DRAFT

Emergence, mind and divine action: the hierarchy of the sciences in relation to the human body-brain-mind.

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Summary

The hierarchy of complexity (both synchronic and diachronic) observed by the sciences in the natural world will be interpreted in terms of an 'emergentist monism' which is non-reductive; which attributes an influence of the properties and states of higher levels upon their components; and which, because of such a 'causal' relation, justifies the attribution of reality to higher-level properties and states. It will be proposed that such a metaphysic also applies to the body-brain-mind-society complex of the human person and so warrants the putative reality of reference of mental (and indeed spiritual) terms when applied to human persons ─ as well as providing valuable clues to the nature of divine action.

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Hierarchies of complexity—'emergentist monism'.

'Levels' in a philosophical perspective

The natural and human sciences more and more give us a picture of the world as consisting of a complex hierarchy ─ or more accurately, hierarchies ─ a series of levels of organisation and matter in which each successive member of the series is a whole constituted of parts preceding it in the series[1]. The wholes are organised systems of parts that are dynamically and spatially interrelated — a feature sometimes called a

[1] Conventionally said to run from the ' lower', less complex to the 'higher', more complex systems from parts to wholes so that these wholes themselves constitute parts of more complex entities ─ rather like a series of Russian dolls. In the complex systems I have in mind here, the parts retain their identity and properties as isolated individual entities. So the systems referred to are those which, loosely speaking, were the concern of the first phase of general systems theory. In those systems the parts (or >elements=) of the complex wholes are physical entities (e.g., atoms, molecules, cells) which are either individually stable or which undergo processes of change (as, e.g., in chemical reactions) themselves analysable as being the interchange of stable parts (atoms in that case). The *internal* relations of such elements are not regarded as affected by their incorporation into the system.

'mereological' relation. This feature of the world is now widely recognised to be of significance in relating our knowledge of its various levels of complexity ─ that is, the sciences which correspond to these levels.[2] It also corresponds not only to the world in its present condition but also to the way complex systems have evolved in time out of earlier simpler ones.

OHT/Figure 1

We presume at least this with the 'physicalists': all concrete particulars in the world, including human beings, are constituted of fundamental physical entities of matter/energy. This is a *monistic* view (a constitutively-ontologically reductionist one) that everything can be broken down into whatever physicists deem to constitute matter/energy and that no extra *entities* are to be inserted at higher levels of complexity to account for their properties. However, what is significant about natural processes and about the relation of complex systems to their constituents now is that the concepts needed to describe and understand ─ as indeed also the methods needed to investigate each level in the hierarchy of complexity ─ are specific to and distinctive of those levels. It is very often the case (but not always) that the properties, concepts and explanations used to describe the higher level wholes are not logically reducible to those used to describe their constituent parts, themselves often also constituted of yet smaller entities. This is an epistemological assertion of a non-reductionist kind and its precise implications have been much discussed. With reference to a *particular* system, whose constitutive parts (or 'elements') are stable, it is possible to affirm that there can be 'theory' autonomy in the sense indicated above (that is, the logical and conceptual non-reducibility of predicates, concepts, laws etc. of the theories applied to the higher level) without there being 'process-autonomy' (defined to mean that the processes occurring at the higher level are *more than* an interlocking, in new relations, of the processes in which the constituent parts participate).[3]

[2] See, e.g., Arthur Peacocke, *Theology for a Scientific Age*: *Being and Becoming - Natural, Divine and Human* (Fortress Press, Minneapolis, and SCM Press, London, 1993, 2nd enlarged edit., 1993), pp. 36-43, 214-218, and Figure 1 (based on a scheme of W. Bechtel and A.Abrahamson, in their Figure 8.1 in *Connectionism and the Mind*, Blackwell, Oxford and Cambridge, Mass.,1991).

