

Report on the Conference “Emergence and Causation” (Macerata, 23–25 September 2015)

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The conference “Emergence and Causation” took place in Macerata on 23–25 September 2015 and was organised by Michele Paolini Paoletti and Francesco Orilia as a major event within the research project “Causal Relata, Mental Causation and Downward Causation”, founded by The John Templeton Foundation and Durham University. In what follows, I shall summarise one by one the contributions offered by the 12 speakers who attended at the conference, attempting to highlight the main points of each of them.

1. Robin F. Hendry (University of Durham) *Prospects for Strong Emergence in Chemistry*

During the twentieth century chemists and physicists worked together to give *physical* explanations of the structure and bonding of molecules. Accordingly, many philosophers have been led to consider hardly possible that chemistry should be emergent in any ontologically serious way. Against this widespread opinion, Hendry argues in favour of the existence of strongly emergent chemical properties.

The issue of emergence in chemistry is twofold, concerning, on the one hand, the relation between substances and the molecules they are composed of, and, on the other hand, the relation between molecules and their constituent particles interacting according to the laws of quantum mechanics. The two sub-issues have to be dealt with separately.

A (chemical) substance is a particular kind of molecular population that dynamically interacts in a particular way. It is important to stress the role of the dynamic interaction, for it is what renders a substance something more than a mere assemblage of molecules. For example, water is just one of the possible ways a population of H-nuclei, O-nuclei and electrons can be. If a certain sub-

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stance is destroyed and then again regenerated, we cannot say that *the same* substance has been regenerated, but only that the same matter that was that substance is that substance again: the matter is here the *continuant* (the substance in the metaphysical acceptation) while chemical substances are modes.

As to the relation between molecules and their constituents, the first question concerns the nature of molecular structure. According to the geometrical interpretation, molecular structure is given by the equilibrium positions of molecule's atoms. However, this construal is problematic because atoms are incessantly moving entities. Another interpretation is in terms of bond topology, i.e., of the intra-molecular relations that are preserved through change. The notion of chemical bond in turn is construed in two ways. On the energetic view, facts about chemical bonding are understood as facts about energy exchanges between molecular or supermolecular states. No motivation is given for a particular spatial localization or direction of bonds within the molecule. On the structural view, chemical bonds are conceived of as material parts of the molecule. They hold the molecule together and are responsible for spatially localized submolecular relations between atomic centres. Either way, molecular structure is to be conceived of as a mode, a particular way a set of nuclei and some electron density interact.

The application of quantum mechanics to molecules' behaviour shows a direction in explanation that is incompatible with reductionism and suggests the existence of strongly emergent chemical properties. On the one hand, the molecular structure itself seems to be emergent on its physical bases, for it seems capable of downwardly determining the behaviour of its quantum mechanically interacting parts. On the other hand, some properties possessed by molecules – e.g., acidity – seem to be grounded on molecular structures rather than on molecules' physical bases, and should thus be taken to manifest genuinely chemical emergent causal powers. It is worth stressing that this not only conflicts with reductionism, but also seems to undermine the causal closure or completeness of physics: the thesis that all physical events are caused entirely by prior physical events according to physical laws.

2. Stephan Leuenberger (University of Glasgow)

The Possibility of Emergence

Leuenberger presents in his talk a new account of the notion emergence in terms of partial but not full grounding.

Emergent properties are properties of wholes. However, they contrast with properties of wholes of two other kinds. On one side, they differ from *microreducible* (or “resultant”) properties, i.e., those reducible to – hence, supervenient (nomologically and metaphysically) and dependent on – their basis, i.e., the properties had by the whole’s parts. On the other side, they also differ from *macrofundamental* properties, i.e., those that do not depend in any way and are not supervenient on their basis. Given this Janus-faced nature, many current accounts of emergent entities in general – properties and entities of other kinds (facts, objects etc.) – have a *X-but-not-Y* form. Emergent entities are characterised, for example, as nomologically supervenient but not metaphysically supervenient on their base, dependent but not a priori deducible, fundamental but not independent, fundamental but non-basic etc. Yet, many critics find these characterisations (and the very notion of emergence) incoherent: the features an emergent entity is supposed to have turn out to be, ultimately, incompatible with one another. Emergent entities would be therefore impossible, rather than just Janus-faced.

