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Whiteheadian Structured Societies as Open-Ended Systems and Open-Ended Systems as Whiteheadian Structured Societies[1]

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1. Introduction

In this essay I explore the notion of an open-ended system, that is, a thought-system which is sufficiently flexible in its mode of operation so as readily to adjust to whatever changes might be simultaneously taking place in a given physical environment or cultural context. The system, in other words, must be intrinsically "self-organizing," "self-unifying" or "self-referential" so as progressively to take into account significant changes in the empirical data under analysis. It cannot, as a result, have as its structural components unchanging principles of Being which apply the same way in every conceivable situation, but rather principles of Becoming or heuristic structures which presuppose an evolutionary or process-oriented understanding of physical reality. It is, for example, in my judgment questionable whether Aristotelian-Thomistic metaphysics with its assumption of the ontological priority of actuality over potentiality is well suited to the explanation of "emergence" in the natural and social sciences. For emergence in the strict sense of the word implies that the emergent reality is more than and to some extent other than its antecedent cause(s).[2] Yet, according to Aristotelian-Thomistic metaphysics, an effect is ontologically dependent upon its antecedent cause(s) for both its existence and its essence or mode of operation.[3] But some metaphysical systems like the process-oriented philosophy of Alfred North Whitehead were conceived with evolution and emergence as already given or a necessary starting-point. Whitehead's key metaphysical categories, namely, "actual entity" and "society," for example, are specifically designed to account for both significant discontinuity from moment to moment and an ongoing continuity of structure and mode of operation in the empirical data under investigation. No metaphysical scheme, to be sure, can expect to survive unchanged over extended periods of time with the same measure of success in every possible new situation. But some thought- systems have a built-in principle of creativity so as better to account for the new and unexpected in the empirical data under analysis.

In any event, this essay will consist in my defense of two interrelated theses. The first is that Whiteheadian structured societies are best understood as open-ended systems akin to those currently being proposed by individuals working in the natural and social sciences. The second is that an open-ended system is best understood in terms of an ongoing interplay of subjectivity and objectivity such as I propose for a Whiteheadian structured society. In

establishing my first thesis I will make reference to the work of the natural scientist Stuart Kauffman in his book *At Home in the Universe* and to the proposal of the evolutionary psychologist David Sloan Wilson in his book *Darwin's Cathedral*. With respect to my second thesis, I contend that the late Niklas Luhmann's theory of social systems with its exclusive emphasis on objectivity to the virtual exclusion of any reference to subjectivity within the workings of his system is upon closer examination curiously inconsistent, at least in its language. The net result of my presentation should be a better understanding of what I mean both by open-ended systems in the natural and social sciences and by Whiteheadian structured societies as equivalently open-ended systems in their normal mode of operation.

2. Stuart Kauffman and self-organizing systems

To begin with Stuart Kauffman's notion of self-organizing systems in Nature, I note first of all that he is a biochemist and founder of the Santa Fe Institute in Santa Fe, New Mexico. In the preface to his book *At Home in the Universe*, he challenges the claim that natural selection is the sole mechanism for biological evolution: "Another source – self-organization – is the root source of order. The order of the biological world, I have come to believe, is not merely tinkered, but arises naturally and spontaneously because of these principles of self-organization – laws of complexity that we are just beginning to uncover and understand."[4] Natural selection, in other words, comes into play only after a certain level of self-organization within the organism has already taken place. At that point, the Darwinian principles of natural selection, namely, phenotypic variation, heritability, and fitness consequences,[5] determine which such novel experiments in self-organization will survive and prosper and which for various reasons (both genetic and environmental) will inevitably fail. Thus only a combination of self-organization and natural selection ultimately explains first the emergence of life from non-life and then the amazing diversity of biological species that have appeared on this planet in the last four billion years.

Kauffman concedes that there is as yet no commonly agreed-upon conceptual framework for conjoining the principle of natural selection with principles of self-organization within Nature.[6] But in *At Home in the Universe* and in a more technically oriented book *Investigations,*[7] he proposes a hypothesis for the way in which self-organization and higher orders of complexity appear not only in the life-world but perhaps even in economic and political systems. Here I simply summarize Kauffman's hypothesis and indicate how it seems to correspond to the way in which Whiteheadian societies originate and continue to evolve in complexity and scope, above all, if they are conceived as ongoing structured fields of activity for their constituent actual entities. If such a comparison be seen as at least plausible, then the conceptual formula for the self-organization of Nature which Kauffman claims is still lacking in the life-sciences might well be at hand in this revised understanding of Whitehead's metaphysics.

Early in his book Kauffman claims: "life is a natural property of complex chemical systems, that when the number of different kinds of molecules in a chemical soup passes a certain threshold, a self-sustaining network of reactions – an autocatalytic metabolism – will suddenly appear."[8] Kauffman, to be sure, bases this conclusion not on direct observation of empirical data, but on a careful study of the results of computer models (Boolean networks) which project the possible outcomes of such molecular interactions.[9] His intention here is, of course, to speed up analysis of what might be a much longer process of trial and error in

Nature on its own. In any event, I now compare Kauffman's comments on complex chemical systems with Whitehead's generic description of a society:

> A nexus [of actual entities] enjoys 'social order' [is a society] where (i) there is a common element of form illustrated in the definiteness of each of its included actual entities, and (ii) this common element of form arises in each member of the nexus by reason of the conditions imposed upon it by its prehension of some other members of the nexus, and (iii) these prehensions impose that condition of reproduction by reason of their inclusion of positive feelings of that common form.[10]

For Whitehead, accordingly, each actual entity is a unique self-constituting subject of experience with its own individual pattern of existence and activity. Yet all the actual entities within the society still have an analogous self-constitution by reason of their common "prehension" [feeling-level grasp] of the pattern proper to the self-constitution of their immediate predecessors in the same society. This common element of form carried over from one set of constituent actual entities to another constitutes their group-identity as a society.

