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Pattern as an Ontological Category

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Abstract. The paper argues that causal systems and spatial patterns are species of the same genus, namely *pattern*, and that a clear view of spatial patterns throws light on some aspects of the ontological nature of causal systems. In particular, it is argued that all patterns (and systems) depend on a fiat delimitation of something which in itself is a unity without borders. Pattern realism is true.

Keywords: Foundations, Kinds of entity, Top-level ontological taxonomies, Patterns.

Most top-level ontologies in the history of philosophy reckon in some kind of primary substance (be it things, events, or something else), properties, and relations, and they have some place for space and time. Some other categories like causality and quantity are also almost universal in this sense. Very seldom, however, has *pattern* got a place high up in any ontological hierarchy. The aim of this paper is to show that patterns really deserve such a place. Of course, patterns are always patterns *of* something. Therefore, pattern as a category cannot be logically basic, but it is important nonetheless.

In some modern ontologies, *systems* are given a prominent place. In particular, this is true of Mario Bunge's *Treatise of Basic Philosophy*. The fourth volume of this treatise is given the subtitle *Ontology II: A World of Systems*, and is wholly dedicated to systems. It opens with the following two sentences: "Every science studies systems of some kind, whether natural (physical, chemical, biological, or social) or artificial (technical). Moreover most sciences study nothing but systems"([1] p.1). I agree whole-heartedly. However, in my view, systems make up some special species of the genus pattern. And that fact and some other things are not made clear by Bunge. I will here try to develop further some ideas about patterns and systems which I have put forward earlier (see [2] chapters 4, 6, 7, 14, and 15).

Whatever the practical use of ontologies is, and will be, now when information technology revolutionises the world, one of their theoretical uses is to create a bird's eye view from which one can correct various forms of myopia. I will try to show that one gets a better ontological understanding of some aspects of systems when they are seen as species of the category of pattern. The simplest kind of patterns are the spatial patterns, and the ontological structure of such patterns is the topic for the first four sections of this paper. Then there are short sections on spatiotemporal patterns and causal systems. Whether or not my analysis is of direct relevance to the ontology of information systems, I am not able to tell. I look upon the world of research as an extensive division of labour which encompasses not only the sciences and technology but philosophy as well. Philosophy can *interact* with both science and technology, and I hope that this paper will do so, but the interaction is not spelled out in the paper in itself.

1 The ontological point of departure

Every pattern has some kind of components. Patterns, as I have said, are always patterns *of* something. Therefore, I need some ontological categories before I can start my discussion of patterns.

Firstly, I will rely on a rather common-sensical conception of **space**. Space is a special kind of unity which *contains* things, persons, states of affairs, etc. Problems about the limits and structure of space are disregarded. The important thing is that space is not regarded as an aggregate of part-spaces.

Secondly, as **primary substances** I will rely on ordinary material macro things.

Thirdly, material things will be assumed to have **properties** *inhering in them*.[1] Such properties do of course inherit mind-independence from the material things they inhere in. I will regard, for instance, shape, size, and mass as surely being such properties. I will also regard density, i.e. mass per unit volume, as a real property which can inhere in arbitrary small parts of things. When needed, '*P*' will be used as a variable for such properties.

Fourthly, since things and property instances exist in space, there are **spatial relations** both between things and property instances. A property instance can *lie beside* and *be at a certain distance from* another property instance. Also, it can *lie between* two other property instances. Property instances can stand in all kind of spatial relations. When needed, '*-S-*' will be used as a variable for such relations.

Fifthly, I want to introduce a special class of relations which I will call **property-grounded relations** (see [2] chapter 8). A property-grounded relation is a relation which exists thanks to some properties which inhere in the things related. Examples are: '- is larger than -', '- has a size between that of - and -', '- has another colour hue than -', '- is brighter than -', '- is heavier than -', 'has a higher density than -', '- is similar to -', and so on. I do not regard spatial location as a property, which means that I do *not* regard spatial relations (e.g. '- is to the left of -', '- is five metres from -', '- is situated between - and -') as property-grounded relations . As a variable for binary property-grounded relations, I will use '*-R-*'.