Still, according to Leuenberger, a further coherent X-but-not-Y account of emergent entities may be put forward:

- (1) an entity is emergent *only if* it is *partially grounded but not fully grounded* on its basis.

Accepting this characterisation requires, however, rejecting the *orthodox view of partial grounding*:

- (2) *f* partially grounds *g* iff for some *h, f* and *h* together fully ground *g*.

Clearly, this notion of partial grounding will not do: it will not allow for entities that are *only* partially – partially but not fully – grounded. Hence, it will not allow for emergent entities in the sense of (1).

However, the orthodox view of partial grounding can and should be rejected. Consider the following hypothetical counterexample. Assume, first, that the determinable property *schmarge* has two determinate properties: positive schmarge and negative schmarge; second, that in two different worlds *w1* and *w2* laws of nature are such that a mereologically composed thing has schmarge iff it is composed of an even number of atoms, all of which have the fundamental property *F*; third, that for any given molecule possessing schmarge, it is a brute fact what its polarity is. In such a situation, the world *w1*-fact that a certain molecule *m* has positive schmarge would be partially grounded (on

the world *wI*-fact that it is composed of 18 atoms each of which is F), but not fully grounded. It is thus conceptually possible that something is only partially grounded. (However, it must be stressed that (1) does not express a definition of emergence entities, but rather a necessary – and not sufficient – condition for an entity to be emergent, since the partial grounds of an emerging entity, in turn, must consist in *suitable* facts about *suitable* proper parts of the basis.)

3. Rögnvaldur Ingthorsson (Lunds Universitet)

A Unified Account of Causation, Constitution, Persistence, and Emergence

The aim of Ingthorsson in his talk is to offer an account of constitution, persistence and emergence in terms of causal explanation. Such an endeavour seems at first glance simply unfeasible. That is because causation is usually taken to be a relation between distinct entities existing at different times, whereas persistence is a relation that an object bears to itself, constitution is a relation between a part of an object and the object itself as a whole, and both of them, along with emergence, are synchronic relations, i.e., relations that are borne by their relata at a time. Thanks to the developments in powers-based approaches to causation, however, the prospects to provide such a causal account look much better.

One of such approaches seems to be especially promising: the one according to which causation involves the mutual manifestation of dispositions partners. The current understanding of mutual manifestation, however, needs to be modified. Under the influence of Aristotle's distinction between agents and patients, the relation between interacting objects is still often thought of as unidirectional: one object would exert an influence and another would receive it – and not the opposite. This is incompatible with natural sciences, which do not accept any form of unidirectional action: the exertion of influence is perfectly reciprocal: whenever an object exerts an influence of a certain kind on another, the latter simultaneously exerts a proportional influence of the same kind on the former, but in the opposite direction. Hence, within a scientifically appropriate perspective any alleged distinction of interacting entities in agents and patients turns out to be arbitrary. Correspondingly, it is also necessary to dismiss the view that a cause and its effect are, respectively, the action of an agent and the change in the patient that is acted upon. The cause is, rather, an interaction between two or more objects, while the effect is the total outcome of it.

Resorting to the causal framework just described, constitution, emergence

and persistence may be explained as follows. Constitution is grounded on the *dynamic interactions between the parts of the compound entity*. It is worth noticing that such interactions, while producing change (they are dynamic interactions), also guarantee the preservation of a certain structure of the whole. For example, in a compound entity such as the solar system, the attractive and repulsive tendencies of the planets balance each other out, and this results in the preservation of a structure through change (the various planets retain their usual orbits around the Sun, they are not pulled into it and not away from it either). At the same time, the construal of a composite entity as a *causal unity* of dynamically interacting parts marks a valuable step towards the comprehension of the way in which a whole may have emergent properties, i.e., properties that are not possessed by its parts and through which it in some sense “orchestrates” the behaviour of its parts. Turning finally to the topic of persistence, Ingthorsson argues that the very reality of causation excludes perdurantism, at least on the plausible assumption that causation involves *production*, i.e., bringing something into existence. In fact, within a perdurantist universe, objects are spread out through time much the way they are in space, and thus each of their temporal parts is an independent substantial entity that cannot be brought into existence – it simply exists. It seems, therefore, that if causation is real and it involves production, an endurantist stance on persistence is required.

