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FILLING THE GAP, OR JUMPING OVER IT?  
EMERGENTISM AND NATURALISM\*

1. INTRODUCTION: NATURALISM AND EMERGENCE

From the beginning (from Descartes' foundation of modern philosophy) the philosophy of mind is characterised by a deep conflict between naturalistic and anti-naturalistic (or dualistic) views of the psychophysical relation. This conflict has originally taken the form of a contrast between materialism (today physicalism) and (spiritualistic) dualism.

The division of our universe into two different ontological regions creates many difficulties, and in fact it has been rejected by an increasing number of philosophers. Today (almost) nobody would address the question of the psychophysical nexus in this way. This does not mean, however, that everybody believes that mental and physical reality coincide. On the contrary, the contrast between (materialistic) monism and dualism has been transferred to the physicalistic field. Even if spiritualistic dualism is no longer a popular option, many thinkers claim that our natural world contains irre-

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ducible mental properties, which means that, even if everything (concrete) that exists is physical, there are physical entities that have irreducible mental properties. Sometimes this kind of non reductive physicalism is connected with another thesis, according to which, when our physical reality comes to a certain degree of complexity, it shows new aspects, whose nature and existence cannot be explained solely by the mere knowledge of the (mere physical) lower level. This claim gives non-reductive physicalism the title of “emergentism”.

Here I am taking into account two different strategies within the naturalistic field: reductive physicalism and emergentism. In particular I’ll consider the question if there is a version of emergentism that is compatible both with naturalism and moderate physicalism.

To simplify my point, I shall be quite relaxed on definitions. I’ll adopt the following definition of naturalism, taken from *The Oxford Companion to Philosophy*. Naturalism is “the view that everything is natural, i.e. that everything there is belongs to the world of nature, and so can be studied by the methods appropriated for studying that world, and the apparent exceptions can somehow be explained away” (Honderich [1995], p. 604). Such a claim would make the world quite a hostile environment for souls, miracles or spirits. Especially when we accept the further characterisation of the world as an unitary place (“the world should be a unity in the sense of being amenable to a unified study which can be called the study of nature”, Honderich [1995], pp. 604-605).

Naturalism, so characterised, is not the same as physicalism. Physicalism *prima facie* claims that everything that exists is physical in nature, but this is a rather ambiguous thesis, which can lead to a radical or a moderate interpretation. The radical version says (a) that everything concrete that exists is physical in nature, in the sense that it is subject to physical laws, and (b) that physical laws are the only causes of all that happens in our universe. That is: every physical effect is fully determined by physical causes.<sup>1</sup> Principle (b) entails

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<sup>1</sup> I ignore here all the questions related to indeterminism, probability and so on. A stronger requirement, which I do not discuss here, is that (c) every event, process, state in the universe have a physical description.

that every putative non-physical property, which has physical effects, can be reduced to a physical one. If we take into account the explanation of every causal intercourse among physical entities, the physical description of the world is in principle *complete*.<sup>2</sup>

This is a strong interpretation of physicalism, but, as we noticed, there is also a moderate reading. The moderate reading accepts the principle (a), that every event, process, state in the universe is physical in nature. But it does not require that the physical description of the (causal structure) of the world is in principle *complete*. So there may exist events, processes, states that have irreducible non-physical properties, which are causally efficacious. In other word, there may be physical items, which exercises causal influence on the physical world because of their possession of non-physical properties. Sometimes this latter version of physicalism is called “non-reductive physicalism”. And sometimes (i.e. by Kim [1999]) it is claimed that non-reductive physicalism is a form of emergentism. I’ll deal with this point later.

I think that we should consider naturalism as compatible both with radical and moderate physicalism. To avoid spiritualism, we need condition (a): naturalism must be interpreted as saying that everything (concrete) that exists is physical in nature, in the sense that it is subject to physical laws. But it is not apparent whether something like condition (b) should be conceded to secure the physical world its unity. Unity, after all, may be compatible with pluralism. We may well inhabit one universe, which is a pluralistic place, a place that contains different *kinds* of things, properties, laws. Of course there must be some constrains made in order to secure the unity of the world. One of them is probably condition (a), another may be supervenience, of emergence, or whatever relation exists among ‘levels of reality’ we want to postulate to avoid a complete independence among them (we shall discuss this issue later on). But, in principle, the unity of the world may be compatible with a certain degree of causal and even ontological pluralism. To

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<sup>2</sup> Needless to say, in such a perspective *persons* are just physical entities: they are concrete items, with a position in space and time, subject to physical laws that can ‘in principle’ explain all their physical acts.

claim, then, that everything that exists is part of the world of nature doesn't amount to saying that (in principle) our *physical* description of the world is complete. Nor that (in principle) our *physical* understanding of the world can be sufficient to explain and understand everything that goes on in the physical universe.

In this connection, condition (b) for physicalism, that is the thesis that every physical effect is fully determined by physical causes, is a crucial one. Applied to the mental sphere, it entails that mental properties, to be considered as causally efficacious, should be identified with physical properties.<sup>3</sup> But this conclusion – which requires some form of classical (Hempelian) reductionism – seems to be in contrast with the existence of many anti-reductionist arguments, trying to show that there are many phenomena which raise doubts about the possibility of a sound reductionist philosophy of mind.

