Thinking through Doing: Manipulative Abduction?

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Introduction

An interesting and neglected point of contention about human reasoning is whether or not concrete manipulations of external objects influence the generation of hypotheses. I am focusing on the first features of what I call *manipulative abduction* showing how we can find in scientific and everyday reasoning methods of constructivity based on external models.

The Task and the Method

I am analyzing the problem in the light of the so-called historical-cognitive method (Nersessian, 1998). While it tries to integrate findings from research on cognition and findings from historical-epistemological research into models of actual scientific practices, assessments of the fit between cognitive findings and historical-epistemological practices aid in elaborating richer and more realistic models of cognition. There are interesting parallels that can be exploited by cognitive scientists; the relevance of the concept of abduction can contribute to a central issue in cognitive science: hypothesis formation both in science and in everyday reasoning.

Manipulative Abduction in Science

It is well known that many reasoning conclusions that do not proceed in a deductive manner are *abductive*. What I call *theoretical* abduction (Magnani, 2001) is, from a cognitive point of view, an internal process of reasoning. What about the "external" ways of finding hypotheses?

Manipulative abduction happens when we are thinking *through* doing and not only, in a pragmatic sense, about doing. It refers to an extra-theoretical behavior that aims at creating communicable accounts of new experiences to integrate them into previously existing systems of experimental and linguistic (theoretical) practices. Gooding (1990) refers to this kind of concrete manipulative reasoning when he illustrates the role in science of the so-called "construals" that embody tacit inferences in procedures that are often apparatus and machine based.

Epistemic Action

Recent research, taking an ecological approach to the analysis and design of human-machine systems, has shown how expert performers use action in everyday life to create an *external* model of task dynamics that can be used in lieu of an internal model (Kirlik, 1998). Not only a way for moving the world to desirable states, action performs an *epistemic* and not merely performatory role that is very relevant to abductive reasoning.

Experiments and the "World of Paper"

Already in the *Dialogues Concerning the Two Chief World Systems* (1632), accentuating the role of observational manipulations Galileo presents an anatomist that, manipulating a cadaver, is able to get new, not speculative, information that goes beyond the "world of paper" of the Peripatetic philosophy. It is well known that recent philosophy of science has paid a great attention to the so-called theory-ladenness of scientific facts (Hanson, Popper, Kuhn). Nevertheless a lot of new information in science is reached by observations and experiments, and experiments are the fruit of various kinds of artifactual manipulations: the different strategies correspond to the expert manipulations of objects in a highly constrained experimental environment, directed by *abductive* movements that imply the application of old and new extra-theoretical *templates* of behavior.

What I Expect to Find

We still know very little about what governs the manipulative abduction. I plan to better delineating some of the manipulative *templates* of behavior that are active in creative abduction comparing scientific and everyday reasoning: 1. *simplification* of the reasoning task; 2. capacity of overcoming situations of *incomplete* or *inconsistent* information; 3. *control of sense data*: we can change the position of our body (and/or of the external objects) and exploit various kinds of prostheses (instruments, etc.); 4. *external "models"* of task mechanisms.

References

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