

THE STRUCTURE OF REALITY: AN EMERGENT HIERARCHY OF AUTONOMOUS LEVELS?

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ABSTRACT

This paper starts with a question: is the structure of reality a hierarchy of autonomous levels emerging from the increasing complexity of matter through evolution? I will critique this deeply held conviction in the field of systems science, and I will argue that a different world-image is possible. Indeed, I will suggest that my alternative world-image is a more accurate depiction of the structure of the universe. My argument will be unfolded in five parts. First, I will claim that the forerunners of the idea of emergent levels can be found in the British emergentist movement of the 1920s (Alexander 1920; Morgan 1923). Second, I will argue that the idea of hierarchical levels first entered the biological world in the early 1930s (via the work of von Bertalanffy 1928 [1933]) and was later in the 1950s extended to the rest of the cosmos (Bertalanffy 1949 [1953]; Boulding 1956). Third, that the ideas of a ‘hierarchical order’ and ‘general systemology’ could have been suggested to Bertalanffy by Hartmann’s early “theory of categories” (1923, 1926). Fourth, I will introduce Hartmann’s “theory of fundamental categories” (1940), which is devoted to the structure of reality. Finally, in contrast to these ideas, I will argue for a structure of the universe that is not constituted by an emergent hierarchy of autonomous levels at all.

Keywords: emergence, hierarchy, ontology, systems philosophy, systems science

1. INTRODUCTION

The rationale for this article is simple: the domains of science should be dictated by the boundaries of reality, not arbitrary disciplinary boundaries; and systems philosophy needs to provide systems science with a defensible depiction of the structure of the universe that explains the conditions of possibility for the boundaries of reality.

Nowadays, however, we are in a very different situation: the boundaries of reality have been dictated by the disciplinary domains of science: in particular, the natural sciences study the natural world and the social sciences the social world, which represents an unsystemic splitting of our single universe. Furthermore, a domain-specific theory of evolution originating from the discipline of Biology has been generalized to the whole universe, such that the boundaries of reality are now believed to have emerged out of the increasing complexity of matter through evolution. This is because we are lacking a clear demarcation between science and philosophy, so we don’t know exactly who should answer questions about the conditions of possibility for the boundaries of reality.

I suggest that the following is an appropriate systems-philosophical research question: *how is the structure of the universe possible?* In this question I am assuming that the universe has an intrinsic structure, and I am asking for an explanation of something that is already the case but for which we are lacking a plausible answer. So instead of prescribing a scientific explanation (especially one that has been generalized to the whole universe from a single discipline), we need to give philosophy a chance to discover the conditions of possibility of the actual structure of reality. And only after that inquiry we will realize that the structure of the universe doesn't mimic the split between the natural and the social sciences. Also we will find that organicism only applies to the biological world, but not to the rest of the cosmos.

Regarding the structure of this paper, I will unfold the argument in five parts. I will start by introducing the British emergentists (Alexander 1920; Morgan 1923) who portray the universe as emergent levels coming out of the increasing complexity of matter. Second, we will see how the idea of hierarchical levels first entered the biological world (via the work of von Bertalanffy 1928) and was later extended to the rest of the cosmos (Bertalanffy 1948; Boulding 1956). Third, I will argue that both the ideas of 'hierarchical order' and 'general systemology' may have been suggested to von Bertalanffy by Hartmann's (1923, 1926) early "theory of categories". Fourth, I will introduce Hartmann's "theory of fundamental categories" (1940), which is devoted to the structure of reality. Fifth, and finally, in contrast to all these ideas, I will argue for a structure of the universe that is not actually constituted by an emergent hierarchy of autonomous levels at all.

2. BRITISH EMERGENTISM: EMERGENT LEVELS

I suggest that the first explicit fight against reductionism in the 20th Century (reductionism being the aim of explaining all the phenomena of the universe according to the behaviour of their smallest parts, which can be understood using the laws of physics) came from authors in the tradition of British Emergentism, who understood that some phenomena are not 'resultant' but 'emergent' from matter.

In the words of Alexander (1920),

"The emergence of a new quality from any level of existence means that at that level there comes into being a certain constellation or collocation of the motions belonging to that level, and possessing the quality appropriate to it, and this collocation possesses a new quality distinctive of the higher complex [...]. The higher quality emerges from the lower level of existence and has its roots therein, but it emerges therefrom, and it does not belong to that lower level, but constitutes its possessor as a new order of existent with its special laws of behaviour" (1920 [1966]: 45-46)

It is clear that an emergent quality is a new level of existence rising above matter with its own laws of behaviour. To make it more intuitive, Alexander links it to the Aristotelian Matter-Form dualism:

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“To adopt the ancient distinction of the form and matter, the kind of existent from which the new quality emerges is the ‘matter’ which assumes a certain complexity of configuration and to this pattern or universal corresponds the new emergent quality [...]. Life then would be an emergent quality taken on by a complex of physico-chemical processes belonging to the material level, these processes taking place in a structure of a certain order of complexity” (Ibid: 47)

Thus, the levels of reality emerged out of the increasing complexity of matter.

Moreover,

“each new type of existence when it emerges is expressible completely or without residue in terms of the lower stage, and therefore indirectly in terms of all lower stages; mind in terms of living process, life in terms of physico-chemical process [...] thus life is a complex of material bodies and mind of living ones. Ascent takes place, it would seem, through complexity [...]. The emergent quality is the summing together into a new totality of the component materials” (Ibid: 68, 70).

Finally, lower levels are elements of higher level complexes. This is very similar to the idea of ‘system’ as a complex of elements, even though the notion of a hierarchy of systems is still lacking.

