



Structure reconsidered: Towards new foundations of explanatory transitions theory



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ABSTRACT

The most prominent framework for studying socio-technical transitions to date is the multi-level perspective (MLP). While appreciated for its flexibility and usefulness for studying socio-technical transitions it has not been without its critics. In this paper we focus on the ontological foundations of the MLP and its (in)ability to explain transitions and how they come about. The purpose is to initiate development of an explanatory theory for socio-technical transitions, by carrying out an immanent critique of the ontological foundations of the MLP together with a methodological critique. We show that the ontological foundations of the MLP to a large extent inhibits explanatory capacity. The argument is fourfold: since structure and agency are understood as inseparable, (i) the causal influence of material properties are undervalued, and (ii) different degrees of structural constraint and freedom of actors are ignored. As a consequence (iii) transitions are reduced to shifts in the maturity and spread of socio-cognitive rules, without analysis of systemic change. Moreover, (iv) mechanisms are reduced to recurring patterns of events which cannot explain why some transitions fail while others succeed. To remedy these limitations we outline alternative critical realist foundations for transitions theory.

1. Introduction

Research on sustainability transitions of socio-technical systems has grown extensively during the last decade and is being used to support policy making and long-term planning for low-carbon futures. The multi-level perspective (MLP) is one of the most notable analytical frameworks in this field, appreciated for its flexibility and usefulness in identifying patterns of transitions and factors contributing to inertia in existing systems. However, the MLP has also received extensive criticism regarding its undervaluing of agency (Smith et al., 2005; Shove and Walker 2010), politics (Genus and Coles 2008; Meadowcroft, 2009), and ambivalent and simplified conceptualisations of the levels and their respective role in transitions (Berkhout et al., 2004; Markard and Truffer 2008). This critique has led to fruitful debates with clarifications on the ontological foundations of the MLP (Geels, 2010), elaboration on how to conceptualise politics and power (Grin, 2010; Avelino, 2011; Hoffman, 2013) and the regime concept (Fuenfschilling and Truffer, 2014) as well as agency (Fuenfschilling and Truffer, 2016). These developments have significantly improved the analytical usefulness of the MLP but in this article it is argued that core ontological problems of the MLP have not been resolved if transition researchers aim to understand and *explain* socio-technical transitions, their dynamics, patterns and outcomes.

The emphasis in this article is thus on the ontological foundations of the MLP, as well as their methodological implications. Our main focus of attention is the theoretical and conceptual arguments outlined in articles and books published on the MLP (most notably Geels, 2002, 2004, 2005, 2010, 2011; Geels and Schot, 2007, 2010), and recent theoretical criticisms of it. Like Fuenfschilling and Truffer (2014, 2016) we focus on the conceptualisation of structure and agency, but rather than refining and clarifying that conceptualisation we scrutinize ontological assumptions and the problems which follow. Earlier criticism (e.g. Genus and Coles, 2008) have stressed the need to move beyond using MLP as a heuristic device in the narrow sense as a tool to merely organise sets of data, and to link it to more theoretical understandings of the concepts it introduces. However, the label, heuristic, has also been embraced, as it leaves the analyst “space for creativity and sociological imagination” (Geels and Schot, 2010: 101) to construct narrative explanations. But any heuristic is built on concepts with certain connotations and ontological assumptions, which means that if contradictions arise in terms of what we can use the heuristic for, creativity is limited. To develop an explanatory theory of sustainability transitions, ontological assumptions, about what causal objects exist and the nature of their interaction, therefore need to be explicated.

By introducing concepts, the MLP demands of the researcher to know how concepts interrelate to create a conceptual system, how they

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are used to represent phenomena in a particular way, and how they direct search for certain mechanisms. Geels (2010) engaged with this task by looking at the assumptions on causal agents and primary causal mechanisms within a number of social science theories, showing which ontologies would, or would not, fit with the MLP as it was developed at the time. The aim of this article is to show what the limitations of the ontology and associated methodology of the MLP are, and to outline alternative foundations for an explanatory theory of transitions, based on a critical realist philosophy of science (Archer et al., 1998). What do we mean by explanation then? To explain is, according to critical realism, to ask why a phenomena happens and to examine what the necessary conditions are for it to happen. If possible, critical realists therefore “try to get beyond the recognition that something produces some change to an understanding of what it is about the object that enables it to do this” (Sayer, 1992: 106). The basis for explanation consequently lies in the essential structures, mechanisms and causal powers of systems, rather than empirical generalisations at the level of events.

To under-labour¹ for such an explanatory framework of socio-technical systems, we first carry out an immanent critique of the MLP, and then suggest alternative foundations. The article starts with a short summary of the theoretical background of the MLP in Section 2, unfolding some of the most important concepts and assumptions. This conceptual background is followed by a discussion on the implications of the particular conception of structure in the MLP, focusing on what is included and excluded from structure, how this structure conditions and enables agency, and what transitions subsequently are about. The methodological implications of the ontology of the MLP are discussed in section 4, where we examine problems associated with focus on recurrent patterns and sequences of events. The article ends by proposing alternative ontological foundations grounded in a relational approach to emergent structures and agency in Section 5, and concluding remarks in Section 6.