In fact, this is why non-reductive physicalism is welcome as our favourite form of naturalism: one reason to adopt the moderate reading of “physicalism” is the difficulty of radical (or reductive) physicalism to fill up what we shall call here the “explanatory gap”. This expression has been originally introduced to refer to the alleged impossibility of explaining (phenomenal) consciousness in terms of its physical (neuro-cognitive) correlates (Levine [1983]). But I'll use it generally to refer to *the hard problems of reductionism* – that is the existence of many examples of mental phenomena which seems to resist to our reductive strategies. Consciousness and subjectivity, unity of the mind, intentionality, personal identity, (rationally guided) action, are the most outstanding examples of these phenomena.

Non reductive physicalism accepts the existence of the gap, since it allows irreducible mental phenomena; but it tries to locate it in a unified space, which is made accessible by the physical nature of every concrete happening in our universe. In this perspective, even if radical physicalism is perhaps the most natural form of naturalism, non-reductive physicalism is still an example of a naturalistic approach. In fact, it avoids any reference to immaterial (or spiritual)

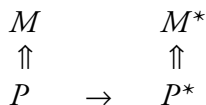
<sup>3</sup> I take this request to imply the weaker one, that to be causally efficacious mental events should be identical to physical events.

substances, thus giving the world a fundamental unity. In the meantime it provides a little amount of dualism (or pluralism), since our physical description of the world is not a monolithic totality, but rather a (fundamental) part of a more complex picture.

Non reductive physicalism has recently come under attack, however, for the way it deals with the psychophysical relation shows a lot of defects previously ignored. Non reductive physicalism typically makes reference to the supervenience relation to explain the connection between the mental and the physical: mental phenomena supervene on physical ones. It is now apparent, that the mere existence of such a supervenience relation may affect the alleged causal efficacy of mental phenomena: if mental states supervene on physical states there is no room left for genuine mental causation.

## 2. THE EXCLUSION ARGUMENT

I'm not going into details on the so called "*exclusion argument*" (Kim [1998]), but the hard core of the question can be stated in the following way. Given a mental event  $M$  that causes (at  $t$ ) another mental event  $M^*$ , the supervenience thesis allows us to infer that  $M^*$  is supervenient on a physical basis  $P^*$ . At the same time, the completeness of physics thesis permits us to infer that, if  $P^*$  has a cause at  $t$ , then it has a physical cause at  $t$ . At this point, if we consider  $P$ , that is the supervenience base of  $M$ , it is very natural to conceive  $P$  as the physical cause of  $P^*$ . So "the most natural way to view the situation" is " $P$  caused  $P^*$ , and  $M$  supervenes on  $P$  and  $M^*$  supervenes on  $P^*$ " (Kim [1998], p. 45, adapted). So we may represent the exclusion argument with the diagram below:



According to the exclusion argument, then, the real causal job is played at the physical level, and there is no need to postulate on the

existence of any causal connection between the involved mental states. So we are apparently pushed back to reductionism: *completeness of physics* and causal efficacy of mental properties together seem to lead to reductionism.

We are then confronted with three incompatible assumptions:

1. the explanatory gap cannot be filled by reductive physicalism
2. mental properties are causally efficacious
3. the physical world is causally closed.

That is why we are interested in emergentism.<sup>4</sup> Emergentism can be seen as an attempt to give up physicalism without abandoning naturalism. Is this a viable interpretation?

### 3. EMERGENTISM

To introduce emergentism, let's go back to the diagram we introduced to express reductive physicalistic view of mental causation.

$$\begin{array}{ccc}
 M & & M^* \\
 \uparrow & & \uparrow \\
 P & \rightarrow & P^*
 \end{array}$$

According to Kim [1998], we may say that this picture:

explains the observed regularities between  $M$ -instances and  $M^*$ -instances, and those between  $M$ -instances and  $P^*$  instances. These regularities are by no means accidental, in a clear sense they are law-based

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<sup>4</sup> One way to present our problem is by reference to two fundamental and conflicting intuitions about mental reality. The first expresses a realistic and pluralistic attitude toward mentality, the second a naturalistic view of the world. They are the following: (a) Cognitive science (and intentional folk psychology) describes kinds of (mental) events, which are real and causally efficacious. This means that there is a field of research, and a portion of reality, that can be investigated by a psychological science, which is perfectly legitimate both from methodological and ontological point of view. (b) Every physical system can be fully described in physical terms, in the sense that the behaviour of any physical system can be described – at least ideally – by the conceptual resources of microphysics (if we take microphysics to be our fundamental physics). In particular we don't need any extra-physical element to describe the causal evolution of a physical system.

and may even support appropriate counterfactuals. However, if we understand the difference between genuine, productive and generative causal processes, on the one hand, and the noncausal regularities that are observed because they are parasitic on real causal processes, we are in a position to understand the picture [...]. (Kim [1998], p. 45)

This passage is very important for us. In particular where it emphasises the following two points:

1. The kind of regularities which are normally interpreted in terms of mental causality are only “noncausal regularities [...] parasitic on real causal processes”.
2. These “real causal processes” are always available at the physical level; whenever we have a putative case of high level causality, the mere existence of a supervenience relation ensures that there must be physical processes which are “genuine, productive and generative causal”.

I think that a reason to investigate emergentism is that an *emergentist* picture denies both (1) and (2). Emergentism claims that there are mental causes, which are “real causal” processes, and that *even if* those processes are not nomologically connected with physical processes *they still* are “genuine, productive and generative causal processes”.

The idea is to contrast Kim’s physicalist scheme with the following emergentist picture:

$$\begin{array}{ccc}
 M & \rightarrow & M^* \\
 \uparrow & & \uparrow \\
 \Phi & & \Phi^*
 \end{array}$$

Here  $\Phi$  and  $\Phi^*$  are not properties, but huge sets of (billions of) micro-properties (of billions of subatomic entities), whose exemplification is necessary for a physical system to constitute a psychological agent who, in turn, exemplifies properties  $M$  and  $M^*$  – I’ll come back to this point later.

