# Determinables as Universals[1]

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According to immanent realism, there are universals in the spatiotemporal world quite independently of language and the mind. The existence of these universals, furthermore, is not dependent upon there being Platonic universals existing outside the spatiotemporal world. In this paper I will try to show that immanent realism holds not only for many *determinate* universals, but for some *determinable* universals as well. In other words, there are *ontological* determinables as well as *conceptual* determinables.

## *1. Determinables and Determinates*

The terms 'determinables' and 'determinates' were made important in philosophy by the Cambridge philosopher W.E. Johnson at the beginning of this century,[2] even though the senses of the terms have a history dating back at least to Aristotle. Franz Brentano lectured about similar ideas in Vienna in 1890-91, but his lectures were not available in print until 1982.[3] What Johnson was to call 'determinables', Brentano called 'logical parts'.[4]

Johnson's distinction between determinables and determinates is applicable both to universal concepts and to universals *in re*. Examples abound. The concept *scarlet* is a determinate of the concept *red*, and the latter concept, in turn, is a determinate of the concept *color(ed)*.[5] Conversely, the concept *color(ed)* is a determinable for the concept *red*, which, in turn, is a determinable for the concept *scarlet*.

Two main features of the distinction between *conceptual* determinables and determinates are: (a) if a determinate concept (e.g., *red*) can be truly predicated of something, then at least one determinable concept (e.g., *colored*) must necessarily also be predicable of exactly the same thing; (b) if a determinable concept (e.g., *colored*) can be truly predicated of something, then there must be some (though unspecified) determinate concept (e.g., *red*) that is also truly predicable of exactly the same thing.

A determinable concept subsumes its determinate concepts. The determinable-determinate relation is a relation which connects two universals. It is not a relation between a universal and a particular falling under this universal. If a certain

particular instantiates a certain determinate, it instantiates the corresponding determinable too.

The two features of the determinable-determinate relation mentioned, (a) and (b) above, characterize the genus-species distinction too. However, Johnson himself wanted to keep the determinable-determinate relation distinct from the genus-species relation. Also, he added a third characteristic, namely (c) that two determinates (e.g., *yellow* and *red*) of the same determinable (*colored*) cannot exist in the same particular at the same time. These latter views of Johnson will be discussed in the last section of this paper. As a foil and a point of departure for my arguments, I will use the views of David Armstrong. [6]

When Armstrong, with his two-volume book *Universals and Scientific Realism* (1978), managed to put Aristotelian immanent realism on the modern philosophical agenda, he also discussed the distinction between determinables and determinates.[7] No determinable *concept* can, he claimed in that book, refer to a real determinable universal *in re*, since there are no such (ontological) determinable universals. All conceptual determinables should, he then said, be conceived of as classes of determinate universals. His immanent realism was in this sense a very restricted realism. Armstrong soon, however, changed his mind. Already in *What is a Law of Nature?* (1983) he said that there probably are some ontological determinables, too.[8] He pointed out that the functional laws of physics, if realistically conceived, seem to require that there are ontological determinables. And this position is endorsed again in Armstrong's latest book, *A World of States of Affairs* (1997).[9]

It should be noted, though, that in Armstrong's view it is only numerical functional laws which require ontological determinables: "It is a plausible conjecture that all ontological determinables are *quantities*."[10] In my view, there is much more to be said in favor of the spatiotemporal existence of determinable universals, and there is no reason to restrict a belief in their existence to quantities.

When the distinction between determinables and determinates is applied to universals *in re*, the main features of the distinction can be described as in the following quotation from Armstrong:

> (a) If a particular has a determinate property, then it is entailed that the particular has the determinable property. Necessarily, if a thing is triangular, it has a shape. Necessarily, if a thing is red, it has a colour. (b) If a particular falls under a determinable, then it is entailed that it has one of the corresponding determinate properties, although it is not entailed which. Necessarily, if a thing has a shape, it has a particular shape. Necessarily, if a thing is coloured, it has a particular colour.[11]

In the next section I shall present my basic reasons for being an immanent realist with regard to determinates. The remaining sections deal with determinables. Those readers who will not be convinced by my very brief argumentation for immanent realism can e.g., consult Armstrong's works for detailed arguments against various forms of nominalism and conceptualism.[12]

## *2. Immanent Realism*

Before considering universals *in re*, i.e., wholly mind-independent and language-independent universals, I will consider universals which are mind-dependent but language-independent, namely universals in perceptual objects.

Obviously, there are, as a matter of fact, determinate universals *or* tropes in perceptual objects. Most people have sometimes perceived a determinate color hue at two different places at one and the same time. And the same is true of perceived shapes. Two of our most common everyday perceptual properties can be at several places in our perceptual space at one and the same time. This means that they are either universals or tropes. From a realist point of view, they obviously conform to the usual characterization of universals: a universal is an entity which can be at two places simultaneously. A universal can have instances. According to *immanent* realism, a universal is identical *in and with* all its instances.

