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THE BASIC PROBLEM OF THE THEORY OF LEVELS OF REALITY

1. FOREWORD

Two essential aspects of Hartmann's thought are its categorial perspective and the theory of the levels of reality. They are also aspects which have exerted significant influence on Hartmann's intellectual legacy, however limited that may be. Here I wish to point out their importance for Bertalanffy (1968) and Lorenz (1978). The latter notes the close similarity between his own ideas and those of Hartmann, and he recalls that for Hartmann the world possesses the unity of a system, but it is a system made up of layers. Some pages earlier he writes that he once asked Roberto Corti, who was closely acquainted with Hartmann, how he thought Hartmann would have reacted to a philogenetic interpretation of his thought. Corti replied that Hartmann would undoubtedly have rejected such an interpretation, but then added "And yet this is the only way to do anything with it".

2. SOME QUESTIONS

The fundamental theses of Hartmann's theory of the levels of reality have been discussed, from various points of view, by other contributions to this volume (see in particular Cicovacki, Johansson, Peruzzi and Wildgen). For this reason I may omit numerous specific details of Hartmann's thought, concentrating instead on certain general aspects of his theory as well as some of its especially problematic ones.

In preliminary terms, the least that one can say about the problem of the levels of reality is that it is not a topic that has been much discussed. Interest in it appears even more circumscribed when one considers that on the rare occasions when an author has alluded to the problem of the levels, by far the most prevalent standpoint has been that of levels of interpretation, not of reality.

The theme of the levels of interpretation is obviously important, but I do not believe that it should be superimposed on (even less confused

Axiomathes **12:** 261–283, 2001.

with) the problem of the levels of reality. Although confusion between the two planes is not infrequent, their names themselves indicate that they occupy different places in a theoretical framework with even the minimum of structuring. The levels of reality have a strictly ontological significance, while those of description have an epistemological one. The presence of intermediate or ambiguous cases does not authorize one to confound categorial specificities. The distance that separates the two themes is therefore the same distance that separates epistemology from ontology. Whatever the relationships between them (of opposition, connection, inclusion, or anything else) may be, they are replicated in the difference between (levels of) description and (levels of) reality.

In what follows I shall restrict my discussion to only certain aspects of the problem of levels of reality. Consequently, I shall be concerned with ontological matters. I shall not address the question of the relationships between ontology and epistemology. Indeed, I shall take care not to slide from one plane to the other (for an outline of my view on the relationship between epistemology and ontology see Poli 2001b).

I begin by posing a number of essential questions and then devote the next sections of the paper to their analysis. The following questions seem of interest:

1. What is a level of reality?
2. What generates the levels?
3. Why are they discrete?
4. What separates them?
5. What holds them together?
6. Are they all of the same kind or are there different types of levels?
7. Are there overlaps between the theory of levels and other theories?
8. Are there connections between the theory of levels and other theories?
9. Who has developed theories of levels?
10. Why is the theory of levels so little discussed in the literature?

In this paper I shall seek to provide some preliminary answers to these questions, devoting closest attention to only two or three of them. For reasons of expository expedience, I shall answer the questions in an order different from that of the above list.

3. Theories of Levels and their Authors

Some temporal, linguistic and geographical specifications are in order. I shall broadly describe the main groups of authors who have developed

TABLE I

Herbert Spencer (1820–1903)	Conwy Lloyd Morgan (1852–1936)	Samuel Alexander (1859–1938)
Synthetic Philosophy (10 vols., 1855–1893)	*Emergent Evolution* (1923) *Spirit, Life and Mind* (1926) *Emergence of Novelty* (1933)	*Space, Time, and Deity* (1920)
Inorganic		Space-time
Organic (includes the mind)	Matter	Matter
Super organic	Life	Life
(social and ethical phenomena)	Mind	Mind

theories of levels since the second half of the nineteenth century, in German and English, with some minor forays into the Polish-speaking world.

With the field thus delimited, two main groups of authors emerge, one of which has worked mainly in English while the other has mainly worked in German (and Polish). The former group has adopted a viewpoint contiguous to the philosophy of science; the latter has taken a predominantly phenomenological approach.

Table 1 provides summary information about the members of the first group, itemising their works with the closest bearing on the problem of the levels, and listing the levels that the authors envisage. The perspective adopted by all of them is aptly summed up in the title of the work by Lloyd Morgan, *Emergent Evolution*. The theory of the levels of reality is viewed mainly from an evolutionary-dynamic standpoint. Overall, the theories put forward by the three authors listed (and by numerous other thinkers of the same period and milieu) were attempts to fit the theory of evolution into a metaphysical framework. The endeavour patently failed and as such warrants no further consideration. The ease with which the immediately subsequent reductionist approach dismantled the tenets of the emergent evolution movement highlights the intrinsic shortcomings and the superficial generalizations of many of its theses (for a useful survey see Blitz 1992).

With regard to the second group, attention naturally focuses on the phenomenological circle of Munich, whose members, besides Husserl, included Pfänder, Reinach, Conrad, and Ingarden. It is well known that Hartmann took a serious interest in their perspectives.

