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Interlinking Text and Data with Semantic Annotation and Ontology Design Patterns to Analyse Historical Travelogues

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Abstract

This paper presents a first draft of the ongoing work on the edition of Franz Xaver Bronner's travelogues, in which we apply a semantic model that combines widely accepted standards (such as CIDOC CRM, Dublin Core, SKOS etc.) with project-specific elements and TEI. We address the question of category development for time, space and events through text encoding and semantic annotation, and their assets for research while focusing on the current DFG-funded project "Digital Edition of Historical Travelogues" (DEHisRe).

1. Introduction

The project "Digitale Editionen Historischer Reiseberichte" (DEHisRe) develops a digital editing approach, enabling editors and researchers to make the categories of historical travelling explicit by applying ontology design patterns for semantic annotation and interlinking of text with data. 1

1.1 Historical Travel Research and its Digital Representation

Historical travel research, especially the study of travelogues, has been a popular field within literary and cultural studies. Research focuses on the exploration of the numerous cultural aspects of travel such as: the formation and rules of the literary genre of the travelogue, reception research, research on cultural contacts and stereotypes and gender aspects (see [Bödeker et al. 2004], [Maurer 1999], [Gruber 2022]). Practical and technical aspects of travel, such as: routes and roads, personal equipment, network and quality of inns, money, currencies and costs, and means of transport (examples: [Mączak 1995], [Brilli 1997], [Gräf and Pröve 1997]) are also of importance, as well as travel relationships between certain groups of people such as students, artists and scholars. Mostly the focus is not on the journey itself, but on the destinations and the perceptions of the travellers. 2

Despite the rise of digital humanities (including the field of digital editions, the discovery of space in social sciences and the development of geoinformation systems), there has not yet been any significant progress in the indexing, processing, and visualisation of travelogues, either in terms of content or method. Current digital travelogue editions can therefore be subsumed into three categories: 3

1. Digital editions based on paper editions, which usually manage without maps or with rudimentary use of maps. Examples are Ernst Samuel Jacob Borchward's Journey to Potsdam of Frederick the Great in 1749[1] or the Italian edition of Marco Polo's travels [Ramusio 2015].

2. Elaborate digital editions of scholars' estates, often with numerous illustrative images and maps from the same collection. The digitalisation focuses on the text, its transcription, content indexing and annotation, and generally on presentation. Examples are “Livingstone Online” [Wisnicki and Ward 2018], the edition humboldt digital[2] and the annotated digital edition of Philipp Hainhofer’s (1578–1647) travel and collection descriptions[3].
3. Cartographic visualisation of travel accounts (e.g. Orwell with a GoogleMaps map) and elaborate realisations. Examples are Karl Grossner’s Linked Paths web application[4] and based on a fictional work the “LotrProject”[5] with multiple visualisations and evaluations of relationships within the work: Genealogies, travel routes (based on Tolkien's maps) with travel times, place explanations, place categories, graphics on demography, etc. However, a link to the text is dispensed with here.

1.2 Structure and Research Questions

This paper presents a first draft of the ongoing work on the edition of Franz Xaver Bronner’s travelogues, in which we apply a semantic model that combines widely accepted standards (such as CIDOC CRM, Dublin Core, SKOS etc.) with project-specific elements and TEI. We address the question of category development for time, space and events through text encoding and semantic annotation, and their assets for research while focusing on the current DFG-funded project “Digital Edition of Historical Travelogues” (DEHisRe).[6] 4

After introducing different standards, concepts and modelling approaches in the digital edition field, we will focus on the ontology development process in section two. Edition guidelines according to TEI were also developed, but are not part of this article. We describe the development of different ontology design patterns and its application to travel events and observations. Some examples for travel events are illustrated in section three. 5

In section four, we present specific research questions which serve as a basis for the development and refinement of our ontology design patterns. Here we give an insight into the ongoing iterative process based on interdisciplinary exchange between historians and ontology developers. The research questions presented focus on the following issues: 1) observation of practices: ethnic groups and cultural norms, and 2) gender encounters: narrating the varied women's agency while on the road. 6

This approach is applied to the digital edition and additional material of the unpublished travelogue of the German expatriate in Switzerland Franz Xaver Bronner (1758–1850)[7], who in 1810 went to the Russian University of Kazan on the Volga to become a professor in theoretical physics and travelled back to Switzerland in 1817 (see [Beyer-Thoma 2017]). 7

To conclude the research, we will give a short overview of the possibilities of connecting TEI and ontologies. Here, suitable tools are presented: advantages and disadvantages as well as the different focal points of these tools are discussed. The ideas presented are based on initial evaluations of the implementation of concepts (textual and ontological) within the project. 8

2. Information Science Perspective

The main problems arising from digital editions are the data models and databases used, which are predominately tailored to the delivery of digital products and are thus far too simple to deal with the diverse number of current issues.[8] Conventional editions based on document modelling with TEI (see the categories in 1.1) do not have the necessary expressiveness and flexibility to deal with diverse use cases. To be able to use a digital edition of a historical travelogue, as a basis for further analysis and visualisation, named entities must be recognised, identified, enriched with additional data and the narration of the events must be explicitly modelled[9] (see section 3). 9

> What humanistic data “looks” like, that is, its structure and content, is shaped by the researcher’s choice of source material, data model, and technology, by decisions regarding the use of external resources, and much more. [Kudella and Jefferies 2019, 42]

2.1 Data Modeling and Digital Editions

According to Kudella and Jefferies (cf. [Kudella and Jefferies 2019]), two groups of data modelling can be distinguished, curation-driven and research-driven data modelling. Curation-driven describes the efforts of libraries and archives to record objects in a uniform way. Standards are used to ensure retrievability and transparency. Research driven data modelling aims to answer specific research questions and follows the interest of a researcher. 10

It is argued that this contrast between research and curation driven data modelling makes the re-use of data difficult or even impossible. The reason for this is the gap created by standardised data collections, as carried out by libraries, which are not sufficient for scientific interpretations and miss the actual research interest. Science-led data collections, on the other hand, are very specific and are rarely oriented towards standards. A feedback into information systems is therefore not possible “because essential information is lacking and because data is captured in non-standard ways” [Kudella and Jefferies 2019, 42]. Eide (cf. [Eide 2014]) addresses the same issue by differentiating between “using a model” and “creating a model” when developing data models. He argues that “middle positions can be found when one takes an existing ontology and extends it, or uses terms taken from multiple ontologies in combination” [Eide 2014, 5]. To ensure re-use and interpretation independent of a specific research project, it is important to consider current standards. 11

In addition, Eide [Eide 2014] uses the distinction between modelling for production and modelling for understanding in the context of TEI encoding (as a form of modelling) of texts. Our approach tries to bridge this gap by re-introducing research driven perspectives into ontology-based modelling and by extending this distinction to the use of TEI editing. 12

2.2 Existing Standards

The TEI Guidelines serve as a de-facto standard for digital editions. “The Text Encoding Initiative [TEI] is the most systematic effort so far to create standards for scholarly memory in an evolving digital culture. The TEI markup language includes [...] different elements to satisfy all manner of scholarly needs in the humanities” [TEI 2019]. The newest version of TEI includes 585 elements (see the TEI Consortium 2022) and was designed to be flexible in order to make it applicable to a wide range of research questions. It is not unambiguous, however, and the same information can be encoded and interpreted differently. This leads to interoperability problems because of the various possible ways of encoding text elements (e.g., `<rs>`, `<placeName>`, etc.) (see [Unsworth 2011]; [Kudella and Jefferies 2019]; [Burrows et al. 2021]; [Giovannetti and Tomasi 2022]). The TEI therefore reflects the dichotomy between research and curation driven modelling practice mentioned above (see 2.1). 13

According to Giovanetti and Tomasi (cf. [Giovannetti and Tomasi 2022]), linking Linked Open Data (LOD) and TEI could address the problem of interoperability: “Enhancing TEI-encoded texts with linked open data represents a possible way to overcome this limitation” [Giovannetti and Tomasi 2022]. We therefore try to solve the interoperability and expressivity problems of TEI and CIDOC “Conceptual Reference Model” (CRM) by means of “Deutsches Textarchiv Basisformat” (DTABf) and frame-based ontology design patterns. This, in turn, makes the categories of travel events and travel observations in historical travelogues explicit for further analysis and visualisation. 14

We use the CIDOC CRM for the enrichment of the text with knowledge made explicit and stored in a database. It is an event-oriented and well-accepted ontology in the cultural heritage sector. The CIDOC CRM has been developed since 1996 as an Application Ontology for the documentation of museum artefacts and was accepted as an ISO standard for data modelling in the cultural heritage sector in 2006. It is intended to serve as a transdisciplinary “lingua franca” for the standardisation of knowledge on cultural heritage objects and structures and is therefore not limited to pure museum documentation. Based on this harmonised, machine-processable cultural knowledge, the CIDOC CRM aims to facilitate the exchange of relevant information between museums, libraries, archives and comparable institutions as well as between different research projects (see [Meyer 2019]). 15

3. Ontology-based Editing of Historical Travelogues

A selection of competency questions presents some of the requirements for data modelling: 16

- From whence to where did a particular section of the traveller's route go?
- Which scholars were visited during a stay in a city?
- Which items were exchanged during visits during the stopover in a city?
- Which other people were met along the way and during a stay?
- Which places were seen or visited during a stay?
- Where did our traveller stay overnight, for a meal, for a snack?