In a dialog with Alexander’s emergent levels, Morgan (1923) would put some flesh onto the bones of the theory of “emergent evolution”:

“Near its base is a swarm of atoms with relational structure and the quality we may call atomicity. Above this level, atoms combine to form new units, the distinguishing quality of which is molecularity; higher up, on one line of advance, are, let us say, crystals wherein atoms and molecules are grouped in new relations of which the expression is crystalline form; on another line of advance are organisms with a different kind of natural relations which give the quality of vitality; yet higher, a new kind of natural relatedness supervenes and to its expression the word "mentality" may, under safeguard from journalistic abuse, be applied” (1923 [1927]: 35).

Furthermore, each higher level includes the levels below.

“Working downwards, then, in our pyramid of emergent evolution, the ultimate basis under such acknowledgment is a world of purely physical events (and their correlates) in changing spatial and temporal relatedness. On this all the emergent part of the pyramid is built up in an order of ascending levels, each one of which involves those that lie below it. Here, therefore, the physical world that is acknowledged is frankly materialistic” (Ibid: 60).

Thus, every new level that emerges is seen as a higher complex of matter, but deep down the multiplicity of levels are ontologically homogeneous.

In summarising his philosophy of emergent evolution, Morgan writes:

“There are levels or orders of reality in respect both of intrinsic and of extrinsic relatedness. This does not, of course, imply a scale of more or less reality, as such, for relatedness as a mark of reality obtains at all levels. It does, however, imply (1) that there is increasing complexity in integral systems as new kinds of relatedness are successively supervenient; (2) that reality is, in this sense, in process of development; (3) that there is an ascending scale of what we may speak of as richness in reality; and (4) that the richest reality that we know lies at the apex of the pyramid of emergent evolution up to date” (Ibid: 203).

So what can we conclude so far about the levels of reality according to the British emergentists? Higher levels emerge from lower levels (upwards causation); higher levels are more complex than lower levels (increasing complexity); lower levels are elements of higher level complexes (part/whole structure); and higher levels include lower levels (the levels are cumulative). Using this conception of the levels of reality it might seem that emergentism is synonymous with the kind of organismic systemology advanced by von Bertalanffy (1968) and others, since both claim that *higher levels depend on lower levels* (dependent levels). However, the organismic view goes one step further in adding that *higher levels, once they have emerged, begin to determine lower levels* (downwards causation), as we are about to see.

3. ORGANISMIC SYSTEMOLOGY: HIERARCHICAL LEVELS

In the case of Bertalanffy (1926), the question of levels of reality already attracted his attention as a PhD student writing a thesis called *Fechner and the Problem of Integration of Higher Order* in which the universe was regarded as a hierarchy of “levels of integration” (Ibid: 49). In fact, a couple of year later in his first work on biology, *Modern Theories of Development* (1928), Bertalanffy provides the following definition:

“A living organism is a system organized in hierarchical order of a great number of different parts [...]. In emergent evolution every step [...] cannot be derived from the subordinate elements [...]. The true enduring entities are ‘organisms’ in which the plan of the whole influences the characters of the various subordinate organisms” (1928 [1933]: 49, 52).

So how many levels of reality does the universe display? Bertalanffy, unlike the British emergentists, seems to be reluctant to consider mind as a different level from life, but is more confident in claiming that society could be another level:

“The series of Gestalten passes continuously from electrons through the atom and molecule to cells and cellular organisms. But biology would, on the other hand, represent a turning-point of the curve, since a level of complication and individuality is reached here which can no longer be dealt with under physical law, and for which a statistic of higher order must be introduced. At the sociological level there is perhaps a second turning-point” (Ibid: 62).

The first clear statement of Bertalanffy’s organismic systemology can arguably be found in *The Biological Conception of the World*, first published in 1949, in which the

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hierarchical order stretches from the biological world to the rest of the cosmos, and every system is seen as an organism. “If we consider the whole of nature, it appears as an immense layered structure of levels in which subordinate systems are always united in higher systems” (1949 [1963]: 25). More explicitly, “the structure of levels of an organism is a particular case of an ordering system, very extended not only to the biological domain but also to the psychological and sociological domains, that can be called *hierarchical ordering*” (Ibid: 41).

Indeed, “in the hierarchical order of every system (elemental physical units, atoms, molecules, cells and organisms) new properties and modes of activity keep appearing” (Ibid: 166). “With each new structural level the degree of freedom increases” (Ibid: 29). In fact, the autonomy of higher levels from lower levels is linked to the notion of purpose. “The whole determines [...] the activity of individuals in the colony with a wonderful "purpose" that surpasses all possible foresight of particular animals” (Ibid: 56). “Development does not result from the action of independent dispositions or independent machines of development, but is governed by the whole” (Ibid: 68).

The same year the English edition of *The Biological Conception of the World* was published in 1953, Boulding contacted von Bertalanffy and they were able to meet regularly in 1954 in the newly created Center for Advanced Study in the Behavioral Sciences (CASBS) at Stanford University, which devoted a seminar to “General Systems” (Pouvreuau 2009: 144). Indeed, 20 years after Boulding (1956) published his seminal *General Systems Theory: The Skeleton of Science*, he acknowledged his intellectual debt to von Bertalanffy:

“The concept of hierarchy of systems, each level of which contains but transcends the lower systems levels owes a great deal to Bertalanffy. My early manifesto on general systems (Boulding, 1956) emerged from that year of constant conversation at Stanford. I would be hard put to say how much of it is his and how much is mine” (Boulding 1977: 305).

In that work, Boulding (1956) proposes a “hierarchy of complexity, roughly corresponding to the complexity of the “individuals” of various empirical fields” (Ibid: 202).

“Each individual is thought of as consisting of a structure or complex of individuals of the order immediately below it - atoms are arrangements of protons and electrons, molecules of atoms, cells of molecules, plants, animals and men of cells, social organizations of men” (Ibid: 201).

