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CATEGORIAL PREDICATION

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Abstract
When, for example, we say of something that it 'is an object', or 'is an event', or 'is a property', we are engaging in *categorial predication*: we are assigning something to a certain *ontological category*. Ontological categorization is clearly a type of classification, but it differs radically from the types of classification that are involved in the taxonomic practices of empirical sciences, as when a physicist says of a certain particle that it 'is an electron', or when a zoologist says of a certain animal that it 'is a mammal', or when a meteorologist says of a certain weather-phenomenon that it 'is a hurricane'. Classifications of the latter types presuppose that the items being classified have already been assigned to appropriate ontological categories, such as the categories of *object*, *species*, or *event*. What do categorial predications *mean*? How are their *truth-conditions* to be determined, and how can those truth-conditions be known to be satisfied? Do they have *truthmakers*? Questions like these are amongst those addressed in the present chapter.

1. Fantology; or, 'Ontology Lite'

Most philosophers today who have been brought up in the analytical tradition have been exposed, at a formative period of their thinking, to the formalism of first-order predicate logic with identity. This has equipped them with a certain conception of reference and predication which is, from the point of view of serious ontology, extremely thin and superficial. It is a view which embodies – to invoke Barry Smith's apt term[1] – all the myths of 'Fantology': the idea that the most basic form of atomic proposition is one that may be symbolized as '*Fa*', where '*F*' is the predicate and '*a*' is a singular term, or 'individual constant' (the logical counterpart of a proper name). The only further elaboration of this

[1] See Barry Smith, 'Of Substances, Accidents and Universals: In Defence of a Constituent Ontology', *Philosophical Papers* 26 (1997), pp. 105–27, and 'Against Fantology', in M. E. Reicher and J. C. Marek (eds), *Experience and Analysis* (Vienna: HPT&ÖBV, 2005).

that is countenanced is to admit *relational* predicates with any finite number, n, of 'places', giving us as the most general form of an atomic proposition '$R^n a_1 a_2 \ldots a_n$'. And the only 'relation' that is given any special formal recognition is the dyadic relation of *identity*, with its own dedicated symbol, '=', as in '$a_1 = a_2$'. Sometimes, a formal recognition is also accorded to the monadic *existence* predicate, as in 'E!a', but this is generally analysed in terms of the particular (or, more tendentiously, 'existential') quantifier, '∃', together with identity, as being equivalent to '$(\exists x)(x = a)$'. And that, basically, is the sum total of the formal machinery of standard predicate logic that serves to represent anything remotely 'ontological' in character: it is 'Ontology Lite'.

One point I am aiming to make here is that there are many more ontological distinctions that we need to be able to make that go beyond either the distinction between object (or 'individual') and property or that between existence and identity. It just isn't good enough to say, with W. V. Quine, that the fundamental question of ontology is 'What is there?', and that its most concise answer is 'Everything'.[2] Ontology is concerned above all with the *categorial* structure of reality – the division of reality into fundamental *types* of entity and their ontological relations with one another. The object/property distinction is very probably *one* such distinction that any system of categorial ontology should recognize, and identity is *one* such relation, but very plausibly there are many others besides these.

Note that, on the now standard view – basically Quine's, which is a development of Frege's and Russell's – we don't even get an 'ontological commitment' to *properties and relations* out of 'first-order' languages, since the latter don't involve quantification into predicate position. For that we need, supposedly, a *second*-order language, where we can say things of the form '$(\exists F)(Fa)$' and the like. But this then apparently treats 'properties' (the 'values' of second-order variables) as second-order *objects*, of which yet higher order properties may further be predicated. So, on this view, the object/property distinction is really just a *relative* one, with an n^{th}-order *object* being an $(n-1)^{\text{th}}$-order *property*, for all $n > 1$. Hence, *all* entities are 'objects' on this view, but there are different 'orders' of objects, starting with first-order ones which

[2] See W. V. Quine, 'On What There Is', in his *From a Logical Point of View*, 2nd edn (Cambridge, MA: Harvard University Press, 1961).

are not ‘properties’ of anything. And maybe we can even discern an echo here, however weak, of the Aristotelian notion of a ‘primary substance’, which is not ‘said of’ anything – of which much more anon. (Quine himself, of course, was sceptical about including ‘properties’ in our ontology – at least, properties conceived as ‘universals’, as opposed to items identifiable as *sets* of first-order objects – on the grounds that he could see no principled way to *individuate* them, rendering them vulnerable to his dictum ‘No entity without identity’.)