17 The ontology design patterns presented in section 3.1 allow the editor to semantically annotate and represent the information which is necessary to answer this kind of questions. It is done by means of information retrieval via SPARQL[10] queries from the database linked to the edited text of a historical travelogue.

18 In terms of narratology, our modelling approach focuses on making explicit the "fabula" of a travel report. The "sujet" is not explicitly modelled, but it can be derived on demand from the semantic annotations: As a byproduct, we are able to query the narrative sequence of travel events, stopovers and activities conducted throughout the journey of a traveller. This sequence represents the sujet and can be compared to the chronological sequence of activities and continuation succession of travel sections — the fabula (see also 3.1).

19 The historical information life cycle [Meroño-Peñuela et al. 2015] envisages various opportunities for retrieval of information for further research and analysis, e.g. social networks for network analysis and visualisation in Gephi[11] or travel routes in GeoJSON as a data exchange format for map making in geographic information systems like QGIS. As Grossner suggests, a simple LineString geometry can be constructed out of place information from the travel and stopover instances in order to provide for example a GeoJSON representation of the whole travel route of a journey for visualisation purposes [Grossner 2010, 186]. After the enrichment and editing phases in the life cycle of historical information, we are now located at the retrieval phase and will proceed to the analysis and presentation phases in the next section.

3.1 Ontology Design Patterns

20 The event-centred modelling approach of CRM (see 2.2) enables us to model the fabula and sujet of a travelogue (cf. [Bartalesi et al. 2017]).[12] As Maurer (cf. [Maurer 2015, 391f]) notes, travelogues written by scientific explorers often follow a thematic organisation to present "travel results" instead of simply following a chronological order (see 1.1 and 4.).

21 To build the annotation scheme and associated ontology design patterns, i.e. to interlink text and data, we apply frame semantics as a theoretical framework. Frames can be represented as n-ary relations[13] and used as skeletal structure in the development of ontology design patterns.[14] Moreover, frames can be considered as "knowledge patterns" for validation of the ontology design patterns (cf. [Presutti et al. 2012]).

3.2 Developing Ontology Design Patterns for Travel Events and Travel Activities

22 The ontology design patterns are the basis for the ontology-based text enrichment and editing workflow. The reason for the frame-like structure of classes for representing travel events and activities during travelling and stopovers is motivated by the semantic annotation use case of interlinking text and data. Our ontology design approach is based on requirement analysis, whereby the competency questions are derived from initial user stories to define data modelling and information retrieval requirements.

23 From an ontological perspective, a travel or journey has to be considered as a kind of event. To be more specific, it is a composite event where a certain person in the role of the traveller is involved throughout all its subsequent events, i.e. travel segments as parts of the travel as a mereological whole. In order to make explicit the segments of a journey reported in a historical travelogue, we need an ontology design pattern to model a journey and all its travel segments including the mereological, chronological, as well as their continuation relations. The traveller conducts several activities (typically observations, arrangements, etc.), which are reported in the travelogue and must therefore be modelled in the

database of its digital edition. This includes not only activities when on the move, but also during stopovers. As we have to be able to distinguish between these two modes, we need two major classes to represent a travel as a complex whole composed not only of journey segments, but also of temporary stays at places in between travelling: a class to model travels/travel segments and a class to model stopovers.

3.2.1 Frames as Building Blocks for Ontology Design Patterns

A *frame* is a structured representation of an event or situation (see Figure 1). A frame's *frame elements* are the semantic roles of the entities involved in the event or situation. FrameNet [Ruppenhofer et al. 2016] provides some possibly relevant frames like `Departing`, `Travel`, `Arriving`, and `Temporary_stay`. The frame `Travel` is obviously the best candidate as basis for the central class in our "Digital Editions of Historical Travelogues Ontology" (DTO) OWL ontology.[15] 24

The best fitting place to locate travel in the taxonomy of the CRM core classes is the class `crm:E9_Move` (subclass of `crm:E7_Activity`) which would satisfy the essential aspects of our modelling requirements. Hence, we created the subclasses `dto:Travel`, `dto:Stopover`, and `dto:Transport`[16] and aligned them to the CRM class `crm:E9_Move` (see Figure 1). 25

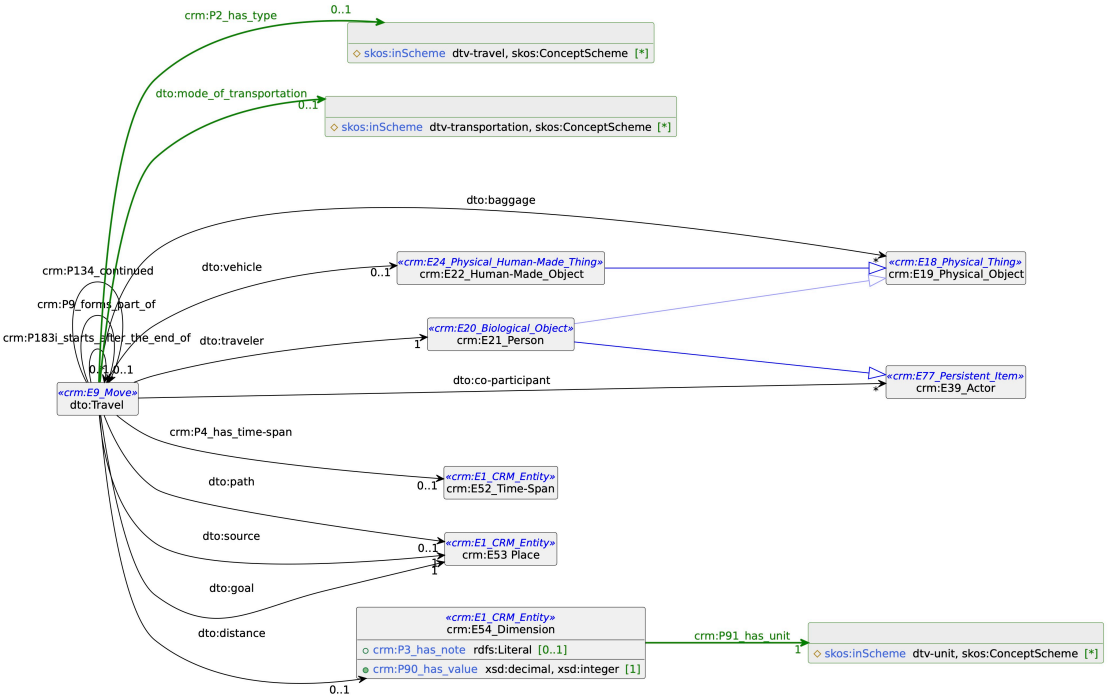

Figure 1. UML-like Class Diagram for the Ontology Design Pattern based on the FrameNet Frame Travel

The frame element `Path` of the `Travel` frame in FrameNet is defined as follows: "The Path is the route along which the travel takes place." Thus, we model the property `dto:path` in our ontology design pattern for the representation of travel events as subproperty of `crm:P7_took_place_at` in the DTO and hence has the CRM class `crm:E53_Place` as its range (see Figure 1). For example "by sea" could be subsumed under the Path element.[17] The `Path` frame element in the more general `Self_motion` frame: "Path is used for any description of a trajectory of motion which is neither a Source nor a Goal." The properties for `Source` and `Goal` can be aligned as subproperties to the properties `crm:P27_moved_from` and `crm:P26_moved_to` of the CRM class `crm:E9_Move`. Therefore we define the class `dto:Travel` as a subclass of `crm:E9_Move`. Grossner defines "Trajectory-Path" as "a calculated *sequenced bag* of Places associated with a complex Event, such as a journey (expedition, pilgrimage, etc.). A trajectory can be derived by selecting for the geometries and temporal attributes of all sub-event parts of a journey" [Grossner 2010, 186].[18] 26

We decided to use only categories to describe the mode of transportation instead of representing specific vehicles etc. 27

The property `dto:mode_of_transportation` is connected with a concept from a classification system (see the SHACL restriction to the *Modes of Transportation* SKOS Concept Scheme in Figure 1 providing the categories ("stagecoach", "own vehicle", "by foot", etc.). In addition to the description of the mode of transportation by means of the classification system, the vessel used for transport can be explicitly stated via the property `dto:vehicle` which is aligned to CRM as a subproperty of `crm:P16_used_specific_object`.