Hence, both self-organizing chemical systems for Kauffman and societies for Whitehead are socially organized realities emergent out of the dynamic interplay of their component parts or members. Where Kauffman and Whitehead differ is in their respective understanding of the objective reality of these systems. In his book *Investigations* Kauffman frequently uses the term "autonomous agents" to describe such self-organizing systems.[11] Whitehead, however, thinks of societies as genetically related groupings of individual subjects of experience with an analogous self-constitution; but, for that same reason, a group has no agency proper to itself as a specifically corporate reality.[12] Kauffman, on the contrary, believes that systems have a corporate reality proper to themselves so that they can exercise agency in their own right. I propose a compromise position. Whiteheadian societies are structured fields of activity for their constituent actual entities from moment to moment. In this sense, akin to Kauffman's notion of systems, they are more than simply aggregates of their components but rather enduring objective realities in their own right. Yet I agree with Whitehead that, while societies or systems are objective realities, they are not autonomous agents in the sense of exercising an agency in independence of their constituent parts or members. The agency of societies or systems is derivative from the combined agencies of their various constituents (e.g., actual entities) working in unison. For example, as a functioning human being I am a byproduct or result of all the individual agencies at work in my body and mind from moment to moment but only because all these individual agencies are organized into a single collective agency so as to give me a sense of being more or less in charge of my own life. Thus I am not a mind using the body for its own purposes, nor am I a body using the mind for its purposes. I am a unitary reality, both mind and body at the same time, exercising agency only in virtue of the collective activity of mind and body working together.

Yet, even if this compromise position between Whiteheadian societies and Kauffman"s self-organizing systems is acceptable, of what practical value is it for understanding the transit from non-life to life? I maintain that with this somewhat revised understanding of a Whiteheadian society, Whiteheadian structured societies, namely, societies composed of sub-societies of actual entities, illustrate from a philosophical perspective how an

autocatalytic metabolism works to produce life from non-life, a living cell from a chemical soup of such molecules. My presupposition here is that Whiteheadian structured societies are organized hierarchically with less complex societies serving as necessary infrastructure for the existence and activity of more complex societies. For example, a Whiteheadian structured society is composed of sub-societies which may or may not involve still other sub-societies of actual entities. The ultimate constituents of a Whiteheadian structured society are thus actual entities, self-constituting subjects of experience, organized into sub-societies. As Ervin Laszlo comments, the same hierarchical ordering is to be found in a systems explanation of the physical world.[13] A living cell is composed of molecules which are themselves made up of atoms with subatomic particles as their components. Then, if one further pursues this correlation between Whiteheadian structured societies and Kauffman's self-organizing systems, a chemical soup of molecules as described by Kauffman is equivalently a set of actual entities or self-constituting subjects of experience that are already grouped into various sub-societies or sub-systems within the soup.

An autocatalytic metabolism takes place when a single such sub-society or sub-system takes on a new mode of operation or in Whiteheadian terms a new "common element of form"[14] in virtue of the way in which its component actual entities are together responding to a change in their external environment. This one sub-society or sub-system will then be different in its mode of operation from the other sub-societies/sub-systems within the soup. If this one sub-society/sub-system with its new common element of form is positively prehended by the actual entities here and now constituent of the other sub-societies/sub-systems so that they in turn incorporate this new pattern of existence and activity into their own individual self-constitution, then all the sub-societies/sub-systems will have changed their previous common element of form and thus will be able to change over time the common element of form for the structured society as a whole. The structured society as a whole will have become a higher-order reality, in this case, a living cell. What starts out as a change in mode of operation or common element of form for just one sub-society/sub-system eventually spreads to the mode of operation of all the other sub-societies or sub – systems within the soup and a living cell results.[15]

All this happens, of course, only because the ultimate constituents of all these sub-societies/ sub-systems are not material atoms governed by strictly mechanistic laws but rather "spiritual atoms," momentary subjects of experience with an inbuilt spontaneity on a purely feeling-level to influence and be influenced by one another and by their common external environment. At the same time, this smooth transit from non-life to life does not always happen. More often than not, the response of the actual entities in all the other sub-societies/sub-systems to the new mode of operation within the one sub-society/sub-system will be negative so that these other sub-societies/sub-systems within the chemical soup equivalently reject this innovation in mode of operation within their midst. As Kauffman comments in terms of his own understanding of an autocatalytic metabolism, "life evolves toward a regime that is poised between order and chaos."[16] It is never certain whether life will prevail over non-life and, if it does prevail, what precise form or structure it will take. But, if it happens, it will have happened in virtue of a principle of self-organization operative within the component sub-societies/sub-systems and not in virtue of some outside agency with an externally imposed plan of operation (as in the case of machines and other humanly contrived tools).