According to emergentism, then: (1) we may interpret the relation between  $M$  and  $M^*$  as a genuine causal relation; (2) it is far

from obvious that the relations between  $\Phi$  and  $\Phi^*$  are examples of nomological connections. On the contrary, we have reasons to believe that, in many cases, the mere existence of a subvenient base at level  $\Phi$  and  $\Phi^*$  is not enough to secure the presence of genuine events and genuine properties connected by nomological (and causal) relations.

#### 4. EMERGENTISM AND CAUSALITY

My approach to emergentism shows that I consider it deeply involved with causality. Brian McLaughlin ([1992], p. 50) claims that emergentism is “a view about the causal structure of reality”. It says that reality is structured on different levels and, when a given level reaches a certain degree of complexity *new* causal powers emerge. Stephan [2002] suggests, on the contrary, that irreducibility, rather than causality is the key to fully understanding emergentism.

In fact, as it is shown by Kim ([1999], p. 5), there are two groups of ideas associated to emergentism. The first is connected with the irreducibility of the emergent properties: “emergent properties are ‘novel’ and ‘unpredictable’ from knowledge of their lower-level bases, and they are not ‘explainable’ or ‘mechanistically reducible’ in terms of their underlying properties” (Kim [1999], p. 5). The second group of ideas stresses the fact that emergent phenomena “bring into the world new causal powers of their own, and, in particular, that they have powers to influence and control the direction of the lower processes” (pp. 5-6). In this perspective, emergentism involves downward causation.

In what follows I’ll consider this second group of ideas as fundamental to characterise emergentism. The reasons I consider causality fundamental are connected with ontological aspects of emergentism, and they will be apparent later on in my paper. For the moment I simply point out that emergentism is easily associated with *causal pluralism*, that is with the thesis according to which there are non-microphysical regularities, which are discovered by the special sciences (and before them, by common sense). These regularities allow

us to speak about properties which are causally responsible and that describe a proper level of organisation of the world (or an epistemological region, if you don't like the layered model). Causal pluralism, together with property pluralism, makes mental causation easy to explain. Of course causal pluralism denies *radical* physicalism at least in the sense that it denies that physicalism can prove that microphysical regularities are all-embracing – can prove that every causal interaction is describable by microphysical laws. But it does not say that *there are objects* that are not subject to microphysical regularities. Rather the idea is that physicalism cannot give reasons to believe that all the properties of objects are physical (that the only existing properties are governed by physical laws<sup>5</sup>).

#### 5. A-EMERGENCE AND B-EMERGENCE

Unfortunately, reference to new kinds of properties is not enough to clarify the ontological status of the emergent properties. There are, on the contrary, many options, according to the different metaphysical analysis we may propose.<sup>6</sup> I'll concentrate on one aspect of this issue: what is the relation between "basal" properties and emergent properties? Do the latter derive their causal powers from the former? If the answer is positive the emergence of new features of a system can be explained by the causal interaction at the micro or basic level. If it is negative, the new causal powers cannot be explained by the causal interaction between the micro (or lower-level) constituent.<sup>7</sup>

We may then distinguish two forms of emergence:

*A-emergence*: the new causal relations among the elements of the emergent level originate out of properties, which belong (also) to the

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<sup>5</sup> Cf. Kistler [1999], p. 228 for a clear clarification of this point.

<sup>6</sup> Cf. Hasker [1999], ch. 7; Stephan [1999], [2002]; Van Gulick [2001] for a few examples.

<sup>7</sup> Cf. Searle [1992], pp. 111-112; Hasker [1999], ch. 7; Van Gulick [2001], p. 17, for further analysis on this point.

basic level. We have new properties, which are properties of the emerging systems (and not of their components); but these new properties are (can be understood as) the causal product of the basic properties. Complexity of higher levels produces new ways in which the causal forces *present at the basic level* manifest themselves.

*B-emergence*: higher level systems (wholes) exhibit *new* kinds of causal organisation. Such an organisation should be understood as the result of the action of new kinds of properties, whose action is not detectable at the basic level, and that should be considered as new emergent features of the (causal organisation of) the world.

According to *A-emergentism*, what makes a property emergent is that it is possessed by the emerging whole, and not by its parts. Further features are also *unpredictability* (the new properties are not predictable on the basis of their “basal” condition), *unexplainability*, and *irreducibility* (the cannot be neither explained nor reduced to lower level properties) (Kim [1999], p. 219).<sup>8</sup>

Apart from its emphasis on causation, the distinction I made is not particularly original. Van Gulick ([2001], p. 17) proposes a distinction between Modest Kind and Radical Kind Emergence. According to the former: “The whole has features different in kind from those of its parts [... A] mouse might be alive even if none of its parts (at least none of its subcellular parts) were alive.” According to the latter “The whole has features that are both 1. different in kind from those had by its parts, and 2. of a kind whose nature and existence is not necessitated by the features of its parts, their mode of combination and the law-like regularities governing the features of its parts”. Van Gulick makes references to wholes and parts, rather than properties, but I think that Radical Kind Emergentism is very close to my *B-emergentism*, since it allows that “there are real