In order to enable the ontology-based editing of travel-related activities, we had to find a balance between building subclasses with specific properties and applying the general activity class in combination with classification systems to classify activities, for example as observations or perceptions. We follow a limited subclassing approach based on frames grasping the specific semantic aspects of the top level categories from a more or less research-driven category system to build subclasses. 28

3.2.2 Frame-based Semantic Annotation

The major objective of the ontology design patterns presented is the semantic annotation and explicit modelling of all the travel events reported in the travelogue and to connect them in their mereological composition, their chronological sequence, and last but not least, their continuation nexus. The narratological sequence of the travel events can be retrieved on demand by exploiting the position of the semantic annotations in the course of the text. Therefore, the narration is not explicitly modelled in our approach.[19] We follow the CRM application profile from the *SDHSS Voyage, movement, transport and displacement* project[20] by reusing the property `crm:P134_continued` to model the relations between continuing travel activities, i.e. the sequence of all waypoints in an intended journey — not including the activities of the traveller during a stopover (see 3.2.1). The representation of the travel events provides basic data for further analysis and visualisation. 29

Travel activities (at stopovers or during travel) can also be modelled via ontology design patterns oriented on frames, e.g. `Activity`, `Perception_active`, `Meet_with`, `Sleep` etc. Each of these frames has at least a frame-element to describe the agent, the place, and the time of the activity. Types of activity, e.g. `attends a performance`, `complains about`, `gets a meal`, play a more central role and their definition is highly driven by research questions, as will be shown later. As an idea of a formal approach, frame-oriented ontology design patterns were in principle pre-conceived already by the tradition of the *ars apodemica*, which proposes typical activities during a stopover, e.g. visiting public places like cathedrals, monuments, museums etc. (see Figure 5 in [Maurer 1999]).[21] 30

The ontology design patterns predominantly use controlled vocabulary from classification systems, the most important of which being those providing categories for places, persons, groups of persons, means of transport, and types of activity. The standardisation allows for information retrieval via SPARQL queries to serve the information needs driven by different research interests. For the time being, we are using data which is destined for the production of graphs, i.e. vertices and edges with additional information retrieved from the frame-oriented database entries. Two types of encounters on the road will serve as an example of the challenges of this kind of research-driven annotation, highlighting the question of ethnic and gender stereotypes, and include the following: 1) contacts between the foreign traveller and the domestic customs officers and 2) between the bachelor traveller and landladies. 31

4. Examples and Learnings from Franz Xaver Bronner's Travelogue

We found early on there were many detailed ways to start analysing Bronner's text. One direction was the study on modes of travel and mail coaches, especially in Russia, to explain the phenomena Bronner reported upon. This didn't demand many amendments of the existing ontology. The visualisation of travel events, i.e. the path and its sequences, with QGIS[22] produced reasonable results, as is shown on Figure 2. 32

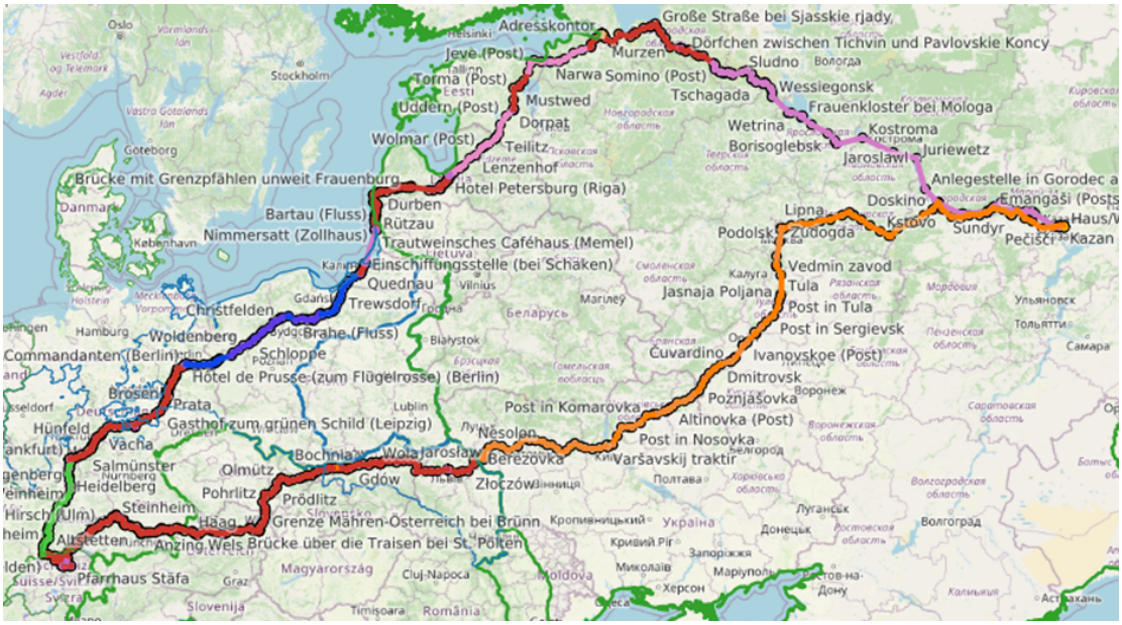

Figure 2. Mode of Transportation; for map legend, see https://qgiscloud.com/BeyerThoma/Bronner_DHQ_0

Bronner used a lot of different means of transport, for example travelling as a fellow traveller in a hired coach, hiring a coach and stagecoach, and for the return trip buying a coach with mail horses. Bronner mentions inns and places where horses were changed, sometimes explicitly stagecoach stations. 33

It proved to be more challenging to produce useful results through visualisation of typical activities during Bronner's travels like the encounters with people. We experimented with the activity types mentioned above and arranged them in various groups, but the preliminary results were not impressive. From the very beginning, we were interested not only in where a meeting took place, but also to what other place it referred to, e.g. when Bronner talked with the physicist Georg Friedrich Parrot during a meeting in Dorpat (now: Tartu), they also discussed the university of Kazan and the university's curator Stepan Rumovsky who resided in St. Petersburg. An overall view of all these geography-related contacts was processed with Gephi to produce a more objective picture than a mere view on the map. 34

Figure 3 shows a clustering (by colour) of relations between places by modularity, i.e. their density where the main places of the journey to Kazan appear as closely interrelated. Likewise, many towns on the way back, especially after Bronner's crossing the Austrian frontier, are clustered together with Vienna as the centre. Munich, as one may notice, does not belong to this cluster. In terms of travel activities, the Bavarian residence is situated much closer to the Kazan university than to the Austrian capital. This clustering occurred because Bronner's travelogue includes reports about letters brought from Kazan and conversations with German colleagues about professors working at the Russian university. In the end, the results of the data modelling we applied came back seemingly inconclusive. 35

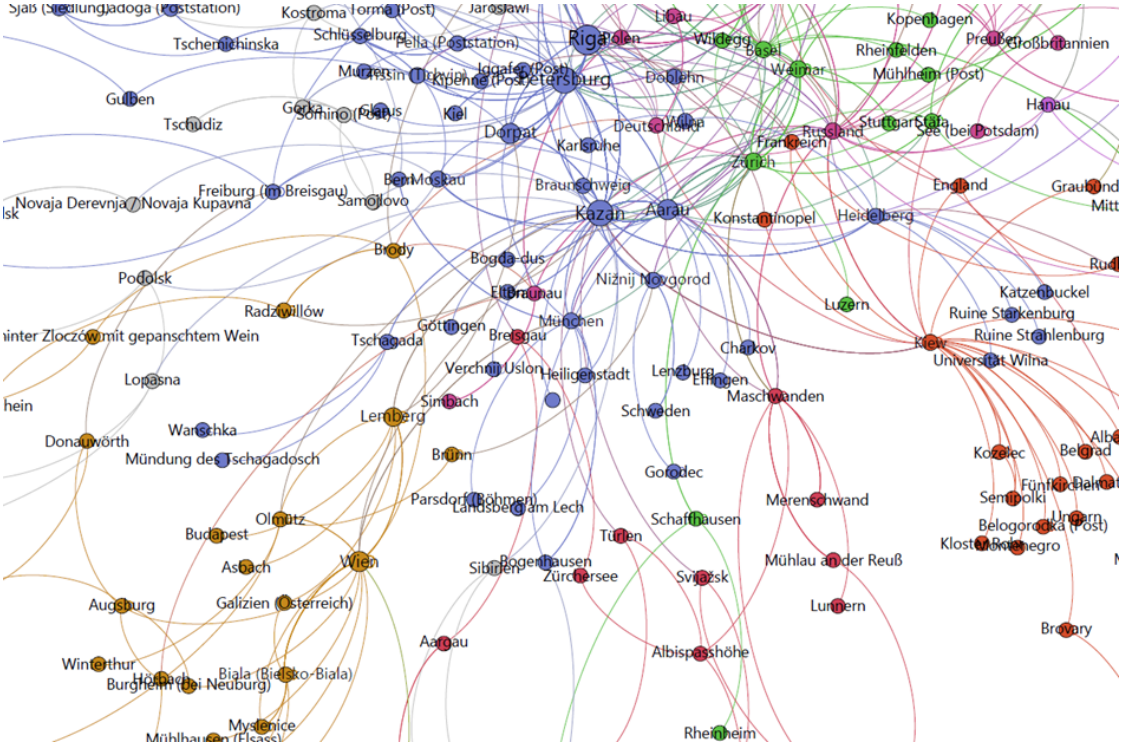

Figure 3. Clustering of relations between different geographical places (Vienna: yellow cluster; Kazan and Munich: blue cluster)