4. Carl Gillet (Northern Illinois University)

Scientific Emergentism and Its Move Beyond Downward Causation: Understanding Mutualism and Machresis

The notions of downward causation and compositional explanation are central to the most recent debate over emergence. Gillet argues that the essential commitment of the views held by scientific emergentists actually is represented by a non-compositional and non-causal relation that he terms ‘machresis’.

The various forms of emergentism share two main commitments. One concerns the occurrence of *conditioned aggregations*: sometimes, entities having certain powers and a certain behaviour in isolation acquire different powers and behave differently if they are parts of a composed entity of a certain kind. The other one concerns the existence of a new type of relation through which a composed entity determines the contribution (or role) of its component’s powers. This relation may be dubbed *machresis* or *machretic determination* (terms obtained by combining the Greek words ‘macro’ and ‘chresis’, where the latter

stands roughly for ‘use’). Emergence thus involves at bottom a form of *mutualism*: wholes and parts are mutually dependent and determinative (parts determine wholes compositionally while wholes determine parts machretically). It is worth adding that machresis, while non-compositional, is also *non-causal* (for it is synchronous and does not involve any exchange of energy) and thus it cannot be construed as a form of downward causation.

The acknowledgment of machresis shows that the most common argument for scientific reductionism is invalid. Scientific reductionists claim that compositional explanations – i.e., explanations of wholes by means of their parts – lead to the view that wholes are “nothing but” their parts. To support their view, they often reason as follows. In all cases of compositional explanation, it is possible to account for all the powers of individuals at higher and lower levels using components alone. We face then an alternative about what there exist: either there exist composed entities along with their components or there only exist components. Applying a parsimony principle, one should choose the second option: there exist nothing but components. In light of what has been told about the role played by machresis and conditioned aggregations in emergent phenomena, we can see that the reductionist argument is invalid. For in some cases it is not possible to account for the powers of components by resorting uniquely to the powers of their constituents: we also have to posit the composed entities as real existents in order to account for the differences in components’ powers and behaviour machretically determined.

5. Stefano Catelan (Durham University)

Strong Emergence and Quinean Existence: An Attempt to Understand

Catelan examines the ontological relationships between Strong Emergence (SE) and the Quinean conception of existence (QE). He argues that the ontological implications of SE and QE cast doubt on their compatibility.

The ontological implications of SE may be summed up as follows. (1) SE makes existential claims in terms of *ontological novelty*: emergent entities are novel, something “over and above” the entities from which they emerge (base entities). Ontological novelty is (1.1) *quantitative*, for emergent entities exist in addition to base entities, or (1.2) *qualitative*, for emergent entities are different in kind from base entities. Moreover, (2) SE makes existential claims in terms of *ontological dependence* and *priority*: emergent entities are existentially dependent on their base entities, which in turn are existentially prior to the emer-

gent ones. (Ontological dependence involves ontological priority: an entity x is ontologically primary if some other entity y depends for its existence on x while x does not depend in a similar way upon y .) SE seems thus to require that the ontological inventory of reality could be affected in either quantitative sense, qualitative sense or both senses: it follows from (1). Furthermore, SE seems also to require reality to have an ontologically layered structure, within which some entities are dependent on (prior to) others: this follows from (2). These requirements, however, seem not to be satisfied by QE, because of its ontological implications.

