Essay: Turing's Reasonable Move in *Computing Machinery and Intelligence*

Matthew D. Sherman

Department of Philosophy, University of Canterbury

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Answering question 2: *Why* did Turing replace the question 'Can machines think?' with the question 'Are there imaginable digital computers that would do well in the imitation game?'. Is his move *reasonable*?

Turing's Reasonable Move in *Computing Machinery and Intelligence*

Introduction

In Alan Turing's 1950 paper *Computing Machinery and Intelligence* (*CMaI*), Turing starts the paper by considering 'Can machines think?' but replaced this question later in the paper with 'Are there imaginable digital computers that would do well in the imitation game?'. In this essay, I will argue that this move of Turing's was reasonable as it reframed the ambiguous 'Can machines think?' to be more operationally defined, thus making the concept of machine intelligence more scientific. To make this argument, I will first explain why Turing replaced the original question. Then I will present arguments in support of my thesis. Finally, I will respond to an objection to further strengthen the validity of my thesis.

Why Turing made this move

To answer this question, I will reference Turing's reasoning in *CMaI*. At the start of *CMaI*, Turing begins his consideration of 'Can machines think?' by first trying to define the terms 'machine' and 'think'. However, he sees these terms, and thus the whole question, as too vague. This view is supported by Dennet in *Can Machines Think?* in which he says that Turing saw this question as one that leads to unproductive debate and arguments over semantic details (Dennett, 2004). Because of this, Turing proposes a different form of the problem which he claims is similar but less ambiguous: the imitation game. Turing's imitation game involves a man (A), a woman (B) and an interrogator in another room (C).

The goal of C is to determine the genders of A and B through written questions, with A trying to deceive and B trying to assist C. Turing questions what would occur if a machine replaced A, and if C would guess incorrectly at the same rate in both the original version of the game and the version with the machine playing. In Turing's view, it is these kinds of questions which replace the original question. To further enhance clarity, Turing specifies that the machines to be used in the game are digital computers. His reasons being that firstly, digital computers existed at Turing time, so they were not hypothetical machines and secondly that digital machines were highly versatile and capable. He also emphasises that it is not about whether computers at the time or if all computers would do well in the Turing test, but if there could be imaginable computers that would do well. With these definitions in place, Turing proposes that 'Are there imaginable digital computers that would do well in the imitation game?' should replace 'Can machines think?'. Overall, Turing's reasoning for this decision was that the original question was too ambiguous, and thus, made the question difficult to consider and explore. Hence, Turing replaced it with a similar question which he believed to be less ambiguous and more operationally defined via the use of more concrete terms. However, Turing goes on to say that the original should not be entirely abandoned due to opinions on the appropriateness of this replacement question and that these opinions should still be heard. Although he mentions that his personal belief is that the original definition is not meaningful enough to warrant discussion.

My argument

In supporting my thesis, I will first agree with Turing and argue for the original question of 'Can machines think' being vague and ambiguous, and thus is not operationally defined. 'Machine' is a very broad term which could refer to anything from a bicycle (Wilson, 1973) to a supercomputer (Adiga et al., 2002). Additionally, the term 'think' – while not entirely

unambiguous in reference to thought generated by a biological brain – becomes very open-ended and debatable in the context of machine thinking. This is due to a variety of arguments such as the hard problem of consciousness (Chalmers, 1998) and the Chinese Room (Searle, 1980). Because of the ambiguity in these terms and thus the question as a whole, 'Can machines think?' is an abstract and theoretical question. This means that if one wanted to rigorously consider such a question from an objective, scientific view, it would need to be reframed more objectively. I will now argue that 'Are there imaginable digital computers that would do well in the imitation game?' reframes the ambiguous 'Can machines think' to be more operationally defined (Turing's *why* in replacing the question). My first reason for this is the greater specificity in the terms used in the question. Instead of the use of 'machine', in the original question, Turing uses the specific and non-theoretical machine type of digital computers. His use of 'imaginable' to describe digital computers could be seen as vague here, but, like Turing, I believe it was important in specifying that it was not only about whether all or current digital computers could perform well in the imitation game. Then instead of the indistinct term of 'think', Turing proposes the imitation game. In his discussion of the 'imitation game' in *CMaI,* Turing is specific in defining the rules of the game to provide an operational rather than theoretical definition of the game. However, I will say that the use of 'do well' appears ambiguous here. By using terms that are more defined, the overall question is able to be a theoretical construct ('Can machines think') stated in concrete and observable procedures. These procedures were answering 'Can machines think?' by designing an experiment to test whether digital computers would perform well Turing's game. From this, I have proven that Turing's new question reframes the original question to be more operationally defined. Finally, I will argue that Turing replacing the ambiguous 'Can machines think?' with the more operationally defined question of 'Are there imaginable digital computers that would do well in the imitation game?' is a reasonable move as it made

the concept of machine intelligence more scientific. I believe this because a question which is operationally defined means that it can more likely be empirically tested and scientifically examined. This is because such a question allows researchers to design experiments with clear parameters and measurable outcomes. By doing this, scientific advancements can be made. In the context of this question, that means making scientific advances in machine intelligence. This is as opposed to an abstract question such as 'Can machines think?' which is explorable in a philosophical context, but not precise enough to be examined scientifically. Hence, as Turing substitutes a philosophical, open-ended question with a question that is more operationally defined and scientifically approachable, then it is reasonable as it made the concept of machine intelligence more scientific rather than being limited to staying abstract. Turing's move here in operationally conceptualising machine intelligence has now propelled the fields such as artificial intelligence forward and changed our understanding of the nature of machines. However, I do agree here with Turing that while there is great value and reason in reframing 'Can machines think', the original question should not be entirely abandoned due to differing views on the replacement question.

An objection to my argument

One objection to my argument could be that even though Turing's replacement question may be more specific and operationally defined, it is not a suitable substitute for "Can machines think". Specifically, that a machine performing well in Turing's imitation game is not an appropriate measure of thought. My response to this is that yes, the imitation game as given in *CMaI* could be seen as being a flawed measure of whether machines can think. This is due to many possible limitations such as human bias, limited scope, and the machine merely imitating thought (Searle, 1980). However, I believe that Turing's move here is still reasonable as it provided a 'first step' in the right direction in making 'Can machines think?'

a scientific rather than philosophical question by the use of more specific and concrete terms. This was the first step which enabled a greater discussion and understanding of machine intelligence at a practical level, ultimately leading to greater scientific research into machine intelligence.

Conclusion

In conclusion, I have argued my thesis that Turing's was reasonable as it reframed the ambiguous 'Can machines think?' to be more operationally defined, thus making the concept of machine intelligence more scientific. I did this by first arguing that the original question is ambiguous and lacks an operational definition, making it difficult to consider scientifically. I then argued that Turing's question of 'Are there imaginable digital computers that would do well in the imitation game' frames 'Can machines think?' to be more operationally defined.

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