The ontological difference between relations of type '*-R-*' and '*-S-*' is reflected in an epistemological difference. If one has knowledge of all the properties which inhere in two things *a* and *b* (= the relata), one can *derive* all the property-grounded relations that exist between these relata, but no spatial relation is derivable. For instance, if one knows that *a* is round and *b* is square, one can derive that a and b have different shapes, but the distance between a and b is *not* derivable. Nor, of course, are spatial relations derivable from property-grounded relations. In every statement of the form '- *R* -', the spatial relations, i.e. '- *S* -', between the relata have been abstracted away (if they have ever been taken into account).

The derivation of property-grounded relations is possible because such relations are existentially dependent upon some properties of the relata. Each *P*-instance in each relata (e.g. round and square) can exist independently of the other, and therefore it can also exist independently of the grounded relation (being of different shape). But the grounded relation being of different shape cannot possibly exist if there are no property instances of shape.

The existence of an ontological and an epistemological difference between '*-R-*' and '*-S-*' is quite consistent with the fact that one certainly can construct location functions for things both in relation to real space and in relation to abstract property spaces. In my view, all abstract spaces are conceptual constructs but real space is not. The confusing thing is that we also can construct a conceptual abstract "spatial space" whose metric mirrors relations in real space.

For some of my later claims about patterns, it is important to note that (in my immanent realist opinion) a property-grounded relation *exists only in the property instances related.* Such relations have what might be called *scattered instantiation.* States of affairs described by statements of the form '*aRb*' exist only in *a* and *b*. My last example of property-grounded relation '- has a shape different from -' exists nowhere else than in the things *a* (which is round) and *b* (which is a square) together; i.e. '*a* has another shape than *b*', if true, is made true by facts wholly contained in *a* and *b*. Spatial relations behave differently. Statements of the form '*aSb*' describe states of affairs which contain not only *a* and *b*, but also some part of space. The statement '*a* is five metres from *b*', if true, is made true by *a*, *b*, *and* the spatial distance between them. The fact that *a* is five metres from *b* is instantiated in a *spatial unity*,

[1] I am an immanent realist, but I think that this paper could equally well be written from the point of view of a Platonist or a "trope thinker".

whereas the fact that *a* has another shape than *b* is instantiated in a *spatial scatter.*

2 Spatial patterns

The paradigm examples of patterns are colour patterns. Let us for instance think of the simple chequered pattern of the chessboard. In common sense, this pattern of black and white squares is thought of as inhering in a thing, the board. Such a pattern would of course not exist if there were no shapes. Colours are not enough. In order for a shape to exist it must have a border, and the borders of the squares of this pattern are constituted by the different colours of the neighbouring squares; the outermost squares have of course one side constituted by the encompassing colour. If the colours did not differ, there would be no small squares. On the other hand, if there were no shapes nor would there be different colours. A colour pattern contains not only the property of colour, necessarily it also contains the property of shape. Its components are colours-with-shapes. Generalised, the last two statements supply me with my first proposal for one of seven "spatial pattern truths":

1. A spatial property pattern contains not only the property in question, necessarily it also contains shapes; the components of a spatial property pattern are properties-with-shapes.