[3] See A.R. Peacocke, *God and the New Biology* (Dent, London, 1986, repr. Peter Smith,

When the epistemological non-reducibility of properties, concepts and explanations applicable to higher levels of complexity is well-established, their employment in scientific discourse can often, *but not in all cases*, lead to a putative and then to an increasingly confident attribution of reality to that to which the higher level terms refer. Because of widely pervasive reductionist pre-suppositions, there has been a tendency for regard the level of quarks (or whatever physicists currently regard as the basic building blocks of the natural world) as alone being 'real'. However, there have long been good grounds for not affirming any special priority to this level of description. When a variety of independent derivation, identification, or measurement procedures appropriate to a particular level reveal an invariance in the entities discovered at that level, then a 'robustness'[4] can be attributed to the entities postulated and any attempts to regard them as less real than some favoured lower level of' 'reality' is to be resisted From this perspective, there is no sense in which subatomic particles, for example, are to be regarded as 'more real' than, say, a bacterial cell, a living organism or a human person.. New and distinctive kinds of realities at the higher levels of complexity may properly be said to have *emerged.* This can occur with respect either to moving, synchronically, up the ladder of complexity or, diachronically, through cosmic and biological evolutionary history.

'Levels'' in a research perspective

The foregoing argument, given only in outline, for the putative reality , and so 'emergence', of that to which higher-level terms refer has been conducted in the philosophical mode of the debate about reductionism in science. This has concentrated upon the relation between already established theories pertinent to different levels in order to determine if new ontological commitments are warranted with respect to the higher levels or if statements in a higher-level theory can in fact be reduced to those of a lower-level theory (via 'bridge laws'). This way of examining the question of reductionism is less appropriate when the context is that of the biological and social sciences for which knowledge hardly ever resides in theories with distinctive 'laws'. In these sciences, what is sought is more usually a *model* of a complex system which explicates how its components interact to

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Gloucester, Mass., 1994 C henceforth GNB) chs.1, 2 . Whether or not this statement about theory- and process-autonomy applies to the relations *between* distinctive systems is another matter.

[4] W.C.Wimsatt has elaborated criteria of 'robustness' for such attributions of reality to emergent properties at the higher levels: "Robustness, reliability and multiple-determination in science" in *Knowing and validating in the social sciences: a tribute to Donald T.Campbell,* eds.M.Brewer and B.Collins (Jossey-Bass, San Francisco, 1981).

produce the properties and behaviour of the whole system ─ organelle, cell, multi-cellular organism, ecosystem, etc. These models are not presented as sentences involving terms that might be translated into lower-level terms for reduction to be successful but, rather, as visual systems, structures or maps, representing multiple interactions and connecting pathways of causality and influence between entities and processes. In these sciences, what often happens is that investigators in attempting to explain the properties and interactions of a particular system and asking how the parts of the system give it those properties and interactions at that level find that they have to use new terms, sometimes brought in from other scientific disciplines. When the systems are not simply aggregates of similar units, then it can turn out that the behaviour of the system is due principally, sometimes entirely, to the distinctive way its parts are put together ─ which is what models attempt to make clear.. This incorporation into a system constraints the behaviour of the parts and can lead to unexpected and unpredicted behaviour of the systems as a whole. As W.Bechtel and R.C. Richardson[5] have expressed it: "They are *emergent* in that we did not anticipate the properties exhibited by the whole system given what we knew of the parts". They illustrate from a historical examination of the controversies over fermentation and oxidative phosphorylation how the understanding of a system

> "in which the contributions of the parts are recognized, but the organization is understood to generate unanticipated behaviours in the whole system, usually develops later, after those pursuing the more reductionistic path discover that the parts are insufficient to explain the behaviour of the system and turn to examining how the organization of the system might affect the activities of the parts." (p.267)

For example, yeast fermentation of glucose to produce energy transpired to involve a

> "highly orchestrated, interlocking *system* of reactions" (p. 273)…..This functional organization creates a fermentation system at a level of organization which resides above that at which chemical reactions…occur. Fermentation is

[5] William Bechtel and Robert C. Richardson, "Emergent Phenomena and Complex Systemss, in *Emergence or reductionism?* , eds. A.Beckermann, H. Flohr and J.Kim (de Gruyter, Berlin and New York, 1992), p.266, emphasis added (page references in the text are to this article)

thus a distinctive activity of a system at a higher level (p.274)".

An even more striking example is afforded by the case of research into oxidative phosphorylation which could not be understood until a model was developed involving a chemical structure of a special kind (a membrane) without which the process could not occur and structural organization (in mitochondria)turned out to be critical for a cyclic system of reactions to be organised in a particular way.

