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PREDICATION AND MATTER

This paper is divided into four sections. First, I will pose what may be called the metaphysical problem of mass. Then, I will describe a related problem: the logico-linguistic problem of mass terms. Third, I will outline the standard solutions to these problems. Fourth, I will suggest a new solution.

1. THE METAPHYSICAL PROBLEM OF MASS

Things would be pleasantly simple if everything were a universal or a particular. Universals, for our purpose, may be thought of as having four essential properties:

(a) universals are jointly (i) eternal, (ii) uncaused and (iii) abstract
(b) universals are intensional entities
(c) universals may be expressed in language by general terms
(d) universals are never said of themselves only; that is, no universal U is such that, for all A, A is U iff $A = U$.[1]

In contrast to universals, particulars do not in general have these properties. Every particular B is such that, for all A, A is B *iff* $A = B$. Particulars *are* said of themselves only. Moreover, particulars cannot be expressed in language by general terms; also, particulars are not intensional entities, and particulars are seldom, if ever, jointly (i) eternal, (ii) uncaused, and (iii) abstract.

Now what about stuffs? Gold? Water? Concrete? Egg nog? Matter, itself? Are stuffs universals or particulars, or are they members of an altogether different metaphysical category?

Given the foregoing criteria, stuffs do not seem to qualify as particulars on at least two counts. First, if S is a stuff, it is not the case that, for all A, A is S only if $A = S$. That is, it is not the case that stuffs must be said of themselves only. For example, if gold exists, then something besides gold must be gold (e.g., a nugget, a gold ring or perhaps just a bit of gold dust).

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The second reason for thinking that stuffs are not particulars is that stuffs *seem* to correlate with general terms in the same way that universals do. *Prima facie*, it seems that the stuff gold bears the same relation to the sentence 'this is gold' as the universal red bears to the sentence 'this is red'.

At the same time, however, stuffs do not seem to qualify as universals. First, stuffs need not be eternal, uncaused, and abstract. Many stuffs are caused and in fact created and, hence are not eternal; here are some examples: plutonium, Saran Wrap, coca cola. Relatedly, some stuffs don't even exist: e.g., phlogiston and kryptonite (i.e., the fictional element that Superman is allergic to). Further, there is some sense – though perhaps not the relevant sense – in which stuffs are concrete. Secondly, stuffs, unlike universals, may well be extensional entities. I have some serious reservations about this point. But isn't it true that, if whatever is composed of S_1 is composed of S_2 and conversely, then $S_1 = S_2$? It may well be the extensionality of stuffs that leads scientists to assert identities such as water = H_2O. Nothing analogous happens with, say, the property of being a creature with a kidney and the property of being a creature with a heart.

Thus, we are faced with a metaphysical problem. Given that stuffs appear to qualify neither as universals nor as particulars, what are they?

2. THE LOGICO-LINGUISTIC PROBLEM OF MASS TERMS

In Chapter III of *Word and Object* Quine introduces the metalinguistic notion of mass term. The difference between mass terms and sortal words (or count nouns) is usually brought out as follows:

(a) if '*m*' is a mass term, it is natural to ask 'how much *m*?' but not 'how many *m*?': 'how much water?' not 'how many waters?'

(b) if '*s*' is a sortal, it is natural to ask 'how many *s*?' but not 'how much *s*?': 'how many pencils?' not 'how much pencil?'

Now consider the sentences 'Socrates is a man' and 'man is rational'. In traditional logic the logical form of these sentences is thought to be '*A* is *B*'. The numerous problems that confront traditional logic led modern logicians, under the leadership of Frege and Russell, to propound

a different logical grammar. According to the modern theory, 'Socrates is a man' has the form '$M(s)$', where 'M' is a predicate or general term and 's' is a concrete singular term. And 'man is rational' has the form of a universal conditional, '$(\forall x)(Mx \rightarrow Rx)$'. Thus, the abstract singular term of traditional logic entirely disappears from the sentences under consideration.

Analogous to 'man' above, mass terms, e.g., 'chalk', seem to occur in two ways, namely, as predicates and as abstract singular terms. The following sentences illustrate this fact:

(i) a is chalk
(ii) chalk is messy.