In the sixty-four squares (i.e. colours-with-shapes) of the chessboard, there are a lot of property-grounded relations instantiated. If we name the squares, as in chess, from a1 to g8, then some of these relations can be described by sentences like the following: 'a1 has the same shape as b1', 'b8 is darker than c2', 'f2 has the same size as d3', and so on. These relations exist as scattered in the relata (=colours-with-shapes) they relate. I find it fairly obvious that no "sum" of property-grounded relations can be identical with the corresponding pattern. Such a "sum" is either a *set* or an *aggregate* of property-grounded relations. By 'aggregate' I mean "a collection of items not held together by bonds, and /which/ therefore lacks integrity or unity" ([1] pp.3-4). If the "sum" is a set it is a non-spatiotemporal entity, but the pattern is spatiotemporal, so a set cannot possibly be a pattern. Certainly, an aggregate is a spatiotemporal entity, but since by definition aggregates contain no inner unity, such an aggregate cannot be a pattern either. A colour pattern is a *unity in space*, and that unity cannot be identical with a number of relations that have scattered instantiation. From these remarks the second of my claims about spatial patterns follows:

2. A spatial property pattern contains a lot of property-grounded relations, but it is not identical with a set or an aggregate of such relations.

My third claim is similar to the second one, but it is not equally obvious. It is about spatial relations like 'a1 is to the left of a2', 'a2 is between a1 and a3', etc. It says:

3. A spatial property pattern contains a lot of spatial relations, but it is not identical with a set or an aggregate of such relations.

To repeat, a *set* (=non-spatiotemporal entity) of relations between colours-with-shapes cannot be identical with a colour pattern (=spatiotemporal entity). But what about, for instance, the *aggregate* of all the spatial relations between all the sixty-four squares of the chessboard pattern? If, in the aggregate in question, we have *all* relations like 'c4 is in space close to b4, c3, c5, d4 ' *with their relata* (and the property-grounded relations they constitute), do we not then have the chessboard pattern as well? In my opinion, we have all the parts needed for the pattern, but we do not have the unity necessary for the pattern itself. Not even this aggregate has the kind of *inner unity* which patterns have. An aggregate does by definition not take the *Gestalt character* of a pattern into account. Spatial patterns are spatially inclusive unities.

The last-mentioned feature comes out more clearly in the following thought experiment. Let us assume that the sixty-four squares of the chessboard are spread out in such a way that each square is one centimetre away from all the neighbouring squares. This rearrangement of the components of the old pattern changes a lot of spatial relations, at the

same time as it leaves all the old property-grounded relations unchanged. But something more happens: *New components come into existence*. The new pattern necessarily makes all the space which now exists *between* the sixty-four squares into one or several components.[2] Spatial patterns cannot, like for instance property-grounded relations and aggregates, exist as scattered. They can only exist in a closed area. If a patch outside a chessboard shall be regarded as part of the chessboard pattern, then the space between the patch and the chessboard becomes part of the pattern, too. In topological terms, a pattern has to have the properties of self-connectedness and 0-connectivity, i.e. the one-piece property and the no-hole property. The following statement is, I think, true:

4. A spatial property pattern contains a specific kind of spatial unity.

According to the four "spatial pattern-truths" stated above, a spatial pattern contains (i) *properties* and *properties-with-shapes*, (ii) *property-grounded relations*, (iii) *spatial relations*, and (iv) *a specific kind of spatial unity*. All these parts are necessary conditions for a spatial pattern to exist. (Together with a further requirement, formulated in the seventh claim below, they constitute a sufficient condition.) A change in any of the parts will normally result in a change of the pattern. A special kind of change occurs when the absolute size of all the instances of properties-with-shapes are changed in such a way that their relative sizes are not changed. Then we have the same pattern as before, only smaller in size. This affords me with yet another claim:

5. The type-identity of a spatial property pattern is size independent.

3 The mind-independence of spatial patterns

There is a possible overall objection to all the five "spatial pattern-truths" that I have proposed, namely that they have to be placed within some kind of subject-object distinction. I have written, the objection continues, as if colours are mind-independent properties. But today we know that perceived and sensed colours exist only in the eye of the beholder. Therefore, the objection ends, I have shown nothing whatsoever about *mind-independent* patterns, not even their existence.