Following van Inwagen, QE may be summed up in five main thesis: existence is not an activity; existence is the same as being; existence is univocal; the existential quantifier of formal logic adequately captures the sense of existence; Quine’s criterion of ontological commitment is the basic method to ascertain what exists. As again van Inwagen remarks, QE implies that the domain of existents is unrestricted, unchanging, and atemporal. It is *unrestricted*, for Quine’s answer to the ontological question ‘what is there?’ is ‘everything unrestrictedly exists, and nothing else’. It is *unchanging*, since it could never be the case for an entity to go out or come into existence (the coming into / going out of existence would violate the identity between being and existence, and the univocality of the former). It is *atemporal*, because existence is atemporal and all entities exist simpliciter. All three features of the domain of the existent involved by QE clearly conflict with the requirement (1) of SE. Furthermore, according to Schaffer, the ontological domain determined by QE is a set with no internal structure or, equivalently, having a *flat structure*: given a list of entities, there is no guarantee that one can sort them out and fix ontological priority/dependence relations between them. Obviously, this further ontological implication of QE is unwelcome to requirement (2) of SE. It seems thus that SE existential claims could not be adequately understood in terms of QE and, correspondingly, that QE could not allow for a worldview in which there were instances of SE.

6. Michele Paolini Paoletti (Università degli Studi di Macerata)

Downward, Substance, Structural Causation

Paolini Paoletti illustrates and defends in his talk a new model of downward causation: the Downward, Substance, Structural Causation (D.S.S.C.) model.

He starts by making some ontological assumptions concerning causation and

the nature of powers. Causation is causation by substances. Substance causation is fundamental, in the sense that it is irreducible to other sorts of causation by other sorts of entities. Substances possess powers and the activation of a power is a causing. In this regard, it is worth stressing that the possession of a power is distinct from its activation. A causing consists in the production of an absolute change, i.e., the coming to be and/or the ceasing to be of a substance or a mode. (Modes are particular properties that ontologically depend on substances bearing them or on other modes.) Powers are of two kinds: basic and non-basic ones. *Basic powers* are those powers that are *not* activated in virtue of anything else. "In virtue of" expresses a relation of ontological dependence between the activation of powers and other entities. Notice, however, that the mentioned definition of basic powers does not exclude the possibility that some of them are activated *only if* some non-active conditions – i.e., some features of the world that are not actions by substances – are met. If my power to *decide to raise my arm* were a basic power, it would be activated only if certain non-active conditions were met, e.g., my being conscious of having an arm. Instead, *non-basic powers* are those powers that are activated in virtue of something else, i.e., in virtue of other powers' being activated and/or certain conditions being met. My power to *raise my arm* is activated in virtue of the activations of those neurons' power to fire.

The D.S.S.C. model appeals to two main relations: a relation of *emergence* between an emergent power and its emergence base, and a relation of *downward causation* between the emergent substance – i.e., the substance that possesses and activates that emergent power – and some effect at the same lower level of the emergence base. To get clear on how the model works, let us consider, again, my power to *decide to raise my arm*, and let us assume that this power is an emergent one, having as its emergence base a certain stable neural configuration. When I decide to raise my arm – i.e., when I activate that power –, I downwardly cause something at the level of my neurons, which in turn causes my arm to raise. The main idea here is that an emergent causal power with respect to some entities is a power that (1) is *possessed* by a substance in virtue of some action(s) by those entities (i.e., in virtue of the activations of some of those entities' powers) and/or some non-active condition(s) being met, but (2) *cannot be activated* – directly or indirectly – *by* those entities. Briefly, my neural emergence base gives me the power to decide to raise my arm, but it cannot activate such a power: only I can. Accordingly, the activation of this power – unlike the possession of it – has *no correlate* in the emergence base of the power itself. It is worth stressing that, since the neural emergence base of the posses-

sion of that power does *not* activate that power (I activate it), it *cannot* be considered an (indirect) cause of what I (downwardly) cause at the neural level. A last, crucial feature of downward causation needing to be mentioned is its structural character: by deciding to raise my arm, I cause that my neurons work together in certain appropriate ways. In this sense, I *structure* the activity of my neurons, which in turn cause my arm to rise. Downward causation is thus structural causation, something producing the acquisition of a certain structure by certain lower-level activities.

7. John Heil (Washington University in St. Louis)
Downward Causation

Heil’s contribution focuses on two very different threats to emergence and downward causation. The first one is the sceptic objection that all allegedly emergent properties and causal powers of wholes actually reduce to arrangements, properties and causal powers of their parts. The other worry for emergentists and downward causationists comes from the very general picture of the universe formulated within recent theoretical physics.