The logico-linguistic problem of mass terms results from the fact that not all the sentences in which mass terms occur before the copula can be analyzed as universal conditionals. For example, 'water is widespread' is not equivalent to 'whatever is water is widespread'. Hence, the modern theory must be adjusted.

Thus, we are are faced with a logico-linguistic problem. What is the logical form of sentences whose surface grammar contains mass terms? What is the correct way to parse sentences that seem to contain mass terms?

Before going further I should make two points of clarification. First, not all mass terms determine stuffs. For example, the expressions 'motion' and 'music' can be used as mass terms, but motion and music are certainly not stuffs. I should also state that I will not count things like furniture, footwear, traffic, or information as stuffs in my sense. In this paper I will not suggest any theory about the nature of non-stuffs that are determined by mass terms. Inevitably, then, I will leave a number of questions open.

Second, it is best to view our enquiry as analysis, not ontology. We are not trying to determine whether stuffs really exist or not. Rather we are trying to determine whether stuffs, if they exist or were to exist, would be universals, particulars or something else. We are not trying to determine whether various positive forms of mass-term sentences are true (or pragmatically required for the statement of scientific facts). Instead we are trying to determine what are the real logical forms of the various kinds of mass-term sentences. It is not crucial to our discussion that such

sentences should be true (or indispensible to science) or that stuffs should exist.

3. THE STANDARD SOLUTIONS

We will now examine the three standard solutions to the metaphysical problem of mass and the logico-linguistic problem of mass terms. These standard solutions are (a) Quine's analysis, (b) the general-term analysis and (c) the abstract-singular-term analysis.[2]

(a) *Quine's Analysis*

According to Quine's ingenious analysis, mass terms in ordinary language are ambiguous. The logical forms of our sample sentences (i) '*a* is chalk' and (ii) 'chalk is messy' are:

(i′) $C(a)$
(ii′) $M(c)$

In (i′) the entity that correlates with the predicate '*C*' is of the kind that normally correlates to a general term. Thus, for Quine, the correlatum of '*C*' is a set, namely, the set of things that are composed of chalk. (Given Quine's parsing, platonists such as Russell would say that correlatum of '*C*' is the *property* of being composed of chalk.) In (ii′) the correlatum of the singular term '*c*' is the fusion of all particulars that are composed of chalk. That is, '*c*' names a kind of *particular* which Nelson Goodman calls a scattered particular. Thus, Quine's proposal allows us to retain the view that everything is either a universal or a particular.

There are two kinds of difficulty with Quine's proposal. Consider four sample sentences:

Chalk is used for writing on blackboards
Champagne creeps up on you
Plastic is inexpensive
Plutonium is heavier than hydrogen

The problems here are obvious. For example, although plastic is inexpensive, the fusion of all things composed of plastic is certainly not inexpensive.

The second kind of difficulty with Quine's proposal is *logical*. Consider

the following apparently valid argument:

a is gold
gold is malleable
$\therefore$ a is malleable

On Quine's proposal, there is no clue of how to bring this argument within reach of contemporary methods of logic. The following sentence creates a related problem:

White chalk is white.

One would think that this sentence is logically true. But again, there is no clue of how to make it so.

(b) *The General Term Analysis*

The second solution to the metaphysical problem of mass and the logico-linguistic problem of mass terms may be called the general-term analysis. This analysis has been suggested by Richard Grandy and Tyler Burge.[3]

According to this view our sentences (i) and (ii) are to be treated in the standard fashion prescribed by modern logic. Thus, (i) and (ii) have the following logical forms:

(i') $C(a)$
(ii') $(\forall x)(Cx \rightarrow Mx)$

The entity that corresponds to the general 'C' is of the kind that usually correlates to a general term, i.e., a set or a property. So far, then, the general term view allows one to hold the view that everything is either a universal (or a set) or a particular.

The general-term view has the additional advantage of solving the second kind of problem that confronts Quine's view:

a is gold		$G(a)$
gold is malleable	$\Rightarrow$	$(\forall x)(Gx \rightarrow Mx)$
$\therefore$ a is malleable		$\therefore$ $M(a)$
White chalk is white	$\Rightarrow$	$(\forall x)((Wx \,\&\, Cx) \rightarrow Wx)$

Both of the symbolic translations are valid.

