# CSC: Classic Paper Review/Analysis

## Title and Author

Title COMPUTING MACHINERY AND INTELLIGENCE

Author A. M. Turing

## Summary/Hook

Turing's paper outlining his imitation game which is the primordial thought conundrum posing the question of can and how machines think. Extensively it raises a further question in embodiment as to what it means to be a computer, what it means to be a digital computer, and if a boundary really exists between these imaginary abstractions. Turing also explains how nuanced his game is in the reality which computers will take in the future beyond the publishing date of this paper, and also puts human thought into question as when a computer gains the ability to deceive a human in his game. Ultimately this paper serves as a cornerstone in computing to ground computer science in reality and distinguish that algorithms can be incredibly deceiving in their human perceived level of intelligence.

## Knowledge Relating to the Cognitive Science Program Learning Outcomes

1.7. Consciousness and Controversies

> There are already a number of digital computers in working order, and it may be asked, "Why not try the experiment straight away? It would be easy to satisfy the conditions of the game. A number of interrogators could be used, and statistics compiled to show how often the right identification was given." The short answer is that we are not asking whether all digital computers would do well in the game nor whether the computers at present available would do well, but whether there are imaginable computers which would do well. But this is only the short answer. We shall see this question in a different light later.

2. 8. Embodiment, Emergence, and Distributed Cognition

> Of course electricity usually comes in where fast signalling is concerned, so that it is not surprising that we find it in both these connections. In the nervous system chemical phenomena are at least as important as electrical. In certain computers the storage system is mainly acoustic. The feature of using electricity is thus seen to be only a very superficial

similarity. If we wish to find such similarities we should took rather for mathematical analogies of function.

3. 2. Symbol Systems

Given the table corresponding to a discrete-state machine it is possible to predict what it will do. There is no reason why this calculation should not be carried out by means of a digital computer. Provided it could be carried out sufficiently quickly the digital computer could mimic the behavior of any discrete-state machine

4. 9. Formal Systems and Theories of Computation

The latter result is the most convenient to consider, since it refers directly to machines, whereas the others can only be used in a comparatively indirect argument: for instance if Godel's theorem is to be used we need in addition to have some means of describing logical systems in terms of machines, and machines in terms of logical systems. The result in question refers to a type of machine which is essentially a digital computer with an infinite capacity. It states that there are certain things that such a machine cannot do. If it is rigged up to give answers to questions as in the imitation game, there will be some questions to which it will either give a wrong answer, or fail to give an answer at all however much time is allowed for a reply.

5. 9. Formal Systems and Theories of Computation

Even this interpretation of the criticism is not sufficiently sympathetic. But we cannot afford the space to go into it much further. It seems to me that this criticism depends on a confusion between two kinds of mistake, We may call them "errors of functioning" and "errors of conclusion." Errors of functioning are due to some mechanical or electrical fault which causes the machine to behave otherwise than it was designed to do. In philosophical discussions one likes to ignore the possibility of such errors; one is therefore discussing "abstract machines." These abstract machines are mathematical fictions rather than physical objects. By definition they are incapable of errors of functioning. In this sense we can truly say that "machines can never make mistakes."