Articles

Invited paper

SOCIAL EMERGENCE: RELATIONAL OR FUNCTIONAL?

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Abstract:

This paper outlines a relational variety of the theory of emergence and claims that it can be applied more fruitfully to sociology than the functional variety advocated by Keith Sawyer. Sawyer argues that the wildly disjunctive multiple realizability of social properties justifies a nonreductive approach to causal explanation in the social sciences (but also ontological individualism). In response, this paper argues, first, that the social properties he discusses are not wildly disjunctive, and secondly, that we can explain their causal significance more effectively with a relational emergence theory linked to the critical realist account of causal powers. Although these properties are multiply realizable, they are not emergent because they are multiply realizable, but despite being so.

Key words: Emergence, multiple realizability, reductionism, critical realism, mechanisms.

Introduction

Since it was advanced by Emile Durkheim over a hundred years ago, the idea that social structures might be causally effective as a consequence of being emergent has been controversial (Durkheim 1974 [1898]).[1][2] One of the most interesting recent contributions to the debate is Keith Sawyer's argument, drawn from the functionalist tradition in the philosophy of mind, that *multiple realizability* and *wild disjunction* provide a justification for regarding social properties as emergent and thus causally effective (Sawyer 2001, 2002, 2003, 2005). If it was viable, Sawyer's argument for emergentism would have important implications. Within sociology, it might offer a possible resolution of the perennial debate on structure and agency. Beyond it, it offers an understanding of emergence that could be applied in many other disciplines. Sawyer himself sees it as providing an opportunity to turn the tide of disciplinary imperialism by making sociology foundational to economics and indeed all the social sciences (Sawyer 2005, pp. 11, 225–9).

This paper will explain and evaluate Sawyer's argument from the perspective of a different kind of emergence theory: what I call *relational* emergence theory. It concludes that Sawyer's functional emergence is *not* applicable to most social properties. Many social properties are emergent, but the concept of multiple realizability does not explain *why* or *how* they are emergent. Instead, multiply realizable properties, when they are emergent, are emergent for the same reasons as other relationally emergent properties. The relational account offers a much more widely applicable version of emergence theory – a version, I suggest, that has been too readily dismissed in much of the mainstream philosophical literature.

The paper begins with a brief overview of the competing strands of emergence theory, then summarises the key elements of the relational version I advocate. It then outlines and evaluates Sawyer's argument.

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[1] I would like to thank Jason Edwards and two anonymous referees for their very useful comments on an earlier version of this paper.
[2] Indeed Sawyer traces many uses of the concept back to Auguste Comte (Sawyer 2005, pp. 38–40).

Theories of emergence

Although emergence is a concept that has been invoked in a variety of contexts, philosophical discussions of it have been most heavily concentrated in the philosophy of mind, where it has been seen as a potential solution to the mind-body problem. Early emergentists, such as C D Broad, generally espoused a *strong* version of the concept.[3] For Broad a property of a (token) whole is emergent if it cannot be explained from the properties of the lower-level parts of the whole *and their relations with each other* (Broad 1925, p. 61). While a property that was emergent in such a sense (if one existed) would clearly be autonomous of lower levels, it seems that no scientific explanation of the property would be possible. As Horgan writes, "there is no explanation for why emergent properties come into being, or why they generate the specific non-physical forces they do. These facts are metaphysically and scientifically basic… they are unexplained explainers" (Horgan 2002, pp. 115–6). If mental properties were emergent in this sense, this would seem to provide a justification for treating them as causally autonomous from physical properties. However, there are few philosophers who consider that strong emergence in Broad's sense is a widespread feature of the actual world (Kim 1999, p. 18), and the philosophy of mind in recent decades has seen a series of attempts to theorise alternative versions of emergence that might justify treating mental properties as autonomous in some sense.

Perhaps the most successful of these, at least in terms of its influence in the philosophy of mind, has been the doctrine upon which Sawyer bases his argument: *non-reductive physicalism*, developed originally by Putnam and Fodor (Fodor 1974; Putnam 1975), which employed the concept of multiple realizability to justify the claim that there might be regularities of mental properties that could not be explained reductively as regularities of physical properties. At times this has seemed to be the default view of the mind-body problem. Shapiro, for example, introduced his critique of the view by writing that "Philosophers are near consensus that the multiple realizability of higher-level properties in lower-level properties stops theoretical reduction dead in its tracks" (Shapiro 2000, p. 635) (see also Sober 1999, p. 542).