Of course I think that this objection fails and I will, at the same time as I explain why, also defend the following representation thesis:

6. Mind-independent spatial patterns can be represented by mind-dependent spatial patterns.

I will not discuss realism in general, only *realism for property patterns*. This means that I take it for granted that some of the properties which physics talks about do exist in a mind-independent world. Density (=mass density), charge density, and electromagnetic field strength are three such properties which can constitute property patterns. The first two are scalar quantities whereas the third is a vector quantity. There are scalar as well as vector patterns, although I will reason only about scalar quantities.

In order to realise that densities-with-shapes and density patterns can be understood realistically, one has to grasp a distinction between *real* and *nominal* density. On the one hand there is the real density of each compact and homogeneous part of a body with mass, on the other hand there is the (nominal) mean value density. In homogeneous things the two densities are numerically identical; in heterogeneous things the mean value density always differs from the real density of at least some parts. Mean value density is merely a conceptual construct. It has to be conceived nominalistically. Real density, however, can be conceived as realistically as mass can. As a moving body has in each instant a velocity, a body with mass has in each spatial point a density.

A specific colour hue instance is extended in space until it "meets" an instance of another colour hue, or reaches the end of the thing it inheres in. Similarly, a specific real density instance is extended in space until it "meets" an instance of another specific real density, or reaches the end of the thing it inheres in. All real densities that are not infinitesimally small,

[2] There are of course new *spatial relations*, too; but that it is not the important point.

have such borders and are always instantiated as densities-with-shapes. This means that they can be components in spatial property patterns. Between two (or more) densities-with-shapes, there are always property-grounded relations as well as spatial relations. As soon as the densities-with-shapes come together in such a way that they inherit a spatial unity from that part of the space in which they exist, a spatial density pattern comes into existence.

An example of a density pattern could be a sheet of wood "divided" into sixty-four squares, thirty-two with "white" density and thirty-two with "black" density. This mind-*in*dependent chequered density pattern would not be perceptually apprehensible, but it would be just as real as the mind-dependent chequered colour pattern. Obviously, the visual chessboard pattern can be used to represent the density pattern just described.

There are in the natural world (mass) density patterns, charge density patterns, electromagnetic field strength patterns, and other kinds of objective spatial property patterns. Most of them seem to lend themselves to representation by means of subjective colour patterns.

In passing I want to remark that *all* physical properties cannot constitute property patterns. Mass, in contradistinction to mass density, cannot. But that is a problem I have pursued elsewhere (see [2] chapter 4, and [3]).[3]

4 The conventionality of spatial patterns

There are in the world not only on the one hand mind-independent phenomena and on the other hand mind-dependent phenomena, there are *fusions* of mind-independent and mind-dependent phenomena as well. A special kind of such fusions occur when, by a man-made decision, some mind-independent entity is divided into parts. The ownership of a bit of land is such a fusion. Although the land in itself is mind-independent, the borders are man-made and in that sense *conventional*. An estate is a *fiat object* with a *fiat boundary*. (The concept of *fiat* objects and boundaries is taken from some of B. Smith's papers; see e.g [5].)

Conventions can exist in relation to both mind-dependent and mind-independent phenomena. Phenomenal colours, to take an example, are subjective, but the property-grounded relations they ground are objective. (Objective grounded relations can be grounded in subjective phenomena.) The property-grounded relations of similarity and dissimilarity among phenomenal colour hues can constitute a scale, the spectrum. And, trivially, the spectrum can be *conventionally* divided into a number of colour hues. Likewise, the density scale can be conventionally divided into, for example, very low density, low density, mean density, high density, and very high density. Continuous scales contain no natural borders. Therefore, for pragmatic reasons, consciously, half-consciously or unconsciously we create fiat boundaries.

Like continuous scales, mind-independent spatial property patterns have no natural borders. Since zero density can be part of density patterns, the whole universe may be said to make up one spatial density pattern. All objective spatial property patterns are merely parts of the corresponding pattern of the universe. A specific density instance, on the other hand, has a natural border. It ends where another density is instantiated. But, obviously, a density pattern can not end in this way. The density on the other side of the presumed border can very well be made part of the pattern. The borders of ordinary spatial mind-independent patterns cannot but be conventional. Or, in other words: Spatial mind-independent patterns (which are smaller than the whole universe) are fiat objects.

