

REALISM, ORGANISATION, AND EMERGENCE

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ABSTRACT

This study focuses on emergence in the light of developments in physics and draws on the differences between the dissipative structure proposed by Harvey and Reed, and the relational organizing structure developed by Lawson (2012). It argues that accounts of emergence grounded in dissipative structures, while illuminating certain forms of self-organization, remain limited in explaining the processual, relational, and practice-dependent character of social reality. Drawing on Lawson's theory of collective practices, the paper develops an alternative ontological account of emergence that emphasizes relational organization, social positioning, and the dynamic reproduction of social forms. This framework explains the processual character of social reality and the concrete aspects of the social sciences, including economics, within a critical realist perspective.

Keywords: Emergence, Relational Organizing Structure, Critical Realism, Dissipative Structure, Collective Practices, Social Ontology.

Jel Codes: A10, B40, D20, L10.

1. INTRODUCTION

In recent years, the crisis in economics and the questionable performance of social theory more widely have seen a revival of interest in social ontology. This is a branch of philosophy concerned with the study of the nature of social material, and orients itself to preparing or clearing the ground for the social sciences. One project that has been fundamentally involved in this ontological shift in the social sciences is that which is sometimes systematized as critical realism. Central to this project has been the idea of emergence, which is loosely understood to mean the appearance of novelty from something that already exists. Many contributors to social ontology, including those who are associated in some way with critical realism, have made the concept of emergence central to their analyses. However, it seems to have gone unnoticed that the concepts of emergence that are formulated are often quite different, and that this affects the sorts of conclusions that are drawn. Thus, the purpose of this study is to render these differences explicit in the hope of clarifying the discussion in this field.

The paper is organized as follows. Section 1 examines the theory of complex realism developed by Reed and Harvey (1992) and then draws upon recent developments in quantum mechanics and point out their reflection on social science.

Section 2 presents an account of emergence based on the concept of the nested hierarchal structure involving self-organization developed by Harvey and Reed and compares this with an account of emergence based on relational organizing structures.

Section 3 argues the case that the relational organizing structure is more sustainable in social domains, including the field of economics, by virtue of collective practices. More specifically, it is argued that capitalist society works on the assumption that human beings exist and act in ways that are independent of any relationships, and that each human being is

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confined within the economic sphere as an "individual in the market". However, we know that human beings are always culturally situated, and have ideas, feelings, and purposes. They interact and co-operate in structured communities, which are organized systems. Therefore, the feature of human interaction that needs to be emphasized is collective practices, which helps to coordinate social interaction. Collective practices are thus an emergent form of organizing structure. Concluding remarks follow.

2. WHAT IS "COMPLEX REALISM"?

Over the last three decades, researchers in almost every field have become increasingly interested in dynamic processes involving the relationships and interconnectivity among individual components within a system and between systems and their environment. These are features of complexity theory, which pervades every field of the natural and social sciences. Prior to the advent of complexity theory, Science was conceptualized based on Newtonian mechanics. This meant that predictions could only be made based on non-complex closed systems with stable, linear dynamics. In the view of the positivist, there is no contingency. In addition to this, Newton's success was based on his explanations of natural phenomena, and science and its methods were universalized through the principles of Newtonian mechanics². Science reduces all of nature to a vast deterministic mechanism and defines that mechanism according to the laws of Newtonian physics. Newtonian mechanics, therefore, assumes a linear 'clock-work' view of the world that involves no selection or variation. There is no novelty or creative process; everything that exists now has existed from the beginning of time and will continue to exist (Deacon and Cashman, 2007).

In this sense, the theory of complexity is a radical break from the past in terms of its abandonment of the classical paradigm of Newtonian science. Modern science and philosophy have abandoned the teleological approach and the flawed deterministic view, thereby opening a new window for humanity. All developments in the world of science move us towards a social reality, which should be able to be explained by scientific laws (Prigogine, 1977; Deacon and Cashman, 2007; Artigiani, 1987).

There are two distinct approaches taken regarding the application of the science of complexity to studies by social scientists, including economists. As Byrne states, "one is concerned with the order that lies hidden within chaos and is essentially US-based. The other, European and represented particularly by Ilya Prigogine, focuses on the order that emerges from chaos" (Byrne, 1998, p. 16). Although both share the same ontological field, which relies on non-linear systems, there are profound differences between them. While the Santa Fe Institute in the United States has developed a complex adaptive system based on mathematical modelling, the chaos theories developed by Prigogine and the Brussels School have used models from statistical non-equilibrium thermodynamics to study the external system of complex systems (Harvey, 2001). Meanwhile, Harvey and Reed (Reed and Harvey,

² It could be useful to distinguish between the reception of Newton in the Scottish Enlightenment and the reception of Newton in the Continental Enlightenment. The basis of Newtonian method is Mathematical-deductive and experimental. "Newton refers to the Experimental method as the method of analysis and deductive method is as the method of composition" (Redman 1993, 212) Although Newton's method is mathematical; the method of analysis relies on observation and experimentation. Whereas Newtonian view in the Continental Enlightenment based on Mathematical-deductive method, Newton's theory in Scottish Enlightenment relied on experimental and observation. For example, Adam Smith used little mathematics in his theories but mainstream economics comes closer to using Newton's Continental approach than Smith. Positivism has done economics wrong.