As far as I can see, all forms of nominalism (including conceptualism) [13] rejecting tropes must, confronted with the existence of perceived colors and shapes, make the claim that universal linguistic concepts have *unconsciously* structured our perceptions. In my view, such variants of nominalism implicitly claim that the basic non-linguistic particulars of the world are not structured. Such forms of nominalism, pursued to the (bitter?) end, must hold that not even a color sensation can be ascribed a qualitative identity of its own. Such a sensation must then be a particular which, in spite of the fact that it can be structured by a linguistic universal, has no qualitative identity of its own. However, the idea of an aggregate of propertyless particulars seems to be a contradiction in terms. What, in such an aggregate, makes one particular distinct from another? How can two spatiotemporal entities be spatially distinct from each other if both lack a shape? If they do not have a shape they do not seem to have a border, and the idea of a finite spatiotemporal particular without a border seems contradictory.

So much for trope-less nominalisms. But what about the view that tropes exist? What about the view that in each perceived color spot and in each perceived shape there is a trope, i.e., a nonrecurring determinate color and a nonrecurring instance or "moment" of determinate shape, respectively? Let us think of two exactly similar color spots, i.e., the spots have the same color hue with the same degree of intensity and of saturation. According to the trope analysis, there are then primarily two exactly similar tropes but no universal. Because of the existence of the resemblance relation we can, secondarily, construct a universal concept, but there are not in our perceptual objects any universals.

The difference between immanent realism and trope nominalism can, I think, be traced back to different views on the relationship between the *relation of exact resemblance* and (generic or) *qualitative identity of properties*. Trope theorists have

to claim that exact resemblance is logically prior to qualitative identity of properties,[14] whereas immanent realists have to make the opposite (and true) claim: *qualitative identity of properties is logically prior to the relation of exact resemblance*.

When, according to immanent realism, we perceive two instances of the same lowest specific determinate color, then we have two numerically distinct but *qualitatively identical* color spots. Secondarily, and due to the qualitative identity of the properties, there is *also* a relation of exact resemblance. This relation supervenes "with increase in being"[15] upon the colors of the relata, and it is not identical with the qualitative identity of the two color instances in question. The difference between the *qualitative identity of a property* and the *relation of exact resemblance* might be subtle, but the difference is there. [16] Let me explain.

Assume that we perceive a determinate volume relation, e.g., *being larger than*, between A and B. The relation can be described by: "The volume of A is larger than that of B"; but this description loses some of the perceived determinateness. In my view, the perceived determinate *relation* is an ontological universal, although it has to be grounded in two ontological *property* universals, i.e., in the perceived volumes of the relata A and B. Similarly, the relation of exact resemblance has to be grounded in some *properties* of the relata. Resemblance, necessarily, has to supervene upon something.

If A and B were the only entities in the universe, and A were larger than B, then this relational fact would be dependent upon the fact that A has one determinate volume and that B has another one. If A were to pass out of existence, then the relation *being larger than* would also pass out of existence, but B's volume (the *property*) would exist nonetheless. Conversely, if B were to pass out of existence, then the relation would again pass out of existence, but A's volume would still exist. Quite generally, there is an asymmetry between relations of this kind and the connected (=subvenient) monadic properties. The properties can exist, with their qualitative identities, without the relation, but the relation (with *its* qualitative identity!) can not possibly exist without the properties.

The kind of ontological asymmetry that exists between the relation *being larger than* and the property instances it relates, seems to be necessary also between the relation of *exact resemblance* and the property instances it relates. As far as I can see, a trope theorist cannot ascribe properties to a trope in a one-trope-world without taking recourse to counterfactual resemblances. But such a move makes no sense to me. Counterfactuals can be used to explicate *concepts*, but they are unable to perform any ontological work. By definition, a counterfactual describes something which does not exist. Therefore, in my view, the existence of the relation *exact resemblance* cannot possibly explain the existence of any property universal, whereas qualitative identity of properties can explain the existence of the relation of exact resemblance.

The structure of this brief argument of mine for immanent realism - with regard to determinates - can be represented as follows:

a) Either immanent realism or trope nominalism is true of *perceived determinate* colors.

b) Of these two views, the one which is true of determinate perceived *colors* is also true of the determinates of perceived *shapes* and *volumes*.

c) That view which is true of determinate *perceived* shapes and volumes, ought to be true as well of the mind-independent *non-perceived* determinates of shapes and volumes.

d) Qualitative identity of properties is logically prior to the relation of exact resemblance; therefore, immanent realism makes more sense than trope nominalism.

e) Immanent realism is true in relation to both perceived and mind-independent determinate universals.

I will now regard immanent realism in relation to determinates as proven true, but discuss it in relation to determinables. (A trope philosopher can of course in a corresponding way try to prove that there are trope-determinables.)[17] My conclusion will be:

f) Immanent realism is true in relation to some perceived determinable universals, as well as in relation to some wholly mind-independent determinable universals, i.e., there are ontological determinables.

