

Logical Machine

1902 | Minute Logic: Chapter I. Intended Characters of this Treatise | CP 2.56-9

A celebrated treatise is entitled *Logic, or Computation*, and although not all reasoning is computation, it is certainly true that numerical computation is reasoning. But calculating machines are in everyday use; and Babbage's analytical engine would perform considerable feats in mathematics. Other logical machines have been constructed. All those instruments perform inferences; and those inferences are subject to the rules of logic. If from true premisses they always yield true conclusions, what more could be desired? Yet those machines have no souls that we know of. They do not appear to think, at all, in any psychical sense; and even if we should discover that they do so, it would be a fact altogether without bearing upon the logical correctness of their operations, which we should still have to assure ourselves of in the same way we do now.

The idea I am endeavoring to convey is difficult to seize. It cannot be seized by a reader who, instead of trying to seize it, puts himself into a resolutely hostile posture of mind toward it. Does he wish to know what I mean? If so, let him postpone criticism until he clearly apprehends what it is that is to be criticized. There are many minds who will be so occupied with a certain objection that it will quite eclipse the sense of what I have been saying. They will urge that those machines do not perform any inference, at all; that it is, on the contrary, we, who, knowing how they are constructed (be it in detail or in a general way, by testimony), infer that the number which is exhibited at the end of the process must be in a certain arithmetical relation to the numbers which determined the setting and working of the machine.

It will further be urged that if those machines were to be regarded as reasoning, there are others which would reason in far higher ways. For the calculating machines only execute variations upon $1 + 1 = 2$, while there are machines which may, with as much justice, be said to resolve problems before which generations of able mathematicians have fallen back, repulsed. Such, for example, are the solids of different shapes which yacht-designers drag through the water, and thereby come to the knowledge of arcana of hydrodynamics. Blocks of wood should seem, then, on my principles to be better reasoners than the brains of Gauss and Stokes. And why stop here? Any apparatus whatever used for experimentation would be, on the same principle, a logical machine. A steam-engine would be working out, at every revolution, its problem in thermodynamics; a simple match, scratched on a box, a question that we are unequal to so much as the formulating of.

This sounds crushing. What have I to say to it all? Simply that it is absolutely just. A logical machine differs from any other machine merely in working upon an excessively simple principle which is applied in a manifold and complex way, instead of upon an occult principle applied in a monotonous way. If anybody wishes me to acknowledge that a logical machine reasons no more than any other machine, I do not know why I should not gratify him. That seems to me a matter of words. The result which the logical machine turns out has a relation to the data with which it was fed, which relation may be considered from the point of view of whether the former could be false so long as the latter are true. That is all there is in the facts of the case; and whether it is called reasoning or not I do not care. All that I insist upon is, that, in like manner, a man may be regarded as a machine which turns out, let us say, a written sentence expressing a conclusion, the man-machine having been fed with a written statement of fact, as premiss. Since this performance is no more than a machine might go through, it

has no essential relation to the circumstance that the machine happens to work by geared wheels, while a man happens to work by an ill-understood arrangement of brain-cells; and if there be room for less, still less to the circumstance that a man thinks. Say, if you like, that thinking has everything to do with the life of reasoning; I still insist that it has nothing to do with the logical criticism, which is equally applicable to the machine's performances and to the man's.