> "One had to develop new sorts of models, foreign to the lower level. In these models, the processes associated with the lower level were no longer construed to operate as they would in isolation, but were altered by being constrained to operate in a highly structured system. The complexity made possible sorts of phenomena which could not be generated by the components alone or when put together in a simple manner. Moreover, the effects of such structures could not be anticipated simply by knowing the components. This constitutes a sense in which the phenomena in question are *emergent*: they are different in kind from the phenomena that can be generated without the structured system and can only be understood once we understand the structured….. *With emergent phenomena, it is the interactive organization, rather than the component behaviour, that is the critical explanatory feature* (pp. 278,.285, emphasis added).

There are, therefore, good grounds for re-introducing the concept of 'emergence' into our interpretation of naturally occurring, hierarchical ,complex systems constituted of parts which themselves are, at the lowest level, made up of the basic units of the physical world. I shall denote[6] this position as that of *emergentist monism.*

Whole-part influence (or causation)

[6] As does Philip Clayton.. Note that the term 'monism' is emphatically *not* intended (as is apparent from the non-reductive approach adopted here) in the sense in which it is taken to mean that physics will eventually explain everything.

If we do make such an ontological commitment about the reality of the 'emergent' whole of a given total system, the question then arises how one is to explicate the relation between the state of the whole and the behaviour of parts of that system at the micro-level. It transpires that extending and enriching the notion of causality now becomes necessary because of new insights into the way complex systems, in general, and biological ones, in particular, behave.

A more substantial ground for attributing reality to higher level properties and the entities associated with them is any distinctive *causal efficacy* of the complex wholes which have the effect of making the separated, constituent parts behave in ways they would not do if not part of that particular complex system, that is, in the absence of the interactions that constitute that system.. For "to be real, new, and irreducible....must be to have new, irreducible causal powers".[7]

Subtler understanding of how higher levels influence the lower levels allows application in this context of the notion of a 'causal' relation from whole to part (of system to constituent) ─ never ignoring, of course, the 'bottom-up' effects of parts on the wholes which depend on their properties for the parts being what they are. A number of related concepts have in recent years been developed to describe these relations in both synchronic and diachronic systems ─ that is, both those in some kind of steady state with stable characteristic emergent features of the whole and those which display an emergence of new features in the course of time.

The term *'downward-causation'* or *'top-down causation'* was employed by Donald Campbell[8] to denote the way in which the network of an organism's relationships to its environment and its behaviour patterns together determine in the course of time the actual DNA sequences at the molecular level present in an evolved organism ─ even though, from a 'bottom-up' viewpoint of that organism once in existence, a molecular biologist would tend to describe its form and behaviour as a consequence of those same DNA

[7] S.Alexander, as quoted by J.Kim, "Non-Reductivism and Mental Causation", in *Mental Causation*, eds. J.Heil and A.Mele Clarendon Press, Oxford, 1993), p.204.

[8] D. T. Campbell, " 'Downward causation' in Hierarchically Organised Systems", in *Studies in the Philosophy of Biology: reduction and related problems*, eds. F.J.Ayala and T.Dobhzhansky (Macmillan, London, 1974), pp.179-86

sequences. Campbell instances the evolutionary development of efficacious jaws made of suitable proteins in a worker termite. There are imprecisions and a lack of generalisability in Campbell's example and I prefer to use actual complex systems to clarify this suggestion. One could instance, for example, the Bénard phenomenon[9] ─ at a critical point a fluid heated uniformly from below in a containing vessel ceases to manifest the entirely random 'Brownian' motion of its molecules, but displays up and down convective currents in columns of hexagonal cross-section. Moreover certain auto-catalytic reaction systems (e.g., the famous Zhabotinsky reaction and glycolysis in yeast extracts) display spontaneously, often after a time interval from the point when first mixed, rhythmic temporal and spatial patterns the forms of which can even depend on the size of the containing vessel. Indeed H..Morowitz[10] has, in fact, identified some 28 emergent levels in the natural world.