Finally, given that structured societies are Whitehead's generic term not only for inanimate compounds but also for organisms (plants, animals, human beings), even for supra-organic realities like human communities and natural environments, Whitehead as well as Kauffman seems to believe that the same basic laws of self-organization are operative everywhere in the cosmic process. Kauffman, for example, compares the explosion of new species at the beginning of the Cambrian era on earth to the rapid spread of new technologies in the economic sphere and then comments: "I am not an expert on technological evolution; indeed, I am also not an expert on the Cambrian explosion. But the parallels are striking, and it seems worthwhile to consider seriously the possibility that the patterns of branching radiation in biological and technological evolution are governed by similar general laws."[17] For Whitehead, what happens within structured societies on the organic and supra-organic level of existence and activity is only a more complex version of what happens at the inorganic level of atoms and molecules. In every instance, novelty arises within a structured society when a change in the common element of form or particular mode of operation of a single sub-society is extended to all the other sub-societies within the structured society and the new common element of form for the structured society as a whole is sustained and deepened over time.

One should not, of course, over-estimate the similarities between Kauffman's and Whitehead's world view. Kauffman limits his investigation of the laws of self-organization of Nature to interactions at the molecular level whereas Whitehead proposes that actual entities, momentary self-constituting subjects of experience which are dynamically linked together in a society with a common element of form are also the agents of change and evolution at the subatomic and atomic levels of Nature. My point in this first part of my essay, however, is simply to make clear that the notion of a structured society within Whitehead's metaphysics supports Stuart Kauffman's more empirically based hypothesis of self-organizing systems at the molecular level of existence and activity within Nature, and that Kauffman's theory gives some indirect empirical evidence for Whitehead's evolutionary metaphysics, the dynamic relation between actual entities and the societies within which they originate and to which they contribute in terms of a common element of form.

3. David Sloan Wilson and unifying systems in the social sciences

Turning now to David Sloan Wilson's use of systems theory in his well known book *Darwin's Cathedral*, I first note how he sees his own work in the context of contemporary evolutionary psychology. He admits that most of his colleagues in the social sciences deal with groups as collections of basically self-centered individuals, but he himself thinks otherwise: "What is the nature of human society? Is it a collection of self-seeking individuals, or can it be regarded as an organism in its own right?"[18] Wilson believes that at least some groups of human beings include a significant minority or even a majority of individuals who act unselfishly toward one another. Furthermore, such groups of relatively unselfish human beings tend to survive and prosper in a highly competitive world because they have a clear sense of the common good which defines them as a group. Wilson cites Charles Darwin to that effect: "It must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men of the same tribe, yet that an increase in the number of well-endowed men and

advancement in the standard of morality will certainly give an immense advantage to one tribe over another."[19] Sloan Wilson's point here, in thus citing Darwin on the advantages of altruistic behavior among members of a human group for their continued well-being, is to show the importance of morality and by implication of religion as the guardian of moral values for group survival and prosperity in competition with other groups of human beings. Along the way, however, he talks about human groups as "adaptive units" and "unifying systems," thereby implying that groups have an objective identity over and above the particular identity of the different members of the group. It is this admittedly secondary issue in Sloan Wilson's overall project that I wish to address. For, Sloan Wilson's notion of unifying systems likewise bears in my judgment a strong resemblance to Whiteheadian structured societies (above all, if a Whiteheadian society be understood as an enduring structured field of activity for its constituent actual entities rather than simply as an aggregate of such actual entities) and Whiteheadian structured societies, in turn, confirm from a strictly metaphysical perspective Sloan Wilson's more empirically oriented understanding of how unifying systems within human society work.

For example, in Sloan Wilson"s judgment a group can be defined as this group rather than another because they all share a single trait, regularly participate in a common activity:

> My bowling group is the people with whom I bowl, my study group is the people with whom I study, my platoon is the group of people with whom I fight, my nation is the group of people who share the same laws, my church is the group of people with whom I worship. All of these groups are defined in terms of the individuals who interact with respect to a given activity. There is an infinite variety of groups, but only when we consider an infinite variety of activities. For any particular activity, there is a single appropriate grouping.[20]

As Wilson sees it, the evolution of a group (as opposed to the evolution of individuals within the group) can only be assessed in terms of this single trait or activity and how it was possessed or exercised amid various external changes over an extended period of time. Compare this understanding of how a group is defined with Whitehead's definition of a society:

> The common element of form is simply a complex eternal object [pattern or structure] exemplified in each member of the nexus [society]. But the social order of the nexus is not the mere fact of this common form exhibited by all its members. The reproduction of the common form throughout the nexus is due to the genetic relations of the members of the nexus among each other, and to the additional fact that genetic relations include feelings of the common form. Thus the defining characteristic is inherited throughout the nexus, each member deriving it from those other members of the nexus which are antecedent to its own concrescence [self-constitution].[21]

In more common sense language, what Whitehead is claiming is that the constituent actual entities of the society feel their affinity with one another in terms of an intuitive grasp [prehension] of a common trait which all of them recognize as specific to themselves as this society rather than some other society. That trait may evolve or change character with the passage of time as new actual entities arise and currently existing members cease to exist. But the society still has a "defining characteristic" or common trait which clearly marks it out as this society rather than another.