The next pernicious aspect of the ‘standard’ view is this: it accommodates no notion of ‘property’ other than as *something* – though exactly *what* is often left obscure – that ‘corresponds’ to a *predicate*, as in ‘*Fa*’, where ‘*F*’ supposedly expresses a ‘property’ of *a*. This is despite the fact that we know that, on pain of contradiction, not *every* predicate can denote or express a property – this simply being a consequence of one version of Russell’s paradox. Take the predicate ‘– is non-self-exemplifying’, which seemingly applies, for example, to the first-order property of *being green* (‘first-order’ property because it is a property of first-order *objects*, such as *apples* and *leaves*). ‘Being green (greenness) is not *green*’ certainly seems to be true, whence it seems that we can conclude that ‘Being green is *non-self-exemplifying*’ is also true. If the example is not liked, another can easily replace it. But we know that there can be no (second-order) *property* (property of a first-order property) of *being non-self-exemplifying*, since if there were it could plainly be *neither* self-exemplifying *nor* non-self-exemplifying, giving us a contradiction.

We are also now in the territory of Frege’s notorious paradox of the concept (that is, first-order property) *horse*, which he contended was *not* an object because it is not ‘saturated’ – the apparent implication being that the *object* that we *do* denote by the singular term ‘(the property of) being a *horse*’ is not what is expressed by the predicate ‘– is a horse’.[3] The best that the standard view can do at this point, it seems, is to say that for every ‘property’ of order n – ‘property’ in the sense of *semantic value of a predicate* – there is a corresponding *proxy*-object of order $(n + 1)$, which is the semantic value of a corresponding singular term. If that is right, then it turns out that the object/property distinction

[3] See Gottlob Frege, ‘On Concept and Object’, in *Translations from the Philosophical Writings of Gottlob Frege*, 2nd edn, ed. and trans. P. T. Geach and M. Black (Oxford: Blackwell, 1960).

isn't even straightforwardly *relative*, as was suggested earlier. Rather, we have a series of *objects* of ascending 'orders' and, *distinct but in parallel with that*, a series of corresponding 'properties'. The scheme is something like the following – where, listed in each column of the table, are typical expressions whose semantic values are the 'objects' and 'properties' of successively higher 'orders':

	Objects	**Properties**
1st order	'Dobbin'	'– is a horse'
2nd order	'Being a horse'	'– is a first-order property'
3rd order	'Being a first-order property'	'– is a second-order property'
4th order	'Being a second-order property'	'– is a third-order property'
Et cetera		

This scheme is organized so as to enable us, supposedly, to assign appropriate 'semantic values' to the semantically interpretable parts (subjects and predicates) of sentences such as the following:

(1) Dobbin is a horse.
(2) Being a horse is a first-order property.
(3) Being a first-order property is a second-order property.
Et cetera

Of course, as well as affirming, for example, (2) – 'Being a horse is a *first-order property*' – we are *also* supposed to be able to affirm 'Being a horse is a *second-order object*', since the foregoing table displays that alleged fact by listing 'Being a horse' in the second row under the 'Objects' column. One might suppose that this would entitle us to conclude that *a first-order property is (identical with) a second-order object*: but that is problematic, given Frege's contention that the object/property (or object/concept) distinction is mutually exclusive, on the grounds that properties but not objects are 'unsaturated' entities. This just shows how intractable the 'paradox' is, at least given Fregean assumptions.

But what, really, are the 'semantic values' of predicates – *properties* – supposed to *be*? On one view – not Frege's, clearly, but maybe Quine's – they are just the 'extensions' of those predicates: the sets of things to which they apply, such as the set of all (actually existing) horses in the case of the predicate ‘– is a horse’. This would make the semantic value of that predicate an *object*, however, since sets are pretty clearly objects by any reasonable account. On another view – neither Frege’s nor Quine’s – the semantic value of such a predicate is instead a certain kind of *function*: namely, a function from ‘possible worlds’ to sets of objects existing in those worlds.[4] Thus, the semantic value of the predicate ‘– is a horse’, on this view, is a function from possible worlds to the sets of *horses* existing in those worlds (and Quine would reject the view because he rejects ‘possible worlds’). This, in the current technical jargon, assigns an *intension*, rather than just an *extension*, as the ‘semantic value’ of this predicate. But, fairly evidently, a ‘function’, at least as this is normally understood by mathematical logicians, is itself just a special kind of set-theoretical entity and so a certain kind of *abstract object* – not the kind of ‘unsaturated’ entity that Frege took properties (or ‘concepts’) to be. However, these entanglements take us too far from our current purpose, save to illustrate once more the baroque qualities of ‘Fantology’ and its insouciance about questions of serious ontology. Its adherents exhibit no genuine interest in understanding the real *nature* of properties, if such entities there be.