As I have suggested elsewhere, however, attempts to invoke emergence in the philosophy of mind have been framed by what I have called the residual Cartesianism of the field, which is heavily oriented to the question of whether and how it might be possible to exempt mental properties from attempts to offer neurological explanations for them (Elder-Vass forthcoming). One consequence is that treatments of emergence in this field are mostly rather different from those outside it. Beyond the philosophy of mind, emergentist thinkers generally espouse some variety of what I call a *relational* concept of emergence. This is the version endorsed by most complexity theorists (for example Holland 1998; Gell-Mann 1995) as well as by critical realists like myself, and it also has some important advocates within mainstream philosophy (e.g. Searle 1992; Wimsatt 2006). While Sawyer's approach is a version of the multiple realizability tradition, applied to the social sphere, the approach that is advocated in this paper is a version of the relational tradition, applied to the social sphere.

Relational emergence and causal powers

In general, the relational approach to emergence argues that entities (i.e. objects or things) may have emergent properties, which are properties that arise *because of* the particular relationships that hold between the parts in a particular kind of whole: the particular ways in which the parts are organised that constitutes them collectively into a whole of this type. Thus, for example, in linking sociology to complexity theory, Smith has written "What defines such an emergent phenomenon is that it cannot be understood merely as an aggregative product of the entities or parts of the system but arises though their organization. Interaction often yields structures, forms that cannot be understood through simple linear decomposition of a system into its interacting parts" (Smith 1997, p. 55). And complexity theorists like Holland have stressed this same point: "Emergence is above all a produce of coupled, context-dependent interactions. Technically these interactions, and the resulting system, are *nonlinear*" (Holland 1998, pp. 121–2; Cilliers 1998, p. 43).

Relationally emergent properties can be contrasted with *resultant properties*.[4] These are properties of wholes that are also possessed by their parts, where the property of the whole does *not* depend on the specific relations between its parts that are char-

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[3] I owe the usage of *strong* to describe this type of emergence to Boogerd et. al. (2005).

[4] This term, like emergence itself, was first defined by G H Lewes (1874-9).

acteristic of this kind of whole. A typical example is mass – the mass of a molecule, for example, is simply the sum of the mass of its constituent particles. Wimsatt has analysed the distinction between resultant and emergent properties in great detail (e.g. Wimsatt 2000), introducing the concept of *aggregativity* to denote the characteristics that make a property resultant:

> *Aggregativity,* a claim that 'the whole is nothing more than the sum of its parts', is the proper opposite to *emergence* … Aggregative system properties are degenerately simple cases of reduction where the organization of parts doesn't matter: they are unaffected by organizational rearrangements and have no mediating mechanisms (Wimsatt 2006, p. 448).

As Wimsatt argues, this means that a very broad range of properties are emergent; indeed aggregative properties are rather rare (Wimsatt 2006, p. 448). While some commentators have suggested that "there exist too many properties which are emergent in this sense" (Stephan 2006, p. 487), there is no necessity for emergence to be a rare phenomenon. On the contrary, in the critical realist version of this tradition, emergent properties underpin the entire causal process. For critical realists, emergent properties are also *causal powers*: they are properties of entities that enable them to have an effect on events, and all events are caused by the interaction of such powers (Harré and Madden 1975; Bhaskar 1975). Emergent properties thus take on a central place in understanding how the world works, as opposed to being somewhat rare occurrences that might enable us to justify dualistic treatments of, say, mind and the body.

Relational approaches to emergence argue not only that higher level properties are co-occurent with particular organisations of parts, but also that these higher level properties can be explained by such organisation. As von Bertalanffy put it:

> The meaning of the somewhat mystical expression 'the whole is more than the sum of the parts' is simply that constitutive characteristics are not explainable from the characteristics of isolated parts. The characteristics of the complex, therefore, compared to those of the elements, appear as 'new' or 'emergent'. If, however, we know the total of parts contained in a system and the relations between them, the behaviour of a system may be derived from the behaviour of the parts (Bertalanffy 1971, p. 54).

One consequence of this approach is that *entities* play a more prominent role in relational accounts of emergence than in many philosophical accounts. Relationally emergent properties are always properties *of* token entities, and they always arise *from* the composition and structure of the entity possessing them – from the parts of the entity, their properties, and the relations between them. In this paper I will call any complete set of parts of a token entity, along with the relations between them that constitute them into this entity, a *composition base* of the entity.[5] A relationally emergent property, then, always depends upon the composition base(s) of the entity possessing it.

We must go a little deeper, however, if we are to understand both relational emergence and the difficulties in Sawyer's account of functional emergence. Consider that any given entity can possess multiple distinct properties. My shirt, for example, is both a good insulator (a causal power that contributes to it keeping me warm when I wear it) and green. Each of these properties is the consequence of a distinct *mechanism*, and each mechanism may depend on a different subset of the entity's parts and the relations between them. The insulation provided by my shirt arises from one mechanism: it is constructed in such a way as to trap many small air pockets within its fabric, a consequence of the thickness of the fabric and the way it is woven together. Its being green arises from another: the molecules that make up its surface have a range of possible energy levels that causes them to absorb photons representing certain wavelengths of light but not others.

