

How can cognitive science make explanations in a single framework: using flows beyond levels

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Cognitive science, as a multidisciplinary enterprise, faces the problem that several and different explanations of the same phenomenon can be given by different disciplines. In particular, neuroscientific explanations are often competing with psychological ones. Such explanations are often considered as speaking about distinct levels of cognition. In our view, however, the concept of "levels of explanation" can easily lead to reductionism, if it is intended to claim that cognition is better understood by disciplines concerned with one level (especially the neural level) rather than another. We claim that the true question is not which level of cognition should be better investigated, but which discipline is involved, and how to account for the fact that each discipline has different objects and methods.

The solution proposed here stems from work of Greco (2006, 2012) and can be summarized as follows. The idea is to adopt some general or abstract concepts which may permit to encompass diverse perspectives under a single unifying umbrella. It is suggested to analyze cognitive tasks as scientific objects from the perspective of different disciplines (Abney, 2014; Agazzi, 1991). This leads to descriptions concerning different conditions of the system, called "states", which are specified by variables or predicates belonging to a particular discipline (e.g. a physical state, or a state of the body, of the brain, of consciousness, etc.). *Changes of state* that give rise to new states will be called "events" (see Casati & Varzi, 2008 for an analysis of this concept). A succession of events occurring in time is called "flow". This idea captures the fact that psychological phenomena are *processes* which deploy themselves in time. Given the different nature of states and events, there may be a number of different "flows", e.g. a physical flow, a neural flow, a behavioral flow, etc. Different flows are different descriptions of what is happening at a certain point in time. In other words, the representation of different flows describes, in parallel, from various disciplinary standpoints, the same events occurring in a certain time course (called a "flow-chain", see fig. 1). This allows to establish the nature of correspondences and links between events in the same or different flows. Such links may be vertical (correspondences between different flows at the same time) or horizontal (i.e. changes of state in one flow at different times). Such links may also be causal or simply correlational.

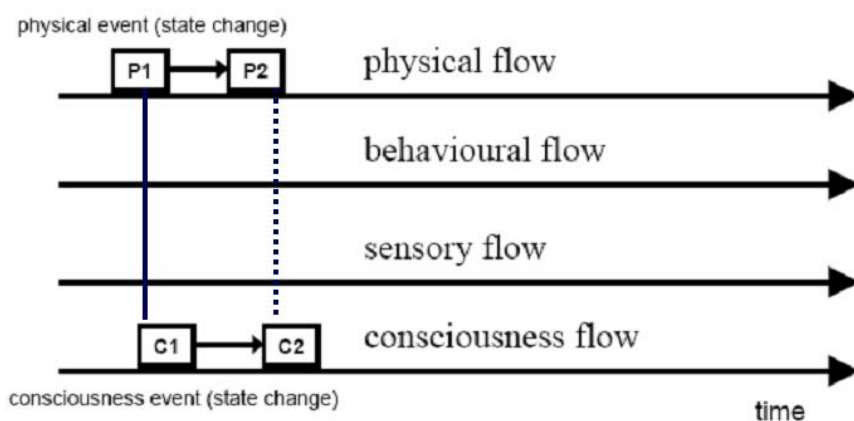


Figure 1. A flow-chain (from Greco, 2006)

In the present paper, after explaining in detail the proposed model, we give some examples of how it can be applied in multidisciplinary analyses of specific phenomena. In particular, the "phi phenomenon", psycho-physical isomorphism, Libet experiment about awareness of decision, attentional errors, Stroop effect, judgment of responsibility and related decision of punishment, will be considered.

Steps for explanation will be described. It is argued that rather than looking for the most important discipline it is necessary to look in which stream the most important event is, in a "pragmatic explanation" frame (van Fraassen, 1980). We argue that this proposal can give an answer to the

need for a unifying framework for a single cognitive science as opposed to many cognitive sciences, while avoiding any sort of reductionism.

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