Many examples are now known also of dissipative systems which, because they are open, a long way from equilibrium, and non-linear in certain essential relationships between fluxes and forces, can display large-scale patterns in spite of random motions of the units - — 'order out of chaos', as Prigogine and Stengers dubbed it.[11]

In these examples, the ordinary physico-chemical account of the interactions at the micro-level of description simply cannot account for these phenomena. It is clear that what the parts (molecules and ions, in the Bénard and Zhabotinsky cases) are doing and the patterns they form are what they are *because* of their incorporation into the system-as-a-whole ─in fact these are patterns *within* the systems in question. This is even clearer in the much more complex, and only partly understood, systems of gene switchings on-and-off and their interplay with cell metabolism and specific protein production in the processes of development of biological forms. The parts would not be behaving as observed if they were not parts of that particular system (the 'whole'). The state of the system-as-a-whole is affecting (i.e., acting like a cause) on what the parts, the constituents, actually do. Many other examples of this kind could be taken from the literature on, for example, self-

[9] For a survey with references see A.R.Peacocke, *The Physical Chemistry of Biological Organization* (Clarendon Press, Oxford, 1983, 1989) C henceforth PCBO.
[10] Herbert Morowitz, *Emergence* (Oxford University Press, New York, 2002).

organising and dissipative systems[8] and also economic and social ones[9] .

T.Deacon [12]has usefully categorized emergent levels thus (using his descriptions)s:

I..*First order*..[13] Distribution relationships among microelements determine statistical dynamics that produce the higher-order collective properties. Examples are: the statistical properties of large aggregates of water molecules. These emergent phenomena are typically synchronic.

II. *Second Order*. Spatially distributed re-entrant (i.e., feedback) causality allows microstate variation to amplify and influence macrostate developments with progressive amplification of microstate influences, increasing divergence and decreasing predictability ─ macro-relationships undermine, constrain and bias micro-relationships. Examples are: chemical networks (Zhabotinsky reaction), biochemical cycles (glycolysis), chaotic and self-organising (autopoietic[14]) systems. These emergent phenomena are typically diachronic, developing in time, with symmetry-breaking.

III. *Third order*. Causality is distributed across time as well as space via memory (*i.e* . ,re-presentation of ensemble properties in properties of ensemble elements) with time and progressive amplification of adaptation and with increasing divergence, complexity and self-organization, a 'self-referential self-organization'. The key example is the evolution of living organisms. Third-order emergence inevitably exhibits a developmental and/or evolutionary character and involves both amplification of global influences on parts but also redundant 'sampling' (='natural selection') of these influences. Whereas second-order emergent phenomena exhibit locally and temporally restricted whole-to-part influences, third-order evolutionary emergent phenomena can exhibit amplification of these effects as well.

These three subcategories of emergent phenomena can be arranged into a hierarchy of increasing complexity because higher-order forms are composed of lower-order ones. Because higher-order emergent phenomena are dependent on lower-order ones their probability of formation is substantially lower so that there are vastly more examples of I than of II than of III.

We do not have available for such systems any account of events in terms of temporal, linear chains of causality as previously conceived (A→B→C…) for the term 'causation' has tended to denote simply a regular chain of events (sometimes, too, simply in terms of a Humean conjunction). A wider use of 'causality' and 'causation' is now needed to include the kind of whole-part , higher- to lower-level, relationships that the sciences have themselves recently been discovering in complex systems, especially the biological and neurological ones. Where such causal influence of the whole of a system on its parts occurs, one is justified in attributing reality to those emergent properties and features of the whole system which have those effects.. This understanding accords with the pragmatic attribution, both in ordinary life and scientific investigation, of the term'

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[11] I.Prigogine and I. Stengers, *Order Out of Chaos* (Heinemann, London, 1984).

[12] Terence Deacon, "Three Levels of Emergent {Phenomena", paper presented to the *Science and Spiritual Quest Boston Conference*, October 21-3, 2001.

[13] Somewhat ambiguously ─ in view of the intense philosophical discussion concerning the meaning of the term ─ called 'supervenience' by Deacon since there is a strict correspondence relation between the higher-level and lower-level properties.

[14] N. H. Gregersen , "The Idea of Creation and the Theory of Autopoietic Processes", *Zygon* 33 (1998) 333-

reality' to that which we cannot avoid taking account of in our diagnosis of the course of events, in experience or experiments. Real entities have effects and play irreducible roles in adequate explanations of the world.