## *3. The Gap Argument*

Between the lowest determinate (mind-dependent phenomenal) colors, between the lowest determinate (both phenomenal and mind-independent) shapes, and between the lowest determinate (both phenomenal and mind-independent) volumes, there are relations of resemblance. For instance, relations like *a is more like b than c*. With the help of such resemblance relations, determinate volumes can in thought be ordered on a line where each volume-determinate is ascribed a punctual position and a real number. Phenomenal colors cannot, like some of their underlying causes, the wavelengths of electromagnetic radiation, be quantified. Nonetheless, they can be ordered. In the so-called color spindle (see Figure 1) each color is ascribed one single point. Each point in this "color space" represents a specific color-hue (the periphery of the circle in the Figure), a specific color-intensity (the vertical line), and a specific color-saturation (the radii of the circle). The resemblance relations among shapes, to take a third example, are even more complex. Even though some

subclasses of shapes can be ordered on a line (for instance, ellipses according to their eccentricity), nobody seems as yet to have managed to construct a "shape space" in which *all* possible shape-determinates can be ascribed a point. But, perhaps, some day it will be done.[18]

Now, first of all, I want to remove a possible misunderstanding. I am going to argue that volume, color, and shape are ontological determinables, but that does *not* mean that their determinates have to be thought of as points on a line, where the line represents the determinable. Volumes may be thought of in this way, but shapes cannot (at least today).

Trivially, two arbitrarily chosen volume-determinates can always, in thought, be continuously connected by a chain of intermediary determinates. The color spindle shows that the same goes for colors, too. With respect to colors there are even infinitely many such chains between any two points. Shapes can today neither be quantified nor ordered in a "shape space." Nonetheless, even two arbitrarily chosen shape-determinates can always, in thought, be continuously connected by intermediate determinates (see Figure 2). One small reservation, however, has to be added. The expression 'continuous connection' is not meant in a strict mathematical sense. According to geometrical topology, a square, to take merely one example, cannot possibly be turned into a circle unless three mathematical points are taken away.[19] But such infinitesimally small lacunas and mathematical discontinuities do not affect my argument.

Despite all their differences in quantifiability and orderability, the determinates of volume, color, and shape, have one feature in common. It can be expressed as follows: *two different determinates of the same determinable can always be continuously connected*. Can, similarly, two *determinables* be continuously connected by a chain of intermediaries? If such a connection is possible, it would of course also connect some corresponding determinates. But this seems to be impossible. No color-determinate resembles more closely a shape-determinate or volume-determinate than any other. There is, so to speak a *necessary lack of resemblance* between the determinables under discussion. We simply cannot conceive of something which continuously connects them with each other, and this non-conceivability seems to be grounded in the entities themselves rather than in a weakness in our faculty of imagination. In what follows, I will sometimes talk of this peculiar fact as *the gap* between determinables.

"Lack of resemblance," in the sense now spoken of, must not be conflated with "being very dissimilar." Two shapes which are very dissimilar can nonetheless be continuously connected by means of other determinates. Resemblance admits degrees, and being very dissimilar is merely "long distance resemblance". Lack of resemblance is something else. *All* determinate colors seem to differ from *all* determinate shapes in *exactly the same way*. The simplest explanation of this lack of resemblance is that all color-determinates have something in common, namely the ontological determinable of color. All the shape-determinates have something

else in common, namely the ontological determinable of shape; and similarly for volumes. The determinables, in turn, are simply different.

Usually, conceptual determinables can be ordered into levels like the concepts *scarlet*, *red*, and *color(ed)*.[20] My claim about ontological determinables is by no means meant to imply that there are ontological universals which correspond to the conceptual determinables of every such level. On the contrary: *where there is no gap there are no separate ontological determinables*. In my view, the concepts *volume*, *color*, and *shape* can be used to refer to ontological determinables since there are gaps between them (and there are corresponding ontological determinates), but the concepts of red, orange, and yellow cannot refer to ontological determinables since there are no gaps between the concepts. The limits of the latter concepts are conventional, and the extension of each concept is merely a class of lowest ontological color-determinates. None of these determinable concepts can be used to refer to an ontological determinable.[21]

The remark just made applies, with some reservations, to shapes and volumes, too. Most ordinary shape concepts are, like the ordinary color concepts, only conceptual determinables, i.e., they have as their extension merely a class of different shape-determinates. Some shape concepts, however, are special in the sense that they have exactly one determinate in their extension. Examples are the concepts *perfectly circular* and *perfectly square-shaped*. They can only be used to refer to one lowest ontological determinate each. Such concepts ought to be called 'lowest possible conceptual determinates'. The ordinary concepts *round* and *square*, however, have as their extensions classes of lowest ontological shape-determinates which contain more than one member.

Everyday volume concepts, like *large* and *small*, behave of course like the ordinary concepts *round* and *square*. Their extensions are multi-membered classes of ontological determinates. Note, however, that every determinate *quantitative* concept, e.g., the concept *5,013 $cm^3$*, should, like the concept *perfectly round*, be regarded as a conceptual lowest *determinate*. It can only be used to refer to *one* ontological determinate. Such a quantitative concept is of course relational, whereas the monadic property it may refer to, is non-relational. But there is no contradiction here. The explicit referent of a relational concept can very well be a non-relational entity.