Also well known, I believe, is Husserl's theory of regional ontologies and his consequent distinction among the regions of nature, consciousness and society (intersubjectivity). Because the phenomena typical of each region have their own specific status, they can be entirely likened to three levels of reality.

Hartmann proposes four levels: physical, organic, mental and spiritual. If the first two levels are conflated (for the reasons given below), it is immediately apparent that Hartmann performs the same regional segmentation as Husserl, though he does so in his own original terms. With respect to Husserl, in fact, Hartmann analyses the laws of dependence *among* the levels and *within* the levels themselves.

The authors mentioned certainly do not exhaust the field. Besides the philosophers of science and the phenomenologists, also to be mentioned are the logicians (Russell, Brouwer, Chwistek, Ramsey and Quine), and the aestheticists (from the art historians of the Vienna school (Panofsky and Riegl) to the *allgemeine Kunstwissenshchaft* movement of Berlin (Dessoir) and the structural inquires of Utitz). Many other authors have dealt with levels, perhaps most notably Plessner, Santayana and Sellars. In various respects, starting from the most disparate intellectual backgrounds and interests, all these authors have addressed the problem of the levels of reality (for further discussion of Hartmann and Ingarden see Poli 1998).

4. What is a Level of Reality?

Giving a satisfactory definition of its subject of inquiry is a crucial requirement for any discipline or area of research. In our case, however, there is no scholarly community that has reached a general or majority consensus on the criteria with which to define, describe or at least sketch the idea of 'level of reality'. Among the various proposals that can be put forward, the one that seems most general (or the one that is least tied to specific, local interpretations), is to adopt a categorial criterion: the levels of reality are characterized (and therefore distinguished) by their categories. With regard to the levels of reality, it is obvious that the categories in question are ontological.

The next step is to distinguish between universal categories that pertain to reality in its entirety (time, whole/part, etc.) and categories that pertain solely to one or some domains (levels) of reality. To anticipate the analysis conducted in more detail later, we may begin by distinguishing the specific categories of the material world from, for example, those of the mental world, or from those of the social world. Each of these broad domains

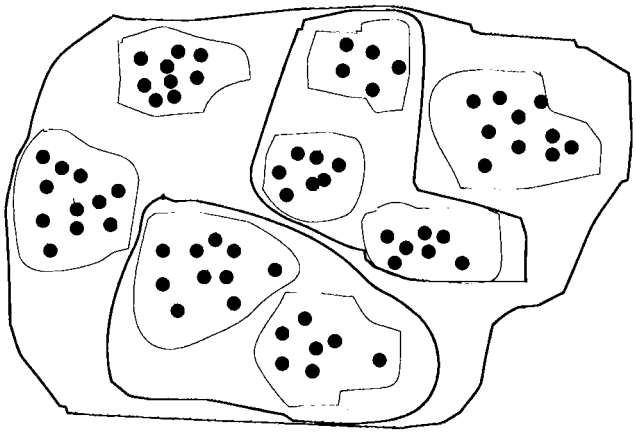

Figure 1.

displays further categorial articulations (the categories of physics are not those of chemistry, not those of biology).

If the set-up just described is at least partly plausible, a series of problems immediately arise. With no claim to completeness, these concern:

- Coordination (integration) among the categories governing some or other level of reality.
- Forms of dependence among levels.
- Forms of autonomy among levels.
- Categorial closure (completeness) of levels.

A different but not unrelated group of problems concerns (a) the relationship between a given level and the items (objects, processes) that constitute it; and (b) the relationships among items belonging to different levels.

Numerous authors prefer to develop their theories on the basis of these latter problems, adopting an objectual standpoint, so to speak, rather than a categorial one. Arguing in favour of the objectual standpoint has the undoubted advantage that it yields an elementary definition of 'level': a level consists of a collection of units (Pattee 1973, p. 75). From this point of view, the series of levels is a series of objects interacting at different degrees of granularity. The model envisaged is illustrated by Figure 1, which shows level-0 objects (atoms: the dots); level-1 objects (groups of atoms: 8 in number); level-2 objects (groups of groups of atoms: 2; level-3 objects (groups of groups of groups of atoms): 1. The process can of course be indefinitely iterated.

Almost all the theories of levels more or less explicitly presuppose a model of this kind. Moreover, the model is accepted by large part of the

scientific community, because it depicts the widely held view of levels based on a structurally reductionist approach. The various groups of items may behave differently, even to the point that it is impossible to calculate (predict) their specific behaviour, but in the end what matters is that they can all be straightforwardly reduced to their *atoms*.

If this were indeed the way matters stand, then the general neglect shown towards the problem of the levels would be justified (which would answer question 10; I shall return to this below). In reality, however, analytical study of the levels shows that this attitude is more ideological than scientific. It is a legacy from positivism.

The objectual interpretation thus comes to assume the deceptive features of naïve interpretation. In order to deal with the real complexity of the problem of the levels, it must be altered so that it becomes possible to study not only 'linear' hierarchies but 'tangled' ones as well. This conclusion bears out the approach which undertakes categorial analysis, compared to the one which studies items in iteration.