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<sup>8</sup> The latter predicaments should be taken in a moderate sense: *unexplainability* and *irreducibility* just involve that the conceptual resource of lower levels cannot be sufficient to explain the new emergent features. (To explain what is a living organism we must refer to aspects of it, which are not described at the inorganic level. Nor its biological properties can be ‘reduced away’. But this doesn’t mean that there is anything supernatural in the emergence of biological features.)

features of the world that exist at the system or composite level that are not determined by the law-like regularities that govern the interactions of the parts of such systems and their features” (Van Gulick [2001], p. 18).<sup>9</sup>

In my opinion, *A-emergence* is particularly apt to understand the relation between levels of reality whose relations can be object of scientific inquiry. Which are then investigated by (different) scientific theories, whose principles are broadly speaking comparable – which share, so to speak, the same ‘*explicative style*’. (It is a form of inter-theoretic emergentism.) *A-emergence* is also a form of *monistic emergentism* compatible with moderate ontological physicalism. For example, if we take mental properties as systemic *complex* properties originated by structural properties of the brain, you may consider them both as irreducible/unpredictable *and* dependent in their causal powers from the biological properties of the brain.<sup>10</sup>

*A-emergentism* satisfies condition (a) for physicalism (everything concrete that exists is physical in nature, in the sense that it is subject to physical laws). But, in a certain sense, it satisfies also condition (b), that is the thesis that every physical effect is determined just by a physical cause. *A-emergentism*, in fact, adopts a *causal inheritance principle*: the causal powers of the emerging properties are the product of the causal powers of the “basic” properties. So if we accept the transitivity of causality (Searle [1992], p. 112), *A-emergent-*

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<sup>9</sup> Another classification, by Achim Stephan ([1999], [2002]), stresses the difference between weak and strong emergentism. According by Stephan ([2002], pp. 79-80), *weak emergentism* involves three thesis: (a) “the bearers of emergent properties are made up of material parts only”; (b) emergent systems have systemic properties, properties “that none of a system’s parts have”; (c) “a system intrinsic properties and disposition depend nomologically on its micro-structure”. Such a form of weak emergentism is in fact compatible with reductionism, while *strong emergentism* is not. For Stephan “irreducibility lies at the heart of all strong form of emergentism” (p. 85). And at least one form of it “seems to imply downward causation” (p. 86). I have no room to discuss the interesting details of Stephan analysis.

<sup>10</sup> Perhaps the new emergent mental properties may be considered as second-order properties defined over (micro) physical properties. And even if they may lead to “net addition to the causal structure of the world” (to quote again Kim [1998], p. 117), there is no net addition to the *ontological* structure of the world.

ism is not committed to any interesting form of downward causation, and satisfies condition (b).

Kim [1999] characterises his version of the *causal inheritance principle* as a thesis about the identity of causal powers: “If a functional property  $E$  is instantiated on a given occasion in virtue of one of its realizers  $Q$ , being instantiated, then the causal powers of this instance of  $E$  are identical with the causal powers of this instance of  $Q$ ” (Kim [1999], p. 16). I have to recognize that to speak, as I do, of “the product” of lower level causal powers is more ambiguous than speaking of identity, as Kim does, but I am not addressing this question here. My point is that, according with causal inheritance principle, the new emerging features of the world (even if unpredictable or even unexplainable at the base level) *derive their existence* only from the causal powers operating at the base level.

So  $A$ -emergentism can be seen as an attempt to fill the “explanatory gap” that it is compatible with naturalism. But unfortunately it cannot solve the philosophical worries that motivated the introduction of the emergentist picture of the psychophysical nexus. The reason is that to adopt causal inheritance means to reduce the causal efficacy of emergent properties to their “basic” conditions. But this means to move back from an emergentist picture to a reductive one. Let’s see again our emergentist diagram:

$$\begin{array}{ccc} M & \rightarrow & M^* \\ \uparrow & & \uparrow \\ \Phi & & \Phi^* \end{array}$$

If  $M$ ’s causal powers are inherited from  $\Phi$ ’s causal powers, then  $\Phi$  alone is able to explain the causal behaviour of the emergent level in which  $M$  occurs.

So this is the most plausible picture:

$$\begin{array}{ccc} M & & M^* \\ \uparrow & & \uparrow \\ \Phi & \rightarrow & \Phi^* \end{array}$$

So *A*-emergentism, *via* causal inheritance, implies that there are causal powers that explain the passage from  $\Phi$  to  $\Phi^*$ . We don't know how to unify in a single nomological macro-connection the multiplicity of micro-connections between  $\Phi$  and  $\Phi^*$ . But we know that they must exist, since they are the basic materials, so to speak, of the  $M$ - $M^*$  (apparent) causal connection. The problem is that now this connection can be seen as an expression of the "noncausal regularities that are observed because they are parasitic on real causal processes" – to quote again Kim ([1998], p. 45). So, as far as causality is involved, we probably should speak of *A*-emergentism as a form of *reductive emergentism*.

However, as we have already seen, we have independent reasons to question reductionism in the philosophy of mind, so that *to postulate* causal inheritance seems both *ad hoc* and in contrast with strong anti-reductionist arguments.

## 6. *B*-EMERGENCE IN A PLURALISTIC UNIVERSE

The most obvious way out to avoid reductive emergentism is to reject the causal inheritance principle. We might say that the causal inheritance principle allows us to avoid mystery and the supernatural, but at the same time it prevents us from reaching the kind of phenomena that are emergent in a stronger sense. These are the phenomena referred to when we speak of intentionality, rationality, phenomenal consciousness, subjectivity, unity of the mind, personal identity and so on (the *hard problems* of reductionism). In this case the reasons to adopt an emergentist approach are motivated by a strong heterogeneity between "basic" and emergent levels. We simply have no idea about how the micro level features can be connected with the higher level features.