Here the term **whole-part influence**, will be used to represent the net effect of all those ways in which a system-as-a-whole, operating from its 'higher' level, is a causal factor in what happens to its constituent parts, the 'lower' level. With arrows representing causal influences, the causal relation between the higher (H) and lower (L) levels in such systems and their succession of states (!, 2, 3…) can be represented thus

H_1 H_2 H_3

L_1 L_2 L_3

OR

H_1 H_2 H_3

L_1 L_2 L_3

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Vertical lines represent the state of the system H composed of L at a particular time. Note that there could be said to be a joint effect of state H with L at any one time on its successor state at a later time.

The mind-brain-body relation and personhood

Much of the discussion of the relation of higher- to lower-levels in hierarchically stratified systems has centred on the mind-brain-body relation, on how mental events are related to neurophysiological ones in the human-brain-in-the-human-body in effect the whole question of human agency and what we mean by it. In this context a hierarchy of levels[15] can also be delineated each of which is the focus of a corresponding scientific study, from neuroanatomy and neurophysiology to psychology. Those involved in studying 'how the brain works' have come to recognise that

> "Properties not found in components of a lower level can emerge from the organization and interaction of these components at a higher level. For example, rhythmic pattern generation in some neural circuits is a property of the circuit, not of isolated pacemaker neurons. Higher brain functions (e.g., perception, attention) may depend on temporally coherent functional units distributed through different maps and nuclei".[16]

So that even an in-principle physicalist, such as Patricia Churchland, can express (with T.J.Sejnowski) the aim of research in cognitive neuroscience thus:

> "The ultimate goal of a unified account does not require that it be a single model that spans all the levels of organisation. Instead the integration will probably consist of a chain of models linking adjacent levels. When one level is

[15] The physical scales of these levels are , according to P.S. Churchland and T..J Sejnowski ("Perspectives in Cognitive Neuroscience" *Science*, 242 (1988) pp. 741-5), as follows : Molecules, 10^{-10}m.; synapses, 10^{-6}m..; neurones, 10^{-4}m.; networks, 10^{-3}m.; maps, 10^{-2}m.; systems, 10^{-1}m.; CNS, 1m., in human beings.

> explained in terms of a lower level this does not mean that the higher level theory is useless or that the high-level phenomena no longer exists. On the contrary, explanations will co-exist at all levels, as they do in chemistry and physics, genetics and embryology."[17]

The still intense philosophical discussion of the mind-brain-body relation has been, broadly, concerned with attempting to elucidate the relation between the 'top' level of human mental experience and the lowest, bodily physical levels. The question of what kind of 'causation', if any, may be said to be operating from a 'top-down', as well as the obvious and generally accepted 'bottom-up', direction is still much debated in this context.[18]

When discussing above the general relation of wholes to constituent parts in a hierarchically stratified complex system of stable parts, I used the term 'whole-part influence'[19] and maintained that a non-reductionist view of the predicates, concepts, laws, etc. applicable to the higher level could be coherent. Reality could, it was argued, putatively be attributable to that to which these non-reducible, higher-level predicates, concepts, laws, etc., applied and these new realities, with their distinctive properties, could be properly called 'emergent'. When this emergentist monist approach is applied to the mental activity of the human-brain-in-the-human-body then, to elucidate its nature "we must look to vernacular ['folk'] psychology and its characteristic intentional idioms of belief, desire, and the rest, and their intentional analogues in systematic psychology".[20] Mental properties are now widely regarded by philosophers as epistemologically irreducible to their physical ones and, in the light of the criteria already discussed, I think they can be described as 'emergent' in the same sense as already applied to complex, non-conscious, systems.

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[16] T.J. Sejnowski, C. Koch and P. Churchland, *Science* 241 (1988) p. 1300.

[17] *Op. cit*., ref. 11`, above, p. 744.

[18] *Q.v.,* for example, the collection of papers in *Mental Causation*, ref. 5, above.

[19] It must be stressed that the 'whole-part' relation is *not* regarded here necessarily, or frequently, as a spatial one. 'Whole-part' is synonymous with 'system-constituent' It must be stressed that the 'whole-part' relation is *not* regarded here necessarily, or frequently, as a spatial one. 'Whole-part' is synonymous with 'system-constituent'.

[20] J. Kim, *op.cit*., ref.5, above, p. 193.