To tackle this issue, we took a closer look at the distinctive social and other features of the people who made up the contacts, marking in the first place, if mentioned, sex and religion. Additionally, we introduced a notification of social status and profession, as well as attributes of ethnicity or nationality. Most importantly, we started to focus more on the outcome from close reading of the travelogue and, in the end, came to readjust not only the activity types, but also the inner core of the ontology. 36

We will illustrate the issue of adapting the ontology to complex research questions, firstly, on several retrievals for cartographic visualisation and, secondly, on the subject of female agency as reflected in Bronner's travelogue (a popular theme in the history of travel writing). This also leads us to discuss the compatibility of network theory with actor-network methodology. 37

4.1 Observation of practices: perspectives on ethnic groups and cultural norms

In a first step, we added to the types of activities the item “(he/she/them) compares”[23] since Bronner often made comparisons, especially after crossing the Russian border behind Memel (now: Klaipėda). A visualisation of the results can be seen on Figure 4: 38

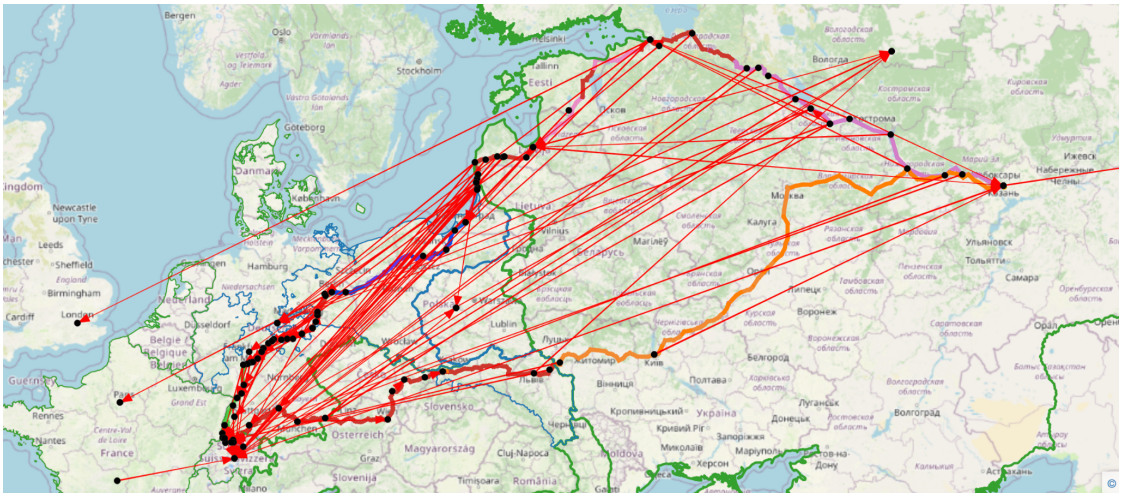

Figure 4. Mode of Comparisons; for map legend see https://qgiscloud.com/BeyerThoma/Bronner_DHQ_1

39 Before Bronner migrated to Switzerland in 1794, he had lived in the Swabian-speaking region centred around Höchstädt, Donauwörth and Augsburg. After the Swiss Revolution of 1797, he got a position in the administration of the newly founded Helvetic Republic and in 1803, when it was dissolved, he had accepted an ill-paid and insecure position as a teacher in Aarau, the capital of the newly created Swiss canton of Aargau, which Bronner regarded liberal enough to be a safe place for a former revolutionary. Bronner had become a Swiss patriot [Radspieler 1967, 13–79][24] and the country, in his comparisons, stood for a lovely landscape, flourishing agriculture and free, wealthy people. Germany, meanwhile, represented in Bronner's view a higher state of culture. Bronner's home region and the "Upper Germany" (i.e., Southern Germany), however, very seldom appeared as a reference during his journeys. The contrast with Switzerland got marked for Bronner when he entered the Baltic provinces of the Russian Empire, the more so since the serfdom that prevailed there had already reached the attention of the educated public of Germany [Heeg 1992]. Bronner also made comparisons with places formerly seen on his travels.

40 These findings spurred us to refine our ontology to more abundantly reflect all kinds of perceptions made by Bronner. To start with a narrowly travel-related subject: Bronner's descriptions of officials change at the border with Prussia in Treuenbrietzen where he was vexed by toll officials. Consequently, we classified professional groups and added various types of observations regarding his perception of officials to the travel activities classification system to be used in the pattern for the `Perception_active` class (see Figure 5).

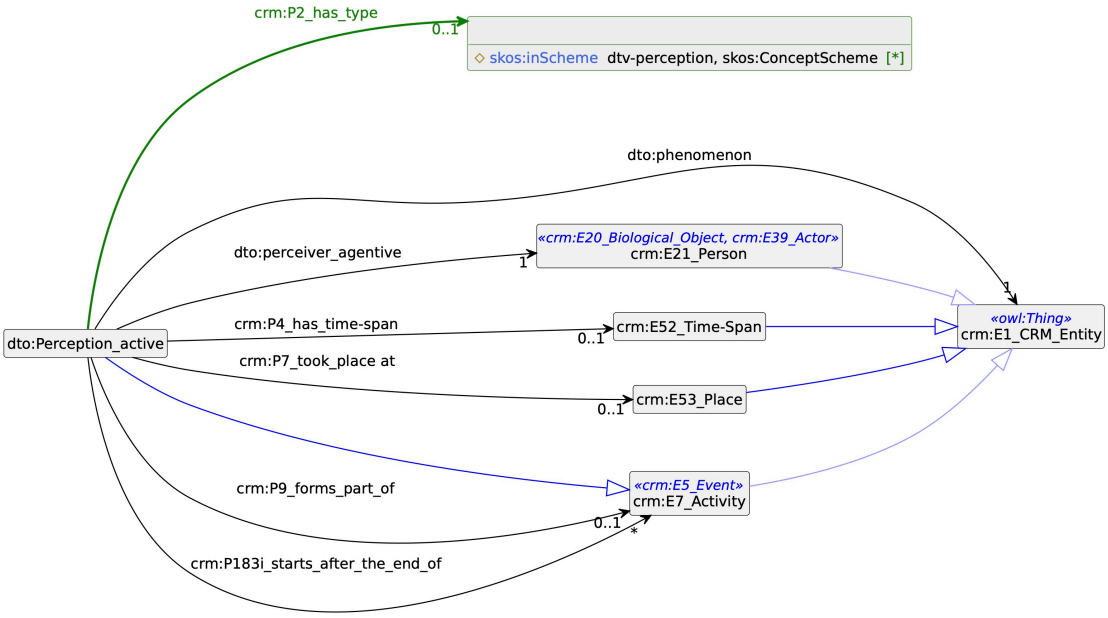

Figure 5. UML-like Class Diagram for the Ontology Design Pattern based on the FrameNet frame Perception_active

Figure 6 shows the area of distribution of Bronner's utterances of dissatisfaction with state officials that started at the Prussian frontier and continued throughout Russia and – in a slightly milder way – Austria. The last instance was in Braunau before Bronner crossed the Austrian-Bavarian frontier. Bronner, nevertheless, noted in Braunau in his draft travelogue: "Compare the honest character of Austrians and Bavarians with [that of] Poles and Russians" (Bronner 1817, December 1). 41

Figure 6. Encounters with Customs Officers; for legend, see https://qgiscloud.com/BeyerThoma/Bronner_DHQ_2

Bronner describes unpleasant encounters with Russian people during his journeys but refrains from commenting on them. The encounters with Polish and Jewish people, on the other hand, are more explicitly commented on. Figure 7 shows the authors' perceptions of these two ethnic groups according to the travel activity classification system. Bronner first encountered Poles in the former Polish territories of Prussia, thereafter in the Baltic and in the Ukraine, and the 42

Eastern part of Austria. He commented on these encounters, with one exception, always in a negative way. His critical observations on Jews, however, focused on Eastern Jewish lifestyles, and Jewish prevalence on the whole, in Polish towns. Bronner mentioned Jewish people and communities eastbound from Prussia onward and on the way back until Bohemia.