For example when we move from sub-personal to personal explanation of an action a new explicative style is adopted. New causal principles are applied, without any connection with the lower level (micro physical) causal explanations. This is the realm of *B*-emergentism. *B*-emergent entities exhibit new causal powers, new *capaci-*

*ties*. The new emergent properties describe new kinds of behaviours, exhibited by new kinds of entities, and are connected by new kinds of law-like relations: to describe them is to describe a new *regional ontology*. If you like phenomenology, you may say that there is a plurality of ways in which we can have experience of the world, and every thing that exists is related with its particular style of experience.<sup>11</sup> To describe a regional ontology is to present the different ways in which different aspects of the world are given to us.

Do *B*-emergent properties really exist? Are they really exemplified? I think that there are certain aspects of the relation between mind and world, which can be interpreted as examples of a *B*-emergence relation. For example, the relation between brain and person *could* be an example of *B*-emergence.<sup>12</sup> It is not merely speculative to believe that brains cause happenings, while persons (or minds as properties of persons) cause actions. In *this* sense a person may cause things that cannot be caused by neurons.) There are reasons to believe that identity conditions for intentional actions cannot be reduced to those for happenings. And there are reasons to believe that mental properties, which play a causal role in the production of intentional action, cannot be reduced to physical properties. The mere existence of a subject of experience, who possesses a conscious mind whose nature and content explain intentional actions, can be seen as a paradigmatic example of a *B*-emergent phenomenon.

Of course, it is during their development that human beings acquire the kind of (new) properties that are expressed by psychological predicates. This is possible only because human nervous system have a peculiar structure. So (in a limited sense) psychological properties exist *because of* the complex features of the human nervous system. But they cannot be reduced or explained by means of the (kind of) properties that describe the physical (biological) assets of the human brain. The kind of causal explanation involved here refers to a completely different explicative style from that used in sci-

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<sup>11</sup> Cf. De Monticelli [1998].

<sup>12</sup> Maybe there are other *B*-emergent relation *outside* the mental realm. Maybe the relation between quantum world and macro-world is another example. But these are just speculations.

ences such as physics. When we explain human behaviour at the personal level, intentional, semantic and normative aspects play a crucial role in our description of the causal goings on.<sup>13</sup> Not to mention the emergence of the subjective and qualitative aspects of the personal mind: the “what-it-is-like” element of our inner life, the unity of personal experience, the perspective-dependent character of the inner life.<sup>14</sup>

When we deal with the *B*-emergence of mental properties we are considering the relation between what we may label *personal* and *sub-personal* level of explanation of behaviour. And whoever thinks that this relation defeats reductive analysis should be prepared to explore *B*-emergentism.

*B*-emergence, however, is a kind of *ontological* emergence, which undermines the (causal) unity of the world we associate with naturalism. Such an ontological emergence is pluralistic: our universe exhibits a plurality of things. These things are sometimes *constituted* by other entities, but they are not identical with them. They have different identity conditions and different causal powers.<sup>15</sup> *When lower-level entities are parts of an emergent entity, they acquire new causal powers*, since they can contribute to novel forms of causal goings on. In this sense, a *person's* brain may cause things that cannot be caused by its neurons (and perhaps *this* is an example of downward causation).

This is a rather radical change both from the reductionist picture and from *A*-emergentism. In this perspective, in fact, we should give up to an implicit assumption suggested by the diachronic picture of a world acquiring an increasing degree of complexity – where lower-level entities are more fundamental, and in a sense more ‘real’ than higher-level entities. On the contrary, within the metaphysical picture of *B*-emergentism, emergent entities have more (causal) efficacy than ‘basic’ entities. And, if we take causal efficacy as a mark of re-

<sup>13</sup> We may refer, in this connection, to the distinction between “space of causes” and “space of reasons” (McDowell [1994]).

<sup>14</sup> Cf. Crane [2001], ch. 2; Di Francesco [2002], §§ 2.8-2.9 for a first introduction to these question and their connection with the emergentistic point of view.

<sup>15</sup> Cf. Baker [2000] for a (radically anti-reductive) analysis of the constitution relation.

ality (following thinkers from Hegel to Ian Hacking), they are ‘more real’ than ‘basic’ entities. Even if they follow historically, they come first ontologically. Lower levels act as *constraints* not as *determinant* of higher ones.

## 7. LATENT PROPERTIES. A MODERATE WAY OUT?

It is time to take stock. *A*-emergentism involves the causal inheritance principle, and, apparently, the causal inheritance principle makes this form of emergentism too weak to secure emergent properties their causal autonomy. So it fills the explanatory gap by a *fiat* (a primitive assumption), but at the cost of characterising itself as a reductive emergentism, so far as causality is involved. Whenever we perceive non-physical goings on, we have to consider them appearances “parasitic on real causal processes”, which are physical in nature. Unfortunately, this is exactly what we didn’t want in the case of the *hard problems* of reductionism.<sup>16</sup> And the very *assumption* of the causal inheritance principle made by *A*-emergentism doesn’t seem justified, when we consider the *hard problems* of reductionism (the anti-reductionist worries) we described previously.