This idea of higher levels made of lower levels is reminiscent of Alexander’s (1920) complexes of elements (part/whole structure). In addition, similarly to Morgan’s (1923) notion of integral systems: “each level incorporates all those below it” (Boulding 1956: 207).

In terms of the levels of reality, Boulding is uncertain about the boundary of life:

“It may be, indeed, that self-reproduction is a more primitive or "lower level" system than the open system, and that the gene and the virus, for instance, may be

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able to reproduce themselves without being open systems. It is not perhaps an important question at what point in the scale of increasing complexity "life" begins" (Ibid: 203).

This isn't the case for mind, however, since Boulding clearly sees that, at the plant level, "there are no highly specialized sense organs and information receptors are diffuse and incapable of much throughput of information - it is doubtful whether a tree can distinguish much more than light from dark, long days from short days, cold from hot" (Ibid: 204). Whereas at the animal level, "we have the development of specialized information-receptors (eyes, ears, etc.) leading to an enormous increase in the intake of information; we have also a great development of nervous systems, leading ultimately to the brain" (Ibid.).

But Boulding did acknowledge an overlap between the human and social levels, since the symbolic universe is common to both. At the human level, "self-consciousness [is] probably bound up with the phenomenon of language and symbolism" (Ibid: 205). Yet,

"Because of the vital importance for the individual man of symbolic images and behavior based on them it is not easy to separate clearly the level of the individual human organism from the next level, that of social organizations. [...] So essential is the symbolic image in human behaviour that one suspects that a truly isolated man would not be "human" [...]. Nevertheless it is convenient for some purposes to distinguish the individual human as a system from the social systems which surround him, and in this sense social organizations may be said to constitute another level of organization" (Ibid: 205).

Looking at Boulding's hierarchy of systems ten year later, von Bertalanffy would reaffirm this position:

"We presently "see" the universe as a tremendous hierarchy, from elementary particles to atomic nuclei, to atoms, molecules, high-molecular compounds, to the wealth of structures (electron and light-microscopic) between molecules and cells (Weiss, 1962b), to cells, organisms and beyond to supra-individual organizations. One attractive scheme of hierarchic order (there are others) is that of Boulding" (1968: 27).

Furthermore, von Bertalanffy accepted the boundaries of reality that were dictated by the domains of science – especially the split between the natural and the social worlds:

"Natural science has to do with physical entities in time and space, particles, atoms and molecules, living systems at various levels, as the case may be. Social science has to do with human beings in their self-created universe of culture. The cultural universe is essentially a symbolic universe. Animals are surrounded by a physical universe with which they have to cope: physical environment, prey to catch, predators to avoid, and so forth. Man, in contrast, is surrounded by a universe of symbols" (Ibid: 197).

So what did Bertalanffy add to the question of the levels of reality which already occupied his mind while working on his doctoral thesis submitted in 1926? Clearly, there

are three ideas that stand out. First, the universe is an organismic system. Second, the universe is hierarchically structured in subordinate parts integrated into autonomous wholes (autonomous levels). Finally, despite his strong attack on the arbitrary nature of disciplinary boundaries (von Bertalanffy, 1950, 1956), he made the assumption that the boundaries of reality in some ways reflect the domains of science: the natural (physics and biology) and the social (psychology and sociology) worlds are distinct.

At this point someone may wonder why I haven't said anything about von Bertalanffy's general system theory (GST). Why don't I include it in my discussion about the structure of reality? Surely, that research program is about finding "the structural uniformities of the different levels of reality" (Bertalanffy 1968: 87)? Holding back from discussing GST is going to allow me to introduce a major influence on von Bertalanffy's work, the philosophy of Nicolai Hartmann, that has only recently been acknowledged by Pouvreau and Drack (2007) and Pouvreau (2009, 2013). That this influence has only recently been accepted is surprising given that "the philosopher Theodor Ballauf (1911-1995) demonstrated, for his part, in two articles in 1940 and 1943 the remarkable parallel between his [von Bertalanffy's] "organismic" philosophy and the "theory of categories" [Kategorienlehre] of N. Hartmann" (Pouvreau 2009: 78).

4. HARTMANN'S INFLUENCE ON BERTALANFFY

In this section I am going to argue that Hartmann's (1923, 1926) theory of categories anticipated both von Bertalanffy's general systemology and the hierarchical order of the universe that is still mostly assumed by the field of systems science today. Indeed, as I mentioned earlier, the hierarchy of "levels of integration" already appears in von Bertalanffy's doctoral thesis, along with a curious observation: there is an "eternal recurrence of the same in all levels of integration" (1926: 49). In fact, Hartmann wrote an article in 1923, subtitled *Toward the Foundation of the General Theory of the Categories*, in which he introduced his theory of categories that already covered both the ideas of levels of integration and the recurrence of the same across those levels.

In arguing against the "error of heterogeneity", which consists in applying categories from one domain of phenomena to a different domain, Hartmann wrote:

"Every domain of phenomena must have its own particular set of categories that belong only to it. To the extent that they do indeed extend themselves into a domain of differently constituted, structurally 'higher' phenomena, as it were, they can only play a *subordinate* role and never pertain to what is distinctive about these phenomena themselves. It does not follow from this postulate that certain *principles* could not also have comprehensive significance as such. To find out how, to what extent, and for what they are valid is the task of a particular investigation" (my highlights, Hartmann 1923 [2012]: 330).

In the first part, Hartmann is claiming that there are subordinate domains of phenomena; and, in the second part, that there might be universal principles that apply to all domains of phenomena. The latter seems to me to be what von Bertalanffy's general systemology

aimed at: “the discovery of the principles of organization at its various levels” (Bertalanffy 1968: 12).

Furthermore, Hartmann published another article entitled *Categorial Laws: Toward the Foundation of a General Theory of Categories*, in which he was more explicit about the “law of return” of categories crossing different levels, and also about the hierarchical order of the universe. What changed was that the categories no longer belong to different levels of *phenomena* but to different levels of *reality*, the so-called *strata*.

