The Turing Test: Verbal Behavior as the Hallmark of Intelligence

Stuart Shieber (editor)
(Harvard University)

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This eagerly awaited anthology, while surely not the last word on the Turing Test, equally surely deserves to become the principal source of information on the test. It includes not only Turing's classic paper, but a fine selection of the main replies to date, all tied together by an engaging and penetrating essay by the editor.

Stuart M. Shieber's name is well known to computational linguists for his research and to computer scientists more generally for his debate on the Loebner Turing Test competition, which appeared a decade earlier in *Communications of the ACM* (Shieber 1994a, 1994b; Loebner 1994).[1] With this collection, I expect it to become equally well known to philosophers.

The collection begins with historical "precursors" to Turing's paper: two pieces by Descartes—his *Discourse on the Method*, Chap. V (1637), and his "Letter to the Marquess of Newcastle"—followed by selections from La Mettrie's *Machine Man* (1748).

The second part contains the centerpiece: Turing's 1950 paper from *Mind*, "Computing Machinery and Intelligence," accompanied by three "ephemera": two early (1951) and difficult-to-find articles by Turing—"Intelligent Machinery, a Heretical Theory" and "Can Digital Computers Think?"—and a transcript of a 1952 BBC radio interview with Turing, M. H. A. Newman, Sir Geoffrey Jefferson, and R. B. Braithwaite, "Can automatic Calculating Machines Be Said to Think?" Shieber's presentation of the pièce de résistance (Turing 1950) devotes great attention to the sanctity of the text and is replete with scholarly paraphernalia comparing his carefully edited reprint with the original (which, by the way, is now available online, courtesy of JSTOR.org).

The third, and final, part contains the immediate reactions to Turing's *Mind* paper as they appeared in that journal, followed by now-classic responses and some more-recent, important papers, some arranged chronologically, others logically. The first published response was Leonard Pinsky's early (1951)—and satirical—"Do Machines Think about Machines Thinking?" for which Shieber offers a brief, wry introduction. Next we have a quartet consisting of Keith Gunderson's important "The Imitation Game" (1964), Richard Purtill's response ("Beating the Imitation Game," 1971), and Geoffrey Sampson's ("In Defence of Turing") and P. H. Millar's ("On the Point of the Imitation Game") 1973 replies to Purtill. Jumping ahead a couple of decades comes Robert M. French's 1990 "Subcognition and the Limits of the Turing Test." Next, in more of a logical than a chronological order, comes a trio consisting of John

1 Interestingly, neither Loebner nor his competition are mentioned by name, or even discussed, in the book under review, though there is a citation to Shieber 1994a.

R. Searle's almost equally classic "Minds, Brains, and Programs" (1980), Ned Block's important "Psychologism and Behaviorism" (1981), and Daniel C. Dennett's "Can Machines Think?" (1985). Skipping back in time a bit, we next have a debate between James H. Moor (his excellent "An Analysis of the Turing Test," 1976) and Douglas F. Stalker ("Why Machines Can't Think: A Reply to James Moor," 1978), with Moor's reply to Stalker ("Explaining Computer Behavior," 1978). A gift closes the book: a previously unpublished essay by Noam Chomsky, "Turing on the 'Imitation Game.'"

Meandering through these delicacies are Shieber's introductory remarks to each, which, taken together, constitute an extended essay on the Turing Test, the issues it raises, and its significance. Shieber begins his introduction with an analogy that makes the Turing Test seem as clear and plausible as possible:

> *How do you tell if something is a meter long? You compare it with an object postulated to be a meter long. If the two are indistinguishable with regard to the pertinent property, their length, then you can conclude that the tested object is the given length.*
> *Now, how do you tell if something is intelligent? You compare it with an entity postulated to be intelligent. If the two are indistinguishable with regard to the pertinent properties, then you can conclude that the tested entity is intelligent. (page 1)*

Shieber observes that the "pertinent property" for "indistinguishability" *according to Turing* is "verbal behavior" (in the sense of *spoken* behavior). This phrase does not appear in Turing 1950; "behavio[u]r" does, but it is not immediately obvious that it always means *verbal* behavior. The phrase brings to mind, of course, B. F. Skinner's (1957) famous book of that name, though Shieber ascribes the notion to Descartes (page 4). Shieber does note that the two cases (meter-measuring and thinking) are not perfectly parallel:

*[U]nlike the case of meter measurement, the identification of the pertinent properties for intelligence are [*sic*] subtle, and ramifies widely in the foundation of the philosophy of mind. (page 1)*

That length is the pertinent property for determining meter-hood is uncontroversial. But exactly what the pertinent property or properties are for assessing intelligence, and whether verbal behavior in particular is the one, has become the key issue regarding the Turing Test. (page 8)

This raises what Shieber calls "the Big Question": "Is passing a Turing Test criterial for intelligence?" (page 8) or "…for thinking" (page 11), where 'intelligence' is to be understood as meaning "being capable of thought" (page 6, note 2).