Thus Whitehead's concept of a society seems to correspond to Wilson's claim that every group should be defined by the possession of a common trait or specific pattern of existence and activity. Furthermore, if, as Whitehead proposes, actual entities are "the final real things of which the world is made up,"[22] and if actual entities instinctively aggregate into societies at all levels of existence and activity within Nature, then unifying systems, as Wilson proposes, are operative everywhere that human beings find things that endure. All organisms and possibly even inanimate things are in the end groupings of components that work together in harmonious fashion. As Wilson comments, upon closer inspection organisms turn out to be social entities, an organized set of individual components or members, all of whom contribute in their own way to a higher-order unity and value.[23] Hence, Whitehead's notion of society provides a philosophical explanation for the way in which Wilson's unifying systems come into existence and survive over time. Like the human beings within a unifying system for Wilson, all the actual entities in a given society somehow recognize the single trait that marks them out as this society rather than another. They are not a society simply because of spatial proximity to one another or because they all exist at the same time in cosmic history. They constitute a society because consciously or more often unconsciously they "feel" an affinity for one another and "want" to sustain it.

I put "feel" and "want" in parentheses to indicate that actual entities for Whitehead do not necessarily possess self-consciousness or exercise intentionality toward one another. But they are still at every level of existence and activity within Nature subjects of experience in dynamic interrelation. For, there is really no other way to claim that components of Whiteheadian societies "feel" an attraction to or dislike for one another. Wilson, to be sure, does not make that further metaphysical claim since his focus is on unifying systems within human society. But, insofar as he wishes to extend the notion of unifying systems or adaptive units to non-human groups of organisms and possibly even to molecules in the transit from non-life to life,[24] he is equivalently postulating the existence of some limited form of subjectivity or spontaneity at all the different levels of existence and activity within Nature. In any case, Sloan Wilson is clearly opposed to a purely reductionist approach to group survival and reproduction in which random genetic mutations or inherited cultural norms unilaterally determine human group behavior. "Confront a human group with a novel problem, even one that never existed in the so-called ancestral environment, and its members may well come up with a workable solution. The solution might be based on trial and error or on rational thought. Confront many human groups with the same novel problem and they will come up with different solutions, some much better than others. If the groups are isolated from each other, they may never converge on the best solution; evolution is not such a deterministic process."[25] For Sloan Wilson, then, cultural evolution is "genuinely open-ended in its outcome."[26]

There are parallels here with Whitehead's claim that "creativity" is at work among actual entities at all levels of existence and activity within Nature. As he sees it, creativity empowers actual entities as self-constituting subjects of experience to make themselves to be what they are in virtue of their individual appropriation of the common element of form proper to the society of which they are the latest members. This evidently rules out any form of strict determinism within Whiteheadian societies. At the same time, the self-constitution of any given actual entity is not simply a matter of chance. The actual entities within a

society must in some measure conform to the pattern of co-existence and activity which their predecessor actual entities in the same society already established by their dynamic interrelation. Yet, as Whitehead also insists, each actual entity has an individual self-identity; it is never fully identical with its contemporaries within the society.[27] So Wilson's presupposition of a trial-and-error approach to the origin and growth of unifying systems certainly makes sense in light of the way that creativity works within Whitehead's metaphysical scheme.

There is, of course, a major point of difference between Whitehead and Sloan Wilson on the issue of the objective reality of a society, on the one hand, and a unifying system on the other hand. If actual entities are really different from one another even within the same society and, above all if, as we have already noted, societies do not exercise agency except in and through their constituent actual entities, then Whiteheadian societies and Sloan Wilson's unifying systems seem to be at best superficially the same. Much like Stuart Kauffman with his notion of self-organizing systems, Wilson claims that unifying systems are higher-order ontological realities existing in their own right and exercising some measure of control over their component parts or members. An affinity between Whiteheadian societies and Wilson's unifying systems, however, can be still asserted if one also accepts my modification of Whitehead's notion of society as a structured field of activity for its constituent actual entities. For, in that case, Whiteheadian societies do have an objective reality over and above the interplay of their constituent actual entities from moment to moment. Furthermore, the society does exercise a collective agency which is indeed derivative from the individual agencies of all its constituent actual entities, yet which still allows the society to exercise the equivalent of an agency in its own right. This is especially the case with Whiteheadian structured societies in which there exists a privileged "nexus" within the structured society which is "regnant" over all the other sub-societies, but only in the interests of the structured society as a whole.

That is, for Whitehead structured societies are composed not only of subordinate societies but of subordinate "nexuses" as well.[28] Sub-societies enjoy a certain independence of the structured society within which they here and now exist since they are societies in their own right; they sustain a common element of form or defining characteristic even apart from participation in the structured society. An example of a sub-society would be a molecule within a cell; it would still be a molecule of a certain type even apart from participation in the life of the cell. But a nexus, especially an "entirely living nexus" which shows a high degree of originality in the succession of its constituent actual entities cannot for that same reason sustain a defining characteristic or common element of form apart from the support of the sub-societies of non-living actual entities within the structured society as a whole.[29] What Whitehead evidently has in mind here with an "entirely living nexus" of actual entities is what Aristotle called the "soul" or the life-principle of the body but with one key difference. For Aristotle, the soul was an immaterial reality, an intelligible form or essence, which is the actuality of the body as a material entity.[30] For Whitehead, the entirely living nexus within a structured society is different only in degree of originality, not in kind, from the other sub–societies within the structured society. All actual entities, after all, have a psychic as well as a physical reality.[31] The only difference between them is whether and to what degree the psychic dimension or the physical dimension has priority over its counterpart.

