

# The dialectic relationship between concepts and artefacts

- illustrated by the idea of time

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Although Newton's absolute concepts of time were long ago abandoned by physicists, a number of concepts, including essentialist views, persist.

Most physics textbooks present an essentialist view of concepts. The problematic nature of the "concept of concepts" is seldom discussed.

Discussions of conceptual change often disregard the fact that concepts themselves change.

My contention is that there is a dialectic relationship between concepts and physical artefacts. Concepts and models alter their meaning due to the co-evolution of artefacts and discourse. Reciprocally, concepts and models are built into artefacts and are also coupled to the development of new artefacts.

The meaning of a concept is given by its use in discourse. Artefacts, as mediation tools, are essential elements of discourse. Thus, I suggest that the meaning of a concept is closely related to the artefact involved.

A simplified illustration of the role of artefacts as a tool for mediation is presented in figure 1.



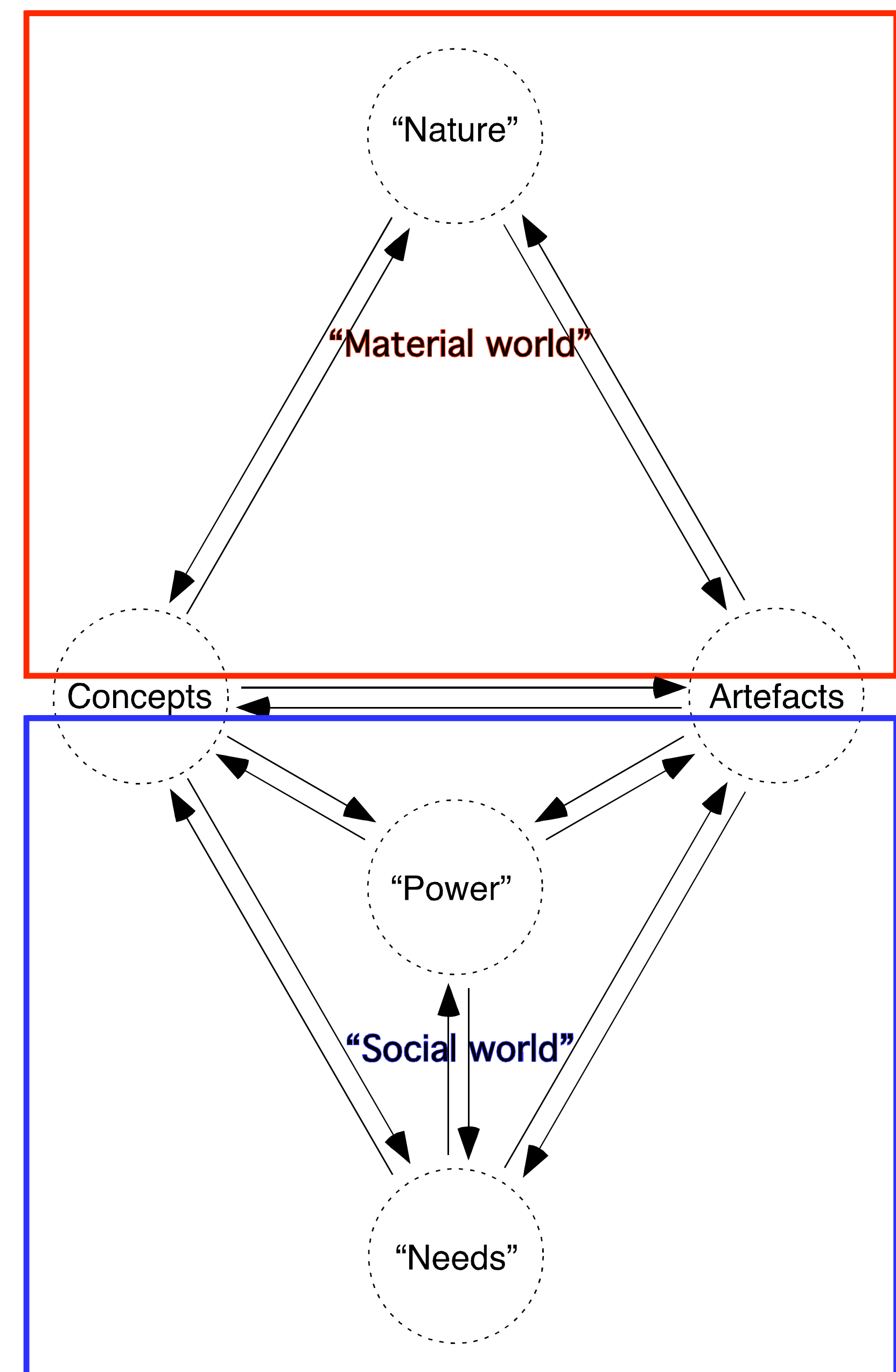
**Figure 1.** The role of artefacts as a mediating tool in human perception.

Thus the "same" concept could have different meanings in different discourses as a result of the influence of the artefact involved.

Scientific concepts are not empirical unless they relate to a possibility of factual observations. Observations within the real world are relevant within a conceptual paradigm and require the use of artefacts. In addition, modern scientific observations are praxis-laden and made with the help of artefacts. Artefacts process and re-present the results of measurements. This often results in us interacting with the system in a specific way, which can be represented as follows: Human  $\Leftrightarrow$  [Artefact - World]. Thus there is a clearly a dialectic relationship between artefacts and concepts.

For example, without time pieces the concept of time would have no empirical meaning and would, therefore, be meaningless!

The evolution of the concept of time, and its subsequent refinement, has been closely related to the development of mechanism to measure it, social and technological demands and to power (in the meaning of Foucault). A tentative model for the sociogeneses associated with artefacts and their related concepts is presented in figure 2.



**Figure 2.** A tentative model for the sociogeneses associated with concepts and artefacts.

Absolute time has been replaced by procedures for measuring time and for synchronising clocks developed by Poincaré, Einstein and others. Thus God's absolute time has been replaced by a common technological time.

In his book *Einstein's Clocks, Poincaré's Maps - Empires of Time* Peter Galison (2003) states in the conclusion:

*Over the last thirty years it has become a commonplace to pit bottom-up against top-down explanations. Neither will do in accounting for time. A medieval saying aimed at capturing the links between alchemy and astronomy put it this way: In looking down, we see up; in looking up, we see down. That vision of knowledge serves us well. For in looking down (to the electromagnetically regulated clock networks), we see up: to images of empire, metaphysics, and civil society. In looking up (to the philosophy of Einstein and Poincaré's procedural concepts of time, space, and simultaneity) we see down: to the wires, gears, and pulses passing through the Bern patent office and the Paris Bureau of Longitude. We find metaphysics in machines, and machines in metaphysics.*

The final sentence above could be rephrased as "we find concepts in artefacts, and artefacts in concepts".