In the sections called "The *Bête Machine*" and "If Animals Could Talk," Shieber discusses the history of "mechanistic marvels" (page 18), beginning with timekeeping devices and how they make "the question of whether real animals are purely mechanistic" (page 18) a plausible one, leading up to a discussion and analysis of Descartes's "*bête machine*" (beast—i.e., animal—machine) and "linguistic test for distinguishing between human and machine" (page 21), an anticipation of the Turing Test, in his *Discourse*.

Further analysis of Descartes appears in the section on "The *Homme Machine*" (man—i.e., human—machine), where Shieber shows that many of the responses to Descartes were empirical attempts to build a machine that was indistinguishable (in relevant respects) from a living creature (e.g., de Vaucauson's duck [page 39]).

Compare (at least one of) the goal(s) of modern artificial intelligence, namely, to build a machine that is indistinguishable (in relevant respects) from a living cognitive agent! Shieber discusses La Mettrie's extension of Descartes's argument to the conclusion that, in fact, machines *can* be made indistinguishable from humans, since we humans are already nothing but machines. Shieber notes that it was only *practical* limitations of mechanics (e.g., those due to friction) that prevented further implementations, many of which limitations have now been transcended by modern electronics. Obviously, many critics believe that there are *theoretical* limitations that will never be transcended, but I wonder if any *physical* limitations of contemporary electronic devices might someday be overcome in their turn by some new engineering tricks (such as optical or quantum computers?).

In "Computer Technology," the section introducing Turing 1950, Shieber suggests that Turing played the role with respect to electronic computers that Descartes played with respect to mechanical devices, asking the same questions, only about different technology. Here, he also raises "the question of whether the Test is intended as definitional of the concept of intelligence or substitutive for it" (pages 61–62). The rest of this section is devoted to a discussion of the textual differences between this reprinting and the original. Because of Shieber's careful scholarly work, it seems to me that this *reprint* should become the standard version, possibly even superseding the original!

Next comes "The Ephemera," a useful reprinting of the two speeches and the radio interview that originally appeared shortly after Turing 1950. Shieber's discussion focuses on the sidebar issues of when the test might be passed and on the role of gender. On the former, Shieber takes issue with the famous understanding of Turing 1950 as having predicted passage by the year 2000; rather, all that Turing predicted would happen by then was passage of a *weaker* test. But one of the ephemera gives a figure of "at least 100 years" (pages 100, 119), that is, no earlier than 2050 (though this still seems somewhat optimistic to me, and I'm a fan both of "strong AI" and of the Turing Test). As for the latter, Shieber explores in some depth the question of the confusing roles of man and woman in the original Imitation Game and whether they are essential in some way to the human–computer Turing Test (with copious references to the literature on the topic), noting that the ephemera side with the non-gendered version. (See also Colby et al. 1972, page 202, and Argamon et al. 2003 for two relevant articles not cited by Shieber.)

In "The Immediate Responses," Shieber offers "the Turing syllogism," an argument from passing the Turing Test to being intelligent (page 136):

1. Humans are intelligent.
2. The conversational verbal behavior of humans reveals that (human) intelligence.
3. If an agent has behavior of a type that can reveal intelligence and that is indistinguishable from that of an intelligent agent, the former agent is itself intelligent.
4. Any agent that passes the Turing Test has conversational verbal behavior indistinguishable from that of humans.

Therefore, any agent that passes the Turing Test is intelligent.

This syllogism "is implicitly assumed by all philosophers investigating the ramifications of the Turing Test beyond" Turing's limitation that it is intended to replace the "meaningless" conclusion (pages 136–137). Shieber goes on to consider whether the Turing Test is a necessary or a sufficient condition of thinking. That intelligent agents can pass the Turing Test does not follow from premises 1–4 because of the possibility of "incidental distinctions" that might prevent an intelligent agent from passing (page 137). Shieber notes that French's contribution argues that the Turing Test is a test of *chauvinistically human* intelligence, not necessarily of intelligence *simpliciter* (see below). As to whether the Test is a *sufficient* condition of thinking, Shieber focuses on the circumstantial evidence cited in premise 3 as the weak link (if an entity walks like a duck, talks like a duck, and is otherwise indistinguishable from a duck, then is it really a duck?). He notes that there is an easy counterexample to this premise: the celebrated case of the monkeys and the typewriter (an infinite number of monkeys working for an infinite amount of time eventually producing the complete works of Shakespeare). Other counterexamples can be found in Block's and Searle's contributions.