An argument in favour of the approach 'by objects' is the ease with which it is possible to pass from a substantialist description to a processualist one: if a level is defined by items in iteration (where the items can be canonically conceived as objects), then a level can be defined by a dynamic. A multiplicity of structurally stable dynamics, at diverse levels of granularity, may define a multiplicity of levels. However, if it turns out that the structuring in levels does not respect a universal principle of linearity, then one is forced to restrict the multidynamic frames to their linear fragments. Which is precisely the situation of current theories of dynamic systems. On careful consideration, in fact, the predominant opinion is that there is only one multi-dynamic (multi-layered) system: the one described by the natural sciences. Other forms of knowledge are scientific to the extent that they can be located in the progressive series of supraformations (groups of groups of groups of items, each with its specific kinds of interaction). Hence the alternative: a discipline is scientific to the extent that it can be located in the series of aggregation levels – if so it can be more or less easily reduced to the base level – or it cannot be thus located and is consequently not a science: it has no citizenship in the realm of knowledge and is scientifically stateless.

We shall see that this is not so, and that the opinion just described is simply wrong. The progressive array of levels, in fact, has breaks in it where the frame of reference is categorially modified. The only way to handle this is to acknowledge that the hierarchy of levels of granularity is only one of the hierarchies of reality. A satisfactory theory must obviously recognize the former, but it must recognize the other forms of

organization into levels as well. For this reason too, a categorial approach is more promising than an 'objectual' one base on items of some kind in interaction.

5. Overlaps Between the Theory of Levels and other Theories

From what was said in the previous section it is evident that the elementary theory of levels (the one based on levels of granularity) has numerous points of contact with various, hotly-debated scientific issues, most notably:

- emergence (supervenience);
- complexity and non-linearity;
- open and far from equilibrium systems.

However, as soon as one passes from the simple granularity version of the theory to the 'tangled' one, the situation becomes much less clear.

The theme of the levels of reality once again raises, from its particular point of view, the problem of ontology, or a categorial structure able to subsume in a general framework the multiple points of view embodied by local scientific theories. In short, what is lacking is ontology, no more, no less.

The theme of the levels of reality can also be used as an acid test to select structurally defaulting ontologies (which adumbrates the answer to question 8: the theories connected to the theory of the levels are the other sub-theories that make up the ontology. With respect to substance, these are at least the theory of particulars and that of wholes and their parts: cf. Poli 2001a).

6. Types of Levels

The foregoing discussion obliges us to indicate the aspects of the theory of levels which *de iure* exceed the capacities of the levels-of-granularity interpretation.

The essential contributions in this regard have been those by Husserl and Hartmann (with Ingarden in the background). With reference to the sphere of real (as opposed to ideal) being, both Husserl and Hartmann distinguish three realms (or strata): which are, in the terminology used here, the realms of material phenomena, mental phenomena and social phenomena. Some minor distinctions aside, the first point to stress is

that the distinction among the three realms of material, mental and social phenomena is categorial. Which means that, apart from the few universal categories, the items of different domains are categorized by different categories (or better, different groups of categories). The diversity in question is categorial otherness. In other words, applying the categories of one realm to the items of another realm may give rise to a categorial error, to a *metabasis eis allo genos*. Hartmann elaborated on the details of the problem, pointing out that the base level of each of the three realms is characterized by the birth of a *new* categorial series.

Each of the three strata of reality has its specific structure. The case of the material or natural stratum is the best known and the least problematic. Suffice it to consider the series atom-molecule-cell-organism (which can be extended at each of its two extremes to include sub-atomic particles and ecological communities, and also internally, as shown below). In this case we have a clear example of a series that proceeds by levels of granularity. The basic distinction of the realm (stratum) into physical, chemical and biological components can be considerably refined. The last component, for example, can be distinguished into genetics, cytology, physiology, ethology, ecology. Each of these sub-levels is characterized by the presence of a different reference item, as shown by the following table of correspondences:

TABLE II

Genetics	$\Leftrightarrow$	Gene
Cytology	$\Leftrightarrow$	Cell
Physiology	$\Leftrightarrow$	Organism
Ethology	$\Leftrightarrow$	Population
Ecology	$\Leftrightarrow$	Ecosystem

Each of these levels comprises typical phenomena which require a suitable categorial apparatus. As one moves from one level to the next, in fact, new categories intervene. However, the difference among the various levels is not restricted to the appearance of some new category: the old categories interact with the new ones, acquiring at least partly different 'meaning'. The distinction among the various sub-levels is relatively clear-cut as long as one does not approach their borderzones too closely. In fact, on close inspection, the differences among the levels merge into a sort of indistinct phenomenal continuum (e.g., supramolecular chemistry). The overall depiction of the material stratum also becomes more blurred at the extremes of the same stratum. The world of elementary particles still sig-