In either case, however, the entirely living nexus and all the non-living sub-societies within a structured society together constitute a unified collective activity for the maintenance of the structured society as a whole so that it can exercise an agency proper to itself as a specifically corporate reality. Put once more in common sense language, as a human being I exercise an agency derivative from all the individual agencies at work in my mind and body at every moment. I am not an immaterial soul imprisoned for the moment in a material body. Nor am I a body with a mind as a tool for its own purposes. I am a unified soul/body reality in virtue of all the agencies, both physical and mental, at work within me at every moment. So understood, a Whiteheadian structured society seems to correspond nicely with David Sloan Wilson's notion of a unifying system or adaptive unit in *Darwin's Cathedral*. Likewise, the notion of Whiteheadian structured societies seems to confirm Sloan Wilson's further claim that groups of organisms often function like higher-order individual organisms[32] and that individual organisms have themselves evolved from "social groups of past ages which have become so functionally integrated that we see the whole more than the parts"[33]

4. Niklas Luhmann and self-referential systems

In the final part of this essay I offer a critique of the late Niklas Luhmann's understanding of social systems as purely objective, that is, as devoid of subjectivity in their internal workings. I argue on the contrary that, if subjectivity and objectivity intrinsically condition one another within a Whiteheadian structured society, and if there is a structural affinity between a Whiteheadian structured society and what Luhmann calls a "self-referential system, then *pace* Luhmann subjectivity in some form or another must be present in these self-referential systems which he regards as the basic paradigm for social systems. In 1984 Luhmann published a comprehensive outline of his systems theory in *Soziale Systeme* (*Social Systems*). As Eva Knodt comments in the Foreword to the English translation:

> Luhmann lays out a theoretical groundwork which subsequently provides a frame for a description of modern society as a complex system of communications that has differentiated itself horizontally into a network of interconnected social subsystems. Each of these systems reproduces itself recursively on the basis of its own, system-specific operations. Each of them observes itself and its environment, but whatever they observe is marked by their unique perspective, by the selectivity of the particular distinctions they use for their observations. There is no longer an Archimedian point from which this network could be connected in an all-embracing vision.[34]

Thus metaphysics precisely as such an all-embracing vision of reality plays no role in Luhmann's analysis of the operations of systems. Likewise, for him human subjectivity and any other forms of subjectivity or spontaneity within Nature are reduced to being no more than the *sine qua non* conditions for the operation of an objective system.[35]

Yet within Luhmann's systems theory interdependence among separate systems seems to be taken for granted. Each system, to be sure, operates according to its own internal rules and thus is not directly affected in its operation by the existence and activity of other systems in its environment.. But Luhmann also allows for "structural coupling": "a state in which two

systems shape the environment of each other in such a way that each depends on the other for continuing its *autopoiesis* [self-constitution] and increasing its structural complexity.[36] Key here is Luhmann's antecedent understanding of self-referential systems: "systems that have the ability to establish relations with themselves and to differentiate those relations from relations to their environment."[37] As I shall indicate shortly, such a definition of self-referential systems likewise seems to hold for a Whiteheadian society, provided that the society be understood as an objective structured field of activity for its constituent actual entities from moment to moment. Luhmann, of course, would strongly object to this comparison between a Whiteheadian society and his own notion of a self-referential system since the latter is "non-psychic."[38] That is, its components are "elements" with purely objective relations to one another in virtue of the structure of the system.[39] They are not momentary subjects of experience with "internal" relations to one another.[40] But can a system be *self*-referential without reference to subjectivity as exercised either by the system as a whole or, as in the case of Whiteheadian societies, by its constituent actual entities in their internal relations to one another? Luhmann, for example, states: "systems must create and employ a description of themselves; they must be able to use the difference between system and environment within themselves, for orientation and as a principle for creating information."[41] Yet can a system as a purely objective reality "create and employ" a description of itself so as to orient itself vis-à-vis other systems and thereby to generate information?

For Luhmann there are indeed "psychic systems" which co-exist along with other social systems (organisms, machines, etc.) within the overall ambit of systems theory.[42] Likewise, the ongoing co-existence of psychic systems demands a new kind of social system (communication systems) to determine the boundaries between psychic systems. As internally organized self-referential systems, psychic systems cannot determine their proper boundaries vis-à-vis one another.[43] A higher-order system (a communication system) must come into play to regulate this "indeterminability" among psychic systems.[44] Yet Luhmann is adamant that the concept of "subject" as used by Immanuel Kant and others should be replaced by the concept of self-referential system:. "Selection can no longer be conceived as carried out by a subject, as analogous with action. It is a subjectless event, an operation that is triggered by establishing a difference."[45] But he then adds: "Difference does not determine what must be selected, only that a selection must be made. Above all, the system/environment difference seems to be what obliges the system to force itself through its own complexity, to make selections."[46] Once again, the language of subjectivity is unmistakably present: the system/environment difference somehow "obliges the system to force itself to make selections." How does a system lacking in subjectivity make such a selection?