Let me define the *emergence base* of a property of an entity as the subset of the entity's parts, the properties of those parts, and the relations between them that the given property depends upon. The occurrence of any given property – an event – thus depends upon a causal process in which external factors, such as light, heat, and air in this example, interact with the emergence base of the property concerned.[6] Different properties of the same entity may therefore depend upon different mechanisms,

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[5] There is some similarity between the concept of a composition base and what Kim calls the microstructural property of an entity (Kim 1999, p. 6).

[6] The idea of mechanisms as processes that underlie the causal powers of entities is also an important feature of Bunge's account of emergence (Bunge 1999, p. 21).

and different emergence bases. Each of those different emergence bases is a different subset of the entity's composition base.[7]

Eliminative vs. explanatory reductions

From the account so far it might seem that relational emergence is thoroughly reductionist, given its acceptance of the possibility that higher level powers can be explained in terms of lower-level entities, their properties, and the relations between them. Stephan, for example, has somewhat pejoratively described this variant of emergence as *weak emergence* and argued that it is "compatible with reductionistic approaches without further ado" (Stephan 2002, p. 79; 2006, pp. 486–8). There are, however, at least as many varieties of the concept of reduction as there are of the concept of emergence (Sober 1999, p. 559). Let us distinguish between two of these: *eliminative reduction* and *explanatory reduction*.[8]

Eliminative reductionism denies the causal effectiveness of the higher-level entities and powers concerned, and hence denies the need for (or value of) any science conducted in terms of these higher level entities. By contrast, in an explanatory reduction, the higher level power is explained by showing how it arises from lower level elements and the relations between them, but this is not taken to entail that the higher level entity is not causally significant, or that it can be eliminated from scientific explanations while retaining their full explanatory value. Relational emergence is compatible with a generalised explanatory reductionism, indeed it assumes that higher level powers are produced by mechanisms that we could in principle explain, and this idea that emergence is compatible with some forms of reductionism is gaining ground in the literature (e.g. Kistler 2006; Marras 2006; Wimsatt 2006, p. 460). But relationally emergent causal powers cannot be eliminatively reduced: these powers would not exist if the whole did not exist, and thus they are ultimately powers of the whole and not of the parts.

A resultant property, by contrast, *can* be explained without reference to the relations between the parts of the higher level entity, and thus eliminatively reduced. But emergent properties *depend upon* the existence of particular sets of relations between the parts of the entity possessing the property: relations that would not exist if the parts were not organised into this kind of whole. Hence any attempted eliminative reduction of an emergent property will suffer from a loss of relevant structure.

One important consequence of this approach is that rather than eliminating higher-level theories, explanatory reductions do precisely the opposite: they provide extra justification for them by demonstrating that they are well-founded in the theory of the lower level, that they are consistent with other accepted bodies of theory, and indeed that they extend their explanatory power (Kitcher 1998; Meyering 2000, p. 181). In Gell-Mann's words, they are not eliminated but "cemented" (Gell-Mann 1995, p. 112).

Relationally emergent properties are irreducible, then, in a rather weaker sense than some commentators have come to expect from the concept of emergence: they can be explained but not eliminated.[9] But this is still an irreducibility that is worth having, because it means that even if they can be explained, higher level entities and their emergent properties are still causally effective in their own right. We cannot ascribe the causal impact of such properties to lower level parts or relations, but only to that complex of parts and relations that *is* the higher-level entity. As Marras has written, "We need to distinguish the *attribution* of causal powers from the *explication of the mechanisms* by which such causal powers are exercised" (Marras 2006, p. 567). Thus, both the higher level entity and its lower level parts may each have causal powers in their own right, being those that depend on the level of organisation represented by the entity concerned (Wimsatt 2006, p. 458).

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[7] There is a similarity here with Shapiro's concept of R-properties (Shapiro 2004, pp. 52-9), at least if we translate them from Shapiro's functional language into terms of mechanisms underlying causal powers, as Bechtel suggests (Bechtel 2008, p. 140).

[8] Searle makes the same distinction, using the term 'eliminative reduction' (Searle 1997, pp. 29-30, 212). The term 'explanatory reduction' is used in a similar sense to that used here in (Bhaskar 1975, p. 181) and (Antony and Levine 1997, p. 43). Wimsatt also uses very similar terminology (Wimsatt 2006). Also see (Elder-Vass 2005).

[9] Wimsatt has suggested, developing an argument first made by Nickles, that the common belief that inter-level explanatory reductions are eliminative is an error arising from the conflation of two different kinds of inter-theoretic relations (Wimsatt 2006; Nickles 1998). There is, incidentally, a parallel here with the functionalist argument: as Block says, functionalism too attempts to give us "reduction without elimination" (Block 1980, p. 177).

