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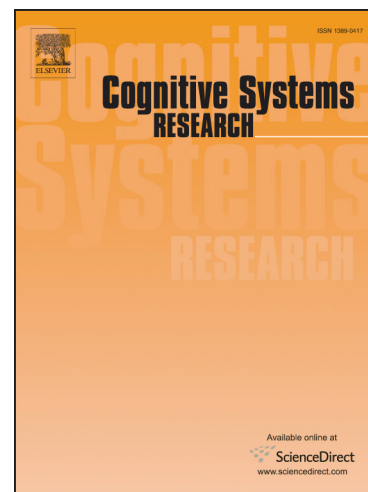
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## Dynamics Properties of Knowledge Acquisition

Sergey Petrov

### Abstract

Repeated counteraction of current knowledge and reality observation in our mind produces new knowledge and can be viewed as a dynamic process. When relevant part of reality belongs to the nature and, therefore, does not depend on human activity, the dynamics results in acquisition of new knowledge, usually as refinement of the existing one. Otherwise, adjustment between knowledge and reality can be achieved by intentional modification of relevant objects as well. This makes the process unpredictable and causes its drift the original direction. It is noted, that such a drift happens only in presence of a computable criteria used simultaneously to modify objects and evaluate quality the result.

**Keywords:** Knowledge acquisition; process dynamics; reflexivity, object model; cognitive dissonance; knowledge representation, knowledge model; data model; knowledge evolution.

### 1. Outline

Current knowledge of an object area initiate human activity to acquire new knowledge, in particular, when it is contradictory per se or contradict our observations. Repetition of this process can be viewed as self-inflicted knowledge dynamics. A few properties and their causes are considered below.

As usual, representation of formalized knowledge approximated below to a set of object class models  $\{M(C)\}$ . 'Objects' correspond to concepts rather and not necessary belong to physical world [1]. Our comprehension of a particular object  $x$  from class  $C$  based on its observation  $O(x)$  and the model  $M(C)$  of its class specified for  $x$ :

$$\langle O(x), M(C, x) \rangle \Rightarrow \text{☺}$$

In the case of radiation direct observation is almost absent, currently, in case of music the same is true for the model. It is natural to assume that model  $M(C)$  defines some kind preferences between objects in  $C$ , for example, order or rating defined on  $C$  elements. In most common case preferences originate from discrepancy between observation  $O(x)$  and specified model  $M(C, x)$  and/or contradiction between class models. Both of them can be a cause of cognitive dissonance as well as inspiration for creation of a new model as a formal result of integration of sensor signals and conceptual knowledge [2]:

$$\langle O(x), M(C, x) \rangle \Rightarrow \text{☹} \Rightarrow M'(C) \quad (1)$$

Repetition of (1) determines dynamics of models (dynamics of our knowledge) as it happens, for example, in natural sciences. Common opinion is that this dynamic process 'converges' to a stable state that is not necessary achievable.

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