The innate mind: Structure and contents: Structure and contents* (pp. 53–68). New York: Oxford University Press.

Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition*. Oxford: Blackwell.

Sperber, D., & Wilson, D. (1987). Precis of relevance: Communication and cognition. *Behavioral and Brain Sciences, 10*(4), 697–754.

Sperber, D., & Wilson, D. (1998). The mapping between the mental and the public lexicon. In P. Carruthers & J. Boucher (Eds.), *Language and thought: Interdisciplinary themes* (pp. 184–200). Cambridge: Cambridge University Press.

Spooren, W., & Degand, L. (2010). Coding coherence relations: Reliability and validity. *Corpus Linguistics and Linguistic Theory, 6*(2), 241–266.

Sporiş, V. (2012). Valenţele semantico-stilistice ale timpurilor verbale în limba română. *Studia Universitatis Petru Maior-Philologia, 13*, 64–73.

Squartini, M., & Bertinetto, P. M. (2000). The simple and compound past in romance languages. In Ö. Dahl (Ed.), *Tense and aspect in the languages of Europe* (pp. 403–440). Berlin: Mouton de Gruyter.

Stalnaker, R. (1974). Pragmatic presuppositions. In M. Munitz & P. Unger (Eds.), *Semantics and philosophy* (pp. 197–213). New York: New York University Press.

Stalnaker, R. (2002). Common ground. *Linguistics and Philosophy, 25*(5), 701–721.

Stavrakaki, S., & Kouvava, S. (2003). Functional categories in agrammatism: Evidence from Greek. *Brain and Language, 86*(1), 129–141.

Steedman, M. (1997). Temporality. In J. Benthem van & A. Meulen ter (Eds.), *Handbook of logic and language* (pp. 895–938). Amsterdam: Elsevier Science.

Steinhauer, K., & Ullman, M. T. (2002). Consecutive ERP effects of morpho-phonology and morpho-syntax. *Brain and Language, 83*, 62–65.

Sthioul, B. (1998). Temps verbaux et point de vue. In J. Moeschler, J. Jayez, J.-M. Luscher, L. de Saussure, & B. Sthioul (Eds.), *Le temps des événements* (pp. 197–220). Paris: Kimé.

Stoicescu, I. (2010). Aspectual classes in adult and child Romanian. *Bucharest Working Papers in Linguistics, vxii*(1), 171–193.

Stoicescu, I. (2013). *Coercion costs: Situation type aspect and verbal inflection in child Romanian*. Presented at the GALA Conference, Oldenburg, Germany.

Stoll, S. (1998). The role of Aktionsart in the acquisition of Russian aspect. *First Language, 18*(54), 351–376.

Stukker, N., & Sanders, T. (2012). Subjectivity and prototype structure in causal connectives: A cross-linguistic perspective. *Journal of Pragmatics, 44*(2), 169–190.

Sun, J., & Grisot, C. (n.d.). Assessing the role of lexical aspect for locating events in time: A corpus-based study of mandarin Chinese and French. *Journal of Pragmatics*.

Tahara, I. (2000). Le passé simple et la subjectivité. *Cahiers de Linguistuque Francaise, 22*, 189–218.

Tahara, I. (2004). *Usage descriptif et usage interprétatif des temps du passé et des adverbes temporels dans le discours de fiction, Université de Genève* (PhD Thesis). Université de Genève, Genève.

Talmy, L. (1988). Force dynamics in language and cognition. *Cognitive Science, 12*(1), 49–100.

Tasmowski-De Ryck, L. (1985). L'imparfait avec et sans rupture. *Langue Française, 67*, 59–77.

Taylor, B. (1977). Tense and continuity. *Linguistics and Philosophy, 1*(2), 199–220.

Tedeschi, P. J., & Zaenen, A. (Eds.). (1981). *Tense and aspect* (Vol. 14). New York: Academic.

Ter Meulen, A. G. (1997). *Representing time in natural language: The dynamic interpretation of tense and aspect*. Cambridge, MA: MIT Press.

Therriault, D. J., & Raney, G. E. (2007). Processing and representing temporal information in narrative text. *Discourse Processes, 43*(2), 173–200.