The notions of downward causation and emergence are closely linked. Allegedly, emergent properties are properties of wholes irreducible to the properties of their parts. In virtue of this irreducibility, they confer to the whole novel causal powers, i.e., causal powers not had by the parts. This, in turn, allows them to play a role in alleged cases of downward causation. Hence, emergentists are also downward causationists, and vice versa. Conversely, sceptics about either emergence or downward causation typically are about both of them. A major objection against the existence of emergent properties and their causal relevance is that all properties of wholes alleged to be emergent really are only *resultant*. An example may help to understand the notion of resultant property. A tomato has the power to roll, owing to its roughly spherical shape. Instead, a tomato’s part needs not be spherical. Thus, it needs not have the power to roll. However, the spherical shape of a tomato cannot be considered in any interesting sense an emergent property. The spherical shape of a tomato is just the particular arrangement of its parts, i.e., a merely resultant property. According to the sceptics, this holds true for all properties of wholes. The parts of a whole, being organised and interacting with one another in certain ways, collectively acquire properties that are not possessed by each of them individually. Yet, these properties ultimately boil down to the relations holding between them and they

cannot be properly qualified as “over and above”, i.e., emergent.

An issue worth of careful consideration in dealing with the characterisation of emergent properties, especially in view of the afore-mentioned sceptical point, is the following: what are the so-called *properties of wholes*? Consider, e.g., the rectangularity of a puzzle. Is the rectangularity literally a property borne by the puzzle as a further entity in addition to its parts arranged in a certain way? Or is the rectangularity just the *arrangement of the parts* of the whole – i.e., the way the parts of the whole are arranged together – and the whole itself nothing beyond the parts themselves arranged together in that way? The question is crucial, since if the second option were to turn out to be the right one, then the sceptical complaint would be markedly strengthened. None of the so-called properties of wholes could be taken to be emergent and, correspondingly, no whole could be taken to have causal powers and to exert a downward causal influence.

The previous remarks have been made assuming the customary picture of the universe as composed of substantial particle-like basic entities. However, it is also interesting to consider the possible consequences for emergence and downward causation deriving from those recent speculations in theoretical physics according to which the universe is made of a single unified field or space-time. Either of these options seems to suggest a monistic picture of reality: the field or space-time would play the role of substance, while particles and collections thereof would turn out to be modes of the substance, i.e., disturbances in the field or wrinkles in the space-time. Although the implications of these pictures for emergence and causation – downward or otherwise – are not clear, it is very probable that both notions would be relegated to the manifest image of the universe.

8. Simone Gozzano (Università degli Studi dell’Aquila)
*Mental Causation and the Compatibility
of Downward Causation and Emergence*

Downward causation and emergence seem to go hand in hand. In philosophy of mind, for example, downward causation is often invoked for the purpose of assigning a causal role to mental properties; and mental properties, in turn, are taken as emerging from the properties possessed by the corresponding physical bases. Gozzano argues that, appearances notwithstanding, the association between downward causation and emergence is more problematic than

it is usually taken to be.

Emergent properties are thought to possess novel causal powers, i.e., causal powers that are not deducible from those of the underlying physical base. However, depending on the lower level and having a role in the exertion of a top-down causal influence upon it, these higher-level properties’ causal powers must in some way interact with lower-level properties’ causal powers. In what way?

Following Shoemaker, let us assume that properties are clusters of causal powers (hence, that they differ from each other in virtue of having different causal powers), and that causal powers, in turn, are construed in terms of causal relations. A property turns out to be a cluster of causal relations. Granted these assumptions, an argument against emergence can be devised that partly parallels Kim’s causal exclusion argument. Reasoning in terms of general causation, consider the higher-level property *MI* causing the lower-level property *P2*. Call this causal relation ‘*R*’. Given that properties are identical with a clusters of causal relations, it seems that we have two options. One option consists in taking *MI* to be a higher-level manifestation of the lower-level relatum of *R*, say *PI*. How are, in this case, *MI* and *PI* related? If – following again Shoemaker – we consider *MI* a property whose causal powers are a subset of those of its realiser *PI*, then we have to conclude that there is no novelty in *MI* and that it does not determine a new causal relation: it just makes the causal relation *R* have a new manifestation relatum as a cause for *P2*. Hence, in this case, there would be no emergence. Nevertheless, there could be downward causation, at least if we accept a counterfactual account of it (without *MI* there would not be *P2*). The other option is to think that *MI* has novel causal powers and fixes a novel causal relation. In this case, too, *MI* has its lower-level realising property, *PI*, which is in turn a new type of property. Hence, there would be emergence *also at the base level*, but exactly for this reason, there would be no downward causation. It seems, therefore, that in either case the supposed compatibility of emergence and downward causation is compromised.