“Once a categorial element emerges in a stratum it does not disappear in the ascendant series of strata, but does not cease to reappear [...]. The lower categories, or their elements, thus reappear continually in certain higher categories as partial moments. The *subordinate* role they play mainly in the higher categories does not change anything. Every individual categorial element forms the starting point of a single line of categorial determination” (my emphasis, Hartmann 1926, cited in Ballauff 1940: 67).

Furthermore,

“Each higher category is, in relation to the inferior that enters it as an element, a completely new formation of an over-ordered content [...]. The upper category, in spite of its dependence on the inferior, is *free* in relation to it” (my emphasis, Hartmann 1926, cited in Ballauff 1940: 68).

In short, lower categories recur in higher strata and higher strata are autonomous from lower strata. Regarding the first point, a few years later, Hartmann realized that the structure of reality was more heterogeneous, restricting the application of the “law of return” at higher strata because certain categories cease to recur at those levels of reality. Indeed, “the lower categories do not penetrate the upper stratum, but are left behind and the return of them collapses” (Hartmann 1933: 121). He acknowledged his change of mind in a footnote: “in my work about the “Categorial laws” (1926) I have treated the “law of return” as something universal. In this form I cannot keep it” (Ibid.). However, like von Bertalanffy, Hartmann (1940) still believed that there were general principles that cut across all levels, the so called *fundamental categories*. Indeed, von Bertalanffy even acknowledged that his general systemology could replace Hartmann’s theory of fundamental categories:

“In philosophy a general theory of systems can replace the “theory of categories” or “ontology” by an exact system of general principles. In fact, the epistemological characteristics that for example N. Hartmann established under that title can be developed here in mathematical form” (1949 [1963]: 230).

5. HARTMANN’S FUNDAMENTAL THEORY OF CATEGORIES

It is now time to turn to Hartmann’s mature theory of categories, devoted to the structure of reality, which he published in a book called *The Fabric of the Real World* (1940),

though his theory of strata was already started in *The Problem of the Spiritual Being* (1933) and the *Foundations of Ontology* (1935).

5.1 The General Structure of Reality

I have mentioned Hartmann's theory of categories, but I haven't said what he means by them, since it only becomes clear in *The Fabric of the Real World* (1940). In this book, he investigates the research program he first mentioned in 1923: the fundamental contents of the general structure of the universe. Indeed, categories are the "fundamental determinations of the entity" (1940 [1959]: 2), and are not predicates or concepts. What Hartmann means is that categories are not abstractions projected onto objects but intrinsic contents of whatever entity is being studied. Furthermore, categories are not being-independent determinations because they don't have being in themselves but being 'for' concretum. In other words, categories are not independent from the concretum.

Furthermore, Hartmann distinguishes this *fundamental* theory of categories from a *special* theory of categories. The former depends on the accumulated experience of the history of philosophy and the latter on the state of science. However, according to Hartmann, both investigations make use of the same research methodology, namely, *categorial analysis*, which involves inductively inferring the categories from the *concretum*. What is interesting to note is that Hartmann sees a clear continuity between philosophy and science; claiming, for instance, that the special categories of natural philosophy depend on "empirical material of sciences, the only one from which we can take the special categories of the strata" (1950 [1960]: 3). Thus, the special theory of categories depends on the progress made by science in concrete domains of phenomena, from which the special categories can be apprehended. Let us leave aside, for the time being, the special categories of the heterogeneous structure of reality and concentrate on fundamental categories related to the general structure of that reality.

According to Hartmann, the fundamental categories cut across all the strata of reality; in fact, they are located *below* the lowest strata of reality, the material stratum, providing the "elements of a much higher structure" (1940 [1959]: 225). This means that the fundamental categories are the foundation upon which the entire fabric of the universe rests. Besides the modal categories (reality, possibility and effectivity), Hartmann also includes the *structural categories* and the *structural laws*, "which concern the internal order and the intercategoryal relations themselves" (Ibid: 227). But this last set of laws will have to wait until we see what the structure of the universe looks like for Hartmann. Here we are going to deal with the structural categories, but only with those that are relevant to our discussion.

Well, what do all structural categories have in common? They are pairs of opposites. Furthermore, "the oppositions of being are the most general categories among the structural elements of the entity, they are the most simple and elemental of the factory of the real world" (Ibid: 243). Indeed, to be honest, the ones that have been picked up for our discussion are the less obvious pairs of opposites, but even if we take them all, only five from a total of twelve pairs would qualify as genuine opposites: inner-outer, quality-

quantity, discrete-continuous, harmony-conflict and element-complex. Unity-multiplicity, for instance, confuses ‘unity’ with ‘one’, because the opposite of ‘unity’ is ‘divisibility’.

Anyway, Hartmann traces the discovery of the *principle-concretum* fundamental category to Plato’s idea-thing dualism. However, he insists that categories are not separate from the concretum since they don’t exist in themselves but only ‘in’ the concretum, ‘for’ which they are categories; that is, categories don’t have an independent existence. Let us analyse the relationship between the principle and the concretum in order not to confuse it with the one between reality and ideality. Both dualisms share the same *relation of subsumption*: categories are contained in the concretum, like ideality is contained in reality. However, there is also a *relation of subordination* between principle-concretum: “principle is that on which “rests” the concretum [...] it is the condition of its possibility” (Ibid: 298). That is, “the principles predetermine their concretum even without us knowing it” (Ibid: 301). Thus, *the concretum depends on the principle*.