However, one important further application of the foregoing scheme of objects and properties of different ‘orders’ is worth mentioning, and it concerns the notion of *existence*. As was indicated earlier, ‘Dobbin exists’ is standardly analysed as ‘$(\exists x)(x = \text{Dobbin})$’, and here ‘$(\exists x)(x = -)$’ may be regarded as denoting or expressing a *first*-order property – the property, possessed by Dobbin and indeed by all other existing objects, of *being identical with something*. But we can, supposedly, also *re-parse* ‘$(\exists x)(x = \text{Dobbin})$’ by treating the expression ‘= Dobbin’ as being, in effect, a sign for the quite different first-order property of *being identical with Dobbin*. This being done, ‘$(\exists x)(x\ -)$’ may then be

[4] Frege himself does, in his own way, treat properties (‘concepts’) as functions, but as functions from objects to *truth-values*, and he accordingly regards functions as ‘unsaturated’ entities: see ‘Function and Concept’, in Geach and Black (eds), *Translations from the Philosophical Works of Gottlob Frege*. Russell speaks instead of ‘propositional functions’, conceived as functions from objects to *propositions*: see ‘Propositional Functions’, in Bertrand Russell, *Introduction to Mathematical Philosophy* (London: George Allen and Unwin, 1919). But neither view is any more attractive than the views now under discussion in this paragraph.

taken to express the *second*-order property of *having at least one (first-order) instance*, which is here being predicated of the first-order property of being identical with Dobbin. Thus re-parsed, ‘$(\exists x)(x = \text{Dobbin})$’ should really be understood as having the logical form ‘$G_2(F_1)$’, with ‘F_1’ denoting the first-order property of being identical with Dobbin and ‘G_2’ the second-order property of having at least one instance, so that the whole sentence may be re-translated into (rather barbaric) English as ‘Being identical with Dobbin has at least one instance’. But once again, of course, the singular term ‘being identical with Dobbin’ now has to be taken to denote a second-order *object*, not the first-order *property* that is the semantic value of the predicate ‘– is identical with Dobbin’, at least if we follow Frege in these matters.

Now, at this point I want to cry out that all of this is completely *insane* from an ontological point of view that aspires to any seriousness, being driven entirely by the constraints of a particular style of logical formalism and the ramshackle ontology that typically accompanies it. We need to sort out our *ontology* properly first, and only then shape our formal logic to fit it, not vice versa. And the first step towards sanity here is to abandon the idea that there is something special and sacrosanct about the ‘atomic’ logical form ‘*Fa*’ – Fantology. Fantology, which originates from the systems of formal logic newly developed by Frege and Russell around the beginning of the twentieth century, does implicitly rest on certain ontological assumptions, but on rather weak and ill-thought-out ones – assumptions which seemed to matter little when they were overshadowed by the sheer *logical* power of those formal systems. It weakly reflects, thus, the *object/property* distinction, whose historical roots lie in traditional Aristotelian substance ontology – ultimately, in fact, in Aristotle’s early work, the *Categories*.[5] But in the *Categories*, Aristotle does not assume a simple dichotomy between ‘substance’ (or ‘object’) and ‘property’. Rather, he introduces a more complex *four-fold* ontological scheme by way of two key formal notions: those of ‘being *said of* a subject’ and ‘being *in* a subject’. Somewhat obscure though these notions may initially seem to be, on further investigation they in fact bear rich ontological fruit and valuable insights into the

[5] See Aristotle, *Categories and De Interpretatione*, trans. J. L. Ackrill (Oxford: Clarendon Press, 1963).

proper relations between logic and ontology. It is a worthwhile project, then, to try to clarify them in terms rather more familiar to present-day metaphysicians, whereupon a comparison between Fantology and traditional Aristotelian categorial ontology will prove to be quite revealing.

2. Aristotelian Categorial Ontology and Its Logical Formalization

I turn now to the foregoing task: that of explicating the 'being said of'/ 'being in' distinction and its application by Aristotle in his characterizations of the most basic ontological types figuring in his four-fold categorial scheme, these types being (1) *primary substance*, (2) *secondary substance*, (3) *property* or *attribute* and (4) *individual accident* or *mode* (to use some familiar Scholastic nomenclature). First of all, then, being *said of* is clearly indicative of *predication*, while being *in* is indicative of what would, long after Aristotle's time, come to be called *inherence*. Now, Aristotle's *primary substances* in the *Categories* are described by him as being *neither said of nor in* a subject – in other words, they are not *predicable* of anything, nor do they exist 'in' anything as ontological ingredients or constituents. Being neither 'of' nor 'in' other things, they are thus in neither sense ontologically *dependent* beings, and this indeed is why primary substances are taken by him to be the entities that are ontologically most fundamental. By contrast, Aristotle's *secondary* substances – the species and genera of primary substances – are, according to him, 'said of' but not 'in' a subject, thus sharing one kind of ontological independence with primary substances but not another. Thus, for example, in affirming that Dobbin *is a horse*, we are predicating *the species horse* of the primary or individual substance Dobbin. But, on Aristotle's view, this species isn't 'in' the individual substance, as an ontological 'constituent' of the latter – that is, as some entity numerically *distinct* from that substance but one which, nonetheless, somehow helps to *constitute* it as the particular substance that it is. Next, we have items in the category 'both said of and in a subject', which gives us a contrast between the predicate '– is a horse' and, say, the predicate '– is warm-blooded'. The latter expresses a *property* or *attribute* of Dobbin, which he shares with all other individual substances of the same species (all other horses) – shares, it seems, as an ingredient or constituent in his *nature or* *being* (his 'essence').[6] Finally, there are the items that are '*in* a subject but not *said of* a subject', which are generally taken to be a primary substance's 'individual accidents' or 'modes' – items such as the *particular* whiteness of Dobbin, as opposed both to the *universal* whiteness that he shares with all other white primary substances and also to the particular whitenesses of *other* white primary substances.