Relational emergence and social structure

Whatever their philosophical merits, such arguments are of little value to social scientists unless they provide us with tools for explaining the causal forces at work in the social world. Making this step from abstract ontology to a more concrete understanding of the entities and powers that populate the social world has been a major focus of my work (notably Elder-Vass 2010, chapters 4-8; and Elder-Vass 2012). Here I offer only the briefest summary of that work using a limited set of examples, in order to illustrate the point that this does indeed give us a viable way of theorising social structure.[10]

In the terms developed above, for social structure to be explained as a product of relational emergence we would have to identify the entities that were taken to have causal power, the mechanisms by which these powers were produced, and the parts and relations characteristic of those entities that interact in these mechanisms. Broadly speaking, I argue that the effects generally attributed to social structure are emergent causal powers of *social entities*: entities composed of people, and often of other parts as well, interacting in specific sorts of ways as a result of specific relations holding between them (cf Ylikoski forthcoming).

Perhaps the most obvious example is the case of organisations (Elder-Vass 2010, chapter 7): an orchestra, for example, is a social entity composed of the musicians who are members of it, and arguably also their instruments. Each musician occupies a position that is defined as a certain role: for example violinist, trumpet player, and conductor. The role is a bundle of norms about how the musician is expected to act in relation to other musicians, to their instruments, and to scores, etc, and when all the musicians concerned follow these normative expectations, the group has the collective power to play complex harmonious music. This is a causal power that is possessed by the group as a whole, but which would not be possessed by the individual members, even collectively, if they were not organised into such a group by virtue of entering into the specific type of relations with each other specified in their roles in the organisation. At a certain level it is fairly straightforward to explain how these interactions generate the collective power to make co-ordinated music, but it remains the case that these individuals would not be able to do so if they were not organised into a larger social entity of this nature, hence this is a causal power of the organisation, not of the individuals, although it is perfectly viable for us to explain the mechanism that generates this power.

Many other examples could be given. I have offered explanations, for example, of normative social institutions as the product of social entities called *norm circles* (Elder-Vass 2010, chapter 6). A wide range of social phenomena, including language, discourse and knowledge depend on normative considerations, and are in part a product of a variety of forms of norm circles (Elder-Vass 2012). Further forms of social entity may be identifiable as lying behind economic phenomena such as market systems and money (Elder-Vass under review). This is not to exclude the influence of human individuals in their own right: we too are entities with causal powers, which co-determine social outcomes (Elder-Vass 2010, chapters 5 & 8), but ours are not the *only* causal powers at work, as methodological individualists insist.

Relational emergence therefore offers us an alternative to methodological individualism in the social sciences: an alternative that on the one hand, does not deny that social properties can be explained in terms of individuals and the relations between them, but on the other, shows that social properties are nevertheless causally effective in their own right.

Sawyer's non-reductive individualism

By contrast with the relational version of emergence theory, Sawyer draws on Fodor's functionalist arguments in the philosophy of mind and argues for what he calls *nonreductive individualism* in the social sciences.[11] He claims that this is a form of emergence, and justifies it on the basis of *multiple realizability* and *wild disjuncture*. Others before him have argued against reductionism in the social sciences on the basis of multiple realizability, such as Daniel Little and Harold Kincaid (Little 1991; Kincaid 1994; Zahle 2003). However, Sawyer may be the first to draw quite such close parallels with non-reductive physicalism and claim this as a form of

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[10] As Zahle has pointed out, the resolution of ontological debates may rest on the ability to demonstrate such benefits rather than on more abstract arguments (Zahle forthcoming).

[11] There is at first sight little or nothing in common between this functionalist tradition in the philosophy of mind and functionalism in sociology. Sociological functionalists claim that certain social phenomena exist because of the useful social functions they perform, whereas "functionalists in the philosophy of mind rather emphasized what a component in the organism did independent of whether it was beneficial to the organism" (Bechtel 2008, p. 136, fn 2).

social emergence. He himself distinguishes his argument from Kincaid's on the grounds that Kincaid neglected the issue of wild disjuncture (Sawyer 2002, p. 553). Nonreductive materialism argues on the one hand for

ontological materialism, the belief that all that exists is matter, thus rejecting various forms of Cartesian dualism and vitalism. However, nonreductive materialism argues that mental properties and states are irreducible to physical properties and states and that the science of the mind is autonomous from the science of neurons (Sawyer 2002, p. 539).