On the other hand, *B*-emergentism is strong enough to *jump over* the gap, but it is not able to fill it – since it doesn’t provide any connection between lower-level and higher-level causal powers. Furthermore, it claims that there are mental properties whose causal powers are not inherited from their ‘basic’ conditions, and in doing so it seems to involve a kind of causal pluralism too strong to be compatible with naturalism, since it denies the physical world its fundamental unity. The divide between basic and emergent causal powers postulated by *B*-emergentism seems too wide to secure the world the unity required by naturalism.

Both emergentisms lead to unwanted consequences. So, instead of choosing between them, I propose do give a further (and closer) look at the mechanisms of emergence, beginning from the *A*-emer-

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<sup>16</sup> We may still speak of emergentism, since the causal inheritance principle doesn’t imply the reducibility of the mental properties. So we may have a property which is both irreducible and causally dependent from its physical basis.

gence picture (and the causal inheritance principle).

Our point of departure will be the notion of “latent property” described by Sydney Shoemaker’s, *Kim on emergence* (Shoemaker [2002]). In particular Shoemaker deals with the relation between ‘basic’ and emergent properties, and tries to formulate it in a way that (1) doesn’t imply any violation of the causal closure of the physical world, and (2) respects the causal inheritance constraint. The hard-core of Shoemaker’s proposal is that the elements of an emergent whole have *latent properties* that cannot be deduced from their *manifest properties*.<sup>17</sup> So, in an emergent system, we may distinguish between two kinds of properties: manifest properties, whose causal powers can be detected at a lower degree of complexity, and latent properties, whose behaviour emerges and can be detected only when the system acquires a certain degree of complexity.

While manifest property are both present and detectable at ‘basic’ level, latent properties are present but not detectable. They are *grounded* on base level, but still not realized, until the system in which they occur acquires the required complexity (Shoemaker [2002], p. 54). According to Shoemaker, when we say, then, that the emergent properties of a whole supervene on the properties of its parts, and that the new causal powers of the emergent whole are inherited from the lower level, we should count among these both manifest and latent properties:

The component entities have powers that, collectively, determine the instantiation of the emergent property when they are combined in the emergence engendering way. But, these being cases of emergence, these cannot all be powers that manifest themselves when the components are not combined in emergence engendering ways. (Shoemaker [2002], p. 55)

So when we combine the micro-entities of a physical system in an emergence engendering way, we have two kinds of “micro-structural properties”: physical micro-structural properties, that can be

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<sup>17</sup> In fact his was exactly C.D. Broad’s thesis in *Mind and Its Place in Nature* ([1925], pp. 24-25). According to Broad, the emergent properties of chemical elements cannot be deduced from the other properties they have. These properties may be said *latent* until they are combined in determined ways (cf. Shoemaker [2002], p. 54).

“specified entirely in terms of the micro-manifest powers of the constituents micro-entities together with how these micro-entities are related”, and emergent micro-structural properties, whose specification requires both micro-manifest and micro-latent powers of the constituent micro-entities (Shoemaker [2002], p. 55).

In this connection, we can attribute a new sense to the causal inheritance thesis: emergent properties are causally efficacious because they derive their causal powers from “basic” properties. But we have two kinds of basic properties: manifest and latent. And the novelty involved in the emergent properties is justified by the peculiar nature of latent properties, which express their causal powers only at the emergent level. Both physicalism and emergentism, then, claim that micro-facts determine macro-facts and that micro-powers determine macro-powers, but a crucial difference is that, on the emergentist view, the micro-facts include the instantiation of micro-latent properties.

What is the relation between emergent and *physical* micro-structural properties?<sup>18</sup> If we want to exploit the idea of latent powers to fill the explanatory gap, and not merely to jump across it, we need something like a determination relation. We need that “as a matter of nomological necessity [...] any micro-entity having that micro-manifest power, or that set of micro-manifest powers, also has that micro-latent power” (Shoemaker [2002], p. 57).

Apparently, this view describes a case of *A*-emergence, since the emerging (mental) properties are determined/fixed by the basic (physical) properties. This is so because latent micro-properties are determined by manifest micro-properties.<sup>19</sup> What makes this form of *A*-emergence interesting from our point of view is that it explains why emerging systems have causal powers *inherited but not predictable* from manifest causal powers of their parts.

We can now explain in a naturalistic framework the very exist-

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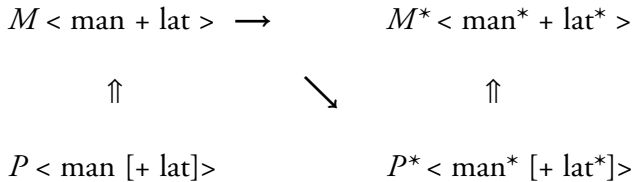
<sup>18</sup> According to Shoemaker this cannot be a relation of realisation. Emergent properties are emergent just because they are not realised (that is they are not already present) in the physical properties they supervene on (p. 57).

<sup>19</sup> Probably we should also request that there must be *homogeneity* (of kind) between manifest and latent properties. But this is a difficult issue, and I’ll skip it now.

ence of (diachronic) downward causation – rejecting the exclusion argument. Let’s take an emerging micro-structural property  $M$ . And let’s suppose that its causal powers are exercised by causing the instantiation of another emergent property  $M^*$ . We know that this is possible only by causing the instantiation of  $M^*$ ’s physical base  $P^*$ . So we are threatened by the exclusion argument. But now the distinction between latent and manifest properties plays its crucial role. Even if it is true that the only way  $M$  can cause  $M^*$  is by causing  $P^*$ , this does not prevent  $M$ - $M^*$  to be a real causal relation, *since the  $P^*$  instantiation is part of the  $M^*$  instantiation* (Shoemaker [2002], p. 59):

The  $P^*$  instantiation is part of the  $M^*$  instantiation that nomically necessitate the rest of it, which it does because of the determination relation between the micro-manifest and the micro-latent powers of the constituents micro-entities. So one could say that the  $M$  instantiation causes the  $M^*$  instantiation by causing a part of it, the  $P^*$  instantiation, that is nomically sufficient for the rest of it. (Shoemaker [2002], p. 59)

We have then the following diagram:



Here both  $P$  and  $P^*$  have a latent component, which is not expressed at the base-level, but whose presence secure that, when  $P$  and  $P^*$  occur in a “an emergence engendering way”, their exemplification is enough to secure the emergence of  $M$  and  $M^*$ .