It will be noted that all *predicables* belong either to the category of secondary substances or to the category of attributes and that all items in these categories are *universals* rather than particulars – all *particulars* belonging either to the category of primary substances or to the category of modes. Thus, on this account, although modes are in one sense 'properties' of primary substances, they are not *predicable* of them, which may sound odd to the ears of present-day metaphysicians. And yet it does seem to be borne out by what we actually *say* in English and other natural languages. When, for instance, we say that Dobbin *is white*, we are making no reference to his *individual* whiteness, even if it is *because* this individual whiteness 'inheres' in him that whiteness (the universal) is predicable of him. (Incidentally, it is precisely because present-day metaphysics is equivocal about the status of 'properties', sometimes treating them as universals and sometimes as particulars in the guise of 'tropes', that I generally prefer to use the term 'attribute' to denote items that are 'both said of and in a subject'.)

Much more can and should be said about all this, but already we can see that we have here a much richer ontology than anything that is offered by Fantology and one that is, despite being categorially more complex, ontologically far less baroque and extravagant. For example, we have no grounds now for believing in a potentially infinite hierarchy of 'orders' of objects and properties. Thus, warm-bloodedness is *said of* a subject – it is a 'predicable' – but is not *itself* a subject, in the relevant sense of 'subject'. Of course, the *word* 'warm-bloodedness' can be made the *grammatical* 'subject' of a *verb*: but that is not the *ontological* conception

[6] Here I am, for the sake of simplicity, glossing over an important distinction between properties in the strictest sense, which are necessarily shared by all primary substances of the same species – by all individual horses, for instance – and what might be called 'general accidents', which are shared by some but not all such primary substances, an example being Dobbin's whiteness (since not all horses are white). I take it that, for the Aristotelian, both warm-bloodedness and whiteness are 'in' Dobbin, but only the former is *necessarily* 'in' *all* individual horses.

of a subject, which is that of a *substance* (whether primary or secondary). So, the sentence 'Warm-bloodedness is a property of horses', say, shouldn't be understood as predicating the (pseudo-) property or attribute of *being a property of horses* of the (pseudo-) subject *warm-bloodedness.* Rather, it is just a roundabout way of saying 'Horses are warm-blooded', which expresses a general truth about the secondary substance or species *horse,* holding in virtue of that species' *essence.* To regard warm-bloodedness as a *subject* – a quasi-substance – would simply and literally be a *category mistake,* on the Aristotelian view. Thus, on this approach, we need have no truck with 'second-order logic' (at least as it is ordinarily conceived) and other such formal monstrosities. And we aren't faced with Frege's hideous 'paradox' of the concept *horse.* For that paradox is really just an artefact of an impoverished logical formalism and its misconceived ontological assumptions.

So, what would a *better* logical formalism look like? First of all, if we are going to follow the Aristotle of the *Categories,* we shall obviously need *four* distinct classes of 'material' (that is, non-formal or non-logical) expressions, not just the *two* ('*F*' and '*a*') of standard first-order predicate logic, in order to denote (1) primary substances, (2) secondary substances, (3) properties or attributes and (4) individual accidents or modes. Let us then adopt the following notation for this purpose:

(1) a, b, c, . . . denote primary substances.
(2) α, β, γ, . . . denote secondary substances.
(3) F, G, H, . . . denote attributes.
(4) μ, ν, ξ, . . . denote modes.

Again, if we are going to follow the Aristotle of the *Categories,* we need *different* devices for expressing 'saying of' (predication) and 'being in' (inherence), in place of the *single* device for expressing 'predication' that we find in standard first-order logic. And indeed I am happy to follow Aristotle here too, partly for purposes of illustration, but also because I largely agree with him.[7] So, to

[7] See my *The Four-Category Ontology: A Metaphysical Foundation for Natural Science* (Oxford: Clarendon Press, 2006). Although I broadly follow Aristotle in that book, I do not there deploy his being said of/being in distinction, preferring instead to make use of a three-way distinction between instantiation, characterization and exemplification. I still prefer the latter approach, but am using this opportunity to explore further an approach that is closer to Aristotle's own.