As a result of close reading of the text and a refinement and completion of our ontology, we can observe that Bronner's view on "Germany" as a stronghold of higher culture and on "Germans" and "Austrians" as more "honest" people is mixed up by his own observations. 43

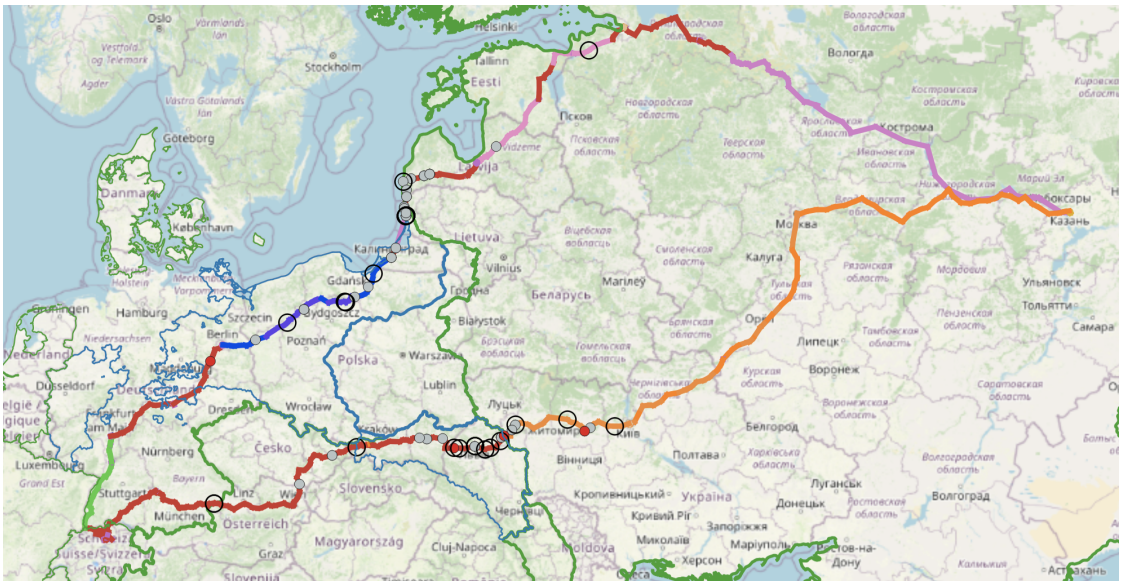

Figure 7. Perception of ethnic groups; for legend, see https://qgiscloud.com/BeyerThoma/Bronner_DHQ_3

4.2 Gender encounters: narrating women's agency

Bronner's text, for the most part written only as a draft to be revised later, nevertheless testifies to his abilities as an accurate observer especially of human relations. He scarcely commented on the many, mostly short, stories with women he reported on. This is why we decided to examine how Bronner represented gender relations in his travelogue. 44

Bronner described the regional costumes of women and by applying the method of geographical mapping, we already found some interesting features concerning gender relations, as can be seen in Figure 8. Remarks on women can be divided into three categories, here visualised by diamonds: mostly not commenting on them (white diamond), emphasising various characteristics of women (light green diamond), negative remarks about a woman's character or appearance (various kinds of red diamonds). In the culturally divided Baltic (starting already in Eastern Prussia), the number of observations increased in opposite directions. Bronner saw women dressed in the European or "French" manner and he was astonished at the incomplete, by his standards, clothing of the Baltic and later the Russian peasant women ("just a shirt"). Likewise, he disapproved that their clothes were not figure-hugging.[25] In the Baltic, Bronner for the first time encountered prostitutes and prostitution, but he stops mentioning them, as well as observations of flirting with a few exceptions, in Russia proper, only to start anew on the way home after the Austrian border (various shades of blue). Interestingly, on the way home Bronner noted with negative remarks that Russian host peasant women demanded a lot of money for boiling water and importunately, as he saw it, asked for gifts for their children and the elderly. Accustomed to the restrained behaviour of German middle-class women, he, as it seems, could not approve that Russian peasant women strongly defended the interests of their family in the sphere which was under their uncontested control.[26] 45

Figure 8. Perception of women; for legend, see https://qgiscloud.com/BeyerThoma/Bronner_DHQ_4

These observations aroused the question of female agency within these encounters and of the impact of the social and cultural norms. To attain results, attention had to be centred less upon the perceptions of the author, but upon how women acted and why – at least as it is portrayed by Bronner as an observer who undoubtedly was determined by the norms of his time. 46

One way of retaining compatibility with the ontology pattern is to apply the methodological approach of the Actor-Network Theory (ANT). It also uses graph-conform data consisting of vertices (“actors”) and edges, but ANT networks are not set out for being operationalized with mathematical methods nor even for visualisation. Instead, they are an instrument for reflection and constant refinement. A central claim of the ANT is that non-human actors of any kind must be considered, though not as preconceived constructs of the researcher. Instead, they must be discernible in the text as objects, motives, ideas, or clusters of them and human actors, conceived by the author or actors themselves at least in an indirect way.[27] The non-human actors to be defined by us according to the ANT mostly were too vague to be palpable and unequivocally identifiable in the text of the travelogue. Consequently, they could not be tagged and the tight connection of TEI tags and the database could be lost. Furthermore, our design pattern so far did not provide non-human actors. Let us give an example: When mentioning that women in a Riga banquet (Bronner 1810, August 30) sat around the housewife, Bronner clearly spoke about a kind of segregation of sexes. This was not the only time Bronner mentioned it, also in the Baltic (Bronner 1810, August 26), he wondered that domestic servants and poor travellers of all sexes shared for the night the same main room of an inn. In this example, too, he refers to a norm of segregation of sexes he was accustomed to from German households regardless of their wealth. We therefore have, according to ANT, to consider different norms of segregation of sexes as “actors”: two norms of Baltic origins and Bronner’s accustomed norms which he brought with him from Germany and Switzerland. As non-human actors these norms interact with people who are sharing them or not acting accordingly. 47

Since agency can be assumed as a unitary action of exerting influence, we decided to treat it with the frame-inspired modelling approach. The representation consists so far of two actors, an activity (using the *Activity Types* classification system), a determinator of strength ranging from 1 to 3, and the definition of direction. We also provided for the possibility of clustering several actors into one as an important requirement of ANT. Some actor-centred activity types had to be added, among them, of course, such that relate to non-human actors. In ANT, they are conceived vaguely in terms of “participation” which can be grasped via thematic roles in the frame semantics framework. But a person can set pressure upon another person by intentionally appealing to, say, a legal or moral norm, and that norm, in consequence, may become coercive – or just for this reason provoke resistance. 48

5. Connecting TEI and CRM: Related Work

To conclude the research, we will in the following give a short overview of the possibilities of connecting TEI and ontologies. We briefly present advantages and disadvantages as well as the different focal points of the introduced tools. 49

Eide discusses six different ways of linking between TEI text and Resource Description Framework (RDF) data [Eide 2014]. He proposes an approach to link RDF data modelling conforming to a CRM data model to a TEI document and a specific TEI element in it (see Fig. 7 in [Eide 2014]). A straightforward approach to interconnect the named entities (the traveller, departure place, destination place, roads, vehicles, etc.) with their corresponding representations in the database is to use XPath Selector to link from the RDF representations of the entities to the related TEI tag. Another approach would be to use the W3C Annotation Data Model to connect TEI and RDF/XML data (cf. [Borriello et al. 2016]). 50

Annotation tools like brat or INCEpTION can be used for visual annotation of the frame-based n-ary relations of ontology design patterns (see Figure 9). 51