Thus a denial of the independent reality of mind is accompanied by an insistence on the irreducibility of mental properties and states to physical ones. Sawyer takes the validity of non-reductive materialism as read and seeks to apply a similar logic to the philosophy of the social sciences.[12] Nonreductive individualism is the analogous combination of *ontological individualism* – the claim that only individuals, and not social entities, are real in the social world – with the denial of *methodological individualism*, on the grounds that "social properties can participate in causal relations" (Sawyer 2003, p. 203). He argues that "social properties may be irreducible to individual properties, even though social entities consist of nothing more than individuals" (Sawyer 2002, p. 541). These two positions are reconciled by arguing that social properties participate in causal relations as *types* rather than as *tokens*, and Sawyer invokes Fodor's account of multiple realizability and wild disjuncture to support this argument.

It is difficult to make sense of this argument without recognising that it rests on a covering law or regularity theory of cause, as Ylikoski points out (Ylikoski 2009, p. 529).[13] Fodor argued that the concepts and laws of higher level sciences cannot be reduced to those of physics because the "natural kind predicates" of the higher level sciences – the

entity or property types that appear in their covering laws – do not correspond to natural kind predicates in physics (Fodor 1974). In particular, the truth of law-like generalisations in the higher-level sciences was not necessarily dependent on a consistency of physical composition amongst the various instances or tokens of the higher-level predicates to which the generalisation applied – what have come to be known as different *realizers* of the higher-level type. There could therefore be a regularity at the higher level which could not be translated by a bridge law into a single corresponding regularity at the lower level because different cases fell under different lower-level regularities.

For a critical realist, this dependence of the argument for functional reduction on a covering law theory of cause is highly problematic. For realists, covering laws do not provide causal explanations, but simply *descriptions* of (usually highly imperfect) empirical regularities, which still require explanation. Those explanations generally take the form of accounts of the processes or mechanisms that contribute to bringing about the approximate regularity. Laws do not cause events; rather, interacting causal powers do, and each such power depends on a mechanism (Bhaskar 1975; Elder-Vass 2010, chapters 2 and 3).

But what the functionalist argument for emergence produces, if it is successful, is nothing more than a covering law. The whole argument rests on the possibility that a higher-level property brings about a certain event sufficiently frequently for this relationship to be judged as a covering law *despite* the fact that the lower-level phenomena underlying the property are different in different cases, so that it is not possible to describe a *single* covering law that links lower level property and the event concerned. We could recast the claim in more realist terms, by saying that in this case there is a single higher level causal power that is produced by different mechanisms in different cases. Such occurences are not impossible: by coincidence, or perhaps by some sort of evolutionary convergence, there might be multiple mechanisms that tend to bring about similar outcomes, and if this phenomenon occurred it would be interesting. But it is difficult to see why we should consider this to be a kind of emergence since the commonality of the property across different realizers does not in itself explain anything at all.[14]

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[12] This paper will not address the validity of non-reductive materialism itself, focusing instead on the sociological version of the argument. It is worth noting, however, that non-reductive materialism is increasingly being challenged (e.g. Kim 1993; O'Connor and Wong 2005).

[13] Sawyer occasionally equates the presence of a higher level covering law with the possession of "autonomous causal powers" by the properties concerned (Sawyer 2012, p. 272), but the logic of his (and Fodor's) argument depends on adopting a covering law, as opposed to a causal powers, model of causality. He has suggested we can have both (Sawyer 2005, p. 85).

[14] Ylikoski has noted that Sawyer's failure to engage with the nature of covering laws and the basis on which causal

Sawyer suggests there is an important distinction between multiple realizability and wild disjuncture:

> Multiple realizability alone does not necessarily imply irreducibility; if there are only a few realizing states, or if those states display some common features, the reduction may not be problematic. However, reduction would be difficult if the neurobiological equivalent of a psychological term were an otherwise unrelated combination of many neurobiological concepts and terms… Fodor termed such a realization *wildly disjunctive*… Fodor argued that a true scientific law cannot have wildly disjunctive components and that wild disjunction thus implied that there could be lawful relations among events, described in psychological language, that would not be lawful relations in the language of physics (Sawyer 2001, p. 557).

It is clear from Sawyer's argument that wild disjuncture is a sub-class of multiple realizability, but it is not entirely clear what criteria distinguish cases of wild disjuncture. At one point, Sawyer talks in terms of a "threshold of complexity" (Sawyer 2001, p. 558); and he has enumerated a long list of features of complex systems that he suggests make wild disjuncture more likely (Sawyer 2004, pp. 271–7). Elsewhere, he seems to suggest that it is the sheer number of different realizations that defines wild disjuncture (e.g. Sawyer 2002, p. 546). Both variations, along with the suggestion in the quotation above that wild disjuncture makes reduction *difficult* rather than *impossible*, imply that this is an epistemological rather than an ontological argument for irreducibility, although Sawyer denies this (Sawyer 2002, p. 552). I suggest that there are both ontological and epistemological elements to the argument. The existence of wild disjuncture is an ontological question, but the obstacle that it poses to reducibility remains an epistemological one: it means that we need to identify many different causal explanations for different realizations rather than simply one or a few.