this end, let us simply use *post*-positioning to represent *predication*, as in standard first-order logic, giving us, for example, 'βa' and 'Fa' as ways to symbolize 'Dobbin is a horse' and 'Dobbin is warm-blooded' respectively (where 'β' = 'horse', 'a' = 'Dobbin' and 'F' = 'warm-blooded'). And let us additionally use *pre*-positioning to represent *inherence*, giving us, for example, '$a\mu$' and 'aG' as ways to symbolize 'This whiteness is in Dobbin' and 'Whiteness is in Dobbin' respectively (where 'μ' = 'this whiteness', 'a' = Dobbin and 'G' = 'white(ness)'). Note that, with this scheme, we can represent 'Dobbin is white' and 'Whiteness is in Dobbin' as 'Ga' and 'aG' respectively, reversing the positions of 'G' and 'a'. But, very plausibly, two such sentences are *logically equivalent*, even if they are not synonymous, so that for logical purposes we may discard formulas of the form 'aG' as superfluous. Here is the scheme laid out in tabular form, followed by the formation rules for constructing 'atomic' sentences:

1. Subjects	**2. Predicables**	**3. Inherents**
Primary substances	Secondary substances	Attributes
$a, b, c, \ldots$	$\alpha, \beta, \gamma, \ldots$	$F, G, H, \ldots$
Secondary substances	Attributes	Modes
$\alpha, \beta, \gamma, \ldots$	$F, G, H, \ldots$	$\mu, \nu, \xi, \ldots$

Rule 1. Any item in column 1 can have something in column 2 *predicated* of it, this being represented by *post*-positioning the former item to the latter: thus, 'βa', 'Ga', '$\alpha\beta$' and '$F\alpha$' – as in 'Dobbin is a horse', 'Dobbin is white', 'Horses are mammals' (or 'A/The horse is a mammal') and 'Mammals are warm-blooded', where 'β' = 'horse', 'a' = 'Dobbin', 'G' = 'white', 'α' = 'mammal' and 'F' = 'warm-blooded'. (Note that the definite or indefinite article in 'A/The horse is a mammal' is logically redundant and would not, of course, have any equivalent in Latin and many other languages.)

Rule 2. Any item in column 1 can have something in column 3 *inherent* in it, this being represented by *pre*-positioning the former item to the latter: thus, 'aG', '$a\mu$', 'αF' and '$\beta\mu$' – as in 'White(ness) is in Dobbin', 'This whiteness is in Dobbin', 'Warm-blooded(ness) is in mammals' and 'This whiteness is in horses', where 'G' = 'white(ness)', 'a' = 'Dobbin', 'μ' = 'this whiteness', 'F' = 'warm-blooded(ness)', 'α' = 'mammal' and 'β' = 'horse'. As implied above, we take 'warm-blooded' and 'warm-blooded*ness*' to be equivalent for ontological purposes, the difference in form being merely a grammatical peculiarity of English. And, once more, we take 'White(ness) is in Dobbin' and 'Warm-blooded(ness) is in mammals' to be logically equivalent, respectively, to 'Dobbin is white' and 'Mammals are warm-blooded', rendering formulas of the forms 'aG' and 'αF' redundant for logical purposes. The only odd case is the last, 'This whiteness is in horses', for how, it might be asked, can a *mode* 'inhere' in a *species*? One answer might be that it does so just as long as *some* individual member of the species, such as Dobbin, has this whiteness inhering in him. Alternatively, we might simply want to rule out this last case as not well-formed and restrict accordingly the formation rule stated at the beginning of this paragraph.

Observe that these formation rules give us just the following *six* types of 'atomic' sentences: Fa, αb, $G\beta$, $\alpha\beta$, $a\mu$ and $\alpha\nu$. The first type predicates an attribute of a primary substance, the second predicates a secondary substance of a primary substance, the third predicates an attribute of a secondary substance, the fourth predicates a secondary substance of another secondary substance, the fifth expresses the inherence of a mode in a primary substance and the sixth expresses the inherence of a mode in a secondary substance. (For reasons just explained, the first type also serves to express the inherence of an attribute in a primary substance and the third type also serves to express the inherence of an attribute in a secondary substance.) As just mentioned, we might want to exclude the sixth type and allow only the first five. There is nothing sacrosanct, of course, about this notation, and others could have been used quite as well. But it is interesting to note that, if we restrict our attention to just the first five types, we can see that the four basic classes of 'material' terms occur in them with the following frequencies: secondary substance terms (α, β) *four* times, primary substance terms (a, b) *three* times, attribute terms (F, G) *two* times and mode terms (μ, ν) just *once*. Whether that rather neat distribution has any significance is hard to say. In saying that just these types of atomic sentences are well-formed, other combinations of terms are by implication excluded, such as 'GF' and '$\mu\beta$': one attribute cannot be predicated of or inhere in another attribute, nor can a mode be predicated of a secondary substance or a secondary substance inhere in a mode.