Tiedemann, J. (2009). News from OPUS-A collection of multilingual parallel corpora with tools and interfaces. In N. Nicolov, G. Angelova, & R. Mitkov (Eds.), *Recent advances in natural language processing* (pp. 237–248). Amsterdam: John Benjamins.

Todorova, M., Straub, K., Badecker, W., & Frank, R. (2000). Aspectual coercion and the online computation of sentential aspect. In *Proceedings of the cognitive science society* (Vol. 1).

Tonhauser, J. (2015). Cross-linguistic temporal reference. *Annual Review of Linguistics, 1*(1), 129–154.

Toutanova, K., Klein, D., Manning, C. D., & Singer, Y. (2003). Feature-rich part-of-speech tagging with a cyclic dependency network. In *Proceedings of the 2003 conference of the North American chapter of the association for computational linguistics on human language technology-volume 1* (pp. 173–180). Association for Computational Linguistics.

Townsend, D. J. (1983). Thematic processing in sentences and texts. *Cognition, 13*(2), 223–261.

Traxler, M. J., Bybee, M. D., & Pickering, M. J. (1997). Influence of connectives on language comprehension: Eye tracking evidence for incremental interpretation. *The Quarterly Journal of Experimental Psychology: Section A, 50*(3), 481–497.

Trnavac, R. (2006). *Aspect and subjectivity in modal constructions* (PhD Dissertation). LOT, Utrecht.

Ullman, M. T. (2004). Contributions of memory circuits to language: The declarative/procedural model. *Cognition, 92*(1), 231–270.

Ullman, M. T., Corkin, S., Coppola, M., Hickok, G., Growdon, J. H., Koroshetz, W. J., & Pinker, S. (1997). A neural dissociation within language: Evidence that the mental dictionary is part of declarative memory, and that grammatical rules are processed by the procedural system. *Journal of Cognitive Neuroscience, 9*(2), 266–276.

Van Der Meer, E., Beyer, R., Heinze, B., & Badel, I. (2002). Temporal order relations in language comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28*(4), 770.

Van Dijk, T. A., & Kintsch, W. (1983). *Strategies of discourse comprehension*. New York: Academic.

Van Eijck, J., & Kamp, H. (1997). Representing discourse in context. In J. Benthem van & A. Meulen ter (Eds.), *Handbook of logic and language* (pp. 179–237). Cambridge: MIT Press.

van Silfhout, G., Evers-Vermeul, J., Mak, W. M., & Sanders, T. J. (2014). Connectives and layout as processing signals: How textual features affect students' processing and text representation. *Journal of Educational Psychology, 106*(4), 1036.

van Silfhout, G., Evers-Vermeul, J., & Sanders, T. (2015). Connectives as processing signals: How students benefit in processing narrative and expository texts. *Discourse Processes, 52*(1), 47–76.

Varlokosta, S., Valeonti, N., Kakavoulia, M., Lazaridou, M., Economou, A., & Protopapas, A. (2006). The breakdown of functional categories in Greek aphasia: Evidence from agreement, tense, and aspect. *Aphasiology, 20*(8), 723–743.

Vendler, Z. (1957). Verbs and times. *The Philosophical Review, 66*, 143–160.

Vendler, Z. (1967). *Linguistics in philosophy*. Cornell: Cornell University Press.

Verhagen, M., & Pustejovsky, J. (2008). Temporal processing with the TARSQI toolkit. In *22nd international conference on on computational linguistics: Demonstration papers* (pp. 189–192). Association for Computational Linguistics.

Verkuyl, H. J. (1972). *On the compositional nature of the aspects*. Dordrecht: Reidel.

Verkuyl, H. J. (1996). *A theory of aspectuality: The interaction between temporal and atemporal structure*. Cambridge: Cambridge University Press.

Verkuyl, H., Vet, C., Borillo, A., Bras, M., Le Draoulec, A., Molendijk, A., de Swart, H., Vetters, C., & Vieu, L. (2004). Tense and aspect in sentences. In F. Corblin & H. De Swart (Eds.), *Handbook of French semantics* (pp. 233–270). Stanford: CSLI Publications.

