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Responses to the Turing Test 1980-1989

The 1980s brought many new thoughts and ideas about the industry of artificial intelligence. Many advancements in technology made thinking machines seem like a not so distant future. Hollywood exemplified these ideas and fears about a sentient machine in movies like *Blade Runner* (1982) and *The Terminator* (1984). In this era of technology, the main focus was on whether strong AI was possible in the future. According to IBM, strong AI is “a hypothetical form of AI that, if it could be developed, would possess intelligence and self-awareness equal to those of humans, and the ability to solve an unlimited range of problems” (IBM). Alan Turing had a strong belief outlined in his 1950 paper, *Mind* in the future of strong AI, but many thinkers of the 1980s did not share this belief. Thinkers such as John Searle, Daniel Dennett, Margaret Boden, and Roger Penrose voiced their opinions in papers and books published in the 1980s about the pitfalls of the Turing test as a valid test of machine intelligence. Most philosophical and mathematical thinkers in the 1980s were highly critical of the Turing test as a complete test for machine intelligence, with their critiques varying wildly, collectively marking a shift away from accepting the Turing test as a sufficient evaluation for computer comprehension within this decade.

Philosopher John Searle explores Alan Turing’s *Imitation Game* and its limitations in the beginning of the decade through his paper “Minds, Brains, and Programs.” Searle argues that passing the Turing test is insufficient to demonstrate if a machine can truly think. Searle states, "the Turing test is typical of the tradition in being unashamedly behavioristic and operationalistic, and I believe that if AI workers totally repudiated behaviorism and operationalism much of the confusion between simulation and duplication would be eliminated" (Searle 13)." Searle asserts Alan Turing's proposed experiment jumbles the concept of behavior with cognitive abilities. While the Turing test evaluates a certain output response interpreted as a means to measure intelligence based on the phrasing and contents of the message, the effectiveness of this analysis is dismissed by Searle; instead, he claims this procedure for measuring the intellect of a machine is flawed because programmed computers and people can have similar input-output patterns when compared to one another. The aspect of intelligence depends on outside factors that are not possible to be measured by human senses, like the mental states or thought processes that occur when constructing an answer. Searle adds, "...whatever purely formal principles you put into the computer, they will not be sufficient for understanding, since a human will be able to follow the formal principles without understanding anything" (Searle 4). Searle directly attacks Turing's criterion of imitation reflecting a machine and its capabilities; a computer's mind is restricted to its programmed operations and data received by outside sources. Additionally, Searle expresses how an individual following given instructions simulates a program, and distinguishing a person's ability to independently think versus blindly obeying provided guidelines is not feasible when the process is anonymous.

Within Searle's publication, he presents an experiment that relates to the Turing test called "The Chinese Room Counterexample." The scenario Searle describes with this argument allows others to understand how computers—like humans—can source material without comprehending its contents. According to Searle, "...it seems to me quite obvious in the example that I do not understand a word of the Chinese stories. I have inputs and outputs that are indistinguishable from those of the native Chinese speaker, and I can have any formal program you like, but I still understand nothing." (Searle 3). This statement depicts the possibility that a correct output does not correlate to understanding of the material. A citizen from China can not confidently differentiate a response from a native Chinese speaker compared to someone foreign to Mandarin who relies on instructions in their native language to craft responses. With Searle's logic, both parties display valid outputs to an outsider yet only one individual understands the significance of the created answer to the question given. Searle investigates the linguistic science behind the Chinese Room Experiment, saying, "formal symbol manipulations by themselves don't have any intentionality; they are quite meaningless; they aren't even symbol manipulations, since the symbols don't symbolize anything. In the linguistic jargon, they have only a syntax but no semantics" (Searle 11). As the rulebook provides insight on the characters to use in this predicament, the literal meaning of the Chinese characters are not elaborated on. Thus, similar to how a machine might operate as it depends on code rather than Mandarin text, the human incapable of reading the language is not concerned with knowing any input or output information; the guidelines given by the outside source are enough to satisfy an acceptable response to a question. There is no presence of thought in this situation—only obeying rules without comprehension.

Daniel Dennett also discussed the Turing test in the 1980s in his article "Can Machines Think?", published in 1984. In the article, Dennett discusses his opinions on the validity of the Turing test, arguing for and against its application. Dennett first claims that, in an unadulterated and unrestricted sense, the Turing test is a perfect test. Dennett states that he wants "to show that the Turing test, conceived as he conceived it, is (as he thought) plenty strong enough as a test of thinking. I defy anyone to improve upon it" (Dennett 123). Dennett goes on to say that while in an unrestricted sense the test is perfect, it is not perfect in the way that Turing presents it. Turing uses conversation as the means for testing machine intelligence, which is simply one of thousands of ways that one could test intelligence. It does not comprehensively test all types of human intelligence. Dennett makes four main claims, his first being this failure of Turing's original test, the reliance on the quick probe assumption. According to Dennett, "the assumption Turing was prepared to make was this: Nothing could possibly pass the Turing test by winning the imitation game without being able to perform indefinitely many other clearly intelligent actions" (Dennett 125). Dennett disagreed with this. The failure of the Turing test would not prove that the machine could not complete any other intelligible actions, so why should a machine's success with the Turing test guarantee success in all other intelligence tests? Dennett sees this as the first failure of the Turing test.