1992; Harvey and Reed, 1994, 1996)³ have applied deterministic chaos theory in their research into fields including social ecology, urban place theory, and demography, and believe that this new approach to science has significant implications for the social sciences. Advocates of chaos theory believe that in terms of scientific ontology regarding the science of dissipative systems, chaos theory seeks to create a unified science by humanizing the physical sciences⁴ (Harvey, 2001).

Harvey and Reed (1994) and Reed and Harvey, (1992, 1996) synthesize critical realism as a philosophical ontology and chaos theory as a scientific ontology. This synthesis creates a so-called "complex realism" (Byrne, 2001). They have been able to assemble these ontologies into "a nested, concentric hierarchy of metatheoretical positions" (Reed and Harvey, 1992). As complex realists, Reed and Harvey have developed a model of nested social system hierarchies that emphasizes their ontologically layered nature.

In the light of these developments, Harvey and Reed argue that the social sciences need to be radically revised whereby they acquire a philosophical perspective grounded in realism. In this study, this philosophical conception of realism is closely related to ontology, which is the study of the nature of being, of what exists, including the nature of the objects of study. The science of physics investigates the basic materials of reality, such as waves, particles, quarks, and mass, all of which are associated with ontology. Social science, including economics, is a part of social reality, and this reality has its own concerns including social relations, money, gender, technology, corporations, and human nature. Hence, social scientists should take social ontology into account (Lawson, 2015).

Social science employs a methodological pluralism based on a dissipative system perspective instead of on methodological individualism. Thus, the scientific ontology of dissipative system theory is compatible with the philosophical and social ontologies developed by Bhaskar. As noted by Harvey and Reed, "Such a wedding, we believe, can rise to a new social scientific world view—one grounded in the axioms of deterministic chaos..." (Harvey and Reed, 1996, p. 296). Here, I briefly outline how Harvey and Reed's account of the new social scientific world can be understood by referring to social and philosophical ontologies. Social ontology, under the head of critical realism's account of generative mechanisms, emergent structures, and ability of complexity and contingency, fits the non-equilibrium thermodynamic and symmetry-breaking process of dissipative systems. Harvey and Reed argue that the gaps between philosophical and social ontologies will be filled by dissipative structures, i.e. scientific ontology.

Thus, the argument put forward by Harvey and Reed can help facilitate a more relevant approach in the social sciences, including economics, than what is currently available, i.e. positivism based on methodological individualism. This merger between dissipative structures and philosophical and social ontologies can lead to a new approach to research in the social sciences.

The aims of the following discussion are twofold. First, I want to argue on the basis of emergence theory that dissipative systems based on scientific ontology are compatible with philosophical ontology. Thus, this study is concerned with clarifying the definition of emergence offered by advocates of dissipative structures, and that of critical realism, and then examining the similarities and differences. The second aim is to explain why a relational organizing structure is necessary in the social sciences, specifically in the field of economics.

³ David L. Harvey mostly has worked on chaos theory and complexity. He especially has determined differences between chaos theory and complex adaptive system in his work 'Response article: Chaos and complexity: their bearing on social policy research, Social Issues 2001'

⁴ For further discussion on the science of complexity, see Harvey (2001).

Proponents of dissipative structures have expressed concern about sensitivity to initial conditions, stating that it is possible that such structures can overlook pre-existing relationships in society. Further, their model of nested social systems depends on interactions between fundamental particles, which can lead to methodological individualism.

The critical realist approach to philosophical ontology is quite different from the dissipative structure approach. The differences between these approaches are related to distinctions based on physics. Physics has recently evolved from the elementary particle view to a field view in which every causal property is a result of process organization. Lower-level entities have no privileges over higher-level entities because the field view is based on quantum field theory, in which no levels exist (Campbell and Bickhard, 2011). In reality, higher-level and lower-level properties both have their own causal powers by virtue of their relational emergence, whereby the relationship is between entities and their properties rather than between levels (Elder-Vass, 2010). Thus, the essence of emergence is the organization of components or parts.

Quantum field theory is a subset of quantum mechanics. In quantum mechanics, each entity has its own behaviour but actualizes into a particle through interactions. Thus, interaction between particles is crucial to developing higher-level emergent properties. Emergence is simply micro particles interacting with each other, but simultaneously involves a level at which particular consequences depend on initial and boundary configurations. Whereas only fundamental particles have causal powers in quantum mechanics, quantum field theory describes a world in which there are no fundamental particles. The basic reality is process-in-organization (Campbell and Bickhard, 2011).