Now what about the troublesome sentences that lead Quine to reject the general term view in the first place. Richard Grandy has suggested that

the recalcitrant sentences be analyzed as being about sets whose names contain only the predicative use of mass terms. For example 'water is widespread' should be analyzed as '$P(\{x{:}x$ is water$\})$' where 'P' is a predicate somehow determined by the word 'widespread'. Hence, '$P\ \{x{:}x$ is water$\}$' might be cashed out as '$\{x{:}x$ is water$\}$ has widespread-membership' or '$\{x{:}x$ is water$\}$ is a widespread-set'. Or take another example. 'Gold has atomic number 79' is to be analyzed as '$\{x{:}x$ is gold$\} =$ $= \{x{:}x$ has atomic number 79$\}$'.

I will suggest two objections to this treatment of mass terms. First, in its details it is unintuitive. Consider the last example. It seems simply false that any particulars besides atoms have atomic numbers. The second and very serious objection is based on some further examples:

(1) Chalk is easy to find.
(2) Chalk is easy for children to find in Holland.
(3) Hot water is in the water heater only when it is not in the tub.

Presumably, these sentences get analyzed as follows:

(1′) $\{x{:}x$ is chalk$\}$ is an easy-to-find-set
(2′) $\{x{:}x$ is chalk$\}$ is an easy-for-children-to-find-in-Holland-set
(3′) $\{x{:}x$ is hot & x is water$\}$ is an in-the-water-heater-only-if-not-in-the-tub-set

The problem I want to point out is this. If these hyphenated expressions are to be introduced as new undefined primitives, then the hope of a systematic treatment of mass terms must be abandoned. For, an infinite number of such primitives is required and an infinite number of primitives can't be managed by humans. On the other hand, if the hyphenated expressions are to be counted as syntactically and semantically complex, new logical machinery must be introduced for dealing with this new complexity. In this case, however, it would look as though the most difficult problems of mass terms have merely been swept under the rug. We must wait for the hypothetical logical machinery to solve the problems. Incidentally, even if such machinery can be provided, it is not clear that the present view, with these complications, would be simpler than the abstract-singular-term analysis.

As I mentioned, besides Richard Grandy, Tyler Burge also recommends the general-term view. Roughly speaking, Tyler Burge chooses to

use *fusions* in place of Grandy's sets. For example,

gold has atomic number 79

is to be analyzed as:

ean 79 = the fusion of all particulars that are gold

where 'ean 79' abbreviates the analysis of the definite description 'the element whose atomic number is 79'.

One possible problem with this approach arises in connection with producing something appropriate for 'ean 79'. Perhaps difficult problems are being swept under the rug.

Another problem is that fusions seem to have the wrong kind of identity conditions. If all jewelry were made of gold and all gold were forged into jewelry, we would not be inclined to say that jewelry = gold and, hence, that jewelry is the element whose atomic number is 79. Perhaps, however, this problem can be fixed up.

A third and possibly more serious difficulty with the proposed view is that it appears unable to handle some of the harder cases. One such case seems to call for something like predicate variables whose substituends can be mass terms. For example,

Gold is malleable, and *it* has atomic number 79 and *it* is hard.

Whereas Grandy is free to represent this sentence as follows:

$(\forall x)(Gx \rightarrow Mx) \;\&\; (\exists F)(F = (\lambda x)(Gx) \;\&\; F = (\lambda x)(x \text{ has atomic number } 79)(\forall x)(Fx \rightarrow Hx))$

Burge is not, since fusions of particulars are not suitable values for predicate variables. The following examples illustrate complex variations on this problem:

(1) Although Plutonium was discovered in Berkeley, it is produced mainly in Los Alamos because it is so unstable and, hence, a threat to urban populations.

(2) Although salt is an essential mineral, none of it is better than too much because it ionizes so readily that it can cause severe dehydration.

(3) Although marble is widespread it is difficult to mine in large pieces because it is very hard and hard stone is difficult to cut without shattering.

(4) Although Andre's beef is the most special food in the house, it is not the specialty of the house because it is too difficult to make in large quantities.