In "The Wedge and the Spark," Shieber introduces Gunderson's objection that "net results" (pages 147, 154) are not enough to decide whether something can think, because there might be a property that is essential for thought that people, but not machines, have. (This is an attack on premise 3.) Such a machine is, in Shieber's terminology, a "wedge" (page 148) driven between "passing the Turing Test" and "being capable of thought." The essential property is a "spark" that would otherwise cause the wedge to be able to think. Gunderson also argues that it is too *easy* to pass the Turing Test, but Shieber argues that this is not the case, based on the difficulties that computational linguists have faced in their investigations of natural-language-processing tasks.

In subsequent sections, Shieber (1) dismisses Purtill's chapter for trying to show that, if computers do think, then perhaps people don't, citing Sampson's objection that "redefining . . . 'think' is not" an "option" (page 163); (2) introduces French's argument that passing the Turing Test might be so *hard* that *only* humans could pass it, not even other "intelligent beings" (page 182); (3) points out that, according to Searle's Chinese Room Argument, the "missing spark" is intentionality (or, perhaps, consciousness; see page 199, note 1); (4) summarizes Dennett's original *Behavioral and Brain Sciences* reply to Searle; and (5) quotes a long passage by I. J. Good that presents Turing's views on consciousness (Turing may have believed that, for a human to retain consciousness after having parts of his or her brain replaced by electronic devices, he or she might require at least 1 cubic inch of "original brain tissue" [page 200]).

If the missing spark isn't intentionality, perhaps it is "richness of information processing." Shieber discusses Block's move from actually passing a Turing Test to "the *capacity* [italics added] to pass" as "a sufficient condition for intelligence" (page 225), which "vitiates the monkeys and typewriters example" (page 225, note 1). But how? Presumably, monkeys and typewriters that actually pass the test thereby also have the *capacity* to pass it. Block's Aunt Bertha machine uses a gigantic table lookup to pass the test, thus lacking "the richness of information processing" of a real human. But as Shieber notes, this notion of "richness" is vague. (And arguably table lookup *is* computational, hence perhaps cognitive; see Rapaport, forthcoming.)

In the section introducing Dennett's supportive view of the test, Shieber cites an early paper of Turing's (1947) that mentions an early version of the Turing Test that

Turing may have actually carried out *and* that contains a hint of Dennett's intentional stance (that what counts as "intelligent" may be [partly] in the eye of the observer).

The Moor–Stalker debate is introduced in the only section that mentions Shieber's own contribution to the literature. Moor claimed that passing the Turing Test is *evidence* of intelligence; the test is neither a definition nor a sufficient condition of intelligence. In particular, it is good *inductive* "evidence for Block's ... [capacity-]conception of intelligence" (page 293); that is, it is a statistical proof in the sense of contemporary "interactive proofs," about which Shieber has written in a forthcoming essay that I hope will be included in any future edition of the present book.[2] Or possibly, following Stalker, it is *abductive* evidence, that is, an inference to the best explanation; if so, then (according to Stalker) there is a better explanation, namely, that the entity that passes is a nonthinking machine. Moor replies in the negative that such a purely mechanical explanation would apply, in neurophysiological form, to humans, too.

In "Dumping the Big Question," Shieber presents Dennett's analysis that Turing was uninterested in what thinking *is* but *was* interested in finding behavior that we would all agree was thinking and then trying to devise machines that could produce that behavior. Chomsky's new essay makes essentially this point.

In conclusion, Shieber observes of the Turing Test that "perhaps like all philosophical quandaries, its role is not as part of an answer but as part of the continual search for one" (page 323), a view congenial to one that this reviewer once proposed on how there can be progress in philosophy (Rapaport 1982).

This volume compiles all of the historically important papers surrounding the Turing Test.[3] Like the essay that it celebrates, it is destined to become a classic.

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2 "[A]n interactive proof is a protocol between two parties in which one party, called the prover, tries to prove a certain fact to the other party, called the verifier. An interactive proof usually takes the form of a challenge–response protocol, in which the prover and the verifier exchange messages and the verifier outputs either "accept" or "reject" at the end of the protocol" (RSA Laboratories FAQ [http://www.rsasecurity.com/rsalabs/node.asp?id=2178]).

3 Readers interested in more recent articles can consult several anthologies that celebrated the 50-year mark: Akman and Blackburn 2000, Moor 2000–2001, and Moor 2003.

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