Thus, quantum field theory can be defined as a field-in-process, or a continuous flow of energy. In this sense, quantum field theory provides us with new concepts and a new way of thinking about reality, introduces a shift from particles to fields, and specifies the significance of processes. "Everything that happens in nature is a result of the interactions and motions of fields. So, it is the idea that everything is made of only fields and fields have mass because they have energy. Thus, regarding quantum field theory, there is nothing: no thing. Only fields" (Hobson, 1995, p. 481).

Having considered developments in physics, I now focus on emergence.

3. COMPETING ACCOUNTS OF EMERGENCE

Emergence is a central theme for both advocates of dissipative structures and critical realists. The concept of emergence in the social sciences is essential to understanding how causal powers govern social reality (Elder-Vass, 2010), and analysis is impossible without presupposing emergence. However, social scientists have different understandings of the concept of emergence. Moreover, there is a particular feature of emergence that impacts every realm of science, namely that *the whole is more than the sum of the parts or components*. Scientists interpret emergence in different ways, and the term is invariably used in one of two senses: weak emergence which is termed epistemological emergence, and strong emergence, which is termed ontological emergence (Welshon, 2002, p. 39). Beyond this, accounts of emergence differ in terms of whether novelty is understood to occur over time or is restricted to a particular point in time, i.e., synchronic versus diachronic emergence. The distinction is essential in the literature on emergence because strong ontological emergence can be understood to be synchronic, while diachronic emergence evolves over time and is related to weak emergence. Weak emergence is prevalent in both the natural and social sciences. In short, in diachronic emergence, novelty is understood in terms of the

unpredictable relationship between current system properties and past ones, and refers to weak emergence. In contrast, synchronic emergence refers to a particular point in time, and novelty revolves around irreducibility; thus synchronic emergence is identified with strong emergence (Humphreys, 2008).

In keeping with the general view, Lawson defines emergence as a novelty, while also emphasizing the importance of organization, noting that "Emergence is a term that expresses the appearance of novelty...And an emergent entity, where addressed, is usually found, or anyway held, to be composed of elements deemed to be situated at a different (lower) level of reality to itself, but which have (perhaps through being modified) become organized as components of the emergent (higher-level) entity or causal totality. Emergence, then, as widely interpreted is ultimately a compositional term, and one that involves components being organized rather than aggregated" (Lawson, 2013, p. 1). Lawson also emphasizes the stratified reality defining emergence, noting that "A stratum of reality can be said to be emergent, or as possessing emergent powers, if...it: (i) has risen out of a lower stratum...(ii) remains dependent on the lower stratum for its existence; but (iii) contains causal powers of its own which are irreducible to those operating at the lower level and (perhaps) capable of acting back on the lower level" (Lawson, 2003, p. 44). This definition incorporates both stratified reality and the process-focused view of emergence.

Accordingly, the fundamental ontological element of reality is a structured process or, according to Lawson (2012), the notion of organization rather than separate atoms or particles. This is a crucial step towards an alternative ontology for economics, as individuals are no longer seen as isolated 'atoms'. The fundamental level is not comprised of elementary particles, but rather a complex hierarchy of interrelated processes (Lawson, 2012; Latsis, 2015). Ontology is not reduced to particles in space and time, and causality is not restricted to particle-to-particle encounters.

In the words of Lawson, "the antireductionist thesis is no less coherent with the results or findings of modern physics than is the doctrine of synchronic reductionism...proponents of the thesis that emergent phenomena are synchronically reducible have understandably been especially interested in seeking out any fundamental elements from which all others ultimately have emerged, and to which all are ultimately reducible. And in particle physics, specifically, the categories of elementary particle or fundamental particle have been fashioned to express just such elements. These categories are applied to phenomena interpreted as particles but not known to have any substructure, i.e. they are believed not to be made up of smaller particles. From such a standpoint it is easy to suppose that only causation at the level of elementary particles is real or proper scientific interest" (Lawson, 2012, p. 355).

Thus, an ontology based on elementary particles can no longer sustain the reductionist view that there are only processes of varying scale and complexity. As is clearly evident, this view is the basis of quantum field theory, in which no privilege level exists. While change in the natural sciences involves a field-in-process, in the social sciences it involves an organization-in-process (Lawson, 2012).

As a result, the notion of organization is essential to every branch of science, from the natural sciences to the social sciences. The main problem in the social sciences, including the field of economics, is whether society is simply the sum of individuals or something more. Similarly, natural science examines whether reality is made up of stable atoms, particles with their own causal powers, or energy fields (Martins, 2014).