This is also the implication of Kim's well known critique of Fodor's argument. Kim argues that when a higher-level property is multiply realized, each distinct type of lower-level instantiation of the higher-level predicate could be explained separately, and so functionalism does not constitute a viable alternative to reductionism (Kim 1998, p. 116). Thus, for example, the mental property *being in pain* may be realized differently in human beings, reptiles, and Martians, but each case may be reductively explainable (Kim 1992, pp. 16–17). Where there is a large number of radically divergent lower-level realizations, it may be impractical to provide a reductive set of explanations for a single higher-level law, but it nevertheless remains true that the behaviour of each instance of the higher-level predicate may be reductively explainable in principle.

Sawyer suggests that Fodor's argument is significant for sociology because "most social properties of interest to sociologists seem to have wildly disjunctive individual-level descriptions" (Sawyer 2001, pp. 558). For example "an individual-level description of the social-level natural kind term 'competitive team sport' is likely to be wildly disjunctive" (Sawyer 2002, p. 549). On Fodor's argument, any causal law predicated on the properties of such a social-level natural kind will therefore be irreducible to a law expressed in terms of properties of its lower level parts, since the lower level properties involved in each case (or group of cases) will be different.

On the one hand, then, Sawyer believes that each token social event is caused by mechanisms that operate at the level of the individual. But on the other he argues that there are social laws (i.e. covering laws whose predicates are social properties) because there may be empirical regularities and thus causal laws that relate a given type of social property to a given type of social event, even though different token instances of this type of event are caused by different mechanisms at the individual level. Thus, he suggests, there can be social laws in which social predicates cause event types even though the event tokens are caused purely by individual predicates (Sawyer 2003, p. 214). He is somewhat hesitant about the scope of his argument: he does not claim that all social structures are emergent, but rather that there may be some social structures that are wildly disjunctive and if so these are resistant to explanatory reduction. It is thus an empirical question whether (and how many) such structures exist, and Sawyer's evaluation of how many there might be is rather variable (Sawyer 2004, p. 269; 2012, p. 272; 2005, p. 99).

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claims are made is troubling (Ylikoski 2009, pp. 529-530).

What counts?

In order to judge such empirical questions we would require some criterion of whether a given set of cases was multiply realized and/or wildly disjunctive. As we have seen, Sawyer is far from clear about what these criteria might be.[15] The long quote in the previous section seems to suggest that there are two criteria for wild disjuncture: the number of different realizers and the degree of difference between those realizers.

It is difficult to see why the quantity of realizers should be significant. What difference in principle is there, for example, between a higher level regularity that is based in three radically different types of realizer and one that is based in a thousand radically different types? And if there is a difference in principle, what is the numerical threshold at which it kicks in? Perhaps if the number of different realizers was very large scientists might not think it worthwhile to identify each one, and be satisfied with stating the higher level regularity instead, but this is a purely epistemological basis for asserting irreducibility, and one that would always be vulnerable to improvements in scientific technique – if, that is, it ever actually occurred in the first place.

The degree of difference between realizers is more interesting, and this question has prompted some useful debate in the philosophy of mind. Both Shapiro and Bechtel have suggested that "two realizations should count as different realizations of the same phenomenon only if they involve different operations (i.e. different mechanisms)" (Bechtel 2008, p. 140).[16] This may be expressed using the concepts of the *composition base* and the *emergence base* of a property introduced earlier. Any given emergent property of a token entity, I have argued, is the product of a mechanism that can be explained in terms of the properties of the parts of that entity and the relations between them: its *composition base*. However, the mechanism underpinning the higher level property need not depend upon *all* the properties of the parts and *all* the relations between them. In some cases it may depend only upon a subset of

the composition base: the *emergence base* of this property.

Whenever a token entity possesses a property whose emergence base does not include the entire composition base of the entity, there will be other properties of its parts, and relations between them, that are irrelevant to the determination of the property. *Hence many token entities may possess the same higher level property by virtue of possessing the same emergence base for that property, even though their other properties differ.* In his critique of multiple realizability theories, Shapiro offers the example of different coloured, but otherwise identical, corkscrews (let us say for the sake of the example that they are both double-lever or wing corkscrews) (Shapiro 2000, pp. 643-4). Since the colour of the corkscrew makes no difference to how and whether it can be used to remove corks, it is not, in my terms, part of the emergence base of the capacity of the corkscrew to be used to remove corks. Two corkscrews of different colours may have identical emergence bases and thus remove corks using the same mechanisms. Otherwise identical black and red corkscrews, on this account, would therefore not be different realizers of the property 'can be used to remove corks'.