Of course, this gives us, so far, only a way to formally represent 'atomic' propositions. There is a lot more expressive power that we still need to cater for in order to express, for instance, truths of *existence* and *identity*. Here we may follow existing practice, however, and use the symbols 'E!' and '=' respectively for these purposes. But we also need *quantifiers* – at least a *particular* and a *universal* quantifier – although for this purpose too we may as well again follow existing practice and use the symbols '$\exists$' and '$\forall$'. However, we shall *not* adopt the usual assumption that existence can be 'analysed' in terms of '$\exists$' and '='. And another appropriate diversion from standard practice would be to favour so-called *restricted* quantifiers for most purposes. For instance, in order to represent the sentence 'Some (individual) horses are white', we shall use a formula such as '$(\exists x\colon \alpha x)(Fx)$', where '$\alpha$' = 'horse' and '$F$' = 'white'. Similarly, in order to represent the sentence 'Some (species of) mammals are viviparous', we shall use a formula such as '$(\exists \varphi\colon \beta\varphi)(G\varphi)$', where '$\beta$' = 'mammal' and '$G$' = 'viviparous'. (It will be noticed, incidentally, that I am here adopting the convention of using x, y, z, . . . as variables ranging over primary substances and φ, χ, ψ, . . . as variables ranging over secondary substances.)

My reason for favouring restricted quantifiers for these purposes emerges most clearly in the case of universal generalizations. Consider, for instance, the true sentence 'All (species of) mammals are warm-blooded'. This I prefer to represent by a formula such as '$(\forall \varphi\colon \beta\varphi)(H\varphi)$', where '$\beta$' = 'mammal' and '$H$' = 'warm-blooded'. This, I think, is greatly preferable to a formula such as '$(\forall \varphi)(\beta\varphi \rightarrow H\varphi)$', which uses *unrestricted* quantification over secondary substances. In fairly plain English, the difference is, very roughly, between 'Any mammalian species is warm-blooded' and 'Any species, if it is mammalian, is warm-blooded'. But one problem with the latter formulation arises when we consider what sort of sentence qualifies as an *instance* of this sort of generalization. The sort of sentence that qualifies is one such as 'If (the species) mountain is mammalian, then it is warm-blooded' – or, more colloquially, 'If mountains are mammals, then they are warm-blooded' – which I would represent by a formula such as '$(\beta\gamma \rightarrow H\gamma)$', where '$\gamma$' = 'mountain'. The latter clearly *is* entailed by '$(\forall \varphi)(\beta\varphi \rightarrow H\varphi)$', by an application of the logical rule of universal instantiation. But the *antecedent* of 'If mountains are mammals, then they are warm-blooded' – 'Mountains are mammals' – is very hard to make any sense of. Indeed, it seems to constitute a *category* mistake: not, indeed, one involving the four *most basic* categories of the Aristotelian scheme, but one involving two different *sub*-categories of secondary substances.

Mammals (that is, mammalian *species*, such as the horse and the rabbit) belong to the sub-category of *biological* species, whereas mountains belong to the sub-category of *geological* species – and it apparently makes no sense even to entertain the 'thought' that mountains are mammals, that is, that a species of geological structure is a species of living organism. No such absurdity is entailed by my preferred formula, '$(\forall\varphi\text{: }\beta\varphi)\,(H\varphi)$'. This, *in conjunction with* a formula of the form '$\beta\gamma$', entails one of the form '$H\gamma$'. For instance, 'All (species of) mammals are warm-blooded' together with 'The horse is a (species of) mammal' entails 'The horse is warm-blooded'. But the additional premise here, 'The horse is a (species of) mammal', is evidently perfectly uncontentious and indeed just expresses an essential truth about horses.

I noted above in passing that I follow the convention of using x, y, z, . . . as variables ranging over primary substances and φ, χ, ψ, . . . as variables ranging over secondary substances. For the sake of completeness, however, we need also variables ranging over *attributes* and *modes*. But in saying this we must be careful to remember that the latter are not *subjects* (that is, they are not *substances*, either primary or secondary). We can have *names* for them and *variables* ranging over them, but that should not lead us to treat them as quasi- or pseudo-substances, which is the implicit mistake of those philosophers and logicians who think that 'second-order' logic, by quantifying into predicate position, incurs ontological commitment to a new class of 'objects', over and above the 'first-order' objects that are the supposed values of 'first-order' variables. This, I think, is just a horrible ontological muddle on their part. *Properties,* in the form of both attributes (universal properties) and modes (particular properties), should certainly be accorded a place in any sensible ontology, but it is wrong to *reify* or *hypostatize* them. This is because they are essentially 'inherent' entities, always being 'in' a subject (substance) – or, as we might otherwise put it, always being only *aspects* of substances, or '*ways* substances are', never substances in their own right.