2. Ontological foundations of the MLP

2.1. Stability and change

The MLP was created in order to understand technological transitions, i.e. “technological changes in the way societal functions are fulfilled” (Geels, 2002: 1257), but it was later developed and refined to serve as a heuristic device to study sustainability transitions. It draws on a combination of diverse theories; mainly certain strands of evolutionary economics, interpretive/constructivist theories such as social construction of technology (SCOT) and actor-network theory (ANT) from science and technology studies (STS), and structuration theory. Geels (2010) argues that these theories have a good ontological fit in that they assume actors to be creative and interpretive but with bounded rationality, as well as having a core focus on processes (see also Geels and Schot, 2010).

In picturing transitions, the MLP builds on an analogy from biology: a hegemonic regime (species) can be replaced when there is external pressure (environmental change) leaving room for a niche (species), with better adapted fit to the new environment, to grow hegemonic (Geels and Schot, 2010). A straightforward translation of this analogy would be to replace “species” with “technologies”, but this is not what is meant by the MLP. Such a straightforward translation would tell us little about why and how different technologies fit well with different environments, or why they are developed. The notion of socio-technical systems, the idea that technology is being embedded in social practice and co-constituted with society (i.e. its environment), is introduced from STS. So while technology may be the locus of change (sometimes

the driver and sometimes the result of it), it is not the defining feature of transitions in the MLP.

Instead, the MLP conceptualise the dynamics of structural changes as a co-evolutionary interplay between three different levels: niches of radical innovations, socio-technical regimes and the landscape. Niches are the protective spaces from where the “seeds of change”, i.e. radical innovations, originate (Smith and Raven, 2012). The regime is the established practices, or “rules”, of the sector's socio-technical system, while the socio-technical landscape consists of macro-level factors such as external shocks, slowly changing trends in society, and factors that do not change (or change only slowly) (Geels, 2002; van Driel and Schot, 2005). The three levels have been defined in a number of different ways but the most recent development of the MLP suggest that the levels should be understood as different degrees of structuration (Geels and Schot, 2010; Geels, 2011; further elaborated on by Fuenfschilling and Truffer (2014, 2016), which means that all levels have structuring properties but with varying degrees of maturity and dispersion.

In order to understand stability, it is the regime concept that is of most importance. The regime concept was introduced to conceptualise the relative reproduction and stability of the present system. It is influenced by Nelson and Winter (1982) who defined the regime as the shared cognitive routines of engineers when developing technologies. Rip and Kemp (1998), and Geels (2002, 2004, 2010) broadened the conception of regimes (influenced by sociology and institutional theory) to be defined as sets of rules shared not only by engineers but a broader set of social groups. The extension of the concept by the more sociological notion of rules allowed for letting in more actors and networks; widening the scope to situate the regime at what DiMaggio and Powell (1983) call the level of organisational fields (Geels and Schot, 2007).

STS scholars on the other hand, put more focus on agency and individual actors' intentional attempts to produce alternatives. The interpretive/constructivist ontology is therefore focused on “meaning” and sense-making from an agency perspective, making intersubjective sense-making, interpretation, strategies, visions, beliefs, and expectations key in guiding search processes. In other words, STS introduce a great degree of voluntarism to counteract the determinist tendency of evolutionary “natural trajectories”. Structure is, from such a perspective, a mental artefact, which means that a technological trajectory is merely a self-fulfilling prophecy (Geels and Schot, 2010).

To balance the voluntarist tendency of STS, the MLP furthermore draws on the structuration theory of Giddens and neo-institutional theory (of e.g. Powell and DiMaggio (1991) and Scott (1995)) (Geels and Schot, 2010). These theories also have an agency perspective, but actors are more explicitly conceptualised as embedded in structures on which they draw in local practice. Structure and agency is conceptualised as a duality which is inseparable – with structure defined as reproduced instantiations of norms and cognitive interpretive frames in our minds that guide our behaviour. These instantiations are called rules, which due to the inseparability of the duality means that they are both medium and outcome of action; both constraining and enabling. Actors do not simply follow rules passively, but interpret and creatively apply them. Structuration theory and neo-institutional theory thus provides the basis for how to understand what structure is, and neo-institutional theory was used to further elaborate *what kind of rules* the regime is made up of: cognitive, regulative and normative rules.

2.2. Structure as rules

The conceptual core of the MLP for understanding the contextual embeddedness of agency and the stability of the present system is, as outlined above, the concept of the socio-technical regime, which “refers to the semi-coherent set of rules that orient and coordinate the activities of the social groups that reproduce the various elements of socio-technical systems” (Geels, 2011: 27). While the regime concept has not

¹ Under-labour: to elaborate a clear and consistent ontology and methodology for scientific practice able to walk one's talk (and talk one's walk) (Bhaskar, 2013).

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