However, Hartmann (1940) is aware of a contradiction: “*the principle is independent from the concretum*, because it is rather the concretum that depends on it; and at the same time it is dependent on the concretum because it only exists in it” (my emphasis Ibid: 462). His way out of the contradiction is to resort to the relation of subsumption between the individual and the general. That is, the principle is contained in the concretum in the same way as the general is contained in the individual. “There is a double relation in it: [the general] exists independently of the singular case, it is not in fact linked to it, but is not independent of all the real cases. Because it doesn’t have being next to them” (Ibid: 464-465). However, by using this analogy, Hartmann is coming close to claiming that categories are predicates of the concretum instead of fundamental determinations of the entity. That is, general determinations predicated on many individuals, in which case categories would be akin to concepts, something Hartmann denies because categories have an independent existence beyond individual cases.

In addition, besides the subsumption, subordination and independence relationships, the principle-concretum also has a *relation of correspondence*. Indeed, the principle-concretum as a structural category is not only located underneath the lowest strata of reality, but also permeates the real world, reaching the highest strata of reality. That permeation, unlike with other structural categories, remains mostly identical throughout the different strata suffering very small variations. According to Hartmann, “the more general and more schematic (that is, the poorer in content) is a category, the more it cuts across simple and identical” (Ibid: 295). So the principle-concretum recurs at every strata of reality. This is where the fundamental theory of categories gets messy, because “the strata of the real have necessarily to be repeated with a corresponding strata of categories” (Ibid: 222). To my understanding, this correspondence relation between the principle (strata of categories) and the concretum (strata of reality) seems to be duplicating the universe by postulating a stratified world of categories next to the stratified universe. Yet Hartmann denies this: “principles don’t form [...] a second world together with the world of things, events and singular cases. They are not a cosmos above the cosmos, but a cosmos within the cosmos” (Ibid: 177). But does it change much if that other cosmos is above, on top, outside or inside reality? Do we really need to duplicate the universe if the real world is one single reality? I don’t think so, but now that we have

travelled from the bottom to the top of the real world following the principle-concretum, it is time to introduce Hartmann's stratified universe.

5.2 The Multiple Strata of Reality

In my opinion, Hartmann's greatest contribution is the understanding that we live in a universe that has a heterogeneous structure. He is very critical of any attempt to reduce reality to either materiality or spirituality – the metaphysical dualism that has permeated the history of Western philosophy since Plato. In addition, he is also critical of philosophies that only see a difference of degree between strata, assuming a continuous transition, and he mentions Aristotle, Leibniz and Schelling as cases in point. In addition, during his life, Hartmann was also witness to the growing organization of the sciences according to what he believed were the major boundaries of reality: nature (sciences of nature) and spirit (sciences of the spirit). This was a confirmation, for him, that the domains of science would eventually correspond with the stratification of the universe. Indeed, I also believe that the territories of science need to be dictated by the boundaries of reality, and not vice versa, although my assessment is that we are actually a long way from this because of the continuing pursuit of science along disciplinary lines.

In Hartmann's time, the sciences of the spirit were gaining momentum, so he wrote *The Problem of the Spiritual Being* (1933) to provide “the foundation of the philosophy of history and the sciences of the spirit”, as he wrote in the subtitle of the book. Just as there was a natural philosophy dealing with the *categories of nature*, there was a need for a philosophy of history that investigated the *categories of spirit*. Ironically, I wonder whether Hartmann was, in fact, falling prey to an artificial boundary in science, which he believed was a genuine boundary of reality. I think that this is the most problematic boundary in Hartmann's ontology because it assumes a Matter-Spirit dualism.

After framing the discussion, we are now ready to introduce Hartmann's heterogeneous structure, starting from the major boundary of reality demarcating the two domains of science; namely, nature and spirit. Indeed, contrary to Leibniz and Schelling, who saw no jumps between strata, the universe for Hartmann isn't a continuous transition from one group of categories to another, but a stratified universe of different groups of categories. In fact, between the categories of nature and the categories of spirit rests the “great abyss”:

“This especially sharp boundary [...] was already known since ancient times, for example, in Descartes, Spinoza [...] and Leibniz, as the “psychophysical dividing line”. The abyss between the soul and the body takes centre stage and becomes the great problem of the seventeenth century [...]. The psychic is undoubtedly linked to the physical stratum, and cannot exist without it, but it is, however, radically different from it; The cogitatio, as expressed by Descartes, is a substance distinct from the extensio” (1949 [1961]: 123-124).

According to Hartmann, what we find ‘under the line’ (or below the abyss) is the organic stratum, and ‘above the line’ something completely different.

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“On the organic rises the psychic stratum, which makes its appearance as consciousness. This stratum constitutive of consciousness is not yet spirit, but clearly stands out from it [...]. The realm of the psychic is characterised by being an inner kingdom, an immaterial and non-spatial world [...] with the psychic a heterogeneous stratum begins” (Ibid: 123).

Thus, the psychophysical line separates consciousness from the organic strata as two heterogeneous groups of categories, since for every strata of reality there is a corresponding strata of categories. Unlike consciousness, the organic stratum is spatial and material.

Hartmann even connects this boundary of reality to Subject-Object Dualism:

“And this opposition responds to the diversity of the ways of giving: the external giving of the things located in space and the inner giving of psychic acts themselves as belonging to the subject itself and belonging to him” (1940 [1959]: 217).

So, what then are the defining categories separating nature and spirit? Basically, *nature and spirit have opposite categories: the former is spatial and material and the latter non-spatial and immaterial*. Does this remind you of Matter-Spirit Dualism?

However, besides the organic and the psychic strata, there are other groups of categories that predetermine their strata of reality. Below the organic there is the material stratum, and above the psychic stratum is the spiritual. To give an idea of the content of these two strata, we can introduce the types of special predetermination in each of them. Whereas the material stratum is determined by the *causal* nexus, in the spiritual stratum we find the *final* nexus. By nexus, Hartmann means that, in each special concretum, everything takes place according to a sequential relation between events. In the case of the material stratum, there is a causal chain of events in which the effect follows the cause and, regarding the spiritual stratum, there is a consciousness that proposes ends and chooses the appropriate means. However, according to Hartmann, there are other forms of predetermination and even more than one for some strata.