Note, incidentally, that the formal logical language sketched above is in fact only classifiable as a '*first*-order' language in the standard sense, despite the fact that it includes names for and variables ranging over properties, in the shape of both attributes and modes. This is because it does *not* involve 'quantification into predicate position' in the standard sense. (Moreover, in model-theoretic terms, it does not invoke a domain which includes *all* *sub-sets* of the domain of first-order objects quantified over by a standard first-order language and hence a domain whose cardinality is necessarily greater than that of the latter, even if there are infinitely many such first-order objects; a domain of quantification for a formalized language like mine could perfectly well include only a denumerable infinity of entities, so long as it included some entities belonging to each of the four basic ontological categories.) Now, the latter phenomenon – quantification into predicate position – is exemplified in a formula of so-called 'second-order' logic such as '$(\exists F)(Fa)$'. But, in standard predicate logic, the 'F' in 'Fa' is supposed to represent a *predicate*, understood as an 'incomplete' expression such as '– is white'. By contrast, 'Fa' in my formalization of Aristotelian categorial ontology serves to express the proposition that the attribute *F*(ness) inheres in, or is predicable of, the primary substance *a*. 'F' and 'a' here are thus to be thought of as two *terms*, each *naming* an entity belonging to a certain ontological category. In standard predicate logic, 'F' is not a *term* in this sense at all, since it doesn't serve to *name* any entity but just represents what remains of a complete predicative sentence when a name is removed from it – as, for example, '– is white' is what remains when the name 'Dobbin' is removed from the sentence 'Dobbin is white'. Another way to make this point is to say that, in the standard formalism, the 'F' in 'Fa' has an implicit 'is' of predication *built into it*, whereas in my formalism 'F' simply denotes a certain *attribute* and its predicability of *a* is represented formally not by a further symbol (although this could certainly be done), but rather by means of the post-positioning convention whereby 'a' is placed immediately after 'F'.

3. Categorial Predication: Its Form, Meaning and Use

I come now properly to the topic indicated by the title of this chapter, *categorial predication*, for which the preceding two sections have provided a necessary preliminary. The system of formal logic whose language I have been constructing is meant to be one which respects and reflects certain fundamental categorial distinctions of an ontological nature. But now we have to consider how we can speak *explicitly* of such categorial distinctions, by extending the expressive power of our formalized language. So far, these categorial distinctions have been only *implicit* in the language, being embodied in our choice of *symbol* types and our ways of representing predication and inherence. A *categorial* statement, however, will be one which explicitly assigns some entity to a specific ontological category; and in our present system, of course, we have *four* such categories: those of *primary* and *secondary substance*, *attribute* and *mode*. (But we should again recall that these are just the *basic* categories of the system, which need by no means exclude further *sub*-categories of these basic ones.)

So consider, for example, a statement such as 'Dobbin is a primary substance', or 'The horse is a secondary substance (species)'. On the face of it, the expression '– is a primary substance' is a *predicate*, which *says something* of Dobbin. (That, as we have seen, is at least the now standard conception of what a 'predicate' is.) But on our currently preferred *Aristotelian* view of predication, *predicables* are what are 'sayable' of subjects. So, does there not exist a *predicable* that is said of Dobbin by the statement 'Dobbin is a primary substance'? If so, then that predicable will have to be either a *secondary substance* or else an *attribute*: for these and only these are things that may be 'said of' a subject. One suggestion, then, might be that there is a species (or, rather, a very high-level *genus*) – that of *primary substance* – which can be 'said of' Dobbin, very much as the species *horse* and the genus *mammal* can be 'said of' Dobbin. An alternative suggestion is that there is a highly abstract *attribute* – that of *being a primary substance* – which can be 'said of' Dobbin, very much as the attributes *being warm-blooded* and *being viviparous* can be 'said of' Dobbin. But neither suggestion is preferable to the other and both are in fact unattractive (and perhaps even incoherent).[8]

The solution is to reject *both* suggestions. This, however, requires us to recognize a certain ambiguity in the notion of 'saying of' or predication. In one sense – the sense hitherto to the fore in our discussion of the Aristotelian system – the notion of predication is a *relational* one. In this sense, in predication *one* thing is 'said of' *another* thing, with each of these things belonging to an appropriate ontological category. For example, an *attribute* is said of a *substance*, either primary or secondary. Or a *secondary substance* is said of a *primary substance*. Or *one* secondary substance is said of *another* secondary substance. But then there is and must

[8] Consider, thus, the proposal that 'primary substance' denotes a *genus* to which all primary substances belong. Then it turns out that, since all genera belong to the category of *secondary* substance, the sentence 'Primary substance is a secondary substance' must be in some sense true. But I find it very hard to make any clear sense of this.

be another, *non*-relational notion of 'saying of' or predication, where this includes assigning an item to a certain ontological category. (Another plausible case is that of predicating *existence* of something, since it is highly doubtful that existence is properly conceived as a *property* or *attribute* of anything; if it were, then it ought to make sense to say that *existence exists*, and yet it scarcely does seem to make sense to say this.)