As Pratten points out, "Where the particles are elementary they do not have a configuration or organisation but they do participate in configuration or organisation relative to each other and it may seem initially that an emergentist conception of the world is thereby salvaged. However, if the particles are the purported locus of causal power higher-level organisation acquires only nominal characteristics with no causal power of its own. New patterns of particles may manifest new regularities of the causal interactions among the particles, but only the particles engage in any causal interaction. The new regularities are merely manifestations of the manner in which the particles interact within certain configurations. Organisation is factored out as a locus of causal powers of its own" (Pratten, 2013, p. 262).

Having considered emergence, I now turn to the model of nested social systems.

3.1 Nested Social Structures

The concept of dissipative structures has arisen in relation to the study of natural systems, which are materially and thermodynamically constituted entities governed by an evolutionary dynamic with a far-from-equilibrium nature. In short, the field of natural systems driven by the non-linear dynamics of deterministic chaos is the same as that of social systems that are structured and capable of self-organization while having a dissipative structure (Prigogine and Allen, 1982).

Dissipative structures, although first discovered in simple non-living physicochemical systems, also exist in the social realm. They represent a bridge of understanding that spans living and non-living entities (Allen, 1982, p. 134), and non-linearity bounded by dissipative structures can be applied to both the natural and social sciences. Regarding the key role of non-linearity in the social sciences, Prigogine and Allen commented:

"Non-linearities clearly abound in social phenomena...non-linear systems operating far from equilibrium. It is precisely in such systems that coherent self-organization phenomena can occur...on a scale much larger than that of the individual elements in interaction" (Prigogine and Allen, 1982, p. 7).

Emergence is of particular interest in relation to dissipative structures. The application of emergence to dissipative structures relies on the particle view adopted by quantum mechanics. The study of fundamental particles exposes a new layer of the world as we know it. As Reed and Harvey note, "...a hierarchy of open, nested structures so that, as science penetrates each new layer, it discovers the ontological base of those entities and structures it has previously composed. For example, as science has penetrated deeper into the structure of matter, the perspectives of, first, classical physics, and then molecular chemistry, gave way to quantum mechanics and the study of the subatomic world" (Reed and Harvey, 1996, p. 299). According to dissipative structure theory, all complex systems and structures involve interactions between system parts and subsystems.

Dissipative structures are cumulatively and hierarchically grounded in a stratified reality. The model of social systems developed by Harvey and Reed (1994) and Reed and Harvey (1996) relies on nested social system hierarchies and sees social systems as comprising emergent layers that are ontologically distinct and irreducible (Reed and Harvey, 1996). The scientific ontology of dissipative structures allows us to understand not only the evolution within each ontological level, but also that which occurs through symmetry-breaking processes. Anderson describes the theory of broken symmetry as⁵ "a general theory of just how [the] shift from quantitative to qualitative differentiation takes place...[that] may be of help in

⁵ As Marx (1990) [1867] stated, "...merely quantitative differences beyond a certain point pass into qualitative changes."

making more generally clear the breakdown of the constructionist converse of reductionism" (Anderson, 1972, p. 393). In this sense, the model of nested social system hierarchies emphasizes the irreducible character of nature. Here, the term 'nested' is used to indicate the "belief that the ontological antecedents of dissipative social systems and the preconditions for their evolution are cumulatively and hierarchically grounded in a multiply layered reality" (Harvey and Reed, 1994, p. 373). Harvey and Reed (1994) examine this multi-layered reality and the relationships between these ontological levels using a pyramid-shaped model in which antecedent ontological levels form the material base for later levels at the top, and "...as one moves from the periphery to the center...one passes from the more fundamental and broad-reaching features of the natural world to increasingly more specific sectors of reality" (Harvey and Reed, 1994, p. 373). In the model, each ontological level is emergent from a previous level, and there exists a hierarchy in which higher ontological levels are rooted in and emergent from lower ontological levels. For example, the social structure is emergent from and rooted in the biological structure, but is ontologically irreducible to the previous ontological level.

Dissipative structures, by virtue of interactions among human individuals or agencies, are capable of novelty and hence the creation of new structures. Basically, these emergent properties depend on interactions among individuals and between individuals and their environment. Accordingly, it can be said that the emergent properties or powers of the whole include those of its parts. This concept of emergence is inherently compositional, meaning that any entity's emergent properties depend on it being composed of a collection of lower-level entities, which are fundamental particles (Elder-Vass, 2010; Buckley, 1998). The only causality lies in the interactions among fundamental particles, and the only causal powers are those of the fundamental particles. In the words of Buckley, "all of these levels of reality are interrelated in an emergent process. Individuals in society are at the same time sociocultural, psychological, biological and physicochemical assemblies...A system view of reality allows one to see that it is made of successive layers of bonded elements, each layer with properties emergent from the previous one" (Buckley, 1998, p. 78). This hierarchical structure leads us to the emergence that is a feature of self-organization.

