

EDITORIAL INTRODUCTION

The title I intended to give to both issues of *Philosophica*, and which was the item I discussed with the authors, was "Self-organization and teleology". Unfortunately, this title has been changed into "Self-organizing and complex systems". To remedy this 'small' error, we have decided to entitle the second issue "Self-organization and teleology. Self-organizing and complex systems II".

A short introduction on most of the articles included in this issue can be read in *Philosophica*, nr. 46. There is however one article which has been added, namely the one written by Olaf Diettrich, "Induction and evolution of cognition and science". I am particularly pleased with that article, because it actualizes, generalizes and clarifies several ideas which came up for discussion during the cybernetics of second order, the cybernetics connected with the Biological Computer Laboratory of Heinz Von Foerster. Like Von Foerster (and Piaget), Diettrich stresses the importance of invariance - all regularities perceived and the laws of nature derived from those are invariants of mental operators -, and he criticizes the acceptance of an independent reality of which the structure is knowledgeable and explainable. The main issue according to Diettrich is to understand and explain in what way structural theories can help us predict in a correct manner quite a lot of new observations starting from a rather limited number of observations. The traditional, non-constructivist view leaves this problem unsolved in a sense that it assumes that the structure of reality guides the developments in science: "... theories in the usual sense are teleological in character", "Scientific evolution must converge (...) towards a final state which would comprise a definitive and correct description of nature". Several problems arise from this view, amongst others in relation with the notion of information and the genetic program in biology. The criticism of Diettrich is here almost equivalent to the one of Henri Atlan.

How shall we however consider the laws of nature, their 'objectivity' or 'universality' in a constructivist approach. In what manner can we explain that scientific theories work so well? Diettrich deals with several aspects of this problem. We only mention some of them.

The conservation laws can be denominated universal, in the sense that they depend on the human specific mental mechanisms generating the metric of time and space; they can be called

'antropic'. They are not universal in the sense that they are independent of any phylogenetic history. Objective theories, which assume that the structure of an external reality is independently knowledgeable, are empirically unverifiable. The importance of invariance in a constructivist view is demonstrated on the basis of (i) the arrow of time, (ii) causality, (iii) the laws of conservation, (iv) kinematics.

The relation between theoretical and observational terms, between elementary and higher order theories, is the second major point of attention. There are phylogenetic and ontogenetic reasons why the category of reality acquired so much importance in our thinking. Diettrich shows how the category of reality serves to protect the established interpretations of perceptions (elementary theories). The problem of induction is approached starting from the relation between observational and theoretical terms, which are considered to be in certain way homologous. The legitimation of empirical induction must be found in the internal mental operators generating regularities and not in any external reason.

The consequence of this constructivist view on knowledge is that progress in science is viewed as an endless evolution of theories and experiments. Experimental extensions, amongst others via artificial mechanisms, can create new invariants endlessly. This is a standpoint very different from the one called teleological in the beginning. One of the major merits of Diettrich is to explicit the epistemological consequences of a truly constructivist approach of cognition and science. He shows in a convincing way that we do not necessarily arrive at any of the skeptical conclusions traditionally linked with constructivism.

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