If ontological determinables are accepted as that which explains the gap or lack of resemblance between classes of determinates, then they can also fulfill other explanatory functions. *Prima facie*, resemblance is always resemblance *in a certain respect*. Two things cannot just be similar or dissimilar. They have to be similar or dissimilar *with respect to* volume, color, shape, or some other such property. The hypothesis of ontological determinables explains in a simple way why resemblance is always resemblance in a certain respect. (This is also Armstrong's view.)[22]

*4. The Argument from Physical Magnitudes*

Before I put forward my next argument in favor of ontological determinables, I will briefly present Armstrong's argument, since, like mine, his argument is centered around the magnitudes of physical laws. As I said in Section 1, Armstrong thinks that the existence of functional laws indicates the existence of ontological determinables. The simplest functional laws have the form Q = f(P), where Q and P are determinable universals. A real example from the history of science would be Boyle's law for gases: $p \cdot v$ = constant (at constant temperature); $p$ is the pressure and $v$ the volume.[23]

Armstrong's argument for the view that a law like Boyle's, if true, implies the spatiotemporal existence of the *determinable* universals *pressure* and *volume*, relies on a very specific assumption. He "assume[ s] the truth of what may be called Actualism."[24] According to this kind of Actualism, firstly, dispositions and powers cannot be real; and, secondly, a genuine law cannot be uninstantiated, i.e.,, it cannot be about the merely physically possible.

In Armstrong's (and my) view, true functional laws represent *necessitation relations between universals*. Given this assumption, one way to analyze Boyle's law, $p \cdot v$ = constant, is to view it as a mere shorthand for an infinite conjunction of laws. Each such law would then relate two determinate universals to each other: $p_1$ if and only if $v_1$, $p_2$ iff $v_2$, $p_3$ iff $v_3$, $p_4$ iff $v_4$, and so on *ad infinitum*. Surely, a lot of values of $p$ and $v$ will never correspond to any determinate universals *in re*, and this creates a dilemma for the Actualist Armstrong: either all functional laws must be given an instrumentalist interpretation, or some functional laws must have a reference which makes the *whole law* refer to something actual. Since, obviously, Armstrong wants to avoid the first horn of the dilemma, i.e., dismiss all possible functional laws of the natural sciences as being *a priori instrumentalist*, he must find some way in which functional laws can fit in with his Actualism. His solution is to regard the *determinable concepts* of true functional laws as referring to ontological determinables. What determinables there are in the world can, according to Armstrong, only be decided *a posteriori*.

Armstrong's dilemma is not a problem for immanent realism *in general*. In my opinion, we can speak and think of non-existent (= non-instantiated) universals, just as we can speak and think of non-existing entities like unicorns. Boyle's law would then (even if true) not be only about really existing determinate universals. It would imply a lot of counterfactual truths about all the non-instantiated relevant determinate universals as well. If the (assumed) non-existent $p_{39}$ would become instantiated, then necessarily $v_{39}$ would have to become instantiated, too.

Since I think that Actualism is false, Armstrong has in my view reached a true conclusion with the help of a false premise. Even Armstrong himself, it should be noted, finds Actualism "most difficult and uncertain," [25] but nonetheless he believes

in it. There are, however, other arguments in favor of the existence of determinables which appeal to physical magnitudes and functional laws.

Let us first look at additive magnitudes. A numerically determinate physical magnitude can be regarded as a determinate number associated with a physical dimension. Now, it only makes sense to add (or subtract) magnitudes which have the same dimension. 5 $cm^3$ + 3 $cm^3$ = 8 $cm^3$, and 5 kg + 3 kg = 8 kg, but 5 $cm^3$ + 3 kg is not equal to 8 of any physically meaningful magnitude. One determinate volume can be added to another determinate volume, and one determinate mass can be added to another determinate mass, but it makes no sense to add a volume to a mass.

In physics it is taken for granted that it only makes sense to add quantities which have the same dimension. [26] The best explanation of this (often tacit) assumption, is that each dimension differs from all other dimensions by *gaps* of the kind described in the preceding section. And, therefore, *when the determinates of such a dimension are given a realist interpretation* the dimension (variable) itself represents an ontological determinable universal. In the Gap Argument it was assumed from the start that all the determinables discussed (*phenomenal color*, *shape*, and *volume*) have ontological determinates. In the Argument from Physical Magnitudes this assumption has to be relaxed. Obviously, a lot of variables in physics have to be given an instrumentalist interpretation.

Even though, from a physical point of view, magnitudes with different dimensions can never be added or subtracted, they can be multiplied (as in Boyle's law) and divided with each other. Does, perhaps, this fact tell against the view that some physical dimensions are best interpreted as representing ontological determinables? I think not. Rather, it supports this view, as I will try to show by some brief remarks on (scalar) multiplication.

As already said, a numerically determinate magnitude consists of a determinate number associated with a physical dimension. This means that we are performing *two* operations simultaneously when we are multiplying physical magnitudes. We are not only making a purely mathematical multiplication of the numbers at hand, we are also multiplying the corresponding dimensions. If a pressure-determinate, e.g., 6 $N/m^2$ (Newton per square meter) is multiplied by a pure dimensionless number, say 7, we get another pressure, 42 $N/m^2$. This is equivalent to the addition 6 $N/m^2$ + 6 $N/m^2$ + 6 $N/m^2$ + 6 $N/m^2$ + 6 $N/m^2$ + 6 $N/m^2$ + 6 $N/m^2$. However, if we multiply a pressure of 6 $N/m^2$ with a volume of 7 $m^3$ we get the number 42 associated with the new dimension Nm (Newton times meter). If we multiply 1 $N/m^2$ with 1 $m^3$ there is (since 1 times 1 equals 1) no purely arithmetical difference between the magnitude of the product and the magnitudes which are being multiplied, but nonetheless there is an important difference in physical dimension. $N/m^2$ times $m^3$ equals Nm.