The resulting picture is a stratified universe of four sets of categories corresponding to the four strata of reality. The choice of the word ‘stratum’ is not random since Hartmann talks about a *superposition relation* between the four strata, where one rests on top of another, like the layers of rock or soil studied by geology. Moreover, making use of the *complex-element* structural category, he claims that complexes of the higher stratum are composed of elements of the lower strata.

“Between strata there is a very visible relationship. The formations of the upper stratum are composed of those of the lower stratum and are used as ashlar for their own factory. [C]omplexes of the lower stratum become thus elements of the upper stratum” (1949 [1961]: 121).

However, the complex-element category is appropriate for the strata of nature but has its limits in the strata of the spirit, since the metaphor of “the fabric made of elements or members, which is characteristic of the complex, is not exact here” (1940 [1959]: 369).

This is because, even though every upper stratum rests on top of a lower stratum, we don't need to imagine the element of the higher stratum "in analogy with the material elements. They do not need to be simple. They can be in turn whole complexes [and] any kind of complex can be in turn an element of further complexes" (Ibid: 362).

Furthermore, complexes are also stratified formations:

"The ascending series of complexes in the total constitution of the real world is not at all continuous. It is subject to the same cuts that are also felt in the remaining forms of the ontic superposition" (Ibid: 362).

Hartmann wants us to distinguish between strata and formations in order to avoid confusing the gradations within each stratum of reality with the different strata. Indeed, inside a given strata we can find gradations of formations; for instance, higher formations (community) composed of lower formations (persons) that don't belong to different strata. However, according to Hartmann, some formations such as the subject and the person are made of acts of consciousness but belong to different strata of reality. This overlap between strata of reality could be due to the lack of progress in the sciences of the spirit compared to the sciences of nature. According to Hartmann, categorial analysis is in its infancy "especially in regard to the higher strata, it can as yet hardly record results worth mentioning" (1942 [1953]: 63).

Yet, to say that we are lacking the special categories that belong to the higher strata is different from saying we lack the boundaries between higher strata. However, Hartmann insists that "the border lines between the strata are dependent on the categories which are dominant in them" (Ibid: 52). Despite not having established a clear boundary between the psychic and the spiritual strata, the psychophysical line is also problematic. The only approximation that Hartmann mentions is the Subject-Object Dualism between the *inner world* (non-spatial and immaterial) and the *outer world* (spatial and immaterial) separating the psychic from the organic strata. This means that higher animals and persons, for instance, have an inner and an outer world, according to Hartmann. Again, this means that the person belongs to both of the higher strata. In short, the psychic stratum is the most problematic boundary of reality because it is lacking a clear content of its own. So what are the boundaries of reality? In several passages (1940 [1959]: 569, 575, 577), Hartmann repeats the following ontological levels.

Table 1. Hartmann's Ontological Levels

Ontological Levels	Strata of Categories
Spirit	Categories of Spirit
Consciousness	
Life	Categories of Nature
Matter	

With the use of the superposition relation and the element-complex category that, as a fundamental category, permeates the fabric of the real world, it seems that Hartmann conceives the universe as a system of *multiple structures*. So it is difficult to conceive the universe as one single structure because it seems that every group of categories constitutes a special structure. Moreover, as was mentioned earlier, it also seems that we have two stratified worlds side by side: the stratified world of strata (concretum) and the stratified world of categories (principle). Thus, according to Hartmann, instead of one single structure of reality, we have three types of structures of reality. First, a type that I haven't dealt with in this paper: we have a *fundamental structure* of reality predetermined by the ideal being. Next, there is a *general structure* of reality predetermined by the structural categories. And now we have the *multiple structures* of reality predetermined by different groups of categories. It could seem at first that every stratum of reality is a closed world in itself, but Hartmann makes use of another set of fundamental categories, the *structural laws*, to explain the dependence relationship between strata of categories, as we will see in the last section of this paper.

6. ONTOLOGY: HOW IS THE STRUCTURE OF REALITY POSSIBLE?

After having discussed Hartmann's multiple structures of reality, it is time to introduce my own proposal of the structure of the universe. However, given that this proposal already assumes that the universe is structured, we may start by asking: how did the different levels of reality come into being in the first place? As we saw before in the discussion of British emergentism and organismic systemology, it is often assumed that the levels emerged out of matter through evolution; namely, Life emerged from Matter and Cognition from Life. Another option held in ancient times was that Matter emanated from Soul, Soul from Intellect and Intellect from God. But do we really need emergentism or emanantism to explain how the structure of the universe is possible? What if the structure of reality was One, Infinite, Immutable and Eternal? Indeed, the structure of the universe is One, since there is only one reality; Immutable, since it never changes; and Eternal, since it doesn't have a beginning or end in time. In fact, these three attributes were already proposed by Parmenides (550 BCE), even though he believed that Being was spatially finite and we would have to wait for his disciple, Melissus (5th century BCE), to argue that "if being is limited by nothing, it must be infinite and not finite [...]" (my emphasis, Copleston 1946, Vol.1: 53). In short, the *structure of the universe is one and the same, not plural and mutable*.

6.1 The Ontological Levels of Reality

Having theorised the different boundaries of reality before having read Hartmann's fundamental theory of categories, I was surprised to see that we both coincide in one important respect: opposites are present in the structure of the universe. Even so, we only share one duality in common: *inner-outer duality*. However, in contrast to Hartmann, I argue that each duality doesn't permeate all the levels of reality, but different dualities are intrinsic to different levels of reality instead. Furthermore, unlike Hartmann, I don't

believe that the universe has multiple structures, because the universe has one single structure. In short, the ontological levels of reality are not different structures of reality.