Shapiro also suggests a slightly more challenging case: what if the corkscrews had identical designs but were made of two different metals (Shapiro 2000, pp. 644-5)? Unlike the colour of the corkscrew, the material is causally relevant: it must have a certain degree of rigidity and strength, for example, for the mechanism to work. Would these count as different realizers? One might argue that the mechanism by which such corkscrews works depends on the rigidity and strength of the materials but not on other properties of the materials, which therefore are not part of the emergence base, but on the other hand, the rigidity and strength of the materials are in turn dependent on their (different) molecular structures, in which case we could accept the view advocated by Pereboom in response to Shapiro that these *are* part of the emergence base of the capacity of the device to be used to remove corks (Pereboom 2002). Now we appear to have two different realizers of the property (though opinions might differ on that – Shapiro argues that the property of rigidity "screens off" the differences between the metals), but perhaps not wildly disjunctive ones (Shapiro 2000, p. 645).

Shapiro takes us further with the corkscrew example: what if we compare a double-lever corkscrew

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[15] Shapiro points out that no philosopher has given a clear specification of what is required for two cases to be "distinct realizations" (Shapiro 2000, p. 636), and wild disjuncture presumably requires both this and a further specification of what kinds of distinct realization are wildly disjunctive.

[16] Sawyer also cites different mechanisms as one of his criteria of multiple realizability (Sawyer 2004, p. 267).

with a waiter's corkscrew (Shapiro 2000, p. 644)? One might argue that these use different mechanisms as they obtain the leverage required to pull out the cork from different kinds of structures, and thus are one step more different than the previous pair. Does this take us to wild disjuncture? Or does the fact that both rely on inserting a screw into the cork and applying leverage against the top of the bottle mean that they depend on what are essentially two different varieties of the same mechanism? Even the question of *radical* differences in mechanism seems to be a rather uncertain way of differentiating multiple realization and wild disjuncture – and a significant one here as one of Sawyer's own criteria for wild disjuncture is that "different mechanisms might not be similar in any sociologically meaningful way" (Sawyer 2004, p. 267). We could certainly think of more radical cases of difference in mechanism - cork removers that work by injecting a gas into the bottle and raising the pressure inside it, for example. But how are we to decide what degree of difference is required between mechanisms before the different realizations become wildly disjunctive? It is hard to avoid the conclusion that there is no clear way to distinguish wild disjuncture in real empirical cases, and thus no clear criterion of when functional emergence could be present.

Are there social cases?

While we still have no clear criteria for wild disjuncture, the discussion above suggests that the issue might best be understood as the degree of difference in the mechanisms involved in the different realizers. Given this, we can at least begin to consider the empirical question of whether there *are* any wildly disjunctive social properties. Let us consider the example of churches, cited by Sawyer:[17]

'being a church' could be realized in disjunctive ways in different cultures and social groups. Nonetheless, 'being a church' could participate in social laws such as 'if a group has the property of being a church, then its degree of solidarity will be higher than groups that do not have this property' (Sawyer 2002, p. 550).

It is clear that churches do take many different forms. They are organised in different ways, they espouse differing belief systems, some have to cope with greater problems of internal diversity, and so on. Hence their composition bases can be radically

different from one another. I suggest, however, that any regularities in the causal powers of churches as a type arise, not from this diversity, but from certain similarities between churches. Thus, for example, the increased degree of solidarity between the members of a church by comparison with non-church-members may be attributable in part to them (a) sharing similar religious beliefs that are not shared by those outside the church; (b) seeing each other as common members of a distinct community; and (c) meeting other members of this community on a regular basis. The emergence base of the property 'increased solidarity' would seem to include these relations between the parts (members) of the entity (the church), and this emergence base is part of the composition base of all churches despite the variations in other elements of their composition bases.

This property therefore seems to be relationally emergent from the shared emergence base of all churches, rather than wildly disjunctive in the sense required by Sawyer's argument. On the argument developed here, to be wildly disjunctive 'higher solidarity' would need to be (a) common to all churches; but (b) based on many different mechanisms in different types of church. Of course, the details of the mechanisms do vary from church to church – some churches share dogmatically identical beliefs while others allow a range of beliefs with certain core similarities; some represent more unified and homogeneous communities than others; some expect far more frequent attendance at church events than others. But these are all variations of degree of what are essentially the same mechanisms – we could reasonably consider these variations to be analogous to that between corkscrews made with different metals, as opposed to that between screw-and-lever corkscrews and gas pressure cork removers.

A wide range of social properties are multiply realizable in this sense, and inevitably so. Most obviously, social entities are composed primarily of human beings, and all human beings are different, as a result of their differing DNA and the effect of their differing life histories on their beliefs and dispositions. Hence, this variability of their *parts* implies that all types of social entity will be multiply realizable.[18] However, they are also likely to be multiply realizable because of variations in the *relations* between these parts. Just as all churches differ from

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[17] I consider this Sawyer's paradigmatic example, as it is the only one of which I am aware that cites a social property *and* a causal regularity in which it participates.