The above explanations of emergence in dissipative structures show that emergent properties arise from whatever existed previously, and atoms, molecules, cells, human individuals, social groups, and corporations are all entities⁶ that consist of sets of interacting particles. Thus, higher-level properties can be explained in terms of lower-level entities. This does not mean that higher-level properties are a simple aggregation of the properties of their components—i.e., elementary particles—but rather that higher-level properties depend on lower-level interactions, and thus are causally reducible to lower-level properties. Interaction within a certain environment is essential in this type of emergence. Briefly, to be able to interact successfully, individuals-particles must be conceived in a certain environment as being isolated like atomistic view in economics.

This is why the argument of Reed and Harvey (1992) that "the scientific ontology developed by Prigogine is compatible with Bhaskar's philosophical ontology" (Reed and Harvey, 1992, p. 354) and that "scientific ontology, which fits Bhaskar's philosophical framework: one which treats nature and society as if they were ontologically open and historically constituted; hierarchically structured, yet interactively complex; non-reductive and indeterminate" (ibid, p. 359), does not fit the notion of emergence as applied to critical realism. Harvey and Reed's commitment to causal reduction is a result of their paying insufficient attention to a relational

⁶ Elder-Vass (2010, p. 17) defines an entity as "a persistent whole formed from a set of parts that is structured by the relations between parts."

organizing structure as a higher-level feature. In addition, the dynamics of deterministic chaos display a sensitive dependence upon initial conditions. This sensitivity can cause scholars to overlook pre-existing relationships in society, even though these are always present.

4. CRITICAL REALISM AND ALTERNATIVE VIEWS ON EMERGENCE

The study of fundamental particles depends entirely on the predominance of lower-level properties over higher-level properties. Anderson (1972) highlighted emergent causal powers that cannot be reduced to fundamental particles. He proposed that each stratification of reality is structured according to its own causal properties such that each new ontological level organizes itself around its own set of irreducible principles. Because different principles regulate the activities of each level, no level can be reduced to a lower level.

Anderson's explanation is in accordance with quantum field theory, and his account of emergence can be evaluated in terms of the critical realist approach. A tradition of critical realism is relied on Bhaskar's philosophical ideas and concept of his emergent causal power. Thus, the central point of critical realism is emergence, which for advocates of critical realism is an account of stratified reality (Archer, 1995; Bhaskar, 1986; Lawson, 1997, 2003; Sayer, 2000; Elder-Vass 2007). Their emphasis on emergence is both non-causally and non-ontologically reductionist, especially in the case of Lawson (2012) and Bhaskar (1986, 1975). This form of emergence, which is especially favoured by Lawson and Bhaskar, involves process organization and relationships (Pratten, 2013). According to this view, no levels exist, thus higher-level and lower-level causal emergence are similar, and simply represent different levels of process organization, thus ending the privilege of lower-level phenomena. Lawson elaborates on and promotes this form of emergence as a relational organizing structure, meaning that both higher and lower levels have their own causal powers and the organization of lower-level phenomena is emerging along with higher-level totality (Lawson, 2012). Lawson uses the example of the construction of a house to define a relational organizing structure within an emergent entity, noting that "As the house is completed, so is the relational organization of the house's components; the two—the totality and the organizational structure—emerge simultaneously. Each is causal, but in different ways...The arrangement of the parts makes the house feasible. The latter is a form of *formal causation*...the organization or arrangement of the bricks and other components makes a difference. And on this criterion of causality, i.e., of possessing the power or ability to make a difference, *the relational organization is causal*" (Lawson, 2013, p. 64).

Lawson's account of the relational organizing structure of emergent entities helps us to understand the difference between the emergence positions espoused in dissipative structure theory and critical realism, and shows that organization is essential.

Critical realism is primarily associated with the work of Bhaskar, whose ontological view depends on the social world being stratified. Bhaskar offers us an alternative way of understanding causality through his "causal power theory" (Elder-Vass, 2010). The notion of real causal power is based on emergent properties and a social reality independent of humans, where the social realm has a relational basis. For Lawson, Bhaskar and Elder-Vass the social world, like the rest of the natural world, is driven by causal processes, and therefore social science is at least partly concerned with seeking to explain the causal interactions that produce social events (Bhaskar, 1998; Elder-Vass, 2010). Critical realists argue that all events are caused by multiple interacting causal powers (Bhaskar, 1975). Emergent causal powers of social structures differ from causal powers of people and causal powers of social