One characteristic of a statement involving categorial predication is that if it is 'formally correct', then it should be *necessarily true*. A perspicuous formalized language should respect this requirement. Suppose, thus, that we introduce the formal ontological predicates 'P', 'S', 'A' and 'M' into the formalized language that was developed in section II. These are to express, respectively, the English predicates '– is a primary substance', '– is a secondary substance', '– is an attribute' and '– is a mode'. Then, to distinguish *categorial* predication from (what we might aptly call) *material* predication (which we have chosen to express by the device of post-positioning), let us use *superscription* for the former. Thus, for example, 'Dobbin is a primary substance' will be formalized as 'a^P', where 'a' represents 'Dobbin'. And then our point is that such a statement will be necessarily true if and only if it is *well-formed*, as it is in this case: that is, it will be necessarily true if and only if the categorial superscript matches the symbol-type to which it is attached. In the present case, 'a' is a symbol for an individual or primary substance and hence matches the superscript 'P'. By contrast, a formula such as 'F^P', representing a statement such as 'Whiteness is a primary substance', is just *not well-formed* in this system and hence *necessarily false*.

But how, it might now be asked, could there be any real *use* for such statements of categorial predication, given that the categorial distinctions are already built into the symbolism of the formalized language (as they are not, perhaps, in a natural language such as English)? The answer is that we want our language to be capable of talking about *pure ontology*. For that, we need also names and variables which are *categorially neutral*, in order to say things such as 'Every primary substance has at least one mode inherent in it'. Thus, using 'e' (for 'entity') as a new type of ontologically neutral variable, we could express the last-mentioned sentence formally in this manner: '$(\forall e_1)(e_1{}^P \rightarrow (\exists e_2)(e_2{}^M \,\&\, e_1 e_2))$'. (Here we are using unrestricted quantifiers, of course, and the proposal would be that these are *only* to be used in statements of pure ontology; note also that, in the formula just stated, '$e_1 e_2$' must be construed as expressing *inherence* rather than predication, given the formation rules and the typing of e_1 and e_2 as P and M respectively.) Statements of pure ontology would all be like this and in this way we could envisage the construction of a formal, axiomatizable *theory* of pure ontology, which would constitute an a priori science analogous to various branches of pure mathematics. In the formal theory of pure ontology, no *specific* entity of any category would be referred to, such as *Dobbin* or *whiteness*: all statements would concern the categories themselves and relationships obtaining between their members purely in virtue of their categorial status, as in the case of the sample statement cited above. Of course, for present purposes I am assuming that the 'correct' formal theory of pure ontology will be a characteristically 'Aristotelian' one, of the kind sketched earlier. But that assumption is not vital to the notion of pure ontology as such. Indeed, one can envisage alternative (or even just *different*) systems of pure ontology, just as there are different branches of pure mathematics. (Some systems of ontology, for instance, include the basic category of *event*, whereas in the 'Aristotelian' ontology there is no room for such entities save in the guise, perhaps, of modes of primary substances.) However, one should not take the analogy with pure mathematics too far, since the latter consists of theories which do make reference to *specific* entities of certain types, such as the natural numbers, whereas pure ontology is perfectly general or 'topic neutral' in its subject matter.

To repeat an earlier point of great importance, categorial predications are – as Wittgenstein might at one time have remarked – true, when they are true, simply in virtue of their 'logical grammar'. Thus, 'a^P' can be seen to be true simply by inspection of its logical form. In that sense, such a truth has and requires no 'truthmaker', if by a 'truthmaker' we mean some *entity* which, by existing, *makes* it true. 'a^P' doesn't even require the existence of the primary or individual substance a to make it true: thus, 'Dobbin is a primary substance' can be known to be a true – indeed, a *necessarily* true – categorial predication *whether or not* Dobbin is known to exist. I do want to allow, of course, that from 'a^P' we may validly infer '$(\exists e)(e^P \;\&\; e = a)$', and vice versa. Thus, I happy to allow that 'Some primary substance is (identical with) Dobbin' is just a longwinded way of saying 'Dobbin is a primary substance'. But recall that I am rejecting the claim that 'Some primary substance is (identical with) Dobbin' is logically equivalent to 'Dobbin *exists* and is a primary substance' or, more generally, that '$(\exists e)(e^P \;\&\; e = a)$' is logically equivalent to '$(E!a \;\&\; a^P)$'.

Dobbin's existing is no doubt logically equivalent to some *existing* primary substance's being (identical with) Dobbin, but not just to *Dobbin's being a primary substance*, since the latter is just an a priori truth arising from an ontological necessity concerning the correct ontological categorization of any such item as Dobbin is *conceived* to be, whether or not Dobbin actually *exists*.[9]

[9] I am grateful for comments received when an earlier version of this essay was presented at the *Ratio* Conference on Classifying Reality, held at the University of Reading in May 2011. I should also like to thank David Oderberg for very helpful remarks on the penultimate draft.