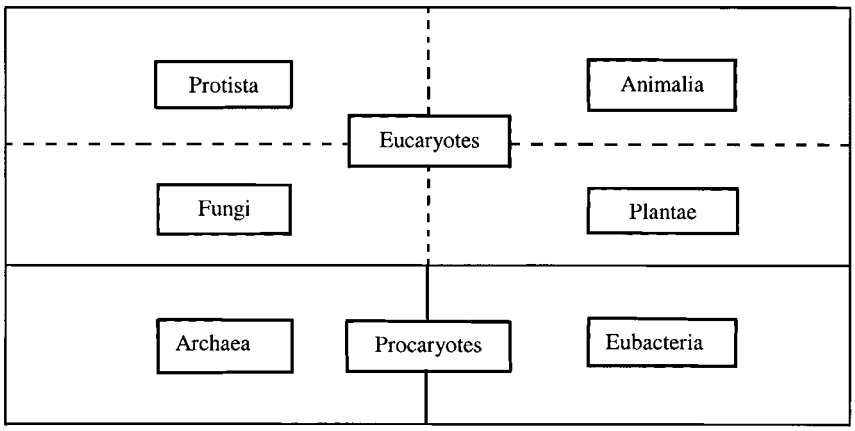

Figure 2. From Margulis and Schwartz 1998.

nificantly resists conceptual homogenization. Moreover, difficulties, albeit less serious ones, also arise at the other extreme of the scale. This does not merely concern the division of the eukaryotes (i.e., organisms whose genome is 'encapsulated' in the nucleous) into different sub-domain (Figure 2). The most important point is the hypothesis that the life world has two different parallel hierarchies: one to do with the biological reproduction of the species, the other to do with its ecological (or economic) reproduction, as shown by Figure 3.

The difficulties in question obviously arise from the problem of giving an adequate categorization to life. This difficulty, however, pertains as much to a theory of levels as more generally to our scientific knowledge. The theory of levels cannot make up for the gaps in our knowledge. From a systematic point of view, the layer of life adds further categorial dimensions to the underlying layers of chemical and physical phenomena, but it does not engender an entirely new categorial series, as instead happens when moving from the material stratum to the mental or social ones. For this reason, I have conflated Hartmann's two strata of physical and life phenomena into a single material stratum.

This unresolved problem having been pointed out, the general theme of this paper requires us to proceed. For my present purposes, I must also outline the features of the other realms, providing at least a preliminary description of these components of the theory.

Compared to the material realm, the mental and social ones are characterized by an interruption in the material categorial series and by the onset of new ones (relative to the mental and social items). The situation of these realms is depicted by Table 3 and Figure 4.

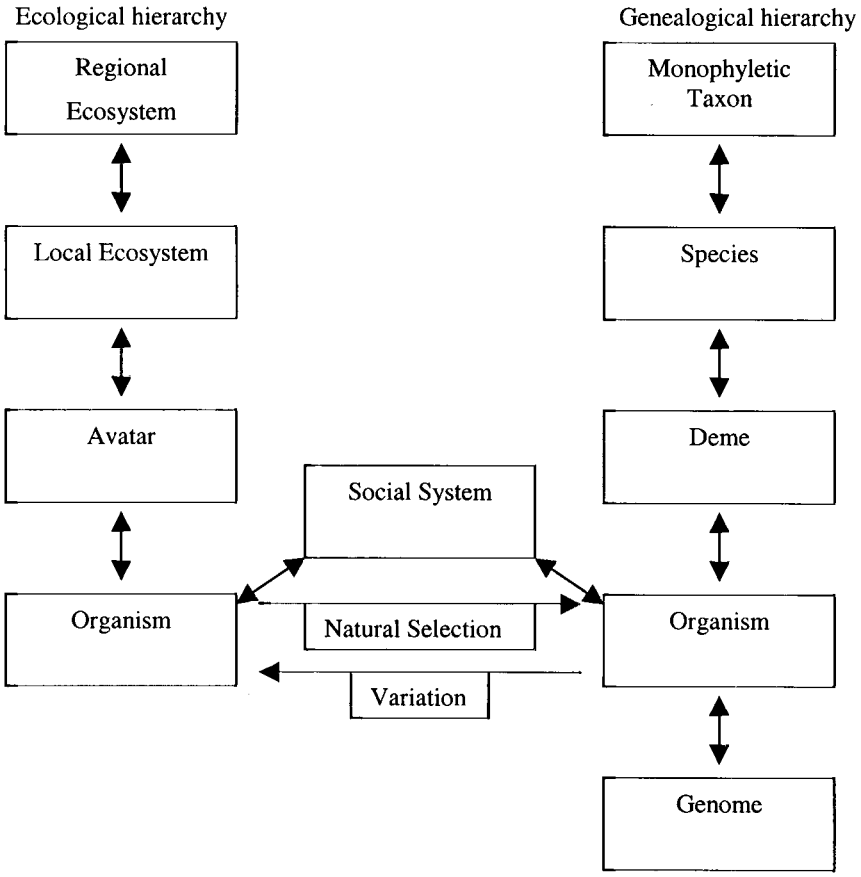

Figure 3. From Eldredge and Grene 1992.