Two things should now be noted. First, it holds true in general, that a product must have another physical dimension than those of the multiplicands. Second, the multiplicands can always be represented by means of an x-axis and an orthogonally opposed y-axis in an abstract space. The second point requires some more words. When one class of determinates (e.g., determinate x-lengths or determinate pressures) is represented as being orthogonally opposed to another class of determinates (e.g., y-lenghts or volumes, respectively), then all the determinates of the first class are represented as being different *in exactly the same way* from all the determinates of the second class. The simplest explanation of the fact that orthogonal representations make sense and work, seems to be the assumption that there is a necessary lack of resemblance between the determinates of each class. Since a determinable $D_1$ (e.g., *x-length* or *pressure*) is simply different from another determinable $D_2$ (e.g., *y-length* or *volume*, respectively), all the determinates of $D_1$ must differ from all the determinates of $D_2$ in the same way.

The two remarks made apply also when the multiplicands seem to have the same physical dimension, as e.g., in 6 m times 7 m. In spite of the fact that both these multiplicands have the same dimension, meter, the product has another dimension, $m^2$. If all the magnitudes are realistically interpreted, the multiplicands refer to *length-determinates* in real space, whereas their product refers to an *area-determinate*. Furthermore, the two length-determinates, 6 m and 7 m, have to be regarded as belonging to two different dimensions which are orthogonal to each other in real space, an x-dimension and a y-dimension. The multiplication makes no physical sense if both magnitudes are regarded as belonging to e.g., the x-dimension. This, in turn, means that these two length-determinates, in spite of appearances, belong to different physical determinables. From a realist physical point of view, the multiplication above is best represented as $6\ m_x \cdot 7\ m_y = 42\ m^2$. Real space is three-dimensional, and each such dimension constitutes an ontological determinable in the sense under discussion.

Obviously, some (and obviously not all) physical dimensions ought to be given a realist interpretation. Therefore, the reflections above indicates, that if the existence of ontological determinables is denied then addition and multiplication in physics become a mystery.

## *5. The Argument from Patterns*

The gap argument makes no difference between quantitative and non-quantitative determinables, but the argument from physical magnitudes applies only to quantities. Like the gap argument, the argument from patterns, which now follows, is independent of the quantifiability of the determinables discussed.

The most pervasive and conspicuous patterns in our everyday world are color patterns. Let us make a partial analysis of them.[27] A color pattern is more than an

aggregate of colors situated close to each other. It consists of determinate colors with determinate shapes, i.e., the *components* of a color pattern are spatial unities of *determinates* of colors and shapes. Any finite uni-colored color spot must have a border. If the border is sharp the border has a determinate shape, if the border is blurred it has a blurred shape, but there is nonetheless a border and a shape. Every kind of property pattern has components which are properties-with-shapes, and the components of color patterns are colors-with-shapes. This means that the components of a color pattern are also spatial unities of two different *determinables*, color and shape.[28]

I will now put forward a *reductio ad absurdum* argument. Assume that the concepts of color and shape do not reflect any *ontological* determinables. This assumption entails that each component of a color pattern is a unity of two determinates which belong to two *conventionally created classes of determinates*. Since these classes are merely man-made constructions, it must be possible to *think* of components of color patterns in which a color-determinate is united, not with a shape-determinate, but with a determinate universal *u* which belongs to another class. All we have to do is to delimit the class of shape-determinates in a new way which makes *u* a member, too. But such unities, colors spatially fused only with non-shapes, seem impossible to think of as components of any color pattern. Therefore, the *conceptual* determinables *color* and *shape* cannot delimit only classes of determinates. They must reflect *ontological* determinables too.

## *6. The Observability of Determinables*

In this section I will try counter a *prima facie* objection to my belief in ontological determinables.[29] Above, I have explicitly or implicitly made the following three claims:

(i) There are *determinate* universals in perceptual objects.

(ii) A determinate and its determinable are instantiated in exactly the same spatiotemporal region, therefore there are also *determinable* universals in perceptual objects.

(iii) Determinable universals of determinate universals in perceptual objects cannot possibly be unobservables.

My arguments commit me to the view that whoever perceives a determinate universal perceives its determinable as well. If no determinables are observable, I have to reject my realism with regard to determinables. The question I have to face can also be put like this: we perceive determinates of volumes, colors, and shapes, but do we really perceive the corresponding determinables?

It is an established truth in perceptual psychology that every perception contains a foreground-background duality. This duality is a spatial duality, and can equally well be called a center-periphery duality. Every perception has a spatial center which "stands out" against a surrounding spatial background. There are, however, some other dualities in our perceptions which very well can be called foreground-background dualities too.

When we perceive a material thing, we primarily see one of its sides, let us call it the front. But in some sense we also immediately *see* that the thing has a back and an inside. The thing is immediately given *as a whole thing*. It makes a lot of difference to see a façade as the façade of a real house or as a mere (movie) façade. In a perception of a material thing, the front is a directly seen foreground which stands out against a background of indirectly seen sides. That which is "really seen," the front, is the foreground, and that which is "seen but not really seen" constitutes a kind of background.

A third kind of foreground-background duality exists in Gestalt qualities. When we perceive a Gestalt, say a face, we also perceive - *in the center and in the front of the face* - a lot of details (the mouth, the nose, the eyes, etc.), but we do not attend to these details. Such non-attended details is still another kind of background, a background for which the Gestalt to which we attend is the foreground.