9. Leon de Bruin (Radboud Universiteit Nijmegen),
Victor Gijssbers (Universiteit Leiden)
Interventionism, Agency and Causal Exclusion

De Bruin and Gijssbers assess the prospects of the interventionist approach to causation in defeating the causal exclusion argument against non-reductive physicalism and they argue that a version of causal interventionism relying on

the notions of agency and causal relevance actually succeeds.

Several authors, most notably Woodward, have maintained that the interventionist approach to causation implies the failure of the causal exclusion argument. Others, for example Baumgartner, have argued that it does not. This debate has led to problematic issues regarding supervenience – issues about which it is very difficult to take a stand. Eronen and Brooks have reacted to this impasse by proposing a sort of interventionist quietism, i.e., a deflationary version of the theory that carefully avoids the metaphysical questions about supervenience and emergence. De Bruin and Gijssbers hold, however, that a further route is available.

The debate on the causal exclusion argument has been centred almost exclusively on the notion of causal efficacy. Yet, if there is a substantial way in which the mental is *causally relevant*, we could also be able to save non-reductive physicalism from Kim's argument. The notion of causal relevance has been introduced by Jackson and Pettit under the title of "programming". Their main idea is that even if A does not produce B – i.e., even if A is not causally efficacious with respect to B –, A can still be relevant to B if the realisation of A guarantees the existence of a C that does produce B . If there is some form of causal relevance such that (1) the mental turns out to be causally relevant for the physical and (2) this form of relevance is substantial – i.e., too strong for an epiphenomenal interpretation –, then the causal exclusion argument would be defeated. Such a substantial form of causal relevance of the mental is in fact yielded by the *primitive agency theory* formulated De Bruin and Gijssbers, whose central idea is that p is a cause relative to q , and q an effect relative to p , iff by doing p we could bring about q or by suppressing p we could remove q or prevent it from happening. Three points about this definition need to be clarified: first, the notion of *bringing about* is primitive; second, p must be an action; third, causal claims must be established by free experimentation. The interventionist concept of causation is thus defined by resorting to the concepts of agent and freely chosen experimental action, both of which are *concepts on the level of the mental*, not of the physical. Without these notions, causation would be indeed undefinable, and this implies that the mental is causally relevant in a way that a mere epiphenomenon could not be.

10. Timothy O'Connor (Indiana University)
Emergent Persons

Drawing from recent contributions in metaphysics on grounding and fundamentality, O'Connor deals with the question of what sort of emergence is required to ensure the claim that human persons are freely acting subjects in libertarian sense.

A central issue in the problem of free will consists in understanding how causally conditioned and mereologically composed entities like human agents can be originators, and not mere conductors, of fundamental causal influence upon the world. Admittedly, our being causally conditioned and mereologically composed seems at first glance to suggest that our causal influence is merely the result of influences of our basic constituents. However, in spite of appearance, it is conceptually possible that a non-basic entity exerts a fundamental causal influence (while whether this is actually the case for human beings is an empirical question). Such entities would be *emergent substances*: entities that are fundamental but non-basic, and thus causally sustained by, but not grounded on, entities that are fundamental and basic.

Macroscopic objects are mereologically composed entities that, *typically*, are grounded on – i.e., derive their existence and features from – their proper parts, and ultimately on a set of mereologically simple objects that are not grounded in anything, i.e., are fundamental. These mereologically simple objects belong to kinds that are ubiquitous in the universe: they might be particle-like, field-like or of some further kind postulated by physics. These mereologically simple objects and their natural intrinsic properties can be appropriately qualified as basic. All basic entities are fundamental, i.e., ungrounded or ontologically primitive. The question is whether it is possible to conceive of entities – objects and intrinsic natural properties – that are non-basic but fundamental. This question amounts to the question of the possibility of emergent entities.