(5) Ascorbic acid causes orange juice to be tart and glucose causes it to be sweet; either way it is healthy.

(6) Many people prefer Uncle Ben's rice to brown rice because it is white and they believe that whatever is white is pure.

Now we come to a fourth objection. Let us assume (and this is a significant assumption) that the proposed view can handle such sentences in a *piecemeal fashion.* Nonetheless, in order to solve the metaphysical problem of mass and in order to solve the logico-linguistic problem of mass terms, what is called for is not a piecemeal approach but rather a *unified method.* Even with our strong assumption, there is no special reason for thinking that the present approach could provide a unified method.

This is where the abstract-singular-term analysis comes in: it has promise of providing a unified method.

(c) *The Abstract-Singular-Term Analysis*

According to this analysis all occurrences of mass terms are occurrences of singular terms. Hence, in our sample sentences (i) and (ii), 'chalk' occurs as a singular term:

(i′) aRc

(ii′) Mc

where 'R' is a relational predicate.

Terry Parsons has propounded the singular term analysis.[4] From a metaphysical point of view, mass terms such as 'chalk' are names of stuffs, where stuffs are neither universals nor particulars. The advantage of this view is obvious: the sentences that were problematic for the general term view are easily handled, they simply say what they seem to say. That is, they ascribe properties to *or* assert relations among *stuffs.*

This analysis has been criticized for having an excessive ontology.[5] However, this criticism seems to be based on a confusion between analysis (metaphysical and logico-linguistic) and ontology. The following analogy should dramatize my point. Someone who declares that the

sentence 'red is a color' has the logical form of a singular predication and that colors are not particulars need not be ontologically committed to to the universal red. He may hold that 'red' is a vacuous name and, hence, that 'red is a color' is not strictly true (or perhaps that it is strictly neither true nor false). At the same time, he may hold that for practical matters like science near *paraphrases* (e.g., 'whatever is red is colored'), as opposed to analyses, can always be supplied piecemeal (or perhaps even systematically). It is simply off target to criticize Parson's analysis (or the analysis that will be suggested in this paper) for ontological excess.

In order to characterize the logic for names of stuffs, Parsons introduces three primitives: two predicates – "is constituted of" and "is a quantity of" – and a *substance-abstraction* operator. This approach has two non-fatal short-comings. First, it is not very plausible that these expressions are primitives, in the sense of being undefinables. One would hope that a complete analysis of stuffs and mass terms would include definitions of these expressions. The second and related shortcoming is that, if these expressions are adopted as primitives, then new axioms which characterize their logical properties must be added to logic. Of course, it would be desirable to obtain the logical principles for stuffs from the logic that we already have. The view that I will now suggest accomplishes this to a much greater extent than Terry Parson's approach.

4. A PROPOSAL

From the logico-linguistic point of view, the proposal I will make is a version of the abstract-singular-term analysis. From the metaphysical point of view, my theory takes the stand that stuffs are neither universals nor particulars. The following is the metaphysical picture:

extensional entities			intensional entities: universals			
...(species?)	stuffs	particulars	propositions	qualities	relations	...

In discussing stuffs, I shall use a somewhat technical expression, '*A* is composed of *B*'. The composition relation differs from the constitution relation. We may say that an ice cube is composed of H_2O but not that it is composed of a volume of H_2O or that is composed of Hydrogen *and* Oxygen.

As I mentioned, the logico-linguistic theory which I shall propose is a version of the abstract-singular-term analysis. The unique aspect of my version is its treatment of the *copula*. I adopt a special theory of the copula as it occurs in Indo-European languages. This theory is foreshadowed by the theory held by Peter Abelard and, in certain fragments, by Leibniz. Further, the theory of the copula that is incorporated in Lesniewski's 'Ontology' and also the treatment of the 'ε'-relation in Quine's set theory *ML* are not entirely foreign to the theory that I will now propose.

According to this theory, it is the same univocal copula that occurs in each of the following sentences:

Socrates is wise
The teacher of Plato is Socrates
Wisdom is good
a is chalk
Chalk is messy
Chalk is calcium carbonate.