There are various kinds of foreground-background distinctions. Is there a specific such distinction when we perceive determinates?

When we perceive a color pattern, we primarily perceive (attend to) a Gestalt (the pattern) against a background of (non-attended) details (the color spots). But I think that, in fact, we also see that all the different color determinates have something in common, namely that each of them is, precisely, a color. There is, as a kind of background, a strictly identical something throughout the whole pattern: the color *determinable*. The color determinable is really perceived, but like a lot of other perceptual features it is perceived indirectly.

In one way, however, the perception of determinables may differ from the other kinds of background-perceptions hinted at. What is periphery in one perception can become center in another perception. Similarly, what is backside in one perception can become front in another perception, and what is first a non-attended detail can later become a Gestalt of its own. But it seems very hard, if not impossible, to make the color determinable into a foreground and push its determinates into the background. This difference, though, has a natural explanation.

Determinables can be said to be more abstract than their (concrete) determinates. In themselves, they seem to be more "thin" than their "thick" determinates. Necessarily, a determinable is less vivid than its determinates. This fact explains why it is so hard to attend directly to a determinable property of a perceived object. However, the background of a perception is as much in the perceptual act as the

foreground is. A background can only - as background - be indirectly observed, but the fact that determinables are indirectly observable supplies all that is needed in order to refute the view that ontological determinables are not observable at all.

## *7. Laws for Ontological Determinables*

The Armstrong of *Universals and Scientific Realism* accepted only lowest determinates as universals *in re*. Today, Armstrong accepts ontological determinables, but he does it hesitatingly, and he restricts the realm of ontological determinables to quantitative ones. I hope this paper shows that there really are determinable universals of various kinds, quantifiable as well as non-quantifiable. Some, but not all, conceptual determinables, reflect the existence of real spatiotemporally existing determinables.

An ontological determinable is strictly the same in all its determinates. Therefore, there is in the world *identity in difference*. There is nothing fundamentally wrong with this old notion.

There are not only ontological determinables, there are also interesting necessary relations connected with such determinables. We have stumbled upon three such laws or principles:

*The Law of Addition and Subtraction*: Only determinates of the *same* determinable can be added and subtracted in a physically meaningful way.

*The Principle of Determinable Dependence*: Some ontological determinables cannot possibly exist unless another determinable exists in the same spatiotemporal region (e.g., *colors* require *shapes*).

*The Principle of Determinate Exclusion*: For some ontological determinables (e.g., *color*) it is true that two of its determinates cannot possibly exist in the same spatiotemporal region.

If there are ontological determinables, then, there is of course no philosophical reason to try to replace the corresponding concepts with nominalistic constructions. There are not even pragmatic reasons. To speak of determinables is simpler and easier than to speak of classes of determinates.

## *8. Determinables as Properties, Relations, and Genera*

In the earlier sections I have restricted my discussion of the determinable-determinate relation to monadic properties. This is in conformity with tradition. In fact, however, I do not think that there are any good reasons for such a restriction.

Obviously, just as there are determinate-determinable series between property concepts (e.g., "*scarlet→ red→ color(ed)*" and "*square→ quadrilateral→ shape*"), there are such series between relation concepts (e.g., "*a little longer than→ longer than in general→ length relation*" and "*much brighter than→ brighter than in general→ intensity relation*"). Relation concepts, just like property concepts, can be fitted into determinable-determinate trees.

The series above can be prolonged. On the one hand we get the two series "*scarlet→ red→ color→ property*" and "*square→ quadrilateral→ shape→ property*", which both culminate in *property*, and on the other hand we get the two series "*a little longer than→ longer than in general→ length relation→ relation*" and "*much brighter than→ brighter than in general→ intensity relation→ relation*", which both culminate in *relation*. In this way, one can talk of a conceptual *property-determinable* as well as of a conceptual *relation-determinable*, both of which are determinables on a level above the determinables earlier discussed. If, as I think, relations cannot be reduced to properties, then the conceptual distinction between properties and relations reflects the existence of two *ontological* determinables. The existence of an ontological property-determinable and an ontological relation-determinable affects what is now and then called *The Principle of Determinables*. Here is Johnson's formulation of the principle:

> if any determinate adjective characterises a given substantive, then it is impossible that any other determinate under the same determinable should characterise the same substantive.[30]

A thing cannot simultaneously be both red and blue in one and the same part. Neither can it be both square and round or large and small. Such impossibilities are easily formulated by means of the determinable-determinate distinction. Johnson, however, generalized too quickly. The Principle of Determinables is true for a lot of determinables (e.g., *color*, *shape*, and *volume*), but not for *all* determinables. If the concept *property* is a determinable which reflects an ontological determinable, we have an obvious counterexample which falsifies Johnson's principle. Surely, a thing can at one and the same time have several determinates of the property-determinable. Even more, things *must have* at least two such determinates since *volume* and *shape* are determinates of the property-determinable.

In my view, Johnson's Principle of Determinables should be substituted by the *The Principle of Determinate Exclusion* of Section 7: for *some* ontological determinables it is true that two determinates cannot possibly exist in the same spatiotemporal region.