The characterisation of non-basic fundamentality for intrinsic natural properties is rather easy. If an intrinsic natural property were a non-basic but fundamental one, it would be (1) had by non-basic objects, and (2) ungrounded. Instead, the characterisation of non-basic fundamentality for objects is more complex, for it is linked to the question whether or not basic objects – which have no mereological proper part – have ontological structure – i.e., have ontological constituents. O'Connor believes they have, and favours a substra-

tum-attribute structure (rather than a mere bundle-of-properties structure or bundle-of-properties-plus-thisness structure). A *garden-variety* object is a composite object that has no substratum and no intrinsic natural property as constituents: there is nothing more to being such an object than the mereological sum of its object-parts, the properties had by these parts and the relations between them. By contrast, a non-basic but fundamental – i.e., emergent – object would be a composite object *that has natural properties*, functions as a genuine unity and is capable of exerting fundamental causal influence in addition to the activity of its parts.

Lastly, a difficulty has to be pointed out. Do emergent entities have a substratum? If so, it must be a substratum that attaches itself (also) to other objects (the composite's parts). Such *object-tied* substrata would be very different from substrata attaching themselves (only) to properties (*property-tied* substrata). The problem is that, given the framework of the theory outlined, such object-tied substrata – unlike other fundamental causal-functional features of wholes – cannot be explained by the presence of distinctive properties. However, if we reject such an object-tied substratum, the genuine unity and the causal role that characterise emergent entities seem to remain ungrounded. Consider human persons: the alleged unity of persons as subjects of experience and purposive originators of actions would seem to remain ungrounded.

11. Robert D. Rupert (University of Colorado Boulder, University of Edinburgh)
In favour of a Flat Psychology

A distinction of two levels is often traced in the domain of the mental. On one side, there is the *personal level*: the ontological realm of conscious beings, of agents, of rationally coherent thinkers, of normative properties. On the other side, we find the *sub-personal level*, which is (part of) the ontological realm of mechanisms, of natural laws, of physical causation, of merely descriptive properties. Generally, philosophers of mind and cognitive science consider the personal level to be higher than the sub-personal level, in roughly the same way in which the ontological realm of biology is a higher level with respect to the realm of chemistry. Rupert argues against the customary layered view in psychology and in favour for a *flat* view, according to which there may be psychological states associated with the phenomena usually placed at the alleged personal level, but actually they do not inhabit a different level from the sub-personal.

Let us admit for the time being the customary layered view and ask the fol-

lowing questions: (1) How are personal-level phenomena related to phenomena located at the sub-personal level? And (2) what is the role that the supposed personal level plays in cognitive science?

There are three main answers. One is the *complete independence* view: the personal level is completely isolated from the sub-personal level. Accordingly, the personal level plays no role whatsoever within cognitive science and, exactly for this reason, it remains completely unaffected by cognitive-scientific developments. However, all this turns out to be highly implausible, given the extent to which cognitive science has succeeded and offered support to naturalism. Another option is the *necessary conditions* view. Our knowledge of personal level phenomena is justified *a priori* or by conceptual analysis, and thus it cannot be informed by cognitive science, which merely catalogues the necessary conditions for these personal-level phenomena. The problem of this view is that it takes cognitive science to be an inquiry that disregards naturalistic methodology by failing to investigate the lower-level mechanisms that produce the observed data and attaining thereby a kind of necessity that is mere covariation. The third option is the *enabling conditions* view. Cognitive science should aim at making personal-level phenomena intelligible. To make something intelligible is to give an explanation of it. In so doing, cognitive science appeals to sub-personal facts containing the enabling conditions of the personal level phenomena. This option looks much more plausible than the former two, but gives rise to a general concern: an honest attempt to explain personal-level phenomena requires the researcher to be opened to the revision and even elimination of *any* aspect of our personal-level picture.

This claim, with the help of some other assumptions, may be used to build an argument in favour of a flat psychology.