The logical form of each of these sentences is:

A is *B*.

Thus, our sample sentences (i) and (ii) have the forms:

(i') *a* is *c*
(ii') *c* is *m*.

An open-ended list of principles should help to impart the suggested reading of the copula:

(i) If *B* is a quality, '*A* is *B*' is true *iff A* is qualified by *B* (i.e., *A* has *B*)
(ii) If *B* is a particular, '*A* is *B*' is true *iff A* is identical to *B*[6]
(iii) If *B* is a stuff, '*A* is *B*' is true *iff A* is composed of *B*.

I must stress that these principles in no way constitute a definition of the copula. The copula cannot be defined. It is a primitive logical constant. In fact it is a primitive in terms of which the other constants in the principles are, hopefully, to be defined.

Against the proposed theory it may be asserted that the so-called 'is'-of-predication is being confused with the so-called 'is'-of-identity and an

'is'-of-composition. In reply I would suggest that this criticism is based on a theory that is a dogma. Despite what the logic texts say, it is simply not obvious that there even exists a *sense* of 'is' that may be called the 'is'-of-identity, for there is an entirely plausible and natural alternative way of looking at the matter. Sentences such as 'red is red' are *structurally ambiguous*. On the reading that makes 'red is red' false, 'red is red' has the form '*A* is *B*'. On the other hand, given the reading that makes 'red is red' true, 'red is red' is elliptical for, i.e., a syntactical transformation from, 'red is identical to red'. The latter sentence has the form '*A* is *B*', and '*B*', i.e., 'identical to red', names a property. Analogously, there is no *sense* of 'is' that may be called the 'is-of-composition such that 'is' in 'the ring is gold' is synonymous to 'is composed of'. 'The ring is gold' and 'the ring is composed of gold' both have the form '*A* is *B*'. In the former '*B*', i.e., 'gold' names a stuff; in the latter '*B*', i.e., 'composed of gold' names a property.[7]

Now I will attempt to give a definition of what it is to be a stuff. Five metaphysical intuitions are utilized in my definition. *First*, stuffs are necessarily not particulars. *Second*, it is necessary that whatever is composed of a stuff is itself a stuff or a particular.[8] For example, the only things composed of water are stuffs (e.g. ice, steam, snow) and particulars (e.g. drops, ice cubes, clouds of steam, snowballs). I shall express this fact by saying that only stuffs and particulars *are comprehended by stuffs*. *Third*, a stuff cannot exist unless there is some particular which is composed of it.[9] For example, chalk exists only if there is some particular piece or bit of chalk. I will express this fact by saying that each stuff is such that some particular *is comprehended by* it. *Fourth*, a stuff is composed of itself. A contrast will help to clarify this point. When the sentence 'red is red' is read as elliptical for 'red is identical to red', it is true. When it is not elliptical for 'red is identical to red', it is false. Now consider the sentence 'chalk is chalk'. On both readings the sentence is true. Given one reading it is to be true only if chalk is identical to chalk. Given the other reading it is to be true only if chalk is composed of chalk. I will express this fact by saying that each stuff *comprehends* itself. The *fifth* intuition concerns a transitivity property. Necessarily, if *A* is composed of *B* and *B* is composed of *C*, then *A* is composed of *C*. For example, the ice cube is composed of ice; ice is composed of water; therefore, the ice cube is composed of water. I shall express this fact as follows: for each stuff *S*, if *A*, *B*, and *C*

are comprehended by S and if A is comprehended by B and B is comprehended by C, then A is comprehended by C.[10]

We begin with two preliminary definitions:

(1) $A = B$ *iff*$_{\text{def}}$. For all C, A is C iff B is C

(2) B is (a) particular *iff*$_{\text{def}}$. For all A, A is B iff $A = B$.

The following, in a nutshell, is the intuition behind definition (2): what is particular about particulars is that they are particular (i.e., they are truly said of themselves and themselves only). Now consider a hypothetical counterexample to this definition. If the property of being an object of thought is the only object of thought, then despite the fact that it is not a particular, it would satisfy the definition. This hypothetical counterexample could be avoid simply by prefixing the definiens with 'necessarily'. If this modification is required, then what is particular about particulars is that they are necessarily particular. Conceivably, however, the modification will not be needed, for thought – like truth – might require ramification in order to avoid antinomy.