The falsity of the principle of determinables is one of my reasons for identifying the determinable-determinate relation with what Searle has called *the specifier relation*, i.e., the conditions (a) and (b) of Section 1.[31] My second reason for this identification is that there are similarities between the genus-species relation and the classical determinable-determinate relation which neither Johnson nor Searle have noted.

Of course, the genus-species relation differs from determinable-determinate relations like *color-scarlet* and *shape-square* in the way stressed by Johnson and Searle. As Searle says:

> In short, a species is a conjunction of two logically independent properties– the genus and the differentia. But a determinate is not a conjunction of its determinable and some other property independent of the determinable. A determinate is, so to speak, an area marked off within a determinable without outside help.[32]

If the species *man* is defined as a *rational animal* and it is logically possible that there are non-animal rational beings (i.e., *rationality* is logically independent of *animality*), then the species *man* is "marked off" (to use Searle's expressions) from its genus *animal* "with outside help" from the concept *rationality*. There is, however, no problem in regarding the genus-species relation as a determinable-determinate relation. All we have to do is to allow the determinable-determinate relation *to be applicable to itself*. There are then different determinates of the *determinable* determinable-determinate relation. One such determinate is the genus-species relation, another such determinate is the determinable-determinate relation *for properties*, and a third such determinate is the determinable-determinate relation *for relations*. Just like all other determinates, these three determinates differ at the same time as they have something in common.

In order to understand the similarity between ontological species and ontological determinates, one should note that when a species is an ontological universal, it is a *complex unity* of the genus-universal and the species-universal. On the purely *conceptual* level the species-concept (e.g., *man*) can be described as a conjunction of two logically independent concepts, *rationality* and *animality*, but *in re* it is different. The genus-universal (*animality*) and the species-universal (*rationality*) are spatiotemporally fused. They are merely aspects, not concrete parts of an actual particular of the species in question. The concepts *man*, *rational*, and *animal*, can be held (as now) spatially apart, but this is impossible when the corresponding universals exist together *in re*. A species is, rather, a Gestalt and as much a unity of its own as its genus and its *differentia specifica* are. Therefore, the relation of a species to its genus is very similar to the relation between an ontological property-determinate and its ontological determinable.

Kevin Mulligan has maintained that there are at least three types of non-conceptual relations of determination.[33] Apart from genus-species trees (which relate to nouns) and Johnson's determinable-determinate trees (which relate to adjectives), there are also specification trees for actions (which relate to verbs). The intuitive appeal of this suggestion also underlines the fact that the relation between the classical determinable-determinate distinction and its own determinable is in need of investigation. Whether or not this relation should be *called* a specifier relation, or, as I have argued, a determinable-determinate relation, is of minor importance.

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NOTES

1. I want to thank Kevin Mulligan, Geneva, for a lot of discussion related to this paper. I have also benefited from comments given by members of the philosophy seminar in Umeå and by D. Bonevac, F. Correia, U. Meixner, and R. Poli.

2. W.E. Johnson, *Logic* (Cambridge: Cambridge University Press, vol. 1, Cambridge 1921; vol. 2, 1922; vol. 3, 1924).

3. F. Brentano, *Deskriptive Psychologie* (Hamburg: Felix Meiner, 1982 , eds. R.M. Chisholm and W. Baumgartner), Part 1, ch. II.

4. For a short overview of Brentano's philosophy and his concept of logical part, see K. Mulligan and B. Smith, "Franz Brentano on the Ontology of Mind," *Philosophy and Phenomenological Research* XLV (1985), pp. 327-44.

5. I have written 'color(ed)' in order to give associations both to the series 'being *scarlet* - being *red* - being *colored*' and the series '*scarlet* is a kind of *red* which is a kind of *color*'; a third corresponding series is 'having *scarletness* - having *redness* - having *color*'. The conceptual and grammatical differences beetween these series are unimportant in relation to the issue at hand.

6. The Italian philosopher Roberto Poli has written a paper in which Johnson's distinction, as well as its reception and later history, is presented. Therefore, there is no need for me to provide a history of the distinction. See Poli, "W. E. Johnson's Determinable-Determinate Opposition and His Theory of Abstraction," in F. Coniglione, R. Poli and R. Rollinger (eds.), *Abstraction and Idealization: Historical Studies* (special issue of *Poznan Studies in the Philosophy of the Sciences and the Humanities*), forthcoming 2000.

7. D. Armstrong, *Universals and Scientific Realism* (vols. I & II), (Cambridge: Cambridge University Press, 1978); in particular vol. 2, pp. 111-13 and 116-20.

8. D. Armstrong, *What is a Law of Nature?* (Cambridge: Cambridge University Press, 1983), chapter 7.

9. D. Armstrong, *A World of States of Affairs* (Cambridge: Cambridge University Press, 1997), chs. 13, 16.

10. *Ibid*. p. 247.

11. D. Armstrong, *Universals and Scientific Realism*, vol. II, p. 112.

12. A short introduction is Armstrong's *Universals. An Opinionated Introduction* (Boulder, CO: Westview Press, 1989), but the classic is his *Universals and Scientific Realism*. For criticism of trope nominalism see also H. Hochberg, "A Refutation of Moderate Nominalism,"

*Australasian Journal of Philosophy* 66 (1988), pp. 188-207, and "Troubles with Tropes," *Philosophical Studies* 67 (1992), pp. 193-95.