So let me introduce my candidate dualities that I believe are intrinsic to each level of reality. The first one that rules the material world can be traced back to the Greek philosopher and physician Empedocles. “Things never cease their continual exchange, now through Love all coming together into one, now again each carried apart by the hatred of Strife”(Trépanier 2004: Fragment 17). Following Kant (1786), however, and in order to avoid anthropocentric connotations, I prefer to term it as the *Attraction-Repulsion Duality* instead of the Love-Strife Polarity.

The next duality was proposed by Spencer (1862) while describing the process of evolution, which to him played out throughout the cosmos:

“Now I propose in the first place to show, that this law of organic evolution is the law of all evolution. Whether it be in the development of the Earth, in the development of Life upon its surface, in the development of Society, of Government, of Manufactures, of Commerce, of Language, Literature, Science, Art, this same advance from the simple to the complex, through successive differentiations, holds uniformly. From the earliest traceable cosmical changes down to the latest results of civilization, we shall find that the transformation of the homogeneous into the heterogeneous, is that in which Evolution essentially consists” (1862 [2009]: 148-149).

Indeed, according to Spencer, “evolution is a change from an indefinite, incoherent homogeneity, to a definite, coherent heterogeneity; through continuous *differentiations and integration*” (Ibid: 216). That is, Differentiation-Integration Duality is intrinsic to the biological world.

Though there is no consensus as to whether Life and Cognition belong to separate ontological levels, maybe the duality in the animal world can help us solve this dilemma. But where can we find the clue to distinguish Life and Cognition? We can arguably trace back the germ of that distinction to the work of Cannon (1932) on the physiology of the body, which expanded Bernard’s concept of *milieu interior*. Indeed, in a book called *The Wisdom of the Body* (1932), Cannon explained the crucial role of the autonomic nervous system in the balance of physiological processes in the body. In justifying why he chose to call the steady-state found in the body ‘homeostasis’, he wrote:

“The constant conditions which are maintained in the body might be termed equilibria. That word, however, has come to have a fairly exact meaning as applied to relatively simple physico-chemical states, in closed systems, where known forces are balanced. The coordinated physiological processes which maintain most of the steady states in the organism are so complex and so peculiar to living beings – involving, as they may, the brain and nerves, the heart, lungs, kidneys and spleen, all working cooperatively” (1932: 24).

What he found to be fundamental in the self-regulation of the body was the balance between two intrinsic forces; namely, *autonomy* and *control*. Moreover, equilibrium is enabled by information. This Autonomy-Control Duality is what distinguishes the

Cognitive level, as opposed to Life, which we have already seen is distinguished by differentiation-integration.

Now we are still left with the last duality that applies to our conscious level. I believe that the dualisms of modern and contemporary philosophy have hidden from our sight the duality intrinsic to Consciousness: the *Inner-Outer Duality*. Indeed, by separating the inner from the outer, these dualisms have created two artificial boundaries of reality that dominate science: the natural world (natural sciences) and the social world (social sciences). This is why I believe that they are pseudo-ontologies.

Maybe a few diagrams will suffice to explain what I mean; they say that “a picture is worth a thousand words”.

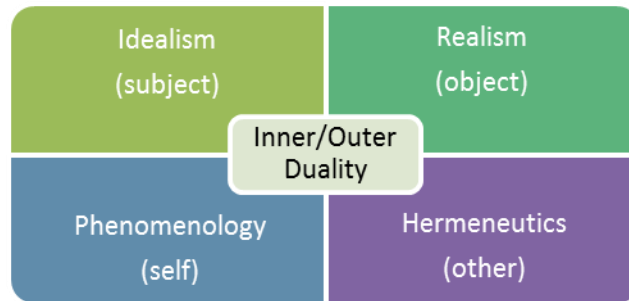


Figure 1. Dualisms splitting Inner/Outer Duality

Indeed, are these the same dualisms we find embodied in Western epistemologies? And what were the pseudo-ontologies derived from those epistemologies?

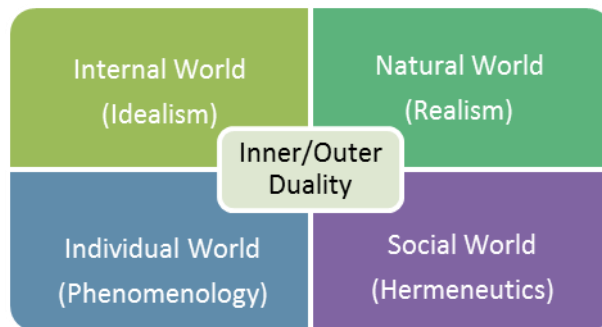


Figure 2. Pseudo-Ontologies derived from Western Epistemologies

In summary, we have to be aware of the ontological monism of organismic philosophy so pervasive in the field of systems science. Evolution may apply to a particular boundary of reality, indeed, but we cannot generalize it to the rest of the universe. This is similar to attempts to conflate Cognition with Life (e.g. Maturana 1970), which is also illegitimate in my view. Likewise, we cannot transfer an ontological level that only applies to Consciousness to the rest of the universe. Let me conclude this section with a table of the boundaries of reality discovered so far.

Table 2. Dualities of Being defining Ontological Levels

Ontological Levels	Dualities
Consciousness	Inner-Outer
Cognition	Autonomy-Control
Life	Differentiation-Integration
Matter	Attraction-Repulsion

Finally, now that we have identified the levels of reality, how are the multiple levels interrelated into a single structure, if the structure of reality is not an emergent hierarchy of autonomous levels?

