

Dimensions of adaptivity

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Artificial Life offers strong tools for making coherent and disciplined our understanding of the relationships between several fundamental concepts within Cognitive Science more generally such as cognition, value, function, learning and others. One concept which may act as an anchor for this set of ideas is that of adaptivity, in its intraorganismic sense of a system being able to change to maintain itself in the face environmental challenges. A-Life, along with many other areas in Cognitive Science, examines different forms of adaptivity, though rarely in an explicit fashion. We therefore miss many opportunities to analyse the concept of adaptivity itself, and what it might tell us about the relationship between life and mind, learning and value, and other issues within this constellation of notions. The present paper will attempt to outline some of the general characteristics of adaptivity, with the particular aim of identifying what distinguishes different forms of adaptivity (for example, homeostatic regulation and operant learning) and how such dimensions might be used to help organise and direct our thinking on the matter in future. Crucial elements include the timescale over which the adaptive mechanism operates (e.g. achievement of reward in an operant learning task versus strategic play in chess), the inertia of those mechanisms (e.g. the tolerance parameters of a homeostatic mechanism) and integrative capacity of the mechanisms (basically, pattern recognition). It may be possible for these three dimensions to give us a coherent account of adaptivity and how it varies. This in turn would open new avenues of research into the relationship between cognition and value, and how that relationship changes through the operation of such adaptive mechanisms. The account proposed differs from the likes of Dennett's "Tower of Generate and Test" (1996, *Kinds of Minds*, Weidenfeld & Nicolson) and similar models as it is an attempt at an analysis of adaptivity per se, rather than the kinds of mechanism in a given organism that might produce different forms of competence or adaptive response.

The proposed account might therefore also offer ways in which we could codify the concept of mediacy in the interaction between an agent and its environment. In this, the framework might fit with other theorising on the matter such as Hans Jonas's (1966 *The Phenomenon of Life*, Greenwood Press) arguments concerning the increasing mediacy of the interaction between animals and their environments in evolution, the concept of the "recession of the stimulus" in Edwin Holt's (1915 *Some Broader Aspects of Freudian Ethics* p.134, Holt Company) description of learning and the variety of forms of cognition identified by Merlin Donald (1991 *Origins of the Modern Mind*, Harvard University Press) in his account of cognitive evolution.