Analytic description of the mental realm is less straightforward than that of the material realm, not only because of its intrinsic complexity but also because our scientific imagination does not comprise an elementary schematization such as that furnished by the physics-chemistry-biology series. Although space precludes presentation of many of the details here, it is important to provide at least a provisional description of the bearing structure of this realm.

As one passes from the material level to the mental and social ones, the distance from Hartmann's original theories becomes more pronounced.

According to Albertazzi (see at least 1999a, 1999b, 2001), the realm of the mind is structured by two primary oppositions. The first is between the objectual plane and that of the emotions. The latter also perform a role entirely analogous to that of reagents in chemistry. In this sense, they are configurations that facilitate or impede the processes characteristic

TABLE III

	Objectual dimension	'Reagents' dimension
Presentation	Modal Amodal	Emotional tone
Representation	S.T. Memory L.T. Memory Imagery Assumption Reasoning etc.	Emotions

of the complementary objectual plane. Matching the distinction between 'objects' and 'reagents' is that between 'presentation' and 'representation'. The former concerns the particular phase of mental activity variously called the time of presentness, moment-now or specious present. This is a fundamental phase (lasting 700 ms on average) of entirely specific status, in that presentation is characterized by phenomena, like those of temporal inversions, which no longer occur in the subsequent domain of representation. Presentation divides primarily between modal phenomena engendered by sensory stimulation (relative to seeing, hearing, feeling, etc.) and amodal phenomena with a specific objectual yield despite the absence of a connected sensory stimulation (as in the well-known case of Kanizsa's triangle reproduced on the cover to this issue).

All higher mental activity (that of representation) is based on presentation phenomena varyingly reified, consolidated or schematized. The domain of representation is extremely rich and comprises memory (in its various forms), imagination, reasoning, assumptions, planning, etc.

Contemporary cognitive sciences seem to have yet to focus on the scheme just briefly sketched. Instead they have concentrated on the objectual level of representation, which although extremely rich is intrinsically incomplete.

Moving to the realm of social phenomena, this has yet another type of basic structure. The social world is characterized, in fact, by the presence of a set of tendentially universal and interacting domains. The dimension of (tendential) universality relates to the fact that each of these domains views the entire universe *juxta propria principia*. The worlds of legal rules, moral values, economic principles, institutions, art, and so on, each use a totalizing interpretative frame which induces it to see reality as a whole

from a particular point of view. The process seems moving through two stages: (1) normalization (elimination of irrelevant cases or situations), followed by (2) selection of an adequate typology of relevance. For the legal world all reality is subject to the law, for the moral world everything is good or evil, for the economic one everything has a price. Each of these standpoints can be applied more effectively if all irrelevant residues are eliminated from the outset (point 1).

A distinctive feature of the social realm is the twofold action of its various domains: on the one hand, each of them operates individually according to its interpretative frame; on the other, all of them operate in parallel, influencing and determining each other (Figure 4).

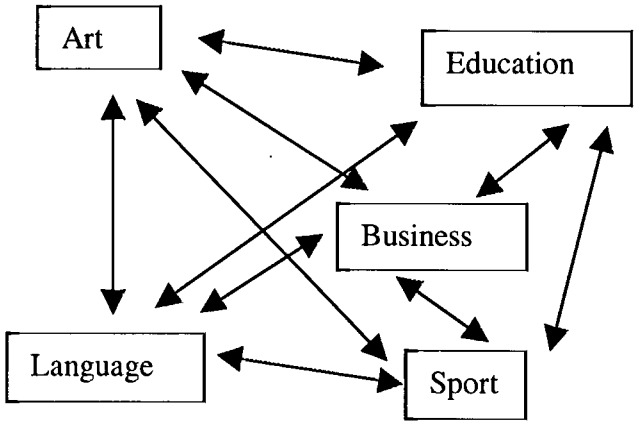

Figure 4.

The above descriptions provide a few details of the three different strata of reality. Of these strata, that of material reality (both inanimate and animate) acts as the bearer for the other two strata. The material stratum bears both the stratum of mental phenomena and the stratum of social phenomena. Each stratum has its own principles, laws and categories. It should be clear by now that the nature of one stratum cannot be understood using the categories of another (Poli 1996, 1998, 2001a, 2001b).

Each social region has local forms of organization which are more or less serial (granular). In order to avoid the error of over-generalization, each section should be analysed individually to bring out its distinctive features.

7. Forms of Connection Among Realms

We have seen that the various realms of reality are differently organized. The mental realm has a double linear structure in which one dimension operates as a parameter for the other. Secondly, the objectual hierarchy of the mental realm has an inflorescent structure whereby the basic presentation generates numerous different representative dimensions. The social realm assumes yet another configuration which seems to magnify the possibilities actuated by the other two realms. The structure of the social world in fact comprises a wide variety of dimensions, many of which seem to reproduce specific serial structures. These structures interact with each other, constantly recodifying themselves with a degree of freedom apparently greater than that which characterizes the material realm.

The question that now spontaneously arises is how the material, mental and social realms are connected together. The most obvious answer is that they have a linear structure like the one illustrated by Figure 5.