Véronis, J., & Langlais, P. (2000). Evaluation of parallel text alignment systems. In J. Véronis (Ed.), *Parallel text processing* (Vol. 27, pp. 369–388). Dordrecht: Kluwer Academic Publishers.

Vet, C. (1980). *Temps, aspects et adverbes de temps en français contemporain: essai de sémantique formelle*. Genève: Droz.

Vetters, C. (1996). *Temps, aspect et narration*. Amsterdam: Rodopi.

Vişan, N. (2006). Between the perfect and the Preterite–a DRT analysis of the Romanian and the English complex past. *Revue Roumaine de Linguistique, 1*, 55–71.

Vuillaume, M. (1990). *Grammaire temporelle des récits*. Paris: Éditions de Minuit.

Wagner, R. L., & Pinchon, J. (1962). *Grammaire du français classique et moderne*. Paris: Hachette.

Webber, B. L. (1988). Tense as discourse anaphor. *Computational Linguistics, 14*(2), 61–73.

Weinrich, H. (1973). *Le temps*. Paris: Seuil.

Wenzlaff, M., & Clahsen, H. (2004). Tense and agreement in German agrammatism. *Brain and Language, 89*(1), 57–68.

Wenzlaff, M., & Clahsen, H. (2005). Finiteness and verb-second in German agrammatism. *Brain and Language, 92*(1), 33–44.

Wilson, D. (2011). The conceptual procedural-distinction: Past, present and future. In V. Escandell-Vidal, M. Leonetti, & A. Ahern (Eds.), *Procedural meaning: Problems and perspectives* (pp. 3–32). Bingley: Emerald Group Publishing.

Wilson, D. (2016). Reassessing the conceptual–procedural distinction. *Lingua, 175*, 5–19.

Wilson, D., & Carston, R. (2007). A unitary approach to lexical pragmatics: Relevance, inference and ad hoc concepts. In N. Burton-Roberts (Ed.), *Pragmatics* (pp. 230–259). Basingstoke: Palgrave Macmillan.

Wilson, D., & Sperber, D. (1993). Linguistic form and relevance. *Lingua, 90*(1), 1–25.

Wilson, D., & Sperber, D. (1998). Pragmatics and time. In R. Carston & S. Uchida (Eds.), *Relevance theory: Applications and implications* (pp. 1–22). Amsterdam: John Benjamins.

Wilson, D., & Sperber, D. (2004). Relevance theory. In L. Horn & G. Ward (Eds.), *Handbook of pragmatics* (pp. 607–632). Oxford: Blackwell Publishing.

Wilson, D., & Sperber, D. (2012). *Meaning and relevance*. Cambridge: Cambridge University Press.

Yap, F. H., Chu, P. C. K., Yiu, E. S. M., Wong, S. F., Kwan, S. W. M., Matthews, S., et al. (2009). Aspectual asymmetries in the mental representation of events: Role of lexical and grammatical aspect. *Memory & Cognition, 37*(5), 587–595.

Ye, Y., Fossum, V. L., & Abney, S. (2006). Latent features in automatic tense translation between Chinese and English. In *Proceedings of the fifth SIGHAN workshop on Chinese language processing* (pp. 48–55).

Ye, Y., Schneider, K.-M., & Abney, S. (2007). Aspect marker generation in English-to-Chinese machine translation. *Proceedings of MT Summit XI*, 521–527.

Ye, Z., Kutas, M., George, M. S., Sereno, M. I., Ling, F., & Münte, T. F. (2012). Rearranging the world: Neural network supporting the processing of temporal connectives. *NeuroImage, 59*(4), 3662–3667.

Zafiu, R. (2013). Mood, tense and aspect. In G. P. Dindelegan (Ed.), *The grammar of Romanian* (pp. 24–64). Oxford: Oxford University Press.

Zagona, K. (2003). Tense and anaphora: Is there a tense-specific theory of coreference. In A. Barrs (Ed.), *Anaphora: A reference guide* (pp. 140–171). Oxford: Blackwell Publishing.

Zagona, K. (2013). Tense, aspect and modality). In M. Dikken den (Ed.), *The Cambridge handbook of generative syntax* (pp. 746–792). Cambridge: Cambridge University Press.