In the mind-brain-body case the idea that mental properties can be 'physically realized' has also been much deployed.[21] in association with the 'non-reductive physicalist' view of the mind-brain issue. This latter view has summarised by J. Kim[22] as follows:

i. *Physical Monism*. All concrete particulars are physical.

ii. *Anti-Reductionism*. Mental properties are not reducible to physical properties.

iii. *The Physical Realisation Thesis.* All mental properties are physically realized; that is, whenever an organism, or system, instantiates a mental property *M*, it has some physical property *P* such that *P* realizes *M* in organisms of its kind.

iv. *Mental Realism*. Mental properties are real properties of objects and events; they are not merely useful.

Kim has argued[23] that, if this concept (which overlaps that of supervenience in many treatments) is taken to mean that a microstructure physically realizes a mental property by being a *sufficient* cause for that property, and if for mental properties to be real is for them to have new, irreducible causal powers, then the non-reductive physicalist is thereby committed to downward causation from the mental to the physical levels. He then argues that, because, in the physicalist perspective there is complete causal closure at the physical level alone, mental properties cannot, in fact, have real causal powers irreducible to physical ones. Hence there is a conflict between the postulate of downward causation (derived from the non-reducibility, and the need for causal efficacy, of the mental) and the physicalist's assumption that a complete physical theory can in principle account for all

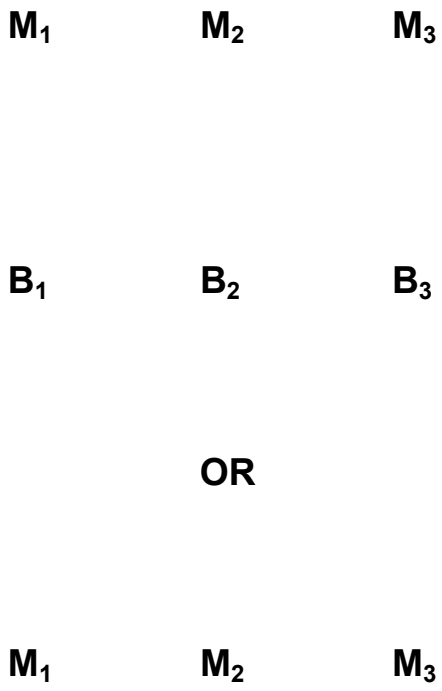
[21] The idea of mental states being 'physically realized' in neurones was expanded as follows by John Searle (in *Minds, Brain and Science*, Cambridge, Mass. Harvard University Press, 1984) p. 26 (emphasis added):

"Consciousness . . . is a real property of the brain that can cause things to happen. My conscious attempt to perform an action such as raising my arm causes the movement of the arm. At the higher level of description, the intention to raise my arm causes the movement of the arm. At the lower level of description, a series of neuron firings starts a chain of events that results in the contraction of the muscles... the same sequence of events has two levels of description. . *Both of them are causally real*, and the higher level-causal features are both caused by and realized in the structure of the lower level elements." What follows in the main text here shows that I am not satisfied with Searle's parallelism between the causality of the mental and physical; it is not enough ─ and I argue later on for a *joint* causality whereby the mental influences the physical level in the brain.

[22] ref..5, above, p. 198.

[23] ref. 5., above, p. 202-5.

phenomena (causal closure). S.D.Crain has succinctly summarised these conclusions of Kim: "... the *non-reductive* physicalist cannot live without downward causation, and the non-reductive *physicalist* cannot live with it."[24] Crain argues (and I agree) that it is Kim's assumption that a physical microstructure in 'physically realizing' a mental property is its *sufficient* cause which leads to the exclusion of any causative role for mental properties. For, in the wider range of physical, biological and other systems previously discussed, the causative effects of the higher levels on the lower ones were real but different in kind from the effects the parts had on each other opermating at the lower level. Hence what happens in these systems at the lower level is the result of the *joint* operation of both higher- and lower-level influences the higher and lower levels could be said to be jointly sufficient, type-different causes of the lower level events. When the higher-lower relation is that of mind/brain-body, it seems to me that similar considerations should apply, represented as follows (where B and M represent, respectively, brain and mental states, successively at times 1, 2, 3…):



[24] Dr Steven D.Crain, in an unpublished paper, kindly made available to me.