So, even if  $P$  necessitates  $M$  and  $M$  causes  $P^*$  in order to cause  $M^*$ ;  $P$  does not cause  $P^*$ , since  $P$  is individuated only by reference to its *manifest* causal powers. And the process that generates  $M^*$  (*via*  $P^*$ ), being emergent, requires *more* than manifest powers:

$P$  determines  $M$ , in virtue of the determination relation holding between the micro-manifest powers and the micro-latent powers of the

constituent micro-entities. The instantiation of  $M$  causes the instantiation of  $M^*$ , which it does by causing the instantiation of  $P^*$  that is part of the instantiation of  $M^*$  and nomically sufficient for the rest of it. This involves no over-determination, and there is no case for saying that  $P$  preempts  $M$  as the cause of  $P^*$ . (Shoemaker [2002], p. 60)

## 8. DID WE FILL THE EXPLANATORY GAP?

I think that this analysis gives a clearer and better sense to the idea of causal inheritance in case of emerging systems. A sense that makes emergence of *new* causal powers a real phenomenon; that allows downward causation, and a pluralistic view of causality, *within* a unitary world. So I like it. But this doesn't mean that it is perfect. A first problem is the very notion of latent micro-properties (or latent causal powers). We never see them. The only things we observe are manifest properties and external conditions. Then we observe the macro-effects (and the macro-emerging properties), which are not justified by the basal properties. Latent properties are theoretical entities whose justification is mainly philosophical. We want to save naturalism and moderate physicalism. So they are the *hidden variables* of our explicative system. To postulate these hidden variables allows us to maintain that the emerging causal powers are inherited by the physical arrangement of matter. In this sense by means of the notion of latent property we can save our naturalism, and fill the explanatory gap. But the gap is filled only at the ontological level. To postulate hidden variable *doesn't explain how the mechanism of emergence works*. At the epistemic level, latent-property  $A$ -emergentism and full-blooded  $B$ -emergentism are identical.

Another problem is that it is not clear whether  $P$  and  $P^*$  are really basic (physical) properties. In fact, we might choose to consider them as *non-physical*, since no base (physical) description can help us to detect and/or to explain the presence of their micro-latent emergent component. In fact, micro-latent emergent properties can be properly individuated only at the emergent level. And this gives to this form of emergentism some characters of  $B$ -emergentism. As Shoemaker himself notes:

*P* and *M* are micro-structural properties whose instantiations involve the very same micro-entities and the very same relations between these micro-entities, and differ only in that the specification of *P* mentions only the micro-manifest powers of these micro-entities, while that of *M* mentions both these and the micro-latent powers of them. (Shoemaker [2002], p. 60)

So we may ask whether they are the same property. This is a difficult question, involving many issues I have no room to consider here.<sup>20</sup> Shoemaker seems to believe that the fact that “*P* and *M* are exactly alike with respect to what effects their instantiations cause or contribute to causing” (p. 60) favours the identity thesis. For my part, I think there may be reasons to reject this solution.<sup>21</sup> But I am not going to discuss these reasons here, since I want to explore the chances of the strongest available naturalistic way-out. So, let us suppose that *P* and *M* are identical. What is then the ontological status of *P*? Is *P* an emergent property? To be identical with *M*, *P* must possess both its manifest and latent causal powers. But now we cannot say that *P* is a physical property – if this means “identified by the conceptual resources of physics”. Its latent causal powers, in fact, can be described only at the emergent and non-reducible level.

When *A*-emergentism embraces the distinction between latent and manifest causal powers, it tries to conciliate the causal inheritance principle with the ontological dependence<sup>22</sup> of micro-physical latent properties on the *possibility* of emergent systems (that is, on the existence of causally efficacious higher levels of reality). *P* exists as an emergent property only if there is a level of reality in which its latent causal powers may manifest themselves.<sup>23</sup> So the *principium*

<sup>20</sup> For example: should we consider the determination relation between *P* and *M* as a causal relation? Are laws of nature connecting *P* and *M* contingent? Can causal relation be reduced to causal relevance?

<sup>21</sup> For example we might say (1) that, while there are nomological connections at the *M*-level, these are absent at the *P*-level. (At the *P* level we have sets of micro-structural states whose causal connections are not described by nomic generalisations.) (2) Differently from *P*, *M* is a mentalistic property, individuated by an intentional idiom, whose logical and explicative structure cannot be expressed by a physical language. Perhaps they involve normative notions. (3) *M* and *P* are different in causal relevance.

<sup>22</sup> I use the notion of ontological dependence in a relaxed way. For a more definite notion see Amie Thomasson [1999], ch. 2.

<sup>23</sup> With this I mean that the structure of reality is such that, given the required

*individuationis* of *P* (and *M*) is outside the physical domain. In this sense micro-latent properties are *ontologically dependent* on the existence of higher levels of reality, in which a *new* causal organisation operates. For an emergentist this should be taken as an ultimate fact, to be accepted with “natural piety”. But this means also that, if we accept latent proprieties, the distinction between *A*- and *B*-emergentism collapses.