system that are composed of people. Social structure is to see it in terms of the causal powers of social entities (Elder-Vass 2010) or Lawson's term communities (Lawson 2012). Elder-Vass draws upon similarity with Lawson and himself "...Elder-Vass and Lawson use these terms to refer to social groups or entities whose parts are people (...), and which have emergent causal powers that depend upon the way in which these people and other parts are organised, or related to each other, within the group concerned' (Elder-Vass 2015: 257). The world is structured, which ultimately means that social reality consists of multiple ontological levels. As Lawson notes, "reality cannot be reduced to the actual course of events and states of affairs. That is, reality is not only open but also stratified, the real is irreducible to the domain of the actual" (Lawson, 1997, p. 62). Thus, social reality is intrinsically dynamic or evolutionary, structured and processual. In short, as Lawson states, the "social realm is emergent from human (interaction) though with properties irreducible to yet capable of causally affecting the latter" (Lawson, 2003, p. 185). Human or individual agency comprises relationships, and a relational or structured ontology assumes that both society and individuals are organizational or structured. This approach leads us to different kinds of emergence and social realities. At each level, the entities formed from the lower-level properties have causal powers in their own right by virtue of how those lower-level properties are organized (Elder-Vass, 2010). Thus, organization is essential for the emergence of higher-level properties. Elder-Vass draws upon the importance of organization like Lawson and Bhaskar and put two types of social structure: Organization and norm circle. Lawson also, especially in his recent works has drawn upon the importance of organization based on his relational social ontology view. The notion of emergence presented by Bhaskar determines the properties of an entity relevant to the organization of its parts into a particular complex whole (Elder-Vass, 2010). Thus, we can easily say that, both ontologically and causally, structure and agency are conceptualized as distinct layers of reality, because they are different from each other and have their own causal powers, and this irreducible character of reality is associated with organization. In other words, especially in the social realm, societies and individuals are not aggregates of their constituent parts. Instead, "Each emergent level has its own synchronically emergent properties which are autonomous with respect to those of other levels" (Kaidesoja, 2013, p. 186).

In short, social reality is a continuous process, similar to quantum field theory, while society is a structured process, just as individuals are. Human agency is an organizational process. As Martins states, "an atom is a structured process emergent from subatomic relation of energy transfer, while a molecule is a structured process emergent from atomic interaction; a cell is a structured process emergent from molecular interaction; a human being is a structured process emergent from cellular interaction; and societies are a structured process which emerges through human interaction" (Martins, 2014, p. 267).

Above all, the essence of emergence relies on higher organizational thinking in which the totality is an organized set of components, each of which is in turn comprised of an organized set of components (Elder-Vass, 2010). Thus, lower-level phenomena become organized as the emergence process is structured. For example, the individual notes in a symphony not only have sound, but also rhythm, melody and harmony. When the notes are organized into the components of a symphony, the result is wonderful music. Thus, the organizational relationship of the notes makes a difference. A symphony includes not only the component notes, but also an organizational structure covering the emergent relationships between the notes. The arrangement of the notes makes a symphony feasible.

A British withdrawal (Brexit) from the European Union (EU) would change both Britain and the EU, but Brexit shows that the EU not only consists of countries, but also has a complex institutional structure. This organizational structure is both causally and ontologically

irreducible to its members. Each member of the EU has its own causal power as a lower-level property, while the EU as a higher-level phenomenon represents totality. In this sense, Brexit displays a relational organizing structure in which organization is essential. Based on this view, social reality thus comprises not only interactions among specific individuals (countries), but also interactions among social structures. Thus the totality is irreducibly organized into states of affairs that are both causally and ontologically its components. In this sense, a lower-level phenomenon has its own causal properties. In short, a situation in which no elementary particles exist is relational and leads to a relational ontology whereby everything is interrelated through space and time, and thus forms a structured process (Martins, 2014).

As the basis of a relational organizing structure, society consists of relationships, and thus, as Lawson argues, "The conception of social reality...positing features such as social relations, positions and powers, is thoroughly naturalistic and even consistent with modern interpretations of quantum field theory. It also serves to ground a social science that can be scientific in the sense of natural science..." (Lawson, 2012, p. 345).

All accounts of emergence proposed by Lawson and Bhaskar involve a social reality that is structured, relationally organized and a continuous process. Moreover, a structured or relational ontology does not assume human agency, because a reality exists independent of individual humans, but both human agency and social structure presuppose each other, while humans are simultaneously structured by their relationships. As Marx emphasized, human beings are creative, and hence able to reproduce or transform the world. Lawson (1997) argues that social structures are reproduced and transformed through human practice and are built by human agents who display not only behaviours but also capacities and dispositions that are developed and transformed depending on individual practices. In short, in a structured or relational ontology, human agency is an active being characterized by ideas, feelings and purposes. Lawson's conception of human agency is evident when he states that "Social reality is everywhere intrinsically dynamic in nature...like social systems human beings are organizations in process; and we have here a clear process of co-development of human individuals and society as each are continuously reproduced and transformed through the sum total of individuals" (Lawson, 2012, pp. 373–374).