The second failure is in the construction of artificial intelligence machines. Dennett calls these machines Potemkin Villages. According to Dennett, most artificial intelligence machines "are cleverly constructed facades, like cinema sets. The actual filling-in of details of Al programs is time consuming, costly work, so economy dictates that only those surfaces of the phenomenon that are likely to be probed or observed are represented" (Dennett 135). In Turing's test, these so-called Potemkin Village machines might pass the Turing test but fail other tests of intelligence. They are not well rounded, intelligent machines, just cheaply constructed machines that are able to accomplish certain tasks. Dennett gives an example of a machine being unable to pass an unrestricted Turing test. The Yale artificial intelligence machine "CYRUS could correctly answer thousands of questions—almost any fair question one could think of asking it. But if one actually set out to explore the boundaries of its facade and find the questions that overshot the mark, one could soon find them" (Dennett 137). The machine was made to answer questions asked the right way. But when asked seemingly simple, common-sense questions or logic-based questions, it was unable to process them. When the right questions are asked, it is very easy to find the flaws in artificial intelligence machines.

Dennett's third claim is about the risk of extrapolation. The Turing test is a very comfortable test, as it is the same test human beings use every day to judge other people's intelligence. The easiest way to test a person's intelligence is by attempting to hold an intelligent conversation. But the comfort of this test is misleading. According to Dennett, "we are in some considerable danger of extrapolating too easily, and judging too generously, about the understanding of the systems we are using" (Dennett 141). Since conversation is so normal, it seems perfect that a machine should be intelligent if it can mimic human conversation. But, Dennett argues, this is a dangerous philosophical and social stance to have, as simply the test of conversation is not nearly enough to give a machine the mark of intelligent thought. Dennett's final claim is about the risk of combinatorial explosion. Dennett describes combinatorial explosion as this: If a computer were made to mimic the human brain, it would need to store so much data about unique facts, actions, and scenarios that it simply would not be possible to store that much information. Dennett gives a specific example of this as it applies to the Turing test. If a machine were given one more task on top of the imitation game, in which it had to identify objects in a room by sense, it theoretically could trick the Turing test into thinking that it actually knows what is in the room based on algorithms alone. But at the same time, Dennett argues this is "not remotely possible in fact, given the combinatorial explosion of possible variation such a system would have to cope with" (Dennett 141). While nowadays, with advancements in storage, it is very possible a machine could store a vast amount of data like this, it is also very unlikely. Dennett argues it would simply be too much for a computer to possibly cope with. Not only would it require an astronomical amount of storage, but it would make the computer incredibly slow and would simply fail. Overall, Daniel Dennett believes that the Turing test in an unrestricted sense is a good test for intelligence, and no machine in his time would pass it. But in the way that Turing presented his test, one could not make the argument that a machine is intelligent for passing it.

British academic and research professor Margaret Boden produced a book titled "Computer Models of Mind" which explains how machines are used to study a variety of topics in psychology. In particular, a section of the paper discusses Boden's take on John Searle's perspective for the Turing test in a chapter named "Escaping from the Chinese Room." Although Boden focuses on critiquing Searle's opinion, her objections display her personal perspective on Alan Turing's *Imitation Game.* According to Boden, "the inherent procedural consequences of any computer program give it a toehold in semantics, where the semantics in question is not denotational, but causal" (Boden 250). In contrast to Searle's belief that computational tasks do not permit a machine to understand meaning, Boden pushes back Searle's claim of computation being purely based on syntax. This indirectly strengthens Turing's argument by implying machines require some knowledge of semantics of an inputted language as opposed to none. An algorithm has legitimate effects on a machine, even if the process differs from a human brain thinking about a prompt. If semantics is not strictly outside of the program, then systems that pass the Turing test might have genuine semantic properties rather than solely knowing proper syntax through its access to a database which serves as the computer's method to read instructions.