In his book *Luhmann Explained,* Hans Georg Moeller makes clear that Luhmann does not deny the de facto reality of human beings but only claims that human beings exist on several levels at once (bodily, mentally, socially) and that these levels as autonomous self-referential systems do not make up an organic whole.[47] Generalizing even further, Moeller argues that for Luhmann "[r]eality is not an all-embracing whole of many parts, it is rather a variety of self-producing systemic realities, each of which forms the environment of all the others. There is no common 'world' because reality is in each instance an effect of individual systemic autopoieses."[48] Luhmann consciously borrowed the term *autopoiesis*

from his analysis of the work of Humberto Maturana and Francisco Varela, two biologists from Chile who applied systems theory to the study of biological reproduction, the way in which living cells are from moment to moment the product of their own internal processes of reproduction.[49] But, whereas subjectivity would seem to be presupposed in the reproductive process of living cells, for Luhmann it is not present in self-referential systems. Hence, even if one concedes the usefulness of general systems theory as a methodology for objective analysis and comparison of otherwise loosely connected scientific disciplines, does it from a philosophical perspective offer anything more than a fragmented understanding both of human nature and of the workings of Nature as a cosmic process?

I turn now to a comparison of Luhmann's notion of a self-referential system with my own modified understanding of a Whiteheadian structured society. As already noted, Luhmann claims that social systems are invariably self-referential systems, namely, "systems that have the ability to establish relations with themselves and to differentiate these relations from relations with their environment."[50] In *Process and Reality* Whitehead seems to say approximately the same thing about the way in which a society is internally organized: "Thus in a society, the members can only exist by reason of the laws which dominate the society, and the laws only come into being by reason of the analogous characters of the members of the society."[51] Just as in Luhmann's notion of a self-referential system, therefore, a Whiteheadian society seems to be self-referential. There is an ongoing dynamic exchange between its constituent actual entities and the laws or objective structure of the society to which they belong so that each society in virtue of its own internal mode of operation is objectively somewhat different from other societies of actual entities in its environment. Where Luhmann and Whitehead differ in their respective description of the constituents of a system or society is that for Luhmann the "elements" which constitute the system are purely objective. They have no value in themselves apart from the system: "the unity of an element (e.g., an action in an action system) is not ontically pregiven. Instead the element is constituted as a unity only by the system that enlists it as an element to use in its relations."[52] For Whitehead, on the contrary, the constituent actual entities are ontological realities in their own right; in Whitehead's view, they are "the final real things of which the world is made up" quite apart from their belonging to any given society.[53]

But precisely here is where Whitehead may have erred in putting too much emphasis on the role of individual subjectivity in the makeup of a society.. In giving constituent actual entities an ontological reality distinct from the society to which they belong,[54] Whitehead seems to have reduced the ontological status of the society to that of a genetically linked aggregate of analogously constituted actual entities. Yet an aggregate of constituents, however closely connected, does not correspond to what Luhmann has in mind with a self-referential system determining its own mode of operation vis-à-vis other systems. Here, however, is where my redefinition of a Whiteheadian society as an objectively structured field of activity for successive generations of actual entities (momentary self-constituting subjects of experience) could possibly bridge that difference by way of a compromise position. If a Whiteheadian society has an enduring objective reality as a structured field of activity for its constituent actual entities in their dynamic interplay from moment to moment, this allows for the objectivity which Luhmann so highly prizes and at the same

time grants to the elements of the system in question a subjectivity or innate power of self-constitution on which Whitehead insists.

That is, just as in Luhmann's understanding of systems and their elements, in my interpretation of Whiteheadian societies there is clear top-down causality from the common element of form of the society upon its constituent actual entities in their individual self-constitution from moment to moment. But whereas Luhmann, given his focus on objectivity, basically ignores the supporting role of individual elements in the formation of a system's governing structure, I agree here with Whitehead in his insistence that the origin and maintenance of the governing structure of the society comes from the ongoing interrelated activity of its constituents, namely, actual entities as momentary self-constituting subjects of experience. Thus, whereas Whitehead in his understanding of a society focuses exclusively on the efficient causality of constituent actual entities in shaping their common element of form as a society, and while Luhmann emphasizes the formal or informational causality of the governing structure of the system in organizing its various elements, I choose the middle path in my claim that a Whiteheadian society and a self-referential system for Luhmann should be considered as constituted in equal measure by bottom-up causality and by top-down causality. In this way, there is a suitable combination of subjectivity and objectivity in producing the functional unity of either a Whiteheadian society or a self-referential system for Luhmann.

Still another feature of a self-referential system as described by Luhmann in *Social Systems* is to be found in his notion of system differentiation: "System differentiation is nothing more than the repetition of system formation within systems. Further system/environmental differences can be differentiated within systems. The entire system then acquires the function of an 'internal environment' for these subsystems, indeed for each subsystem in its own specific way."[55] This can be usefully compared with Whitehead's concept of a structured society, a society "which includes subordinate societies and nexuses with a definite pattern of structural interrelations. A structured society as a whole provides a favorable environment for the subordinate societies which it harbors within itself. Also the whole society must be set in a wider environment permissive of its continuance."[56] Luhmann's notion of system differentiation and Whitehead's understanding of structured societies, however, are brought into even closer conceptual alignment if one thinks of both Whiteheadian societies and Luhmann's self-rerferential systems in terms of structured fields of activity for their constituents (actual entities or elements). Physical reality, in other words, is best seen in terms of fields within fields. The term "field,"of course, is an analogous rather than a univocal concept. That is, it can be applied to different contexts with somewhat different results as a consequence of a particular mode of operation. A gravitational field between two planets in the solar system has a different mode of operation than an environmental field in its mode of operation with respect to the plants and animals living within it. Yet in both cases the field (Whiteheadian society or self-referential system) possesses an internal unity and thus has an individual identity by reason of the ongoing interplay of its constituent parts or members (its constituent actual entities/objective elements). Likewise, in both cases the field in question normally serves as part of the infra-structure of still other more comprehensive fields of existence and activity for entities within the overall system of Nature.