Now we give one more preliminary definition.

(3) Inductive definition of 'A is comprehended by B':
(a) if $A = B$, A is comprehended by B
(b) for all C, if C is comprehended by B and
if A is C,
then A is comprehended by B.

This inductive definition can be turned into a direct definition of 'A is comprehended by B'. To do this we use Frege's method for turning inductive definitions into direct definitions except that the class-membership relation 'ε' is replaced by the copula 'is'. I will omit this step.

Given these preliminary definitions and the previously listed essential properties of stuffs, we advance the following definition:

(4) S is a stuff *iff*$_{\text{def}}$
(a) S is not a particular &
(b) For all C, if C is comprehended by S, then
(i) there exists a particular P such that P is C
(ii) C is C
(iii) for all A and B, if A is B and B is C, then A is C.[11]

Now what about the original logical problems created by names for stuffs?
Consider the argument:

a is chalk
chalk is white
$\therefore$ *a* is white.

This argument has the form:

a is *c*
c is *w*
$\therefore$ *a* is *w*

This is not a valid argument form as the following example shows:

this is chalk
chalk is found in Dover
$\therefore$ this is found in Dover

I suggest that, in addition to its standard use, the sentence 'chalk is white' can be used elliptically for the sentence:

whatever is chalk is white.

This elliptical use makes the above argument valid.

a is *c*
$(\forall x)$ (x is $c \rightarrow x$ is w)
$\therefore$ *a* is w[12]

Now we come to the sentence 'white chalk is white'. Of course, there is an elliptical use of this sentence which is short for:

Whatever is white and chalk is white.

This sentence is valid. $(\forall x)((x \text{ is } c \,\&\, x \text{ is } w) \rightarrow x \text{ is } w)$. By contrast, the non-elliptical use of the sentence is not used for making a statement about the things that are composed of white chalk; rather, it is making a statement about white chalk itself. Symbolically, the sentence is represented as follows:

$(\imath x)$ (x is a stuff & $(\forall y)$ (y is $x \equiv (y$ is white & y is chalk))) is white.

So represented, the sentence is *not* logically valid. But I contend that we should not expect the sentence to be logically valid any more than we should expect the sentences 'purple phogiston is purple' or 'the present king of France is a king' to be valid. What ought to be valid is: 'If it exists, white chalk is white'. Given my method of representing *this* sentence, it indeed turns out to be valid in standard first-order quantification theory.[13]

I shall conclude the paper by suggesting three further definitions. Consider that general notion of *material object* which does not disallow that some material objects may have psychological or intentional properties as well as material properties:

(5) A is a material object iff_{def}
A is a particular $\&$ $(\exists S)$ (S is a stuff $\&$ A is S).

Consider the notion of composition which was used earlier in our informal discussion:

(6) A composes B iff_{def} A is a stuff $\&$ B is A.

Lastly, consider the notion of matter according to which, e.g., gold is matter, steam is matter, the stuff of which electrons are composed is matter and also the stuff of which protons are composed is matter:

(7) matter $=_{\text{def}}$ the stuff B which is such that, for each stuff A, A is B.

Matter is the stuff which all stuffs are.

The definitions I have proposed should be viewed tentatively, for there remain a number of questions about which we have weak or inconclusive intuitions. For example, just as there might be species and genera of particulars, there might be species (or families) and genera of stuffs and, hence, mass terms might double as such species or genera terms. E.g., we say both that gold is metal and that gold is a metal. It is plausible that 'matter', too, has such a dual use. If this is in fact so, I should hope that by methods akin to those used in this paper we could what define it is to be a species of particular and what it is to be a species of stuff and that matter, of the second kind, could be defined as the most general species of stuff. In any case, I consider this whole matter to be an open question.