This conventionality highlights the spatial unity spoken of in claim number four. In fact, it is the unity of space itself which creates the unity of each spatial pattern. I have taken a so-called container conception of space for granted (see [2] chapter 10), and in such a space *pure spatial parts are necessarily fiat parts*. Such a space is neither constituted by relations between things or events in space, nor by its parts since the parts have no identity of their own. The parts exist merely *as parts* of space. The conventional border of a pattern does not create the unity within the border. It merely "carves out" a part of space which already has unity, and that unity "unites" all the included properties-with-shapes and all their relations into a spatial property pattern.

[3] In my terminology in [2] and [3], exclusive properties can constitute patterns but inclusive properties cannot; mass is an inclusive property.

The (sixth) claim that mind-independent spatial patterns can be represented by mind-dependent spatial patterns, relies on the fact that the space of visual perception is unity-creating in the same way as objective space is.

Mind-dependent spatial patterns, like the chessboard pattern, are conventional, too. But they can be conventional in a, so to speak, natural way. As Gestalt psychology once made clear, our perceptual system construes unities. And, obviously, this applies to perceptions of patterns. Therefore, visual patterns can (falsely!) appear as naturally given "brute facts". What our perceptual system does in relation to mind-dependent patterns, our cognitive system *has to* do in relation to mind-*in*dependent patterns.

In thought we are able to transcend perceptually given pattern borders. Assume for instance that the chessboard I have talked about is lying on a table. In thought we can then choose the table as the border, and if we do, we will get another colour pattern. If we choose the room in which the table is placed as the border, we will get still another pattern. And so on. The border of the chessboard pattern must be regarded as conventional. Except for the universe as a whole, it is true that:

7. Spatial patterns are necessarily fiat objects.

The claims number seven and number four should be seen in the light of each other. Spatial patterns need both a delimitation and a unification. A delimitation of instances of properties-with-shapes without any unification would give us an aggregate, not a pattern. Spatial unification without delimitation would give us the universe only.

5 Spatiotemporal patterns

A spatial pattern can exist as a whole, but this is not possible for a temporal pattern which extends beyond "the now". The past no longer exists, and the future has not yet come into existence. Nonetheless we can represent time by means of a spatial line, and we can imagine and think of temporal patterns in analogy with spatial patterns.

Consider again the chessboard, but now imagine that the squares, as time goes by, are changing colours, and that they change in such a way that at every moment there is a chessboard pattern. In time, this spatial pattern gives rise to a temporal pattern. This chessboard pattern with its colour changes is a *spatiotemporal* colour pattern. If the colours are seen as representing different densities, then we have a spatiotemporal density pattern.

A lot of other but similar patterns can jusst as easily be thought of. Above, we had (a) non-changing shapes but changing colours, but we can also (b) keep the colours constant and let the shapes of the pattern vary with time. We can (c) let both the colours and the shapes vary with time. Still another opportunity is (d) to keep both the shapes and the colours of the squares constant, but let them *move* around with time. We then get a movement pattern. The last thought experiment becomes easier if one thinks of each square as a thing. Such spatiotemporal patterns make up the non-causal part of *mechanisms*. Think for instance of the clockwork.

The complexity of spatiotemporal patterns can be even greater. Try to think of a case (e) where the components of the pattern are moving and changing their shapes, while at the same time changing some of their other properties too.

(Real spatiotemporal patterns have of course causes, but that fact does not make it impossible to describe the patterns independently of their causes. I have in another paper, [4], argued that if the causes of mechanisms are abstracted away, then one can study *mechanism geometry* in a way similar to classical purely spatial geometry.)

