

# Some Assumptions about Problem Solving Representation in Turing's Model of Intelligence

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## Abstract

We explore some idealizations that may lead to model methodical intelligence with Turing Machines (TM's). Often the specification of TM's leaves unexplained the intuitions behind positing those characteristics and not others. Our goal is to revisit the possible assumptions of the model and to ponder some considerations in favor or against adopting it. In this paper we deal with the assumptions about representation in general and about the specific kind of representation offered. The assumptions about method are the focus of future work.

Turing made no explicit contention in 1936 about TM's being a model of intelligence in general. That changed in 1950 when he tried to analyze the notion of thinking machines. Turing's ideas are remarkably coherent in these two papers. Our exegesis tries to shed light on both essential and non-essential principles behind the TM's model. A principle is "essential" (1) if its removal from the model changes the computational power of the model. It is also essential (2) because its removal changes the nature of the model whether it changes its computational power or not. In the first sense of "essential", some of the principles can be removed without affecting the computational power of the model, but there are others whose removal opens the door to models with greater, lesser, or just plain different expressive and computational capability. In the second sense of "essential", while some principles are of a cosmetic nature or redundant, some can change the nature of the model to a degree that their presence might force us to change our views about the adequacy of the model to our intuitions about intelligence and mechanical problem solving.