The process of reproduction or transformation through human practice is not intentional, meaning that social structures are unintentionally reproduced or transformed. Bhaskar notes that people "for the most part unconsciously reproduce (and occasionally transform) the structures governing their substantive activities of production. Thus, people do not marry to reproduce the nuclear family or work to reproduce the capitalist economy. Yet it is nevertheless the unintended consequence (and inexorable result) of, and also a necessity for, their activity" (Bhaskar, 1998, p. 44). For example, we are born into language systems rather than creating them, yet our daily speech reproduces those systems unintentionally; thus, social structures exist through processes of reproduction or transformation. As Marx famously stated, "Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past" (Marx, 1994 [1852], p. 188). Structure and agency are important, and social structure and human agency presuppose each other. Neither can be reduced to the other, and both are reproduced and transformed by human practice. Thus, social reality is a continuous, intrinsically dynamic and interdependent process.

As a result, the notion of emergence should abandon the fundamental particle view in favour of the field view and the development of a process ontology based on a relational organizing structure. As Pratten states, "As long as a substance ontology is retained a focus on

emergence only serves to throw up a series of seemingly intractable and foundational problems" (Pratten, 2013, p. 253).

In light of this account, it can be said that the ontological nesting of irreducible layers seems to differ from the critical realist view related to the concept of strong emergence, which makes causal, ontologically irreducible sense (Bhaskar, 1975, 1986; Lawson, 1997, 2012).

4.1 The Importance of Relational Organizing Structures in Economics

As Simon pointed out, "the molecule is composed of atoms which are composed of electrons and nuclei, which are composed of elementary particles, which are composed of quarks..." (Simon, 1995, p. 26).

However, we know that "humans are not molecules...they are always culturally situated" (Lawson, 2013, p. 71). Thus, the social domain cannot be reduced to a biological domain, and social reality is not only constituted by interactions between individuals, as in a dissipative structure, but also by underlying social structures based on social rules that are related to each social position. Rather, humans are social beings, and hence we should consider the association of social reality with social positions that are internally related.

Social reality is intrinsically dynamic or evolutionary, structured and processual, as defined by Lawson. Therefore, it is dominated by internal relationships. While internal relationships in dissipative structures are defined as those between particular individuals, in critical realism, they rely on the positions that people occupy (Lawson, 1997). Thus, the social realm in critical realism consists of internally related positions. Internal relationships involve rights and obligations, and the nature of these relationships depends on the positions that exhibit these rights and obligations, such as the positions of landlord and tenant, teacher and student, employer and employee, and capitalist and labourer. In each case, each role depends on the other, so it is impossible to have one without the other. In addition, under modern capitalism, these internal relationships always reflect the relative power of the parties. One of the best examples of this is the class relationship, as described by Marx (Lawson, 1997, 2003, 2015; Sayer, 1992).

The basis of social reality lies in Lawson's concept of collective practices, which indicate why organization is essential. In the framework of Lawson, I draw upon social reality, which includes structures ontologically irreducible to human agency and resultant behaviour. Simultaneously, social phenomena possess the property of being produced in open systems, and have emergent powers and properties, being structured on the basis of internal relationships and processes. The processual character of social reality is explained by collective practices (Lawson, 2012, 2013). Collective practices emerge within communities, which are the most general form of totality, and also reflect pre-existing structures. Pre-existing relationships always exist within communities, and thus emergent systems are reorganizations of pre-existing systems, and depend on the relational organization of the pre-existing system of components (Lawson, 2013). Thus, collective practices enable us to understand social phenomena and explain why causal reduction is impossible in the social realm. Lawson sees collective practices as an inherently social form of organization, noting that "the conception of social reality so far elaborated (though highly partial) turning on the category of collective practice, is of an emergent form of organisation; it is a (normative) mode of organisation of individuals that facilitates forms of coordinated interaction, (relative) stability and predictability that would be unavailable to each individual in the absence of any such organisation" (Lawson, 2012, p. 364). Lawson argues that "human beings are socially embedded" and stresses positional relationships between individuals, stating that "our personal identities are moulded in relation to others as well as to existing socio-cultural

structures. Eventually we also take on various positional or social identities, with all such identities determined in relation to others and continually reproduced/transformed through practice" (Lawson, 2009, p. 102). Positional interaction is associated with rights and obligations, which differ from mere individual interactions. Positional interaction is independent of specific individuals because individuals are structured (organization-in-process), as are social phenomena, with the latter produced in open systems and having emergent powers and properties based on being structured and internally related.

Capitalist society works on the assumption that human beings exist and act in ways that are independent of any relationships, and are confined within the economic sphere as "individuals in the market". However, individuals are not isolated in the market. Marx drew upon the relational feature of human nature in his sixth thesis on Feuerbach when he stated that "the essence of man is no abstraction inherent in each single individual. In reality, it is the ensemble of the social relations" and he wrote in *Grundrisse* that "society does not consist of individuals but expresses the sum of the relations within which individuals stand" (Marx, 1973 [1857], p. 265). Societies or totalities comprise relationships rather than individuals. Thus, a community, as a social entity including pre-existing relationships, is relationally organized based on positional interaction and individuals reproducing and transforming collective practices. In short, social interaction arising within any community is structurally organized and relies upon collective practices involving rights and obligations. Individuals have positions, rights and obligations peculiar to those communities that embrace them as community members. Thus, there are always communities, and there is always trust among community members. In short, the rights and obligations associated with positions that people occupy constitute social relationships underpinned by trust in others. The human capacities of trusting and being trustworthy are necessary conditions for these interactions, otherwise no exchanges or interactions would take place. That is why there has to be trust between community members⁷. In this sense, collective practices involve relationships that are interdependent. In addition, collective practices clearly require acceptance within the community, even in the face of objections from some community members. Acceptance relates to status within the community. Consequently, collective practices are emergent forms of organizing structure (Lawson, 2013).

