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The garbage can model of organisational behaviour: A theoretical reconstruction of some of its variants

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Abstract

The paper introduces the structuralist concept of theory reconstruction with a trivial model from physics and afterwards applies it to several versions of the garbage can model of organisational behaviour. It shows that simulation and theory reconstruction are to some extent equivalent. The paper also presents a new version of the garbage can model and discusses several results of the simulation model.

Keywords: Garbage can model; Organisational behaviour; Simulation; Axiomatisation

1. Non-statement view and the structuralist concept of theory reconstruction

The structuralist concept of theory reconstruction – the "non-statement view" of theories – introduced in the 1970s by Sneed [6] and elaborated upon by Stegmüller [7] and his successors (cf. [1]) formulates a number of explicit requirements on designing, formulating and formalising theories in the empirical sciences. Balzer et al. [1] used a metaphor according to which "empirical science consists of a large, but finite number of elementary units or 'building blocks', which [they] call 'theory elements'". Theory elements in turn consist of a "'vocabulary' or 'conceptual structure' and some empirical law, which can be formulated with this vocabulary together with a specification of the things to which this law is intended to apply" – the set of intended applications of this theory element. Theory elements can be connected by "intertheoretical links" and then form a theory net [1, p. xx].

A theory element is defined as an ordered pair of the so-called core and the set of intended applications. The core, in turn, consists of several sets of models, and the definition of these sets of model contains exactly the terms which are necessary to speak about the theory in question. Balzer et al. [1] mention that "in ordinary language and in informal contexts within empirical science the term 'model' is used in an ambiguous way" (for a recent discussion from the point of view of computer science about the usage of the term in everyday science see [9, pp. 266–267]) and recommend the following solution: Much like mathematicians and logicians, they always "use 'model' in the sense of the thing depicted by a picture (=by a *theory*)". This usage of the term also appears in ordinary language where a man or a woman can be called the model of a painting. Thus they recommend calling an economic process a model of an economic theory.

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Another important point of view (which is not specific to the "non-statement" view) is the distinction between theoretical and non-theoretical terms where – and this is specific to the "non-statement view" – the criterion of theoreticity is always and only related to a specific theory element. Thus a term can be only theoretical with respect to one theory element, but non-theoretical with respect to another theory element. At the same time this means that calling a term "theoretical" is always incomplete, hence one has to call a term "theoretical with respect to theory element X". Every non-trivial empirical theory element should have at least one term which is theoretical with respect to this theory element (for a discussion of this requirement in administrative science see [10, p. 901]).

At least four sets of models of a theory element have to be described in a structuralist reconstruction[1]: the set of potential models – their description (see the example in Section 4) provides the vocabulary with which everything can be said about the structure of the things that the theory is concerned with, the set of partial potential models – their description restricts the vocabulary to those terms which can be used even without this theory, the set of (full) models – their description additionally contains the laws that are expected to apply, and the set of intended applications mentioned above, which is a subset of the set of partial potential models, and about these intended applications no complete formal description will be possible [1, p. 86–87].

2. Specificities in economics and the social sciences

In economics and the social sciences we are normally interested in processes which should be described and explained, even predicted, with the help of theory. Hence one term of theories in these (and most other sciences) will be time, i.e. an ordered set of points of time. A theory of processes must not restrict itself to describe a state at the end of a process but will have to take state changes into account.

As contrasted to physics, from which the first examples of formal theory and the first structuralist theory reconstructions were reported [6], economics and the social sciences always deal with a large number of components on the macroscopic level which are connected by a large number of different types of interactions. Additionally, measurements of the states of physical objects can be carried out with high precision and at very short time intervals, and often these measurements either do not change the states of the objects, or the state changes are negligible, or they can at least be calculated. All these requirements can only very seldom be met when we measure the state of things economics and the social sciences are interested in.

Although theories in economics and the social sciences can be restricted to a small number of attributes of their objects – human beings in most cases – and to a small number of relations between them, they do not take into account all the other attributes and relations which may also be important – and it is much more difficult to isolate human beings, groups or organisations than to isolate dead things, such that the influences neglected by a particular theory in fact should not be neglected. Moreover the measurements that are necessary to find out properties of human beings, groups or organisations are much more difficult, error prone and biased as compared to measurements of physical or even living objects, and in many cases those measurements are impossible for ethical reasons.

It is above all the small number of types of interactions between physical (particularly mechanical) objects that renders it possible to describe many (of course, not all) interesting physical processes with the help of mathematical methods leading to closed solutions. In economics and the social sciences this is much more rarely the case, but this does not mean that these sciences could not formalise their theories at all. Computational sociology and computational organisation theory [2] are prominent examples of scientific approaches using formal models and executing them in computer simulations.

3. A trivial example from mechanics

We will first explain structuralist theory reconstruction with a rather trivial theory from mechanics. To do this we imagine a state of knowledge in mechanics which allows for measuring angles and distances with the help of geometry (i.e. another theory which is believed to be applicable to distances and angles, and which was

[1] Constraints [1, pp. 40–47] and links [1, pp. 47–62] will not be discussed in detail here, as they are not needed in the simple examples to follow.