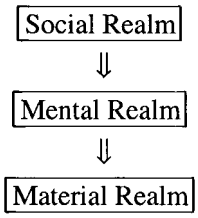

Figure 5.

On this view, the social realm is founded on the mental realm, which in its turn is founded on the material one. Likewise, the material realm is the bearer of the mental realm, which in its turn is the bearer of the social one.

However limited theoretical awareness of the issues concerning the problem of the levels of reality may be, the point of view illustrated by Figure 5 is part of the received wisdom. Although space precludes critical analysis of its various components, I wish at least to suggest that a different opinion is possible. Consider Figure 6.

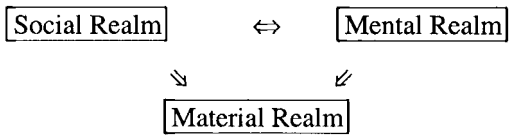

Figure 6.

Figure 6 'says' that the realm of material phenomena acts as the basis, as the bearer, of *both* mental *and* social phenomena. In their turn, the

realms of mental and social phenomena reciprocally determine each other. The underlying idea is that there are no societies without minds, just as there are no minds without corresponding societies. Put otherwise, mental and social systems are formed through co-evolution: the one is the environmental prerequisite for the other (Luhmann 1984).

Without considering Luhmann's theory in detail, one nevertheless notes that he views both social and mental systems as producing sense, and that in both cases the basic mechanism is an overabundance of possibilities filtered by some sort of selective mechanism. Moreover, both kinds of system requires self-reference: that is, the presence of some kind of description of the external environment in which they operate. For both systems, the selection of possibilities may be wrong, eliminating interesting possibilities and maintaining dead ends and any other kind of mistaken or imperfect choice (a very similar position has been developed by Bickhard, in seeming unawareness of Luhmann's theories: see e.g., Bickhard and Terveen 1995).

8. Categorial Dependence and Autonomy

Crucial to the consistency of the framework being outlined here is the difference between 'causal dependence' and 'categorial dependence'. From a causal point of view, the mental and social realms depend on phenomena of the material realm. This is not so, however, from a categorial point of view. Mental and social phenomena are bound to categories different from those that bind material phenomena. Hartmann drew up both a table of the laws of categorial dependence and a table of the laws of categorial autonomy which are summarized below:

1. Every stratum comprises categories of the lower stratum, but in no case do the categories of a higher stratum appear in a lower one. The assumption of categories from one stratum to another can only operate upwards, never downwards.
2. This reappearance of the categories is always limited. It does not occur as regards all the categories of the lower stratum, nor does it extend to all the higher strata.
3. The categories passed from lower to higher strata undergo change. They are transformed by the character of the higher stratum. What persists unchanged is always only a fundamental categorial aspect.
4. The reappearance of lower categories never constitutes the character of the higher stratum. This always stems from the intervention of a categorial 'novelty' which is independent of the lower categories and

> consists in the emergence of new categories. The change occurring in the elements that reappear is brought about by the introduction of this 'novelty' (Hartmann 1952, pp. 75–6).

The laws governing the strata can also be generalized to layers. Also the layers, in fact, are characterized by differentiated sets of categories. Some of these categories are common to all layers (as in the case of strata), others are specific to a particular layer; yet others characterize some layers and not others.

At each level, moreover, all the categories of that particular level perform their determining function jointly (Hartmann 1952, p. 65). Which means that categories occurring in diverse levels have at least partially different meanings because they interact with different sets of categories.

The laws of autonomy are as follows:

1. The fundamental categories encompass all the various ontological levels. However, they display features at every level which are specific to that particular level (because they interact with the complex of categories at that level).
2. The categories of the lower ontological levels are the foundation for the higher ones, but they are indifferent to the higher categories.
3. The categories of the lower levels are stronger than the categories of the higher levels, but they have lesser structural power.
4. In the case of overforming, what is categorized by the lower categories helps to constitute the substrate of the higher level.
5. In the case of building-above, what is categorized by the lower categories acts as the existential bearer of the higher level.

For analysis of these various laws the reader is referred to Hartmann's works cited in the bibliography. For an introduction see Werkmeister 1990 and Poli 1996, 1999, 2001a. Note that Hartmann's laws of autonomy and dependence operate in accordance with a model like the one shown in Figure 5. In fact, they do not take account of the interactions among realms depicted by Figure 6. For the most part, this chapter of the theory still awaits proper developed (Luhmann has been one of the few to discern the problem).

9. THEORY OF DEPENDENCE

The core of Hartmann's theory is its distinction among various types of dependence. The two fundamental types are matter/form dependence, which structures the hierarchy of the material world, and bearer/borne dependence, which governs for example the dependence between the material

and mental layers. The terminology used by Hartmann (and the English translations proposed by Werkmeister) are the following:

TABLE IV

English term	Hartmann's German term	Relation between	Form of dependence
Overforming	Überformung	Layers	Matter/form
Building-above	Überbauung	Strata	Bearer/borne

For the sake of precision, in Poli 2001a I decided to use the term 'level' to refer in general to the levels of reality, restricting the term 'layer' to overforming relationships (matter/form dependence), and the term 'stratum' to building-above relationships (bearer/borne dependence).