The seven "*spatial* pattern truths" I have put forward can be transformed into the following corresponding "*spatiotemporal* pattern truths". Some of them need a comment, but some, I hope, need not.

1. A spatiotemporal property pattern contains properties-with-shapes that are either changing properties, or changing shapes, or moving; this gives rise to spatiotemporal shapes.

Comment: Spatiotemporal shapes can be four-dimensional. A two-dimensional chessboard square which continuously changes shape into a circle, gives rise to a three-dimensional spatial and temporal shape; a cube which continuously changes shape into a sphere, gives rise

to a four-dimensional spatiotemporal shape.

2. A spatiotemporal property pattern contains a lot of property-grounded relations, but it is not identical with a set or an aggregate of such relations; the instantiations of these relations can be both spatially and temporally scattered.

3. A spatiotemporal property pattern contains a lot of both spatial and temporal relations, but it is not identical with a set or an aggregate of such relations.

4. A spatiotemporal property pattern contains a specific kind of spatial unity and a specific kind of temporal unity.
Comment: The spatial unity is the same as earlier described. Time, however, has not the same kind of unity, since it is only "the now" which exists. Since this paper is not a paper in the philosophy of time, I will rest content with two remarks. (i) Temporal unity is not a really existing unity; in one sense it is an imagined and fiat unity, but in another sense it is not an imagined unity since the imagined events have had existence. (ii) When we represent time as a spatial line, our representation of time inherits the kind of unity which space has. This means, among other things, that, as spatial patterns are necessarily "one-piece and no-hole" areas or volumes, (spatio)temporal patterns cannot possibly have temporal holes. If, to take an example, a square during t_1 to t_2 changes shape into a circle, next, from t_2 to t_3 remains a circle, and from t_3 to t_4 changes into an ellipse, then the *non-change* between t_2 and t_3 becomes part of the temporal pattern, too. If this non-change is not regarded as part of the pattern, then we would have one pattern between t_1 and t_2, and *another* pattern between t_3 and t_4. The first pattern can not be connected with the last pattern into one single pattern without bringing in also what happens during t_2 to t_3. Therefore, I regard time as *unity-creating* in about the same way as container space is unity-creating.

5. The type-identity of a spatiotemporal property pattern is independent of spatiotemporal size.
Comment: Both specific kinds of changes and specific kinds of movements can take place in a longer or a shorter temporal interval; both of them have a change intensity. Just as a purely spatial pattern can be spatially diminished without losing its qualitative identity, a spatiotemporal pattern can be spatiotemporally diminished without losing its qualitative identity.

6. Mind-independent spatiotemporal patterns can be represented by mind-dependent spatiotemporal patterns.

7. Spatiotemporal patterns are necessarily fiat objects.
Comment: This claim is a corollary of what was said about spatiotemporal unity in the comment to the fourth claim, and what was earlier said about fiat objects. Spatiotemporally based unities have no natural boundaries, except, of course, the universe and its whole history; if that totality has boundaries. Taking the peculiarity of time's existence into account, one might say that spatiotemporal patterns are more fiat than purely spatial patterns because they are more dependent upon subjective representation.

6 Causal systems

In order for a pattern to exist, a unity must be created. In spatial patterns this unity arises thanks to the unity of space and a fiat delimitation of one part of space; in spatiotemporal patterns the unity arises thanks to a spatiotemporal unity and a fiat delimitation. What distinguishes causal patterns (=systems) from spatial and spatiotemporal patterns is primarily the way their unity is created.

Let us imagine an old wire-based telephone system in a little village with fifteen cottages. The components of this causal system are fifteen telephone apparatuses, a telephone exchange, and the telephone-wires. All the components are things with properties. Scattered in these components there are a lot of property-grounded relations, and between them there are a lot of spatiotemporal relations. Metaphorically, on top of this there are a lot of *causal*

relations. However, as I have shown before, neither a set nor an aggregate of relations can create the necessary unity; that now the relevant relations are causal makes no difference to my arguments.

