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Causality and regularity in a 'creative world'

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Abstract. With its ability to incessantly create new actions and innovations the economy presents itself as an open, evolving (self-transforming) system. In their 'economics for a creative world' Koppl *et al.* (2014) try to account for the features of that system and discuss methodological consequences for its analysis. Claiming that ' ... novelty and innovation are uncaused' and that ' ... no laws entail the evolution of the econosphere' they hold that fundamental scientific principles do not apply. In the present comment it will be argued that both claims are difficult to defend. Causality and law-like hypotheses also apply to novelty and innovation.

1. Introduction

To make sense of events we observe we usually look for causes that may have triggered these events. Thinking in terms of cause and effect is an ages-old part of the occidental worldview going back to at least the ancient Greek philosopher Demokrit. Such thinking informs purposeful human action that would seem pointless if it were not believed to cause an effect. Indeed, the very idea of pursuing given ends with scarce means – for many the essence of economics – would lose its moorings. Does the fact that humans are creative, i.e. capable of coming up with something not previously (fully) known, set limits to this way of thinking? Do we have reason to even infer that 'the economy is not a causal system'? Is it true that, 'if by "cause" we mean what gives a differential effect entailed by law, then we can assign no cause in the evolution of the econosphere'. These two claims are put forward by Koppl *et al.* (2014) in their essay. In the present comment I will argue that these claims are difficult to defend.

Koppl *et al.* make several valid and useful points. I fully agree with many of them. Economics faces substantial epistemological and methodological problems because of the fact that the economy is relentlessly creating novelty (see Witt, 2009a, 2009b). However, some of the arguments of Koppl *et al.* are ambiguous, to say the least, such as when they write: 'In the strict sense of "cause" just given, novelty and innovation are uncaused' or ' ... no laws entail the evolution

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of the econosphere'. Some qualifications which they add only increase the confusion already present as in the following example: 'Although the economy is not a "causal system" in our sense, cause and effect still operate in the econosphere ... '.

To clarify things let us explore what does follow from human creativity for constructing explanations in economics. Is it necessary to abandon the principle of causation? Do we have to give up the idea of recurrent cause–effect patterns in economic evolution that can be characterized by more generally valid hypotheses (sometimes called 'laws') of some kind? To provide answers, the next section discusses the issue of causation and the feasibility of law-like hypotheses. Section 3 then turns to some other consequences for economic theorizing following from human creativity. Section 4 offers the conclusions.

2. The good news: causation and law-like hypotheses are still valid concepts

New actions and innovations that follow from human creativity can change both the path and pace of economic activities. The way in which this takes place cannot be (fully) anticipated since new actions and innovations only reveal their content or meaning once they have occurred. This is an epistemological constraint. The question of whether it implies that novelty and innovation are uncaused can be discussed at two different levels. First, do no causes exist for why economic agents come up with novelty or carry through innovations? Second, are there no causes for why an emerging novelty has a particular content or meaning (instead of another)?

Regarding the first question it is not difficult to identify as causes the reasons that motivate agents to pursue new opportunities. Some of these causes seem to be rather common, i.e. frequently observable ones. Examples are the dissatisfaction of the agents with the *status quo* (relative to their aspiration levels) and their inability to overcome it by already known means; curiosity and an explorative attitude; wishful thinking. In all these cases, the past or the present situation of the agents causes them to search for, and try out, new actions and innovations that are initially not fully comprehended. Regarding the second question, our present understanding of what happens in the human mind when it identifies new meaning is still very limited (see Witt, 2009a for discussion). But to infer from the limits of the existing understanding that the particular meaning which results is uncaused is a *non sequitur*. Indeed, all attempts to improve our understanding are clearly aiming at developing causal explanations for the process of meaning attribution.[1]

1 See, e.g. Edelman and Tononi (2000) and Fauconnier and Turner (2002). The novelty that emerges in the biological processes of mutation, genetic recombination, epigenetics, etc. is generally presumed as being generated by causal mechanisms. Some of these mechanisms are already well enough understood to be exploited by genetic engineering techniques. For a comparative discussion, see Mitchell (2009).

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The knowledge base of economic agents is extended by the insights they gather from experimenting with previously unfamiliar actions and innovations. New knowledge may, consequently, inspire further inventions and discoveries. In a sense, previously acquired knowledge thus breeds new knowledge, often by way of making novel combinations of existing knowledge possible. It is again a *non sequitur*, however, to argue that 'past innovations enable future innovations, *but do not cause them*' (Koppl *et al.*, 2014; italics added). Generating new opportunities that can potentially be recombined with those already existing *is* a cause of later innovations, yet not necessarily a sufficient one. Several causes usually come together – among them not least the just mentioned motivational ones. *Single* cause explanations that are relevant for many mechanical devices do not represent the proper model of causation in the context of explaining evolutionary processes. Their complexity and the relevance of historical contingencies for these processes suggest a model of *multiple* causes that act jointly in determining the eventual outcome. The fact that single cause explanations are not adequate should not be misunderstood, though, to suggest that *no* causal explanations can be given.