5. Conclusion

In this essay I have tried to vindicate the notion of an open-ended system in two ways. In the first place, I set forth my hypothesis that Whiteheadian societies, above all structured societies, are open-ended systems. That is, the system itself contains structural elements or components (actual entities, momentary self-constituting subjects of experience) that are applicable to an ever-expanding range of empirical data to be found in the natural and social sciences. The cognitive system, therefore, can easily adjust to a new situation, an altered physical environment, without damage to the integrity of its underlying world view or metaphysical vision. Secondly, I have proposed that the notion of self-organizing, unifying or self-referential systems as used by Stuart Kauffman, David Sloan Wilson and Niklas Luhmann respectively in the elaboration of their more empirically oriented theories in the natural and social sciences can be usefully compared with the notion of a Whiteheadian structured society as a strictly metaphysical or trans-empirical concept so as to gain a broader philosophical understanding of what is going on in the world of Nature and within the human mind on a day-to-day basis.

Such a comprehensive vision of reality, to be sure, has always been the goal of metaphysical systems in Western civilization from ancient times until the present moment. But, if the notion of a Whiteheadian society (above all, a structured society) does qualify as the master metaphor or governing concept within an evolutionary understanding of reality, then what has traditionally been meant by metaphysics as an academic discipline has undergone a subtle but quite significant change. That is, if the structural elements of the metaphysical system are no longer to be regarded as unchanging principles of Being but rather as principles of Becoming, namely, indeterminate heuristic structures for the organization and analysis of empirical data, then the traditional meaning and value of metaphysics as an academic discipline has been transformed. Metaphysics is then not the systematic articulation of the way "things" are apart from the workings of the human mind, but rather a model or imperfect representation of repetitive patterns of existence and activity within various processes in an event- oriented rather than a thing-oriented world.

In effect, then, metaphysical systems should be seen in the same light as models or paradigms in the natural and social sciences: that is, "abstract symbol systems which inadequately and selectively represent particular aspects of the world for specific purposes."[57] Metaphysical systems are, however, for that reason not to be considered simply as fictional or purely contrived imaginative schemes. As Ian Barbour in his book *Religion and Science* comments about the use of models or paradigms in both religion and science, they "are to be taken seriously but not literally; they are neither literal pictures nor useful fictions but limited and inadequate ways of imagining what is not [directly] observable. They make tentative ontological claims that there are entities in the world something like those produced in the models."[58] This is also what Alfred North Whitehead seems to have had in mind with the following comment in the opening chapter of *Process and Reality:*

> Rationalism never shakes off its status of an experimental adventure. The combined influences of mathematics and religion, which have so greatly contributed to the rise of philosophy, have also had the unfortunate effect of yoking it with static dogmatism. Rationalism is an adventure in the clarification of thought, progressive and never final. But it is an adventure in which even partial success has importance.[59]

6. References

[1] This essay summarizes material more fully explained in my new book *Does God Roll Dice?* recently published by Liturgical Press in Collegeville, Minnesota.

[2] Philip Clayton, *Mind and Emergence: From Quantum to Consciousness* (Oxfors, UK: Oxford University Press, 2004), 39: "emergence is the theory that cosmic evolution repeatedly includes unpredictable, irreducible, and novel appearances." Clayton concedes that many natural scientists still favor "weak" emergence which is reductively ontological physicalism, the belief that "all that exists in the space-time world are the basic particles recognized by physics and their aggregates" (4). He himself is committed to "strong" emergence which allows for top-down as well as bottom-up causation for the explanation of progressively more complex levels of existence and activity within the cosmic process (31-32).

[3] See, e.g., Aristotle, *Metaphysics,* 1013a: in *The Basic Works of Aristotle*, ed Richard McKeon (New York: Random House, 1941); sancti Thomae Aquinatis, *Summa Theologiae* (Madrid, Spain: Bibliotheca de Autores Cristianos, 1951), I, Q. 2, art. 3 resp.

[4] Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity* (New York: Oxford University Press, 1995), vii

[5] Charles Darwin, *The descent of man and selection in relation to sex* (New York: Appleton, 1871), 166.

[6] Kauffman, *At Home in the Universe*, 8.

[7] Stuart Kauffman, *Investigations* (New York: Oxford University Press, 2000).

[8] Kauffman, *At Home in the Universe*, 47.

[9] Ibid., 75-86, 99-111.

[10] Alfred North Whitehead, *Process and Reality:An Essay in Cosmology*, Corrected Edition, eds. David Ray Griffin and Donald W. Sherburne (New York: Free Press, 1978), 34.

[11] Kauffman, *Investigations,* 3-4. 8, 29, 68-73.105, 120, 128-129, etc.