Every emergent phenomenon is ontologically and causally irreducible. Moreover, each emergent property, at both higher and lower levels, possesses powers and properties derived from pre-existing entities. Thus, collective practices, as noted above, exist within certain communities and specify all the features possessed by those communities from past to present, including pre-existing relationships. Collective practices can be said to exist everywhere in the community. As Lawson (2012) states, "individuals everywhere (whether consciously or otherwise) regularly use the *a posteriori* (relative) stability and widespread acceptance of such practices as a basis on which to get by, to form expectations and to decide appropriate action in order to coordinate with the actions of others" (Lawson, 2012, p. 361). The stability of collective practices determines the importance of pre-existing relationships, both human and structural. "Collective practices effectively carry and manifest shared beliefs about implicit collective agreements about what can and should be done in relevant contexts to achieve some specific (sorts of) goal(s)" (Lawson, 2014, p. 6). Further to the accounts of Lawson, it can be said that collective practices basically arrange social interactions (Pratten, 2013). In short, collective practices within communities facilitate coordination among

⁷ The credit mechanism, which is a fundamental relationship between lenders and borrowers in capitalist societies, would not work without trust.

inhabitants of the same community and explain how social transformation presupposes persistent social structures (Lawson, 2012; Martins, 2014).

Society is thus organized around social positions, and social structures, as noted above, are reproduced and transformed through human actions. Thus, social reality is reached via a process. The processual nature of social reality reflects the fact that the social realm is intrinsically dynamic and interdependent, which shows that the social realm is an organization-in-process. The emerging organizational structure is able to rely on pre-existing acts, and is not associated with individuals per se, but rather with their rights and obligations. That is why human behaviour cannot be explained entirely in terms of the actions of individuals, because it is also affected by their organizational interactions. Thus, causal reduction is not accepted in the social realm because higher-level emergent properties do not depend on specific human beings. Additionally, pre-existing relationships can affect higher-level emergent properties, thus social phenomena cannot be reduced to individuals' behaviours.

Consequently, collective practices reveal that the concrete aspects of the social sciences, including the field of economics, are associated with the relational organizing structure of an emergent entity and the processual character of social reality.

5. CONCLUSION

This paper has argued that the theory of scientific ontology and dissipative structures developed by Prigogine does not fit the model of social ontology developed by Bhaskar, unlike the model proposed by Harvey and Reed. The argument has relied on these scholars' respective positions with regard to emergence, in addition to the theory developed by Lawson regarding the association between the relational organizing structure of emergent entities and collective practices. Critical realists, especially Lawson and Bhaskar, focus on organization to understand social reality, which is stratified, processual and evolutionary. These critical realists see emergence as crucial, and see lower-level and higher-level properties alike as elements of process organization. Every emergent layer includes its own transfactual causal powers that are irreducible to the lower layer from which it emerged (Bhaskar, 1998). These causal powers support strong emergence, and are causally and ontologically irreducible to the powers of their components, i.e., lower-level properties. Because social reality is layered, the emergent properties of structures and agents are irreducible to one another, both causally and ontologically. This is why we need an ontology that prioritizes organization. The critical realist view considers emergent forms of organization-in-process, and is supported by quantum field theory.

Scientific ontology and the theory of dissipative structures also support a layered view of the world and the model of nested social system hierarchies developed by Harvey and Reed that displays ontological separation between layers. According to their theory, social reality comprises emergent layers that are ontologically distinct and irreducible. Because these newly emergent layers are acknowledged to be ontologically irreducible, the only causal power is possessed by lower-level properties. In this sense, scientific ontology based on emergence resembles Searle's social ontology. Additionally, borrowing from quantum mechanics, fundamental particles are essential because the study of these particles exposes the interactions among particles that cause higher-level properties to emerge.

In the light of the relational organizing structure and to emphasize the processual character of social reality, I have introduced the theory of collective practices developed by Lawson. Collective practices emerge within society and consider social relationships, including those that are pre-existing. Because social reality is basically constituted by social relationships covering rights and obligations, positional power and social reality is reproduced or transformed through human practices. Individual interactions are insufficient to explain social reality. Further, interactions between individuals do not explain why people co-operate. Human beings are not isolated, but have capabilities, aims and goals that are influenced by emergent social structures based on pre-existing relationships.

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