

## **Turing, Ashby, and “the Action of the Brain”**

**Dr hab. Hajo Greif**

Not very much has been written to date on the relation between Alan M. Turing and W. Ross Ashby besides citing and briefly discussing a letter from Turing to Ashby in which he suggested using an early digital computer for “producing models of the action of the brain” (Turing 1946). Despite the personal acquaintance between Turing and Ashby, and despite the partial proximity of their research fields, the two are often cited as respective figureheads of the competing research programmes of Artificial Intelligence (AI) and cybernetics.

In objection to this dichotomy, this inquiry in history and philosophy of science pursues two complementary aims: first, it is a historical investigation into the interactions between their related-but-distinct views. Second, it will help to answer two closely related systematic questions:

1. What are the relevant formal and material properties required of the “models of the action of the brain”?
2. What are the relevant formal and material properties ascribed to “the action of the brain”?

There are various key motives shared between Turing’s and Ashby’s work, and there are elements to be discovered in their writings and their modelling endeavours that would later figure in both AI and cybernetics. Both Turing and Ashby believed that “the action of the brain” can be subject to a method of modelling that casts it in a strict mathematical description and breaks it down into elementary operations in such a way that the model could be implemented in some kind of machine, in principle or in practice.

However, where Ashby was concerned with material models of organism-environment relations and adaptive, problem-solving behaviours, Turing’s main interest was to demonstrate the possibilities of making complex formal models of various phenomena processable by machines. Where Ashby relied on the Darwinian theory of evolution, Turing dedicated his best-developed formal model to the non-Darwinian “laws of form” of organic growth introduced by D’Arcy Thompson. Still, when the two authors explicitly referred to human thought, both showed little interest in one of its supposed core features: the ability to represent world affairs in symbolic language and thought.

This apparent omission might be systematically important though, as it bears a striking parallel to contemporary approaches in cognitive science, philosophy and “Nouvelle AI” that view the action of the brain as a necessarily embodied, but not necessarily representational phenomenon. Carving out some of the core commonalities and differences between Turing’s and Ashby’s work will make a contribution to resolving the seemingly strict, and intellectually sterile, dichotomy between the formal nature of modelling in Artificial Intelligence (AI) and the principles of embodiment and environmental situatedness mobilised by its critics.