B_1 B_2 B_3

Non-reductive physicalists, particularly in their talk of the 'physical realization' of the mental in the physical, hold a much less realistic view of higher level properties than I wish to affirm here ─ and also do not to attribute causal powers to that to which higher level concepts refer.[25]

Up to this point, I have been taking the term 'mind', and its cognate 'mental', to refer to that which is the emergent reality distinctive especially of human beings. But in many wider contexts, not least that of philosophical theology, a more appropriate term for this emergent reality would be 'person', and its cognate 'personal', to represent the total psychosomatic, holistic experience of the human being in all its modalities, conscious and unconscious, rational and emotional, active and passive, individual and social, etc. The concept of personhood recognizes that, as Philip Clayton puts it,

> We have thoughts, wishes and desires that together constitute our character. We express these mental states through our bodies, which are simultaneously our organs of perception and our means of affecting other things and persons in the world ... [the massive literature on theories of personhood] clearly points to the indispensability of embodiedness as the precondition for perception and

[25] . The 'emergentist monism' perspective in the mind-brain context is, moreover, a position distinct from that of 'dual-aspect monism' or 'two-aspect monism', which appear to be purely epistemological assertions, being about how an entity is *viewed* from two different perspectives. Even when the 'two' and 'dual' refer to distinct properties of a single entity, there is not in these terms any implication of a *causal* relation between the 'aspects' (any more than between the wave and particle aspects of the single entity of the electron). Talk of 'two aspects' is not strong enough to include an affirmation that the higher level is real and has causal efficacy.

> action, moral agency, community and freedom ─ all aspects that philosophers take as indispensable to human personhood and that theologians have viewed as part of the *imago dei*.[26]

There is therefore a strong case for designating the highest level, the whole, in that unique system which is the human-brain-in-the-human-body-in-social-relations as that of the 'person'. Persons are *inter alia* causal agents with respect to their own bodies and to the surrounding world (including other persons). They can, moreover, report on aspects of their internal states concomitant with their actions with varying degrees of accuracy.. Hence the exercise of personal *agency* by individuals transpires to be a paradigm case and supreme exemplar of whole-part influence ─ in this case exerted on their own bodies and on the world of their surroundings (including other persons). I conclude that the details of the relation between cerebral neurological activity and consciousness cannot in principle detract from the causal efficacy of the content of the latter on the former and so on behaviour. In other words, 'folk psychology' and the real reference of the language of 'personhood' are both justified and necessary.

Whole-part influence as a model for God's (special, providential)interaction with the world

In a world that is a closed causal nexus, increasingly unravelled by the sciences, how might God be conceived of as influencing particular events, or patterns of events, in the world without interrupting the regularities observed at the levels the sciences study? Initially, let us prescind from any analogy with the mind-brain-body relation or with personal agency. The model I have proposed is based on the recognition that the omniscient God uniquely knows, over all frameworks of reference of time and space, everything that it is possible to know about the state(s) of all-that-is, including the

[26] Philip Clayton, "The Case for Christian Panentheism", *Dialog* 37/3 (Summer 1998), 201-208 (quotation on p.205); see also his *God and Contemporary Science* (Edinburgh University Press, Edinburgh, 1997), ch.4, "Rethinking the Relation of God to the World: Panentheism and the Contribution of Philosophy", in which the nuances in the proposal of panentheism are well spelt-out. Broadly they amount to a stronger form of immanence in which God is seen as in, with and under the very processes of the world almost in a sacramental modality.

interconnectednesss and interdependence of the world's entities, structures and processes. By analogy with the operation of whole-part influence in real systems, the suggestion is that, because the 'ontological gap(s)'between the world and God is/are located simply *everywhere* in space and time, God could affect holistically, the state of the world (the whole in this context). Thence, mediated by the whole-part influences of the world-as-a-whole (as a *System*-of-systems) on its constituents, God could cause particular events and patterns of events to occur which express God's intentions. These latter would not otherwise have happened had God not so intended.

This unitive, holistic effect of God on the world could occur without abrogating[27] any of the laws (regularities) which apply to the levels of the world's constituents by analogy with the exercise of whole-part influence in the natural systems already discussed. Moreover, this action of God on the world may be distinguished from God's universal creative action in that particular intentions of God for particular patterns of events to occur are effected thereby and the patterns could be intended by God in response *inter alia* to human actions or prayers.