[18] Sawyer makes a similar point, but suggests this is enough to produce wild disjuncture (Sawyer 2002, p. 549).

each other, not just in terms of having different members, but in terms of being organised differently, espousing different belief systems, and so on, so do the instances of many other social types.

Even in Sawyer's paradigm case, then, it seems that the so-called functional property of solidarity in churches is relationally emergent in each token case, and relationally emergent on the basis of *the same causal mechanism* in each token case. The type is multiply realizable in terms of its non-contributing composition base, but all tokens of the type possess the same emergence base. Hence the type has emergent properties, but each token also has the same emergent properties, and the explanatory reduction of the property is the same in each token case. The emergent properties of the type, therefore, arise not *because* of the multiple realizability of the tokens, but *despite* it.

Of course, this may just be a poor choice of example on Sawyer's part, and perhaps we could find cases of social entities that have similar properties arising from wildly disjunctive mechanisms. If there were such cases then it would be valid to deny that the *commonality* of the higher level property between the different realizers was due to relational emergence. But on the relational argument, each realization of the disjunctive property may be emergent in its own right, and there is no need to invoke wild disjuncture as a further argument for emergence. This is a close parallel to Kim's well known critique of Fodor's argument. Kim argues that when a higher-level property is multiply realized, each distinct type of lower-level instantiation of the higher-level predicate could be explained separately, and so functionalism does not constitute a viable alternative to reductionism (Kim 1998, p. 116). For Sawyer, it is only wild disjuncture that produces emergence in cases like this; for Kim, each realization of the disjunctive property can be reductively explained and hence the higher-level property eliminated. But on the relational argument, each realization of the disjunctive property may be emergent in its own right, and there is no need to invoke wild disjuncture as a further argument for emergence.[19]

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[19] Although Kim does not combine his argument with an endorsement of some other form of emergentism, he has indicated support for a view similar to relational emergentism, without labelling it as a form of emergence: "macroproperties can, and in general do, have their own causal powers, powers that go beyond the causal powers of their micro-constituents" (Kim 1998, p. 85).

This paper therefore argues that although a wide range of social properties are potentially multiply realizable, such properties are emergent not *because* they are multiply realizable, but *despite* being so. It is the similarity of their emergence bases that underlies the commonality of their higher level properties, not the divergences between the other aspects of their composition bases. Hence they are relationally emergent rather than wildly disjunctive, as Sawyer argues.

Conclusion

If there are any genuinely wildly disjunctive social properties with consistently similar causal influences, this would certainly be an interesting phenomenon, and one worthy of our attention. It is not at all clear, however, that there are, and those types of social structure considered in this paper do not seem to be examples. Furthermore, if covering law theories of cause are as unsound as many realists have consistently argued, such cases would not provide a basis for rejecting reductionism. For that we need a version of emergence theory that is developed in the context of a causal powers theory of cause, which is just what the critical realist version of relational emergence theory provides.

Relationally emergent properties depend upon the organisation of the parts of the higher level entity possessing the property. They may be explainable in terms of those parts and the relations between them, but such explanatory reductions do not entail eliminative reduction because they still depend on properties and relations that only exist when the higher level entity exists. In this sense, the higher level property or power is irreducible, but this sense of irreducibility does not entail a reifying form of dualism. Kinds at each level can be real by virtue of possessing emergent causal powers in their own right, but such causal powers are never independent of the relation between the higher and the lower level.

Furthermore, an emergent property may depend on a subset of the composition base of the entity that possesses the property – its emergence base. Hence, the same property can be realized in tokens with different parts and structures, as long as their parts and structures include as a subset the emergence base of the property. Multiple realizability of a higher level property is therefore consistent with the property being relationally emergent on the basis of the *same* mechanism in all of the different realizations. The cases of sociological emergence cited as examples by Sawyer appear to share the same emer-

gence base across their multiple realizations, hence the realist, relational account of emergence developed in this paper is able to account for the common features of these properties across their multiple realizations, as well as their irreducibility. By contrast, the functional account of wildly disjunctive emergence advanced by Sawyer, following Fodor, cannot account for the commonality of properties across multiple realizations, and its account of their irreducibility is open to the sort of challenges made by Kim. This paper concludes, therefore, that relational emergence offers a better explanation of the cases of social emergence discussed by Sawyer than his own argument.

Despite this, there are some attractive features of Sawyer's account. He has made a significant contribution to putting emergence on the radar of the social sciences, and it is surely desirable to reconcile the theoretical basis for emergence across multiple disciplines, as he has attempted to do. If emergence is a general phenomenon, then at least some of the theory of emergence must be common to different levels of the ontological hierarchy.

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