Since there are open questions, the thesis to which I wish to be committed is that it is possible to give successful definitions along the suggested or related lines. It should be noted, moreover, that even if all such definitions should break down in the end, the proposed theory of categories and composition may be correct as a metaphysical theory and the proposed theory of predication may be both correct and useful as a logico-linguistic theory. If it is true that successful definitions can be given in terms of logical constants such as 'is', an interesting consequence results. Just as our concept of number and our concepts of the various numbers and operations are, in a well-defined sense, logical concepts[14], the concepts of material object and matter are, in the same well-defined sense, logical concepts. Hence, an expanded form of logicism.

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NOTES

[1] This Fourth property may be confusing. Much more will be said about it later in the paper.

[2] The name 'abstract-singular-term analysis' is misleading, for according to this view, stuffs are in a sense both concrete and general.

[3] Richard Grandy, 'Response to Moravcsik', in Hintikka *et al.*, *Approaches to Natural Language*, D. Reidel, Dordrecht, 1973. Tyler Burge, 'Truth and Mass Terms', *Journal of Philosophy* **64** (1967), 263–282.

[4] 'An Analysis of Mass Terms and Amount Terms', *Foundations of Language* **6** (1970) 362–388.

[5] Cf., Tyler Burge, *op. cit.*, pp. 268–269, 271.

[6] Consider the sentence form '*A* is *B*' that is associated with the standard reading of the sentence 'Frege is smart'. By replacing '*A*' with 'the teacher of Plato' and '*B*' with 'Socrates', we obtain a sentence concerning whose truth value we have unfortunately weak intuitions. What is plain is that (a) the sentence is not obviously false and (b) it would be difficult to show that it is false. Such questions must, I am afraid, be adjudicated by our best metaphysico-logico-linguistic theory. It should be noted that even if this sentence is false, there are alternative ways to treat particulars. Insofar as the theory of mass terms and matter proposed in this paper depends on a treatment of particulars, such an alternative treatment would suffice.

Incidentally, in this paper I will not take a stand on the thesis that in 'Socrates is (a) man' – another '*A* is *B*' sentence – 'man' is the name of a species or natural-kind and not the name of a quality. Nonetheless, I do find this thesis plausible.

[7] In my forthcoming book *Universals: a Unified Theory for Logic, Mathematics, Theory of Language and Psychology* it is shown how syntactically complex property-names (such as 'identical to red' and 'composed of gold') as well as relation names and proposition names (i.e., 'that'-clauses) can be defined is a fully extensional, first-order theory for the copula.

It will be noticed that 'identical to red' and 'composed of gold' are adjectival in form.

The noun forms of these names are 'identity to red' and 'composition of gold'. The properties named are identity to red and composition of gold.

[8] The definition that I am going to propose could be tightened up if 'particular' in this condition were replaced with 'concrete particular'. I believe that I can define 'concrete particular' with methods akin to those used in this paper. However, that definition must await another paper.

[9] Again, the definition that I am going to propose could be tightened up if 'particular' in this condition were replaced with 'concrete particular'.

[10] There are further properties of stuffs which could be cited. However, for a trial run the above five properties should serve our purposes.

[11] This definition could be tightened up by prefixing clause (b) with 'necessarily'.

[12] I find this solution inelegant. The following is an alternative line. It might be logically necessary that the copula is transitive with respect to *a*, *c* and *w* if *w* belongs to a certain category *q* (e.g., the category of physical qualities). If so, the following would be a valid argument:

$$\frac{\begin{array}{l} a \text{ is } c \\ c \text{ is } w \\ w \text{ is } q \end{array}}{a \text{ is } w}$$

This suggestion, however, requires much further study before its value can be determined.

[13] It should be noted that nothing I have said prohibits the elimination of all syntactically primitive names in favor of syntactically complex names whose constituent nonlogical constants are all predicates. For example, 'gold' could be an abbreviation for 'the stuff which goldizes' or 'the stuff all and only instances of which goldize', where 'goldize' is a predicate that expresses, e.g., the essential properties of gold or the properties required in order to be (composed of) gold.

[14] In 'Numbers are Platonic Universals' I show, by an adaptation of Frege's definitions together with a first-order 'no-class' theory, that these concepts can be defined in terms of the copula. Accordingly, 'There are five apples' is a transformation from 'the apples are five', where the latter sentence is of the form '*A*'s are *B*' and '*A*'s' and 'are' are the plurals of '*A*' and 'is', respectively.