However succinct the treatment in previous sections, it has shown that the phenomenology of the forms of dependence is not restricted to the two canonical cases envisaged by Hartmann. Elaboration of a theory of the forms of categorial dependence is a task still entirely to be accomplished.

10. EXISTENTS

Almost all actually existent entities are multi-stratified. Which means that *the layers and strata of reality do not distinguish items. The levels are internal to items but not as their parts!* The ontological poverty of contemporary philosophy and science is evidenced by the constant shuttling by many authors among problems which belong to different theoretical domains (i.e., theories of particulars, of wholes, of levels).

Items belonging to different ontological levels may exist simultaneously in the same place. For every ontological level, one can distinguish items which cannot be simultaneously in the same place, and items that can. As far as the material stratum is concerned, the former may be called 'bodies' and the latter 'penetrables'. In physics this is the distinction between phenomena with or without rest mass. Penetrables obviously do not collide (Johansson 1989, p. 191; Johansson uses *corpuscles* instead of *bodies*).

While the identity of bodies can be given by their position in space, this is not possible in the case of penetrables: firstly because penetrables can exist in the space of other penetrables, and secondly because they can exist in the space of bodies. Their effects on bodies disclose their identity.

These effects are tendencies, and different tendencies can exist in the same time and place. They can be summed by a process of superposition. Note also that tendencies can cancel each other out. In this sense, an aggregate of bodies may have a tendency equal to zero even if all its constituent bodies have tendencies different from zero (Johansson 1989, p. 229. To avoid terminological clashes with a different use of the term *tendence*, in my 2001a, I used spontaneities instead of Johansson's tendencies).

Study of the levels of specific classes of items has been one of the most significant proving grounds for the entire theory. Suffice it to consider the various applications of the theory to the problem of aesthetic objects. Both Hartmann and Ingarten enlarged upon the ontological analysis by levels of various kinds of aesthetic object (pictorial, musical, literary, architectural, etc. works of art). In a very different context, the sociologist Sorokin has developed a theory of social objects as intrinsically multistratified objects. A social object typically comprises three strata: a material (base) dimension, one consisting of the agents which use that base, and a dimension connected with the meaning of the base. In short: a social object is something used by someone for some reason.

11. FORMS OF CAUSALITY

I argued earlier that a level B may be causally constrained by an underlying level A but not categorially constrained by it. In other words, emergence is causally determined (if the necessary conditions are not in place, the emergent phenomenon does not occur), but once it has been constituted, the basic conditions remaining equal, the new level operates according to its own principles.

The two basic oppositions can be summed up in the following hypotheses

1. Reduce everything to the lowest level. One can execute the reduction without any relevant loss of information because higher levels are purely epiphenomenal levels.
2. Reductions are not neutral because reality is intrinsically levelled. When you reduce, you cancel out aspects of reality.

What really makes the difference between the above two theses is the further hypothesis that any ontologically different level has its own form of causality (or presents its own kind of phenomena, providing the term is properly understood). In other words, antireductionism distinguishes ontological dependence between existential or causal dependence and

categorical dependence. In fact, a level can be existentially or causally dependent on another level without being categorically dependent on it.

A theory of the levels thus becomes the natural setting for elaboration of a more articulated theory of the forms of causal dependence. Beside the usual kinds of basic causality between phenomena of the same nature, the theory of levels enables us to single out upward forms of causality (from the lower level to the upper one).

But this is not all. A theory of levels also enables us to address the problem of downward forms of causality (from the upper to the lower level). The point is in direct contradiction of Hartmann, who always ruled out *downward* forms of causality. The question was examined by Donald Cambell some years ago (see e.g., 1974 and 1990), while the recent Andersen et al. (2000), to which the reader is referred for details, systematically collects a series of new studies on the theme.

Note that the problem of the forms of inter-level causality is different from that of inter-level categorial dependences. In the absence of a theory of levels, it is not even possible to raise the problem.

12. VIRTUOUS CIRCULARITY

The above acknowledgement of a possible connection between the theory of levels and causality entails recognition that every level of causality may trigger its own causal chain. A level of reality is distinguished by its specific form of causality. As a consequence, we thus have a criterion with which to distinguish among levels of reality and levels of description.

The acknowledgement also enables us to develop a theory able to accommodate different senses of causality (distinguishing at least among material, mental and social causality). However, if the downward option is also available, the direct or elementary forms of causality should have corresponding non-elementary situations. This may be hard to swallow, but I want to find out where the error lies.

13. ASPECTS NOT DEALT WITH

The foregoing brief introduction to the general theory of the levels of reality has neglected a series of problems. Here I shall list only some of them.

1. A theory of the levels cannot restrict itself to distinguishing layers and strata alone. It must also considers the types of feedback that

take place internally to them, and also the 'echelons' (the chains of command) that govern their dynamics. In fact, as far as systems are concerned, one may distinguish between external and internal hierarchies. The former correspond to the series of layers, the latter to the series of control or command levels (echelons). According to Miller, for instance, the difference between (social) groups and organizations depends not so much on the number of their members as on, respectively, the absence or presence of echelons (Miller 1978, Miller and Miller 1992).

