Chapter XI

What Makes a Thinking Machine?
Computational Semiotics and Semiotic Computation

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Relations are everything, relations are life.
~ J.W. von Goethe

Abstract

Semiotics is considered here as a relational and ontogenetic approach to describing cognition and communication in signifying systems. Implementing a semiotic approach to computing thus would require a computable and scalable signifying space in which signs can be arbitrarily created, related, interpreted, and deliberated. The author argues that although signs are representations, a signifying space cannot be realized under the current representational paradigm of recording and processing static data in a hierarchical data space. A semiotic machine, instead, must implement a genetic epistemology of cognition based on assimilation and pure relations. The pile system introduced in this chapter is supposed to meet these requirements and is described as a semiotic computation system structurally enabling deductive as well as inductive and abductive processes of self-reflection, deliberation, and interpretation commonly associated with thinking.
Introduction

Computer science in general and artificial intelligence in particular have used the metaphors of brain, mind, cognition, learning, and intelligence quite generously in the past without much consideration for the structural conditions required to bring forth these phenomena. There is a danger that computational semiotics continues this tradition by confusing the recording and management of signs with the generative process of creating signs. Semiotics traditionally deals with symbols and symbolic systems, their encoding, and their interpretation in communication. If computational semiotics tries to apply aspects of semiotics to computing, the structural conditions required to do so need to be discussed. In this chapter, I offer an outsider look focusing mainly on the following three issues:

- Semiotics, by fundamentally dealing with semantics, addresses cognitive operations and thus involves not only deductive but also inductive and abductive inferences. This creates a fundamental syntactic problem, as traditional, ontology-based representational and hierarchical approaches do not natively enable the ontogenetic processes that semiotic computing systems require.
- To generate and process signs as tools for expressing and communicating knowledge, a synoptic and synaptic space allowing to relate signs globally and transcontextually is required.
- Any practical and scalable approach to computing and generating signs must be based on a relationist, non-representational approach using self-connecting relation objects as protosigns in a self-organizing assimilative structure. Such a structure I propose to call a semiotic computation space. Operating in such a space consequently would be semiotic computation.

The purpose of this chapter is to discuss the structural and syntactical requirements of semiotic thinking machines in terms of a relationist and genetic epistemology as opposed to the traditional Platonic object epistemology based on representation, deductive logic, and ontology. I apologize to the readers for possible confusions arising from some new and even irritating terminology. But Erez Elul’s (2005) pile system introduced here is barely out of the laboratory stage, and some of the terms used are preliminary choices intended to explicitly mark the differences to traditional approaches. Also, the inventor and the early protagonists of this system (including this author) are not computer scientists but rather amateurs in the original sense of the word. While this might explain a certain fuzziness in our argumentation, it also illustrates the fact that radical innovation sometimes comes from outside the professional tunnel vision that often blocks alternative views in and of a field.

A more philosophical-linguistic problem has been observed by Michel Bitbol (2001) and can be demonstrated through terms like representation; the representational object paradigm of the West has deeply shaped our thinking and our language to the point where we become unaware of the epistemological baggage that comes along with terms like representation. Even when neurobiologists or constructivist philosophers sometimes speak of representation with a different meaning, they nevertheless invoke in their audience the deeply rooted belief that the brain is an instrument of representing and storing true images of the world.
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