The unity of the imagined telephone system can neither consist in the unity of *actual* causal interaction nor in merely the *spatiotemporal unity* of the system. Firstly, the telephone system exists even when nobody is using it, i.e. it exists even when there is no actual causal interaction among the components. Secondly, there is a telephone system even if the wired system is replaced by a radio telephone system, and when such a system is not used the components exist merely as an aggregate. There are then no spatial connections between the components.

My conclusion is that causal systems get their identity from some kind of *possible* causal interaction. Realism with regards to causal *systems* requires both a realist view of causality and a belief in *de re* possibility. Since these are big philosophical issues in themselves, they cannot be dealt with here. There is only space for confession: In both respects I am a believer.

A telephone which is not connected by a wire to any of the other fifteen telephones cannot be used for making calls within the system, and cannot therefore be part of this causal system. Nonetheless, this telephone may causally effect the system in some other way which is not part of the *functioning* of the telephone system. For instance, someone may take this phone and throw it at a functioning phone, and so make the whole phone system non-functioning. In fact, most things on earth seem, in some far-fetched way or other, to be able to affect each other. Therefore, the unity of a causal system is always a unity of *certain kinds* of causal interactions.

The kinds of possible causal interactions which constitute a causal system have to be chosen from all the possible ones. This means that every causal system is a *fiat* system. By fiat we decide to focus attention only on some kinds of interactions. However, as remarked before, conventionality can fuse with mind-independent phenomena. The "fiatness" of causal systems, just like the "fiatness" of spatial patterns, does not cancel mind-independence.

When, now, I am once again listing my "seven pillars of pattern wisdom", I will, in order to be brief, do it with only one comment.

1. A causal system contains things with properties and corresponding spatial and spatiotemporal patterns.
2. A causal system contains a lot of property-grounded relations, but it is not identical with a set or an aggregate of such relations.
3. A causal system contains a lot of both spatial, temporal, and causal relations, but it is not identical with a set or an aggregate of such relations.
4. A causal system contains a specific kind of causal unity.
5. The type-identity of a causal system is independent of its spatiotemporal size.
6. Causal systems can be represented by mind-dependent patterns.
7. Causal systems are fiat objects.

Once again I would like to say that the claims number seven and number four should be seen in the light of each other. Causal systems need both a delimitation and a unification. A delimitation of causal components without any unification would give us an aggregate, not a system. Causal unification without delimitation would afford us with incomprehensibly large systems.

7 Degrees of self-sufficiency and degrees of fiatness

I have distinguished three species of the category of pattern.[4] Often, when there is talk of

[4] In fact, I think there are four. If one believes, as I do, that intentional states cannot be identical with pure causal and functional data processing systems, then there is still another important species of the category of pattern, intentionality. As I hope is clear by now, what really differentiates the species of patterns is their unity-making factor. In my view, intentionality can be unity-making, just like space, time, and causality can. A group of people who mutually perceive each other, or talk with each other, make up a system which is different in character from a purely causal system. The unity of this system is created by nested intentionality.

species and genera, as in botany taxonomy, the species come out as logically independent of each other. They exist, one may say, side by side. But this is not true for the species of pattern. There is a kind of order of existential dependence among the unity-making factors. In my view, causality requires spatiotemporality, and, of course, spatiotemporality requires spatiality; but not the other way round.

Spatial unity is more existentially self-sufficient than spatiotemporal unity, which, in turn, is more self-sufficient than causal unity. This order is an order among the "fiat-independent" factor of a pattern unity. However, it may well be argued that this order implies a corresponding ordering of and degrees of fiatness. That is: spatial patterns are less fiat than spatiotemporal patterns which are less fiat than causal systems[5]. But all of them can, independently of their degree of fiatness, have a mind-independent part.

Pattern realism is true. There are patterns and systems in the world.

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See [2], chapter 15.

[5] Also, I think that causal systems are less fiat than intentional systems, see note 4.