So we didn't *fill* the gap, after all. Does this mean that this is not a *naturalistic* solution? This question deserves an articulated answer. In a sense we may still maintain a very weak form of naturalism. The reason is that our (last) reading of *B*-emergentism conjugates ontological dependence from higher levels and causal pluralism, from the one side, with a unitary vision of the physical world, from the other.<sup>24</sup> In this sense it *can* be labelled as *minimal naturalism*. Certainly it doesn't makes any miracle possible; nor makes scientific vision of the world mistaken. The evolution of an emergent system is guided by its micro-manifest and micro-latent properties, which depends nomically from the micro-structural organisation of its *physical parts*. Such an organisation can be studied by science *at its proper level of reality*, that is at the level in which the involved latent properties manifest themselves. So a key-condition for naturalism is satisfied: everything that exists in the universe has a physical nature. And, even if we deny that the micro-latent properties are physical in character, the principle of causal inheritance justify the claim that everything that happen is the result of a natural process – grounded in the micro-structural properties of the system. Emergent causal powers are inherited from the micro-structural features of the emerging systems. In this sense the (latent) causal powers are not the product of supernatural events. They were already there.<sup>25</sup> To be-

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complexity, the higher-level nomological structure will be present as a fact of nomological necessity.

<sup>24</sup> The first condition is gained by means of latent properties; the second by causal inheritance.

<sup>25</sup> Is the distinction between “already being there” and “emerging as a completely novel causal feature of the world” a genuine one? Perhaps the “already there” reading has the only function to conciliate the causal inheritance principle with emergentism. But even so it is an important function.

come manifest they require the emerging complexity, but this should not be read as if complexity miraculously creates new causal powers. It simply offers the context for their performances. So, in *this* sense, every physical going on that occurs in an emergent system is causally based on micro-physical properties (latent and manifest properties, which are both grounded in micro-structural physical properties).

On the other hand, we may doubt whether there is any reason to insist on naturalism apart from the desire to pay lip service to physicalistic orthodoxy. To begin with, our reading doesn't seem compatible with condition (b) for physicalism: we have a clear sense in which the causal evolution of a physical system is determined by non-physical properties. Even if we believe, then, that "*M*" is just another name for "*P*", we should admit that *P* is a non-physical emergent property. That is, there are physical objects which possess non-physical but causally efficacious properties. These properties are based on micro-structural feature. But the causal powers of these features are specified only *outside* the physical domain. Latent properties as hidden variables may save only a very weak form of naturalism, introducing a strong tension between causal pluralism and monistic naturalism. But we can go further, addressing even condition (a) for naturalism. Instead of taking the physical level as our overall description of the world, securing in this way the unity of the world, we may in fact take the other way round, interpreting the emergent level as the unitary place.

This means to interpret the emerging systems as 'more real' than their physical parts – or, if you like, to claim that these parts have causal powers they wouldn't have if they were not part of an emergent system. There are, so to speak, many "degrees of reality", as Leibniz would have said<sup>26</sup>, starting from the bottom to higher levels. Now, I can't see any reason to consider *incompatible* with naturalism the thesis that the unity of our world is gained at the emergent level, and not at the physical. But it is a very unusual reading of naturalism, according to which it is at the emergent level that the totality of

<sup>26</sup> Cf. G.W. Leibniz [1765], Bk. IV, ch. 17, p. 8. Another source of this idea may be found in Hegel's theory of abstraction (Hegel [1812]).

the causal forces can be observed, and everything is related with everything.

My first question was: "Is emergentism a *naturalistic* strategy to explain the psychophysical relation?". Now I can offer a tentative answer: "It may be so. But at the cost of interpreting naturalism as a very weak position". A position that allows both causal pluralism and the rejection of the (usual reading of the) causal closure of physical world. And that makes reality a unitary place by considering emerging systems as 'more real' than their physical parts. Is this view consistent and worth examining? This is another question, to be discussed in a different paper.

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Michele Di Francesco

COLMARE IL “GAP” O SALTARLO?  
EMERGENTISMO E NATURALISMO

*Riassunto*

Possiamo considerare l'emergentismo come una strategia naturalistica per la spiegazione del nesso psicofisico? La risposta è articolata e verrà indagata in questo lavoro distinguendo due versioni dell'emergentismo, che chiamerò *A-* e *B-*emergentismo. L'*A-*emergentismo accetta il “principio di ereditarietà causale”, secondo il quale i nuovi poteri causali che si manifestano ai livelli emergenti della realtà sono ereditati da quelli presenti al livello inferiore. In questo modo esso tenta di colmare il “gap esplicativo” che separa i differenti livelli, garantendo il requisito naturalistico dell'unità del reale. Tuttavia, verrà argomentato, nel far ciò entra in conflitto con quegli argomenti anti-riduzionisti che sembrano motivare la stessa adesione alla prospettiva emergentista. Il *B-*emergentismo, d'altro lato, rifiuta il principio di ereditarietà causale, ma così facendo reintroduce il “gap esplicativo” tra i livelli.

Questa conclusione pessimistica è mitigata da un'ulteriore analisi dei due tipi di emergentismo, incentrata sulla nozione di “proprietà latente” e dalla conseguente proposizione di una nozione di emergenza che attribuisce ai livelli superiori un grado maggiore di realtà rispetto alla loro base.