

Must Machines be Mechanical? If So, Can They Be "Naked"?

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Certainly anyone schooled in classical computability theory, at least if that schooling happened at some point in the last few decades, has at some point been told, or read, that computational solvability can be formally cashed out as *mechanical* solvability, where by 'mechanical' is meant something very much like interacting macroscopic gears and levers. Hence we have e.g. a longstanding, authoritative, representative treatment of mechanical solvability of the Turing-machine variety, from Boolos and Jeffrey**, in which, explicitly, the machines in question are identified with such contraptions as a simple pump-action mechanical boxcar riding on a rail track. In this regard, B&J are far from alone, since there are myriad depictions along this line; and in addition, those that are said to have "come close" to designing and building a general-purpose machine before, say, 1930 (Leibniz, e.g.), seemed to be without question tinkering with mechanical movement a la B&J et al. Of course, this raises the question: Must machines, including specifically (and given present purposes, most importantly) machines that compute, be mechanical? If the answer is Yes, then can the machines in question be "naked" or "unaided" machines, i.e. machines without a helpful connection to the world outside them, which supplies e.g. a program? The second of these questions has of late risen up because of the view, recently advanced by Richard Granger and colleagues***, that the human brain is machine, and one that computes, but should be classified as a "naked" machine, in which case it turns out to have even less power than a linear-bounded automaton. This would be a shocking result, since it certainly appears that we can simulate Turing machines (let alone LBAs), an apparent fact that grows all the more undeniable when our simulation is thought of as our merely moving a mechanical contraption, such as the aforementioned boxcar.

**Multi-edition textbook: *Computability & Logic*.

***E.g. see paper in *Theoretical Computer Science*: "The Grammar of Mammalian Brain Capacity" (2015)