The ontological 'interface' at which God must be deemed to be influencing the world is, on this model, that which occurs between God and the totality of the world (= all-that-is), and this, from a panentheistic perception, is within God's own self. What passes across this 'interface', I have also suggested [28], may perhaps be conceived of as a flow of information but one has to admit that, because of the 'ontological gap(s)' between God and the world which must always exist in any theistic model, this is only an attempt at making intelligible that which we can postulate as being the initial effect of God seen from our side of the boundary, as it were.[29] Whether or not this use of the notion of information flow proves helpful in this context, we do need some way of indicating that the effect of God at

[27] *N.B*. The same may be said of *human* agency in the world. Note also that this proposal recognises more explicitly than is usually expressed that the'laws' and regularities which constitute the sciences usually apply only to certain perceived, if ill-defined, levels within the complex hierarchies of nature.

[28] TSA, pp.161,164; CC, pp.274-5, 285. John Polkinghorne has made a similar proposal in terms of the divine input of >active information= (*Scientists as Theologians*, SPCK, London, 1996), p.36-7.

[29] I would not wish to tie the proposed model too tightly to a 'flow of information' interpretation of the mind-brain-body problem.

this, and so at all, levels is that of pattern-shaping in its most general sense. I am encouraged in this kind of exploration by the recognition that the concept of the *Logos*, the Word, of God is usually taken to emphasise God's creative patterning of the world and so God=s self-expression *in* the world.

The panentheistic inter-relations of God and the world and the interaction of God with the world, including humanity, I have attempted to represent in Figure ….[30].

OHT/Figure…

This is a kind of Venn diagram and represents ontological relationships. It has the limitation of being in two planes so that the 'God' label appears dualistically to be (ontologically) outside the world and although this conveys the truth that God is 'more and other' than the world, it cannot represent God's omnipresence in and to the world. This limitation may be surmounted by noting that 'God', in the Figure, is denoted by the (imagined) infinite planar surface of the page *on* which the circle representing the world is printed. For, it is assumed, God is 'more than' the world which is nevertheless 'in' God . The page underlies and supports the circle and its contents, just as God sustains everything in existence and is present to all. So the larger dashed circle, representing the ontological location of God's interaction with all-that-is, really needs a many-dimensional convoluted surface[31] not available on a two-dimensional surface. The point and tail of a double-shafted arrow have been placed at the centre of this circle to signal God's immanent influence and activity *within* the world. The present form of this Figure is meant to stress particularly the many-levelled nature of the human recipients of divine communication.

God as 'personal' agent in the world

I hope the model as described so far has a degree of plausibility in depending on an analogy only with complex natural systems in general and on the way whole-part influence operates in them. It is, however, clearly too impersonal to do justice to the *personal* character of many (but not all) of the profoundest human experiences of God. So there is

[25] The infinity sign represents not infinite space or time, but the infinitely 'more' that God's being encompasses in comparison with that of the everything else.

[31] Recall Augustine's representation of "the whole creation" as if it were "some sponge, huge , but bounded" floating in the" boundless sea" of God, "environing and penetrating it...everywhere and on every

little doubt that it needs to be rendered more cogent by the recognition that, among natural systems, the instance *par excellence* of whole-part influence in a complex system is that of personal agency. Indeed in the previous section (3.3), we could not avoid speaking of God's 'intentions' and implying that, like human persons, God had purposes to be implemented in the world. For if God is going to affect events and patterns of event in the world, we cannot avoid attributing the personal predicates of intentions and purposes to God, inadequate and easily misunderstood as they are. So we have to say that though God is ineffable and ultimately unknowable in essence, yet God 'is at least personal' and personal language attributed to God is less misleading than saying nothing! That being so, we can now legitimately turn to the exemplification of whole-part influence in the mind-brain-body relation as a resource for modelling God's interaction with the world. When we do so the ascendancy of the 'personal' as a category for explicating the wholeness of human agency asserts itself and the traditional, indeed biblical, model of God as in some sense a 'personal' agent in the world is rehabilitated ── but now in a quite different metaphysical, non-dualist framework and coherently with the worldview which the sciences engender.[32]

Conclusion……

side" (*Confessions*, VII.7).

[32] See TSA, pp.160-6, and, more recently, CC ,pp 284-7, for an elaboration of this move and a discussion of the extent to which it is appropriate, if at all, to think of the world as the 'body' of the ultimately transcendent God, who has a panentheistic relation to that same world.