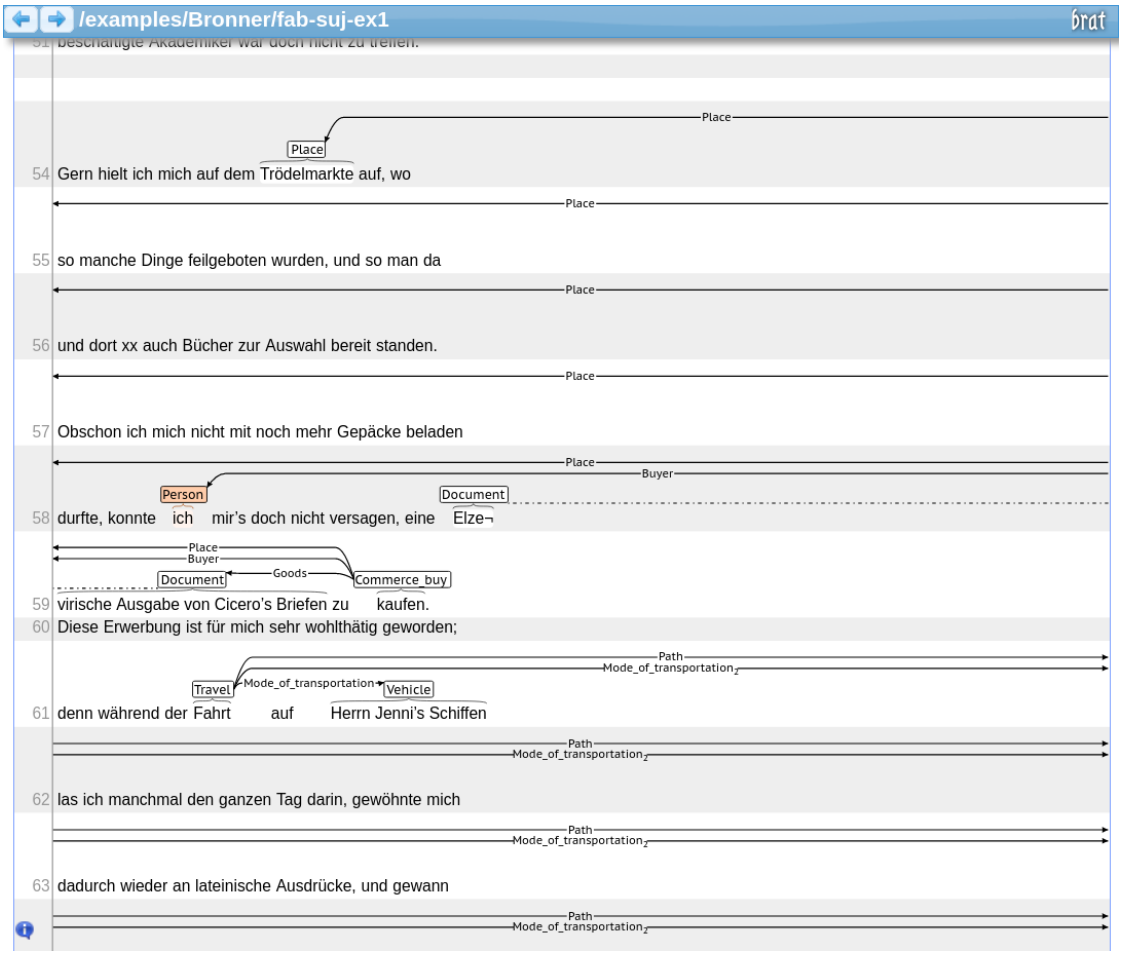

Figure 9. Screenshot of testing the ontology design pattern for travels and activities by means of an annotation scheme configured for the tool brat

From a usability perspective, an important benefit of the n-ary structure of the frame-oriented annotation scheme is that it keeps the manual annotation process simple. It would be quite more cumbersome to annotate events based on an ontology with extensive role-based modelling of activities of the traveller. EARMARK [Barabucci et al. 2013] representation (see Fig. 10) of annotations in LEAF-Writer[28] would allow stand-off markup for the semantic annotation of the n-ary relations. In the light of recent progress in the natural language processing tasks of frame detection and semantic role labelling (see reference to TakeFive below), frame-based semantic annotation may serve as an 52

intermediate layer in digital edition projects in the long run.

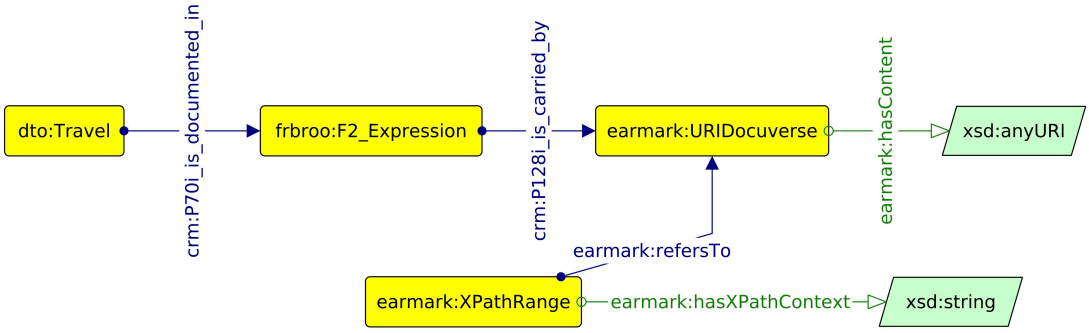

Figure 10. Possible annotation scheme to connect text with data via semantic annotations using EARMARK for representation of the text in RDF and the CRM extension FRBRoo to link to the data modelled according to the ontology design patterns

Overall, there are some examples such as the Hellespont project [Mambrini 2016] or the Semantic Blumenbach edition [Wettlaufer et al. 2015], linking TEI encoded text and CRM modelled data, however, our approach goes beyond the existing projects due to the development and application of ontology design patterns for more explicit data modelling and categorization. 53

The Linked Traces[29] annotation model utilises the W3C Web Annotation Data Model to trace places which were waypoints of a journey. We consider Linked Traces as a data model for data exchange and visualisation purposes because of its GeoJSON compatibility via the underlying Linked Places format [Grossner et al. 2017]. However, due to its limited granularity and expressiveness it is not appropriate for primary data management and knowledge representation and was therefore not considered to be used for building the database in our project. 54

There is a CRM application profile to model travel events: The profile from the *SDHSS Voyage, movement, transport and displacement* project is provided via the OntoME ontology management environment [Beretta 2021] and is also used in the virtual research environment Geovistory [Beretta et al. 2019].[30]. Regarding the modelling of social interactions during travels and stopovers, the social relations between persons for example could in principle be modelled with the pattern proposed by [Hart et al. 2021]. Their relationship pattern (see Hart et al. 2021, Figure 12) uses the class `crm:E7_Activity` with an according classification system to typify an particular activity via the property `crm:P2_has_type` and the class `crm:PC14_carried_out_by` (from the CRMpc extension) for role-based modelling of an actor's role played in the activity. The application of the relationship pattern would be more demanding for semantic annotation because of the additional explicit modelling and classification of roles (via the `crm:P14.1_in_the_role_of` property). 55

TakeFive is a method for semantic role labelling which "transforms a text into a frame-oriented knowledge graph" [Alam et al. 2021, 309]. Frames could become part of semantic editing processes in the long run (see section 5). Besides natural language processing resources for named entity recognition and disambiguation this would mean to use frame ontologies like FrameBase [Rouces et al. 2015] or Framester [Gangemi et al. 2016] in a digital editing environment. 56

6. Conclusion and Future Work

To reach our goal, based on the requirements of user stories and competency questions we had to make a pragmatic modelling decision: building subclasses for modelling genuine travel events (dto:Travel, dto:Stopover as well as dto:Transport) and using more general classes (as subclasses of the CRM class crm:E7_Activity) to model activities and type them with categories from classification systems. The subclasses are oriented on FrameNet frames. The event type specific properties of the subclasses are based on the frame elements and therefore represent semantic roles. Ontology design patterns enables and enforces to enrich text with data in a consistent way and thereby help to produce interoperable and reusable digital editions of historical travelogues. Furthermore, throughout the ontology-based 57

semantic annotation process SKOS vocabularies ensure a standardised way of applying categories for curation and research.

58 To be more specific: digital editions of travelogues can be enriched with ontology-based semantic annotations not only in the sense of modelling for production — ie. creating digital edition of a historical travelogue enriched with explicitly modelled travel events and activities during the travel and stopovers — but also in the sense of modelling for understanding by adding categorizations or data model — e.g., for suitable for a special methodology like social network analysis or actor-network theory — in order to answer a new research question in a new iteration of the historical information life cycle.[31]

59 Whereas the categories from the straightforward classification systems and controlled vocabularies *Travel Types*, *Stopover Types*, *Mode of Transportation*, *Measurement Units* etc. are used as concepts to specify travels (and parts of travels), their modes of transportation, and their dimensions like the travel distance etc., as well as stopovers, the activities of the traveller have to be specified by activity-specific categories: for example perception activities are typified with concepts from the *Perception Types* concept scheme. These concepts are used as analytical concepts for further analysis.[32]

60 At its current state the OWL & SHACL ontology design patterns as well as the according SKOS classification systems and controlled vocabularies are in continuous development and are therefore not yet published.

61 Besides the ontology design patterns and knowledge organisation systems, a main deliverable of the project is a modular digital research infrastructure for the creation and distribution of digital editions of historical travelogues. A useful component to be integrated in the prospective modular research infrastructure for the retrieval phase in the research data life cycle of a digital travelogue edition is Sparql2GraphServer: a server-side tool which allows to construct graph data from RDF data [Leskinen et al. 2021]. This is achieved by defining extraction patterns to extract data in Cytoscape.js compatible JSON response format or in GraphML export format [Ghawi and Pfeffer 2020].

Notes

[1] http://quellen-perspectivia.net/de/borchward/start

[2] http://edition-humboldt.de/index.xql

[3] https://hainhofer.hab.de

[4] http://linkedpaths.kgeographer.org/ and https://github.com/kgeographer/linked-paths

[5] http://lotrproject.com/

[6] https://gepris.dfg.de/gepris/projekt/453498639?language=en

[7] The State Archive Aargau holds the unpublished manuscripts written by Franz Xaver Bronner, see the manuscript collection: Staatsarchiv Aargau, Nachlass Bronner, NL.A-0019.

[8] See the concept of modelling for production and modelling for understanding [Eide 2014].

[9] We follow the Historical Information Life Cycle [Meroño-Peñuela et al. 2015] in creating a digital edition, where ontologies are not only used in the enrichment, editing, as well as the retrieval phases of the life cycle, but also in the analysis and visualisationDOC phases.

[10] SPARQL Protocol And RDF Query Language.

[11] Tool for network analysis and visualisation, see https://gephi.org/

[12] According to Russian formalism, the fabula represents the chronological sequence as well as the causal and mereological relations of travel events reported in a travelogue. The sujet represents the narrative sequence of the events, which can deviate from the chronological sequence when a travel report does not follow the chronological order.