To show this, let us consider one of the supposed personal-level phenomena: action. A necessary condition to be satisfied for the intelligibility of an action is the understanding of the production of the bodily movements (behaviour) co-located with the action. Such an understanding requires, on the one hand, that there is some coherent or regular (vertical, inter-level) connection between the personal-level processes that are supposed to rationalise the actions to explain and the lower-level processes of the mechanisms that produce the corresponding bodily movements. On the other hand, the understanding of such bodily movements requires that there is a sub-personal (horizontal, intra-level) causal explanation of them. Call this second requirement *action-behaviour constraint*. The argument in favour of a flat psychology runs then as

follows. If there is a distinctive domain of personal-level theorising, some central aspects of it are immune from cognitive-scientific refutation. However, if the action-behaviour constraint is valid, no aspect of personal-level theorising is immune from cognitive-scientific refutation (unless the former has nothing to do with our causal-explanatory account of the world). Therefore, if the enabling conditions view is true, there is no distinctive domain of personal-level theorising (relevant to the causal-explanatory enterprise). All this holds true not only for the case of action, but for *any* aspect of personal-level theorising. It is thus possible that all psychological processes allegedly placed at the personal level are, in fact, at the same level of the so-called sub-personal-level processes. In other words, there is only one level: the sub-personal one.

12. Francesco Orilia (Università degli Studi di Macerata)

Emergence, Downward Causation and the Metaphysics of Causation

Orilia takes Paolini Paoletti's talk to be a valuable starting point for a defence of the possibility of emergence and downward causation against the causal exclusion argument. He argues that, although Paolini Paoletti's proposal relies on a conception of causation – substance causation – that is problematic, its essential contribution may be extrapolated and recast in terms of event causation.

The essential contribution of Paolini Paoletti's proposal is represented by the distinction between the possession of a causal power (e.g., the power to will to raise my arm), which emerges from the lower level (e.g., the physical properties of my body), and the activation or exertion of it, which occurs spontaneously, has no lower-level correlate and consists in the production of an effect at the base level (downward causation). Paolini Paoletti's distinction relies on a model of emergence and downward causation formulated in terms of substance causation. Substance causation, according to which substances may be causes of events or – according to Paolini Paoletti – objects' modes, may be taken as a generalisation of agent causation, according to which agents may be causes of events: an agent is in fact a special type of substance. A major reason in favour of substance (and agent) causation is that – unlike event causation – it seems to be compatible with a libertarian account of free will, which in turn appears to be in accordance with the idea that the mind is an emergent entity capable of exerting a downward causal influence.

Yet, substance causation turns out to be problematic for at least two reasons. First, sentences that would seem at first glance to support substance

causation, e.g., ‘ball A caused the movement of ball B’, are plausibly to be construed as just elliptical for sentences expressing event causation: ‘*ball A’s hitting ball B* caused the movement of ball B’. The second, and more serious, difficulty of substance causation is that substances are not sufficient to make causal sentences true. This may be showed by constructing a truth-maker argument against substance causation (and in favour of event causation) similar to Armstrong’s truth-maker argument for states of affairs. Consider a bull infuriated by a moving cloth: the cause of the bull’s fury cannot be individuated in the cloth, since the cloth could have existed without moving and, in this case, the bull would not have become furious. This suggests that the cause is not just the cloth but the cloth’s movement instead.

Fortunately, however, the basic proposal put forth by Paolini Paoletti can be reframed in terms of event causation, taking in particular Kimian events as *relata*. Consider, for example, *my emerging power to will to raise my arm*. ‘I have an emerging power to will to raise my arm’ could be rendered as ‘I have an emergent dispositional property D’, i.e., ‘there is a Kimian event $\langle D, I, t \rangle$ that depends on the physical level’. ‘I exercise the power of willing to raise my arm, freely, in a way that does not completely depend on the physical level’, could be rendered as ‘I exemplify a power-exercise property E, i.e., there is an event $\langle E, I, t' \rangle$, which downwardly causes neuronal events’.¹

¹ I thank Michele Paolini Paoletti for the helpful discussions on several topics touched upon in this report.