Alternatively, Margaret Boden critiques the Turing test in her work instead of supporting Turing's hypothetical measurement of machine thought and intelligence. She delves into the notion that intentional states—mental states that have a direction to a perception—and its role in contributing to intellect. Boden writes, "computational psychology does not credit the brain with seeing bean-sprouts or understanding English: intentional states such as these are properties of people, not of brains" (Boden 244). She is stressing how intentional states are unique to an individual and not physical parts like a human brain or a computer's central processing unit (CPU). Boden is suggesting that comprehension arises at the overall system level while components contribute to the entire system with their distinct roles. Unlike Turing, she does not think behavior alone is satisfactory to settle the question. While people are living creatures and machines are nonliving inventions, both contain systems composed of various parts for designated roles—creating a system. Therefore, a computational device's ability to pass the Turing test can be judged accurately when considering the entire system and not pinpointing certain aspects or algorithms that form the machine. Given Boden's bold claim, she establishes a new perspective: the Turing test might not be useless according to Searle, or a genuine marker for machine intelligence in respect to Turing; Boden's approach rethinks if Alan Turing's *Imitation Game* could be measuring a different aspect that separates humans from machines.

Roger Penrose, in his 1989 novel *The Emperor's New Mind,* also shares his beliefs about the validity of the Turing test as a true test of machine intelligence. Penrose makes arguments in this book both for the Turing test in his argument of operational validity, but also makes arguments against the Turing test and discusses moral issues if a machine were actually intelligent. Penrose's first argument is called operational validity. Based on conventional human interaction, the Turing test provides a strong case for confirming the presence of unique intellectual thought and consciousness. Penrose states, “if the computer were indeed able to answer all questions put to it in a manner indistinguishable from the way that a human being might answer them … then, in the absence of any contrary evidence, my guess would be that the computer actually thinks, feels, etc." (Penrose 46-47). Penrose’s argument is that if the machine accomplishes its goal of replicating a human being perfectly, then he would have no reason to believe that the machine is, in fact, not thinking. The machine is able to accomplish the tasks of a human who is thinking as effectively and efficiently as a human can, so it must therefore have the ability to think for itself.

Penrose also makes arguments against the Turing test. He first argues that the Turing test is not a perfect test for intelligence, as it is biased against machines. For example, a machine is very advanced in its ability to perform mathematical calculations. So in order to be “intelligent,” the machine must dumb itself down to the skill level of a human being. No human could quickly calculate the multiplication of 5-digit numbers, but a machine could do it in seconds. Penrose also argues that it is a necessity for machines to be able to answer common sense questions, like Does an elephant fly? If they are incapable of this, they cannot be considered intelligent. Penrose’s main argument against the Turing test, though, is less about the operational value of the test than about the idea of testing a machine for intelligence at all. Penrose states, “I am implying that when I refer to thinking, feeling, or understanding, or, particularly, to consciousness, I take the concepts to mean actual objective 'things' whose presence or absence in physical bodies is something we are trying to ascertain, and not to be merely conveniences of language!" (Penrose 41). Penrose argues that consciousness and intellectual thought are objective things, not merely ideas that can be observed. In this sense, Penrose disregards the Turing Test as having any use whatsoever for deciding if a machine is intelligent. To Penrose, a machine completing the imitation game, while impressive, provides no real insight into whether or not the machine has conscious thought. It is merely a fun party trick. Penrose's final argument, which he makes in his book, has little to do with the Turing test itself but rather the moral consequence of having a machine that truly thinks. Penrose argues in his book that if a machine were a truly intelligent and thinking entity, it would be cruel and inhumane to treat it as a servant or robot. It would be inhumane to lock it in a room in the house, or leave it in the office overnight, or turn it off. To treat a thinking machine as an individual without rights would theoretically be wrong. This argument ties to the Heads in the Sand objection brought up by Turing in his paper *Mind*. This objection is the thought that having intelligent machines is a frightening thought, and therefore, we must hope for their nonexistence. Overall, Penrose believes in the idea of intelligent machinery in the future, but thinks that the Turing test has many flaws that make it ineffective in proving if a machine is intelligent.

Throughout the 1980s, a multitude of papers were written and published regarding Alan Turing and his proposition of *The Imitation Game.* Majority of researchers in the fields of mathematics and philosophy like John Searle, Daniel Dennett, Margaret Boden, and Roger Penrose during the 1980s took highly critical stances in response to the Turing test's measurement for machine comprehension introduced thirty years prior, with a broad mix of objections that challenge Turing's belief of his test being a successful way to assess a computer's intellect. While viewpoints amongst the experts were heavily different, a primary conclusion was the Turing test was an imprecise determinant for computer intelligence, with some refuting Alan Turing's entire argument. As the years continue to progress and technology develops further, perhaps new discoveries await that can evaluate Turing's *Imitation Game* in a new light. With this revolutionary test, Alan Turing proved to be ahead of his time in relevance to computer science. It's only a matter of time before more perspectives emerge that definitively answer if the Turing test serves as an acceptable benchmark for machine intelligence.

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