[12] Whitehead, *Process and Reality*, 35: "Thus the ultimate metaphysical truth is atomism. The creatures are atomic." See, however, Alfred North Whitehead, *Adventures of Ideas* (New York: Macmillan, 1967), 204: "A society has an essential character, whereby it is the society that it is, and it has also accidental qualities which vary as circumstances alter. Thus a society, as a complete existence and as retaining the same metaphysical status, enjoys a history expressing its changing reactions to changing circumstances." Whitehead then adds in a footnote: "This notion of 'society' has analogies to Descartes' notion of 'substance.'" But he never spells out in detail how a society is simultaneously "a complete existence" and still different from the notion of substance in classical metaphysics.

[13] Cf., e.g., Ervin Laszlo, *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought* (London: Gordon and Breach, 1972), 47-53.

[14] Whitehead, *Process and Reality*, 34.

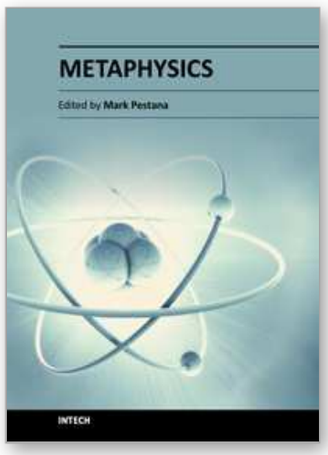
[15] For a more detailed analysis of how such an autocatalytic mechanism works within a Whiteheadian structured society, see Joseph A. Bracken, *Subjectivity, Objectivity and Intersubjectivity: A New Paradigm for Religion and Science* (West Conshohocken, PA: Templeton Foundation Press, 2008), 144-148.

[16] Kauffman, *At Home in the Universe*, 26; see also Bracken, *Subjectivity, Objectivity and Intersubjectivity,* 149: "The constituent actual occasions [actual entities] by their dynamic interrelation at any given moment account for the unexpected emergence

of novelty. But the society as the context or field of activity within which the actual occasions arise and to which they contribute their momentary pattern of interrelation changes in its overall structure much more slowly."

[17] Kauffman, *At Home in the Universe*, 205.
[18] David Sloan Wilson, *Darwin's Cathedral: Evolution, Religion and the Nature of Society* (Chicago, IL: University of Chicago Press, 2003), 2.
[19] Ibid., 9. See also Charles Darwin, *The descent of man and selection in relation to sex* (New York: Appleton, 1871), 166.
[20] Sloan Wilson, *Darwin's Cathedral*, 15-16.
[21] Whitehead, *Process and Reality*, 34.
[22] Ibid., 18.
[23] Sloan Wilson, *Darwin's Cathedral*, 18.
[24] Ibid., 17.
[25] Ibid., 31.
[26] Ibid.
[27] Whitehead, *Process and Reality*, 22-23.
[28] Ibid., 103.
[29] Ibid.
[30] Aristotle, *On the Soul*, Bk. II, Chap. 1 (412a): in *The Basic Works of Aristotle*, ed. Richard McKeon (New York: Random House, 1941).
[31] Whitehead, *Process and Reality*, 177-178 where Whitehead distinguishes various grades of actual entities, depending upon their complexity and degree of originality.
[32] Sloan Wilson, *Darwin's Cathedral,* 17.
[33] Ibid., 37.
[34] Niklas Luhmann, *Social Systems,* trans. John Bednarz, Jr., with Dirk Baecker (Stanford, CA: Stanford University Press, 1995), xii.
[35] Hans-Georg Moeller, *Luhmann Explained: From Souls to Systems* (Chicago, IL: Open Court, 2006), 8.
[36] Ibid., 19. See also Luhmann, *Social Systems*, 222-223.
[37] Luhmann, *Social Systems*, 13.
[38] Ibid., 14.
[39] Ibid., 20-23.
[40] Whitehead, *Process and Reality*, 58-59.
[41] Luhmann, Social *Systems, 93.*
[42] Ibid., 2.
[43] Ibid., 28-29.
[44] Ibid., 29.
[45] Ibid., 32.
[46] Ibid.
[47] Moeller, *Luhmann Explained*, 10.
[48] Ibid., 14.
[49] Ibid., 12-13.
[50] Luhmann, *Social Systems*, 13.
[51] Whitehead, *Process and Reality*, 91.
[52] Luhmann, *Social Systems*, 22.
[53] Whitehead, *Process and Reality, 18.*

[54] Ibid., 22-23.
[55] Luhmann, *Social Systems*, 18.
[56] Whitehead, *Process and Reality*, 99.
[57] Ian G. Barbour, *Religion and Science: Historical and Contemporary Issues* (San Francisco, CA: Harper San Francisco, 1997), ll7.
[58] Ibid.
[59] Whitehead, *Process and Reality, 9.*



Metaphysics

Edited by Dr. Mark Pestana

ISBN 978-953-51-0646-3
Hard cover, 148 pages
Publisher InTech
Published online 13, June, 2012
Published in print edition June, 2012

It is our hope that this collection will give readers a sense of the type of metaphysical investigations that are now being carried out by thinkers in the Western nations. We also hope that the reader's curiosity will be peaked so that further inquiry will follow.

How to reference

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Joseph A. Bracken (2012). Whiteheadian Structured Societies as Open-Ended Systems and Open-Ended Systems as Whiteheadian Structured Societies, Metaphysics, Dr. Mark Pestana (Ed.), ISBN: 978-953-51-0646-3, InTech, Available from: http://www.intechopen.com/books/metaphysics/whiteheadian-structured-societies-as-open-ended-systems-and-open-ended-systems-as-whiteheadian-s

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