[13] Annotation tools like brat or INCEpTION provide an annotation and visualisation component for n-ary relations (frames or events incl. the roles of agent and patient etc.).

[14] See for example the frames Departing, Travel, Arriving, Temporary_stay, Make_acquaintance in FrameNet: http://framenet.lexicalsemantics.org/

[15] The ontology design patterns are developed by combining OWL classes and properties and SHACL node shape constraints. The UML class diagrams are drawn with the SHACL2PlantUML tool available on GitHub: https://github.com/rosecky/shacl2plantuml

[16] We need this class to model the movement of the baggage of historical travellers when this took place on another route by different means of transportation than the traveller's journey. It would not make sense to represent "travelling baggage" because a travel has to be understood as the activity of a sentient being.

[17] annotation example from http://framenet.lexicalsemantics.org/lu/lu5961.xml?mode=annotation&banner=

[18] According to Grossner [Grossner 2010, 131] a path can be considered as an unnamed place. Though, a path in the sense of the frame element can also be a route (specific road or seaway).

[19] See the CRM-based modelling of the narration and textual content introduced by [Bartalesi et al. 2017].

[20] See the project landing page in OntoME: https://ontome.net/project/144

[21] See for the historical item: https://www.digitale-sammlungen.de/view/bsb10184435?page=24

[22] See https://www.qgis.org/en/site/

[23] See the relevant FrameNet frame `Evaluative_comparison` (triggered by the verb "compare"): http://framenet.lexicalsemantics.org/frameIndex.xml?frame=Evaluative_comparison

[24] The most apprehensive biographical work on Bronner is authored by Hans Radspieler.

[25] The traditional clothing of Russian women, especially young girls, is passim described by [Šangina 2008]; for an (as it may seem to somebody: far-fetched) explanation of the non-figure-hugging clothes of Russian women see [Puškareva 1995, 64–65].

[26] About the gender-based division of labour in the Russian peasant family (see [Šustrova 1998]; [Löwe 1989]). It was not so different from that in Germany (see [Mitterauer 1989]).

[27] A central manifesto of ANT is the book by Latour [Latour 2007]. See also the research report by Vicsek, Király, Kónya (2016) and the collection of articles which is consecrated to ANT in history: Füssel, Neu (2021).

[28] https://leaf-writer.leaf-vre.org/

[29] https://github.com/LinkedPasts/linked-traces-format

[30] Ontological problems of CRM's taxonomy are out of the scope of this paper (see ontological analysis by [Sanfilippo et al. 2020]). We are aware of issues with the definition and meaning of the class crm:E53_Place. SDHSS tries to overcome these problems with its new class sdh:C13_Geographical_Place: https://ontome.net/class/364/namespace/3

[31] [Eide 2014] uses the distinction between modelling for production and modelling for understanding in the context of TEI encoding (as a form of modelling) of texts. We extend this distinction to the use of TEI editing combined with ontology-based modelling of the most essential elements relevant for production *and* understanding of the text.

[32] As the handling of terms in the context of this DHQ special issue's topic "Working on and with Categories for Text Analysis" may not always be consistent throughout presentations, see the ISKO Encyclopedia of Knowledge Organization article "Classification" for an elaborately account on definitions of *classification* and *categorization*: https://www.isko.org/cyclo/classification#3.2

Works Cited

Alam et al. 2021 Alam, Mehwish, Aldo Gangemi, Valentina Presutti, and Diego Reforgiato Recupero. (2021) "Semantic Role Labeling for Knowledge Graph Extraction from Text." *Progress in Artificial Intelligence*, no. 10: 309–330.

doi:10.1007/s13748-021-00241-7.

Barabucci et al. 2013 Barabucci, Gioele, Angelo Di Iorio, Silvio Peroni, Francesco Poggi, and Fabio Vitali. (2013) “Annotations with EARMARK in Practice: A Fairy Tale.” In *Proceedings of the 1st International Workshop on Collaborative Annotations in Shared Environment: Metadata, Vocabularies and Techniques in the Digital Humanities*. DH-Case ’13. Association for Computing Machinery. doi:10.1145/2517978.2517990.

Bartalesi et al. 2017 Bartalesi, Valentina, Carlo Meghini, and Daniele Metilli. (2017) “A Conceptualisation of Narratives and Its Expression in the CRM.” *International Journal of Metadata, Semantics and Ontologies* 12 (1): 35–46.

Beretta 2021 Beretta, Francesco. (2021) “A Challenge for Historical Research: Making Data Fair Using a Collaborative Ontology Management Environment (OntoME).” *Semantic Web*, no. 12. IOS Press: 279–294. doi:10.3233/SW-200416.

Beretta et al. 2019 Beretta, Francesco, Vincent Alamercery, Sebastiaan Derks, Lodewijk Petram, and Jonas Schneider. (2019) “Geohistorical FAIR data: data integration and Interoperability using the OntoME platform.” Time Machine Conference 2019. https://halshs.archives-ouvertes.fr/halshs-02314003.

Beyer-Thoma 2017 Beyer-Thoma, Hermann. (2017) “Donauwörth - Aarau - Kazan': Die Auswanderungsentscheidung des ehemaligen bayerischen Mönchs Franz-Xaver Bronner im Jahr 1809.” In *Zeitschrift für bayerische Landesgeschichte* 79 (3): 689–741. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-74075-8

Borriello et al. 2016 Borriello, Marta, Christian Dirschl, Axel Polleres, Phil Ritchie, Frank Salliau, Felix Sasaki, and Giannis Stoitsis. (2016) “From XML to RDF Step by Step: Approaches for Leveraging XML Workflows with Linked Data.” In *XML Prague 2016 – Conference Proceedings*. Prague. https://archive.xmlprague.cz/2016/files/xmlprague-2016-proceedings.pdf

Brilli 1997 Brilli, Attilio. (1997) *Als Reisen eine Kunst war. Vom Beginn des modernen Tourismus: die “Grand Tour.”* Berlin: Klaus Wagenbach.

Bronner 1810 Bronner, Franz Xaver. (1810) Travelogue (“Reise nach Kasan”). Staatsarchivs Aargau, Nachlass Bronner, NL.A-0019 (Manuscript).

Bronner 1817 Bronner, Franz Xaver. (1817) Travelogue (Draft). Staatsarchivs Aargau, Nachlass Bronner, NL.A-0019 (Manuscript).

Burrows et al. 2021 Burrows, Toby, Matthew Holford, David Lewis, Andrew Morrison, Kevin Page, and Athanasios Velios. (2021) “Transforming TEI Manuscript Descriptions into RDF Graphs.” In *Graph Data-Models and Semantic Web Technologies in Scholarly Digital Editing*, 143–154. Norderstedt: BoD.

Bödeker et al. 2004 Bödeker, Hans Erich, Arnd Bauerkämper, and Bernhard Struck. (2004) “Reisen als kulturelle Praxis.” In *Die Welt erfahren. Reisen als kulturelle Begegnung von 1780 bis heute*, edited by H. E. Bödeker and B. Struck, 9–30. Frankfurt am Main: Campus Verlag.

Eide 2014 Eide, Øyvind. (2014) “Ontologies, Data Modeling, and TEI.” *Journal of the Text Encoding Initiative*, no. 8 (December).

Gangemi et al. 2016 Gangemi, Aldo, Mehwish Alam, Luigi Asprino, Valentina Presutti, and Diego Reforgiato Recupero. 2016 “Framester: A Wide Coverage Linguistic Linked Data Hub.” In Knowledge Engineering and Knowledge Management (20th International Conference, EKAW 2016, Bologna), 239–254. Cham: Springer. doi: 10.1007/978-3-319-49004-5_16

Ghawi and Pfeffer 2020 Ghawi, Raji and Jürgen Pfeffer. (2020) “Extraction Patterns to Derive Social Networks from Linked Open Data Using SPARQL.” *Information* 11 (7). doi: 10.3390/info11070361.

Giovannetti and Tomasi 2022 Giovannetti, Francesca and Francesca Tomasi. (2022) “Linked data from TEI (LIFT): A Teaching Tool for TEI to Linked Data Transformation” *Digital Humanities Quarterly* 16 (2). http://www.digitalhumanities.org/dhq/vol/16/2/000605/000605.html.

Grossner 2010 Grossner, Karl. (2010) “Representing Historical Knowledge in Geographic Information Systems.” PhD thesis, University of California.

Grossner et al. 2017 Grossner, Karl, Merrick Lex Berman, and Rainer Simon. (2017) “Linked Places: A Modeling Pattern and Software for Representing Historical Movement.” In *Digital Humanities 2017: Conference Abstracts*, 463–465. https://dh2017.adho.org/abstracts/204/204.pdf.

Gruber 2022 Gruber, Doris. (2022) “Europeans Encounter the World in Travelogues, 1450–1900.” *European History Online (EGO),* 2022-03-08. URL: http://www.ieg-ego.eu/gruberd-2022-en. URN: urn:nbn:de:0159-2022011011 (access 2022-12-05).