6.2 The Relationship Between Levels

Let me first introduce Hartmann's (1940) "autonomy in dependence" relationship between strata of categories, since it is a good example of the structure of reality that I am about to question. Now that we have a series of higher strata that depend on lower strata, how come higher levels seem to be autonomous from lower levels? Can we have both autonomy *and* dependence? It may seem paradoxical, but Hartmann certainly believed it is not only possible but necessary for freedom itself because each stratum had its own determination.

Indeed, "freedom enters whenever a categorical novelty enters. Free is every higher determination which raises itself above a lower one. In a world of only one stratum, freedom is impossible" (1940 [1959]: 121). Moreover, "where a higher stratum rears itself above a thoroughly determined lower one, it brings its own determination with it without suspending that of the lower stratum" (Ibid: 128). What Hartmann means is that, even if higher levels depend on the existence of lower levels, higher levels are still autonomous in relation to lower levels. In his own words, "at every level there is a fresh "autonomy in dependence"" (Ibid: 129).

Very clever! Except for the lowest level, we can still have autonomous levels that depend on lower levels. In fact, if the inorganic strata had a lower level underneath, it could also be autonomous. But how can all levels be autonomous, except for the lowest that enables the "freedom in the stratified structure of the world" (Ibid: 124)? Obviously, they cannot all be autonomous at once; that is, simultaneously. There must be a sense of autonomy that we are missing. Indeed, Hartmann ruled out downwards causation altogether: lower strata enable freedom in the higher strata, but lower strata are autonomous in their own way because each level has its own determination. The only thing we know from Hartmann is that higher levels do not suspend lower levels; lower levels could, therefore, continue acting autonomously without any higher level intervention. In fact, according to Hartmann, *determination-dependence* is a structural category that explains the

relationship between the strata of reality. However, how can we explain the unity of systems through the multiplicity of dependent and autonomous strata? How come autonomous strata integrated in a system can act as one single being; that is, as one and not as many? Acknowledging this problem, Hartmann (1940) argued:

“It must be understood that the deepest heterogeneity does not preclude the unity of essential interrelatedness, both in regards to a single strata of the actual structures as well as in regards to the world. Yes, even the converse might be the case: The forms of unity might rise to a higher level along the increase in the multiplicity and heterogeneity. Indeed, it might be that the higher structures (such as man and society) are precisely the forms of a higher unity” (Ibid: 50).

However, it doesn't really matter how “high” the multiplicity appears in the fabric of the real world, higher and lower multiplicity does not imply higher and lower unity, meaning that a man is more of a unity than an animal because it has more multiplicity. No, multiplicity does not explain unity. We are left with one of those unresolved enigmas that the field of systems science dismisses by assuming downwards causation; that is, higher systems determine lower systems. However, that, in turn, rules out the autonomy of lower ontological levels altogether.

Though Hartmann was reluctant to introduce downwards causation in order to explain the relationship between the strata of reality, some passages suggest otherwise. The spiritual stratum, for instance, can intervene in the strata of nature:

“What the spirit prescribes to nature are but the purposes which it pursues in utilizing the forces of nature as available means [...] It can only exploit their own natural functioning for its purposes [...] used as means towards purposes alien to them” (Hartmann 1942 [1953]: 102).

In this case, I believe he is confusing the relationship between strata with the relationship between formations, as the following passage confirms:

“The organic process intervenes downwards in the existence of inorganic nature (for example, the development of plants in the configuration of the soil and the climate); Thus, the spiritual being extends, in the form of a will and action directed by purposes, downwards, towards what is purposeless by its nature (wherever man profits for his purposes from the given natural forces)” (1938 [1956]: 247-248).

Despite mixing up strata with formations, Hartmann was trying to explain the autonomy of formations by means of the “autonomy in dependence” relationship between strata. However, do we need to justify the autonomy of strata to justify the autonomy of formations (systems)? Is the universe autonomous because higher ontological levels are autonomous from lower ontological levels? Hartmann believes that there is only autonomy in the universe if the new categories emerging at higher strata are independent from lower strata. However, if new categories emerge as a new substrate at higher strata, the world would appear as divided into independent territories of reality. As it turns out, Hartmann's “autonomy in dependence” looks more like an “independence in dependence” relationship between strata of reality.

So what is my alternative world-image, if the structure of reality is neither emergent nor hierarchical? *I believe that lower levels are neither subordinated to higher levels nor higher levels to lower levels. On the contrary, the intrinsic structure of reality contains mutually interdependent ontological levels. Thus, we don't need dependence "from below" (upwards causation) nor determination "from above" (downwards causation) to explain the relationship between ontological levels.* If the universe is one, infinite, immutable and eternal (as I suggested earlier), there is no need for a theory of evolving complexity, which assumes that new, more complex strata emerge from earlier, simpler ones (upwards causation), and then these strata constrain those they emerged from (downwards causation). Could it be that the ontological levels of Matter, Life, Cognition and Consciousness have always existed and have always been intrinsically interdependent?

7. CONCLUSION

The prevailing view of the structure of reality in the field of systems science assumes an emergent hierarchy of autonomous levels. Higher levels emerge out of lower levels through evolution (upwards causation). Higher levels include lower levels (cumulative levels). Lower levels are elements of higher level complexes (part/whole structure). And higher levels determine lower levels (downwards causation). However, the world-image I am suggesting questions that the levels of reality emerge upwards because the structure of the universe is *immutable*. Higher levels don't include lower levels because the levels of reality are *heterogeneous*; that is, ontologically different. Lower levels are not elements of higher level complexes because the structure of reality is not a multiplicity of layers but *one* single structure. And higher levels don't determine lower levels because the ontological levels are *mutually interdependent*. Thus, the structure of reality is not an emergent hierarchy of autonomous levels since the universe is a self-contained macrocosm of mutually interdependent ontological levels. Lastly, every system inside it is also a self-contained microcosm of mutually dependent ontological levels, but 'self-contained' doesn't mean that systems are isolated from each other because they live one and the same universe, not parallel worlds.

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