Zegarac, V. (1991). *Tense, aspect and relevance*. University of London.

Zufferey, S. (2012). Car, parce que, puisque revisited: Three empirical studies on French causal connectives. *Journal of Pragmatics, 44*(2), 138–153.

Zufferey, S. (2014). Givenness, procedural meaning and connectives. The case of French puisque. *Journal of Pragmatics, 62*, 121–135.

Zufferey, S., & Cartoni, B. (2012). English and French causal connectives in contrast. *Languages in Contrast, 12*(2), 232–250.

Zufferey, S., & Gygax, P. M. (2016). The role of perspective shifts for processing and translating discourse relations. *Discourse Processes, 53*(7), 532–555.

Zufferey, S., Mak, W., Degand, L., & Sanders, T. (2015). Advanced learners' comprehension of discourse connectives: The role of L1 transfer across on-line and off-line tasks. *Second Language Research, 31*, 389–411.

Zwaan, R. A. (1996). Processing narrative time shifts. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 22*(5), 1196.

Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin, 123*(2), 162.

Zwaan, R. A., Langston, M. C., & Graesser, A. C. (1995a). The construction of situation models in narrative comprehension: An event-indexing model. *Psychological Science, 6*(5), 292–297.

Zwaan, R. A., Magliano, J. P., & Graesser, A. C. (1995b). Dimensions of situation model construction in narrative comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21*(2), 386–397.

Zwaan, R. A., Madden, C. J., & Stanfield, R. A. (2001). Time in narrative comprehension. In D. Scharam & G. Steen (Eds.), *Psychology and sociology of literature* (pp. 71–86). Amsterdam/Philadelphia: John Benjamins.

Index

A

Aktionsart, 3, 65, 159, 176, 214, 264
Annotation experiments, 1, 35, 64, 65, 114,
        138, 196, 207, 210, 211, 240,
        274–280, 289, 290
Aoristicization process, 17, 18, 26, 195, 206,
        210, 215
Automatic classification, 274–287

B

Boundedness, 47, 48, 50–52, 63, 74, 97,
        158–163, 167–170, 172–174, 177, 179,
        203, 208–210, 214, 250, 253, 262, 264,
        274–288, 290, 292

C

Chinese, 53, 74, 176, 257, 258, 264, 267,
        270–272, 287, 292
Cognitive coherence relations, 291
Compound past, 1, 2, 5, 12, 16–28, 35, 37, 39,
        40, 42, 53, 97, 98, 101, 104, 131, 132,
        134, 135, 155, 162, 173, 178, 180, 188,
        190, 195–198, 204, 206, 208, 210, 211,
        213, 215, 289, 292
Conceptual meaning, 83, 88, 91, 140, 171,
        186, 191, 204, 215
Conscious evaluation of linguistic meaning,
        84, 184
Context, 3, 68, 123, 139, 174, 225, 274
Conversational implicatures, 3, 72, 76, 77, 82,
        83, 110, 191
Cross-linguistic analysis, 118, 121–125,
        127–130, 166, 200, 209, 290

D

Discourse relations, 70, 103, 110, 115, 137,
        139, 192, 218–221, 248, 261

E

English, 1, 65, 115, 141, 176, 225, 264
Ensuite, 17, 87, 209, 224
Explicatures, 78, 81–84, 86, 87, 89, 90, 99,
        100, 102, 109, 176–179, 184, 187, 193,
        201, 203, 214, 290

F

Formal semantics, 182
French, 1, 73, 115, 141, 181,
        226, 264
Frequency, 3, 28, 117, 119, 120, 125,
        126, 132–134, 138, 196,
        206, 215

G

Generalized mixed model, 166–172, 278, 290
Grammatical aspect, 8, 44, 47, 50, 52, 61, 75,
        98, 99, 164, 174, 192, 199, 200, 248,
        251, 260, 266, 276–279
Grice, H.P., 3, 65, 76, 77, 80–83, 180,
        191, 224

H

Highly discriminatory model, 109, 173–180,
        290, 292
Human annotation, 114, 275, 277, 278