2. A law of force, related to their canonical interactions, also characterizes levels. This is especially evident in the case of material levels. But a corresponding law of force also operates in the other realms (a criterion of this kind helps recognition of the correct part of the belief in the prevalence of the economic base, without having to reify it into an ideological view).
3. Temporal rhythms have their specific importance. Within each layer, objects characterized by a shorter time scale may constitute the matter of objects characterized by longer time scales (cell-organism relation). Instead, in the case of relationships between contiguous layers, objects characterized by a longer time scale may constitute the matter of objects characterized by shorter ones (relation between physical persistence and biological persistence). The lack of an adequate conceptual framework makes it almost impossible to work on themes of this kind.
4. Another problem is the relationship between the realms of the real world and the ideal world. Until a way to coordinate forms of reality and ideality is found, it will be impossible to understand the unreasonable effectiveness of mathematics, as well as the ability of values to become dimensions of reality.
5. A level of reality may comprise different kinds of dynamics. One should distinguish between (a) dynamics relative to the *unfolding* of reality, i.e., those relative to processes internal to a stratum of reality which lead to realization of its possibilities, and (b) dynamics relative to the *potentiation* of the level, i.e., those relative to processes among strata of reality by which a higher level emerges from a lower one.
6. The previous point alludes to the difference between *possibility* and *potentiality*, a difference alien to modern reflection (with the significant exception of Bloch). Here I shall merely point out, following Whitehead, that an item possesses potentiality only if it is (adequately) *integrated*. The problem still awaits solution.

7. The reductionist approach has historically relied on the help of a materialistic metaphysics. The different orientation offered by the theory of the levels may likewise rely on the support provided by a different metaphysics – in this case, a panpsychist theory which holds that the ultimate nature of the universe is that of a society of minds. Before this view is held up for ridicule, it should be remembered that it has been put forward by no less thinkers than Leibniz, Brentano and Whitehead.

14. Concluding Synopsis

I began by listing a series of questions; I now summarize the answers to them forthcoming from this article.

What is a level of reality?
There are two possible answers. One is that a level of reality is given by the interactions among objects of a certain type (atoms, cells, molecules, etc.). This answer proves unsatisfactory as soon as one has to deal with 'tangled' hierarchies. The other answer adopts a categorial perspective: a level of reality consists of an (adequate) group of categories.

What generates the levels?
Both answers hold that the levels emerge as correlated by an underlying dynamic.

Why are levels discrete?
The categories are isolable and separable by their nature, and so are groups of them. The categorial perspective therefore makes it possible to specify the ontological differences among levels (the epistemological flavour of the answer is only apparent).

What separates the levels?
The levels are separated by different categorial frames. This relates to underlying differences of a dynamic and causal nature (as well as force and temporal structure).

What holds them together?
This question has been answered only indirectly. The two main forms of unification spring from the fact that (1) the levels are in items and do not separate them into distinct units, and (2) downward types of causality tie at least some upper dimensions to lower one. Point (1) means that the theory

of the levels is unable on its own to provide a conclusive answer to the question.

Are the levels all of the same nature or are there different kinds of levels?
It is obvious that there are different types of levels (at least those of the material, mental and social strata).

Are there overlaps between the theory of levels and other theories?
Of course there are: emerging evolution, dynamic systems, synergetics, complexity, chaos.

Are there connections between the theory of levels and other theories?
At minimum, the theory of levels integrates with the other sub-theories of a well-developed ontology: the theory of particulars used to classify and categorize basic items (objects, processes, groups, stuffs, etc.), and the theory of wholes and their parts used to classify and categorize wholes (aggregates, wholes real and proper, systems), parts, boundaries and their interactions (Poli 2001a and 2002).

Who has developed theories of the levels?
More authors than is generally thought. Towering over them all is the figure of Hartmann. His theory requires thorough revision, as noted in previous pages, where it has been modified in various respects. Nevertheless it is an obligatory point of departure.

In general terms, besides Hartmann, my own preferences are for those thinkers that might be labelled 'dynamic and field thinkers'. The group comprises a substantial amount of contemporary scientists, in many different areas (besides the well-known cases of natural sciences, a basic survey for psychology and sociology is provided by the first volume of Rummel 1975–1981). It may be less known that an equally substantial number of (great and less great) philosophers also belong to the group. To mention at least some of them: Leibniz, Brentano, Husserl, Peirce, Alexander, Whitehead, Ushenko.

Why is the theory of the levels so little discussed in the literature?

Contemporary theories of the levels of reality suffer from a marked lack of conceptualization. Dealing with this problem requires knowledge of what is at stake: adopting a theory of levels entails modification of the metaphysics implicit in a large part of contemporary science and philosophy.

ACKNOWLEDGMENT

Thanks are due to the late M. Rizzotti for his comments to an earlier version of this paper.

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