13. Examples of such nominalisms are, in Armstrong's terminology, predicate nominalism, concept nominalism, class nominalism, and resemblance nominalism. See *Universals and Scientific Realism*, vol. 1, Part II. One may, however, speak about trope nominalism as a resemblance nominalism, too; see the next footnote.

14. I am confining the argument to what I take to be the most plausible kind of trope theory, "Resemblance classes of tropes," to use Armstrong's formulation; see his *Universals. An Opinionated Introduction*, p. 17f.

15. I do not know who has invented this term, but I have taken it from Armstrong; see e.g., *A World of States of Affairs*, p. 141. When, once upon a time, the term 'supervenience' was introduced by G.E. Moore and R.M. Hare, it was tied to non-reductive views; supervenience then entailed "increase in being."

16. This is not Armstrong's view. According to him, exact resemblance is the same as qualitative identity. See *Universals and Scientific Realism*, vol. II, p. 110.

17. K. Mulligan has entertained the idea that a trope theory of substances may require determinable tropes. See Mulligan, "Internal Relations," in B. Garrett & P. Menzies (eds.), *Working Papers in Philosophy, 2*, RSSS, Australian National University, Canberra, Proceedings of the 1992 Canberra metaphysics conference, pp. 1-22 (1993); esp. p. 13. Some trope theorists, e.g., Ivar Segelberg, has taken it for granted that there are both trope determinates and trope determinables, whereas others, e.g., John Bacon, explicitly has left the question rather open. See H. Hochberg (ed.), *Ivar Segelberg. Three Essays in Phenomenology and Ontology*, Stockholm: Thales (Library of Theoria), 1999, "Properties" ch. II.1 and ch. IV.3 (about quality relations); and J. Bacon, *Universals and Property Instances* (Oxford: Blackwell, 1995), pp. 18 and 21.

18. See e.g., J.J. Koenderink, *Solid shapes* (Cambridge, MA: MIT Press, 1990); see in particular chs. 6.8 ("The Local Shape Index") and 9.8 ("Shape Language"), but notice also 1.4 ("What Not to Expect").

19. In topological terms, a square and a circle are homeomorphic but not diffeomorphic.

20. The concept of level was not stressed by Johnson himself, but J. Searle, in an early non-ontological paper, highlighted this feature. See Searle, "Determinables and the Notion of Resemblance," *Proceedings of the Aristotelian Society*, Suppl. vol. 33 (1959), pp. 141-58.

21. Searle was not, in the paper mentioned in the preceding note, interested in the distinction between conceptual and ontological determinables which I am focusing attention on. Nonetheless, he made a distinction between *absolute* and non-absolute determinables which seems to run parallel to the distinction between ontological and conceptual determinables. He even said: "The notion of an absolute determinable is relevant to the traditional problem of categories: every predicate carries with it the notion of a kind or category of entities of which it can be sensibly denied or affirmed." *Ibid*. p. 150. The same views can be found in his article "Determinables and Determinates" in *Encyclopedia of Philosophy* (New York: Macmillan, 1967).

22. *Universals and Scientific Realism*, vol. I, p. 57.

23. Armstrong's examples are Newton's second law, $F = m \cdot a$, and the law of gravitation $F = (m_1 \cdot m_2)/r^2$. They have the form Q = f(P,N) and Q = f(P,N,M), respectively.

24. *Universals and Scientific Realism*, vol. I, p. 8.

25. *What is a Law of Nature?*, p. 9.

26. There are also interesting ontological things to be said about the distinction between additive and non-additive magnitudes; see my paper "Physical Addition," R. Poli and P. Simons (eds.), *Formal Ontology* (Amsterdam: Kluwer, 1996), pp. 277-88.

27. I have given a more thorough analysis in the paper "Pattern as an Ontological Category," N. Guarino (ed.), *Formal Ontology in Information Systems* (Amsterdam: IOS Press, 1998), pp. 86-94.

28. I could equally well have said that the components are unities of spatial extension, color, and shape.

29. The problem is similar to, but not identical with, the "epistemological difficulty" discussed by Armstrong in *Universals and Scientific Realism*, vol. II, pp. 98-99.

30. W.E. Johnson, *Logic* I, p. 181.

31. See J. Searle, "Determinables and the Notion of Resemblance," *Proceedings of the Aristotelian Society*, Suppl. vol. 33 (1959), pp. 141-58, esp. p. 145. Since I am primarily interested in *ontological* determinables, I have avoided the kind of problems which arise when one tries to state *general* conditions which are both sufficient and necessary for a determinable-determinate relation to hold between two *concepts*. To take an example, is *red* a determinate to any of the disjunctive concepts *red or angry* and *colored or angry*? Since I do not think there are any disjunctive ontological universals, I have no corresponding problem. Such problems, however, seem to be capable of being solved, as J. Searle (in the paper mentioned) and J. Woods ("On Species and Determinates," *Nous* 1, pp. 243-54) have shown.

32. Searle, *Ibid*., p. 143.

33. K. Mulligan, "Internal Relations," in B. Garrett & P. Menzies (eds.), *Working Papers in Philosophy, 2*, RSSS, Australian National University, Canberra, Proceedings of the 1992 Canberra metaphysics conference, pp. 1-22 (1993); esp. p. 8.