Gräf and Pröve 1997 Gräf, Holger Thomas and Ralf Pröve. (1997) “Wege ins Ungewisse. Reisen in der Frühen Neuzeit 1500–1800.” Frankfurt am Main: Fischer.

Haaf et al. 2015 Haaf, Susanne, Alexander Geyken, and Frank Wiegand. (2015) “The DTA ‘Base Format’: A TEI Subset for the Compilation of a Large Reference Corpus of Printed Text from Multiple Sources.” In *Journal of the Text Encoding Initiative*, no. 8. doi:10.4000/jtei.1114.

Hart et al. 2021 Hart, Stephen, Karine Léonard Brouillet, and Philippe Michon. (2021) “Semanticizing Sociability: Documenting Relationships in the Context of Cultural Heritage.” In *Semantic Web*. IOS Press. https://www.semantic-web-journal.org/system/files/swj2755.pdf.

Heeg 1992 Heeg, Jürgen. (1992) “Die politische Publizistik Garlieb Merkels und seine Kritik an der livländischen Leibeigenschaft.” In *Jahrbücher für Geschichte Osteuropas* 40 (1): 27–40. https://daten.digitale-sammlungen.de/bsb00003840/image_37

Hotson and Wallnig 2019 Hotson, Howard and Thomas Wallnig, eds. (2019) *Reassembling the Republic of Letters in the Digital Age.* Göttingen: Göttingen University Press. doi:10.17875/gup2019-1146.

Kudella and Jefferies 2019 Kudella, Christoph, and Neil Jefferies. (2019) “How Do We Model the Republic of Letters?” In *Reassembling the Republic of Letters in the Digital Age*, edited by Howard Hotson and Thomas Wallnig, 41–53. Göttingen: Göttingen University Press. doi:10.17875/gup2019-1146.

Latour 2007 Latour, Bruno. (2007) *Eine neue Soziologie für eine neue Gesellschaft. Einführung in die Akteur-Netzwerk-Theorie.* Frankfurt am Main: Suhrkamp.

Leskinen et al. 2021 Leskinen, Petri, Eero Hyvönen, and Jouni Tuominen. (2021) “Sparql2GraphServer: A Server-Side Tool for Extracting Networks from Linked Data for Data Analysis.” In *International Semantic Web Conference (ISWC) 2021: Posters, Demos, and Industry Tracks.* (CEUR Workshop Proceedings; vol. 2980). urn: urn:nbn:de:0074-2980-6; https://ceur-ws.org/Vol-2980/paper343.pdf.

Löwe 1989 Löwe, Heinz-Dietrich. (1989) “Die arbeitende Frau. Traditionelle Räume und neue Rollen, Russland 1860–1917.” In *Aufgaben, Rollen und Räume von Frau und Mann*, edited by Jochen Martin, Renate Zoepffel, 937–972. Freiburg, München: Verlag Karl Alber.

Mambrini 2016 Mambrini, Francesco. (2016) “Treebanking in the World of Thucydides. Linguistic Annotation for the Hellespont Project.” In *Digital Humanities Quarterly* 10 (2). http://www.digitalhumanities.org/dhq/vol/10/2/000251/000251.html.

Maurer 1999 Maurer, Michael. (1999) “Reisen interdisziplinär – Ein Forschungsbericht in kulturgeschichtlicher Perspektive.” In *Neue Impulse der Reiseforschung*, edited by Michael Maurer. Berlin: Akademie Verlag.

Maurer 2015 Maurer, Michael. (2015) “Reiseberichte als Wissensspeicher.” In *Wissensspeicher der Frühen Neuzeit: Formen und Funktionen*, edited by Frank Grunert and Anette Syndikus, 391–412. Berlin, Boston: De Gruyter. doi:10.1515/9783050086637-015.

Meroño-Peñuela et al. 2015 Meroño-Peñuela, Albert, Ashkan Ashkpour, Marieke van Erp, Kees Mandemakers, Leene Breure, Andrea Scharnhorst, Stefan Schlobach, and Frank van Harmelen. (2015) “Semantic Technologies for Historical Research: A Survey.” In *Semantic Web* 6 (6). IOS Press: 539–564. doi:10.3233/SW-140158.

Meyer 2019 Meyer, Till. (2019) “Datenmodellierung für digitale Editionen. Stand und Perspektiven zwischen XML/TEI, Linked Open Data und Ontologien.” Berlin: Humboldt University edoc-Server. doi:10.18452/20754.

Mitterauer 1989 Mitterauer, Michael. (1989) “Geschlechtsspezifische Arbeitsteilung und Geschlechterrollen in ländlichen Gesellschaften Mitteleuropas.” In *Aufgaben, Rollen und Räume von Frau und Mann*, edited by Jochen Martin, Renate Zoepffel, 819–914. Freiburg, München: Verlag Karl Alber.

Mączak 1995 Mączak, Antoni. (1995) *Travel in Early Modern Europe.* Cambridge: Polity Press.

Presutti et al. 2012 Presutti, Valentina, Eva Blomqvist, Enrico Daga, and Aldo Gangemi. (2012) “Pattern-Based Ontology Design.” In *Ontology Engineering in a Networked World*, edited by Mari Carmen Suárez-Figueroa, Asunción Gómez-Pérez, Enrico Motta, and Aldo Gangemi, 35–64. Berlin: Springer.

Puškareva 1995 Puškareva, N.L. (1995) “Sem'ja, ženščina, seksual'naja ėtika v pravoslavii i katolicizme. Perspektivy sravnitel'nogo podchoda.” In *Ėtnografičeskoe obozrenie* 3: 55–70.

Radspieler 1963 Radspieler, Hans. (1963) *Franz Xaver Bronner. Leben und Werk bis 1794. Ein Beitrag zur Geschichte der süddeutschen Aufklärung.* Grünburg: Mayer.

Radspieler 1967 Radspieler, Hans. (1967) *Franz Xaver Bronner 1794–1850. Ein Beitrag zur Geschichte der Helvetik und des Kantons Aargau.* Aarau: Sauerländer.

Ramusio 2015 Ramusio, Giovanni Battista. (2015) *Dei viaggi di Messer Marco Polo gentiluomo veneziano (Navigationi et viaggi, II, 1559). Edizione critica digitale,* edited by Eugenio Burgio, Marina Buzzoni, and Antonella Ghersetti. http://virgo.unive.it/ecf-workflow/books/Ramusio/main/index.html (access: 2022-12-05).

Rouces et al. 2015 Rouces, Jacobo, Gerard de Melo and Katja Hose. (2015) "Representing N-ary Relations using Semantic Frames." The Semantic Web. Latest Advances and New Domains. ESWC 2015. (Lecture Notes in Computer Science; vol 9088), 505–521. Cham: Springer. doi: 10.1007/978-3-319-18818-8_31

Ruppenhofer et al. 2016 Ruppenhofer, Josef, Michael Ellsworth, Miriam R. L. Petruck, Christopher R. Johnson, and Jan Scheffczyk. (2016) "FrameNet II: Extended Theory and Practice. Revised." https://framenet2.icsi.berkeley.edu/docs/r1.7/book.pdf (access: 2022-12-05).

Sanfilippo et al. 2020 Sanfilippo, Emilio M., Béatrice Markhoff, and Perrine Pittet. (2020) "Ontological Analysis and Modularization of Cidoc-Crm." In *Formal Ontology in Information Systems*, edited by Boyan Brodaric and Fabian Neuhaus. Vol. 330. Frontiers in Artificial Intelligence and Applications. doi:10.3233/FAIA200664.

TEI 2019 TEI. (2019) "A very gentle introduction to the TEI markup language." https://tei-c.org/Vault/Tutorials/mueller-index.htm.

Unsworth 2011 Unsworth, John. (2011) "Computational Work with Very Large Text Collections. Interoperability, Sustainability, and the Tei." In *Journal of the Text Encoding Initiative*, no. 1 (June). doi:10.4000/jtei.215.

Wettlaufer et al. 2015 Wettlaufer, Jörg, Christopher Johnson, Martin Scholz, Mark Fichtner, and Sree Ganesh Thotempudi. (2015) "Semantic Blumenbach: Exploration of Text–Object Relationships with Semantic Web Technology in the History of Science." In *Digital Scholarship in the Humanities* 30 (suppl_1): i187–i198. doi:10.1093/llc/fqv047.

Wisnicki and Ward 2018 Wisnicki, Adrian S., and Megan Ward. (2018) "Livingstone Online." http://www.livingstoneonline.org/about-this-site.

Šangina 2008 Šangina, Izabella. (2008) *Russkie devuški.* Sankt-Peterburg: Azbuka-Klassika.

Šustrova 1998 Šustrova, Irina. (1998) "Očerki po istorii russkoj sem'i Verchevolžskogo regiona v XIX – načale XX veka." Jaroslavl': Jaroslavskij gosudarstvennyj universitet.