However, unlike historiographic explanations which focus on the occurrence of singular historical events, explanations of *recurrent* features of the economy and its evolution require more than an enumeration of ever changing multiple causes. They need to be explained as instances of a more general regularity that occurs whenever a specific set of causal conditions is met. Such regularities are described by hypotheses which are 'law'-like in the sense of applying to an entire class of events or of sequences of events. Koppl *et al.* (2014) deny that, in their 'creative world', there is a basis for this mode of explanation when they submit that ' ... no laws entail the evolution of the econosphere'. They seem to overlook that this conclusion is incompatible with their intention to link their 'critical treatment of standard models to the evolutionary logic of what Hodgson and Knudsen (2010) call Generalized Darwinism'? Generalized Darwinism is an abstract reduction of the principles of the Darwinian theory of evolution which, after all, tries to explain evolution in terms of generally valid, law-like hypotheses. In fact, in evolutionary biology, the aim of developing causal explanations for the evolution of the biosphere by means of law-like hypotheses is uncontroversial (see Tinbergen, 1963). There is no conceivable ground why, in principle, the evolution of the econosphere should be treated differently in this respect. The problem seems to be that the notion of a 'law' can be given different meanings. Some notions are appropriate for explanations in the context of the unfolding of a 'creative world' while others are not.

3. The bad news: a 'creative world' is not an 'arithmomorphic' one

To find out which law-like hypotheses are, or are not, appropriate for the explanation of how the 'creative world' unfolds, and for what reasons, recall that

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the specific content or meaning of emerging novelty cannot be (fully) anticipated. Consequently those responses by economic agents that are contingent on the content of emerging novelty cannot be anticipated either. As a consequence of the creative capacity of humans, the economy is – to use the language of system theory – not only an open system (which means that it is subject to potential disturbances from outside). It is an open and *self-transforming* system, i.e. one in which change is endogenously generated.[2]

An important implication of this feature for economic theorizing was clearly recognized by Schumpeter (1934 [1912]). 'Change from within' the economy, as he put it, thwarts attempts by economists to borrow concepts originally developed in classical mechanics to state scientific laws for closed, equilibrating systems, such as that of the planets (ibid.: Chap. 7, English translation in Schumpeter, 2002). The dynamics of systems like these is defined over a closed orbit. In contrast, the self-transformation of the economy implies an unfolding state space. The dynamics pass through an orbit that is changing in unforeseeable ways through the creation of new actions and innovations.

In a similar vein, Koppl *et al.* rightly conclude that ' ... we have no settled relations by which we can write down the equations of motion of the ever new economically relevant observables and parameters revealed ex post by the market process'. This is a valid argument against the widespread use of differential or difference equations in economic theory and empirical time-series analysis. Their use either ignores, or deliberately abstracts from, the possibility that novelty with yet unknown content can intervene at any time and develop an unforeseeable impact.[3] However, if differential and difference equations describe any laws, then these are laws of motion, i.e. a special class of laws particularly suited for an algebraic formulation. There are other laws and law-like hypotheses as well, and they are not all subject to the epistemological caveat as are the laws of motion implicit in differential and difference equations. Koppl *et al.* (2014) do not seem to recognize the difference when submitting that ' ... no laws entail the evolution of the econosphere'.

The best examples of general, law-like hypotheses about an open, self-transforming system can be found in the Darwinian theory of evolution. Principles such as that of natural selection, genetic variation, speciation, or descent can claim general validity without conflicting with the epistemological constraint. In their entirety they provide an explanation for the evolution of the species. The complexity of this process is far beyond that of 'arithmomorphic'

2 The self-transformation capacity is a generic feature of evolving systems more generally, see Witt (2003).

3 In some cases such an abstraction may be justified. A careful examination may show that even open, novelty-generating systems may have aspects and domains not affected by emerging novelty or where, at least in tolerable approximation, the (unknown) consequences of intervening novelty can be neglected. Regarding these aspects and domains, an analysis in terms of closed-systems dynamics may offer useful insights, see Setterfield (2003) for a discussion.

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phenomena in the sense outlined by Georgescu-Roegen (1971: Chap. II and XI). Processes of such a complexity cannot be represented in terms of algebraic laws of motion. Something similar holds for explaining the unfolding of a 'creative world'.

It is evident that in both cases the future course of evolution is contingent on the yet-to-be-revealed implications of emerging novelty. Yet the epistemological constraint implied by this fact does not force us to dismiss the possibility that evolutionary processes follow regularities that can be captured by general, law-like hypotheses tuned to the non-arithmomorphic character of the process. The constraint impedes the ability to positively predict future developments, but not the possibility of making *negative* predictions concerning what we expect to occur (Hayek, 1964). For economic theorizing this means that we can exclude the possibility of some particular future development that, although able to be imagined, would be incompatible with the proposed hypotheses. For this reason, law-like hypotheses that make specific empirical claims about the 'creative world' can, in principle, be falsified.

4. Conclusions

The economy is an open, self-transforming system or, in the terminology of Koppl *et al*. (2014), a 'creative world'. The conditions of such a world challenge, Koppl *et al*. claim, the fundamental idea of causation. Further, in their 'economics for a creative world' Koppl *et al*. see no room for general, law-like hypotheses explaining the course of the evolutionary process. The present comment has argued that both claims are highly misleading, if not wrong. From the fact that we do not fully understand at present how specific emerging novelty is caused it cannot be inferred that the emergence and the specific content are uncaused. Koppl *et al*. are right in criticizing that, for epistemological reasons, the faith placed in the use of algebraic laws of motion to explain economic phenomena is often misplaced. The emergence of novelty and evolution are no arithmomorphic phenomena. However, this does not exclude the possibility that the evolutionary process follows certain regularities, nor that such regularities can be explained by general, law-like hypotheses other than those implied by algebraic laws of motion.

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