Identity and General Similarity

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IDENTITY AND GENERAL SIMILARITY[1]

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I. General Similarity

By a "relation of general similarity" I mean a relation of the form

(1) x and y are (or have) the same Np,

where Np is a common noun representing a kind of *properties* of things. Examples are: x and y have the same shape (color, cardinality). These relations should be distinguished, on the one hand, from relations of *identity*, and on the other, from relations of *indefinite similarity*. Relations of identity have the form

(2) x and y are the same Nt,

where Nt is a common noun representing a kind of *things*. Examples are: x and y are the same apple (number, ship). Relations of indefinite similarity express a non-specific similarity of distinct things rather than a specific similarity (the same *shape*), or the unity of a single thing (the same *ship*). When I note that you and I are wearing the same tie, I mean that you and I are wearing distinct but similar ties (unless we are bound by a single tie!).

According to logical tradition, both identity and general similarity are reducible to relations of *strict identity*, that is, roughly, identity as treated in standard logic. For example, the traditional view is that 'x and y are the same number' reduces to 'x and y are numbers and $x = y$'. Here '$x = y$' expresses the relation of strict identity as characterized in standard logic (first-order quantification theory with identity).[2] Similarly, 'x and y have the same shape' reduces to 'x has shape S_1 and y has shape S_2 and $S_1 = S_2$'.[3]

Logical tradition also has it that although identity is a purely logical notion, general similarity is not. That is, although (2) is viewed as a proper logical constant, (1) is not. The "same shape" relation is likened to relations such as the "taller than" relation. We don't expect pure logic to yield the transitivity of the

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latter relation; for that we need a dictionary. But on the face of it, this is an odd view. Given reduction to strict identity, we *can* verify the transitivity of the "same shape" relation without consulting a dictionary, since this follows directly from the transitivity of strict identity. Nonetheless, though reduction to strict identity yields that general similarity is an equivalence relation, other properties of general similarity—in particular, what might as well be called its "indiscernibility properties"—are not accounted for. If x and y have the same shape, then x and y are indistinguishable with respect to *certain* properties. For example, consider the following two "indiscernibility principles":

(3) If x and y have the same shape, then if x is round, then y is round;
(4) If x and y have the same shape, then, if x has a smooth boundary, then y has a smooth boundary.

These principles clearly resemble instances of "Leibniz' Law," yet reduction to strict identity does not yield a proof of them. For example, suppose that S_1 and S_2 are the shapes of x and y respectively; and suppose that x and y have the same shape. By reduction

(5) $S_1 = S_2$.

Assume that x is round:

(6) Rx.

How then do we derive

(7) Ry

i.e. that y is round? Given (6), and perhaps after consulting a dictionary, we may wish to add the premise:

(8) $R = S_1$,

asserting that S_1, the shape of x, and R, the property of being round, are identical. Then (8), together with transitivity and Leibniz' Law for strict identity, yields (7); but then the derivation would rely on a non-logical "meaning postulate" justifying (8). No doubt it is this sort of problem that has given rise to the view that general similarity is a non-logical notion. But on second thought that view simply does not help much. If we do need non-logical "meaning postulates" to account for the highly uniform and crystal clear indiscernibility principles for general similarity, it is not apparent from case to case what these postulates are. Consider (4). Suppose we have (5) and

(6′) Bx,

that x has a smooth boundary.

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To derive

(7′) By,

that y has a smooth boundary, we need something other than

(8′) $S_1 = B$,

since insofar as (8′) makes sense, it is not true. The property of having a smooth boundary is not a particular shape. It is a property that objects of various different shapes can have. Yet (3) and (4) seem to have the same logical form, and they seem to be true for the same basic reason. Reduction, in itself, does not yield a clue as to what that reason might be. Even if general similarity is not a purely logical notion, surely logic can do better than *this*!

There are a wide variety of relations of general similarity, ranging from the strictly scientific (x and y have the same mass, cardinality, spin) to the vague and colloquial (x and y have the same consistency, personality, scruples). Reduction not only foists such entities as mass points and cardinal numbers on us—entities we do need in any case—it also gives us consistencies, personalities, and scruples, entities we can probably do without. In any event, it should not be necessary to appeal to entities of "higher type", some of which are dubious to begin with, to account for the validity of the indiscernibility principles. There should be a single *modus operandi* underlying them all—and there is. Moreover, this mechanism has a simple set-theoretical characterization somewhat along the lines of the venerable but neglected distinction between *determinate* and *determinable*. The mechanism can be built into the models of *first-order* quantification theory, with the result that—given some adjustments to logical syntax—we have a first-order logic of general similarity which accounts uniformly for the equivalence and indiscernibility properties of general similarity, as well as other important properties of these relations. We do not need to resort to a "reduction" that brings in entities of higher type, and that relies on non-logical meaning postulates. This matter is taken up in section II below.

The proper treatment of general similarity sheds some light on relations of identity. Geach and others have claimed that in general identity relations are not reducible. Geach goes so far as to claim that there is no such thing as "strict, absolute identity," while others make the more modest claim that some Nt-nouns have "non-trivial principles of identity." (See [8], for example.) The idea is that distinct K's might nonetheless be identical J's, where K and J are both Nt-nouns. Reduction rules this out, since if x and y are identical K's, x and y are strictly identical, and if x and y are distinct J's, x and y are strictly distinct. Despite a number of careful and creative expositions (such as [7] and [8]), this notion of "relative identity" is widely viewed with suspicion. On the basis of the developments discussed in section II, I argue in sections III and IV that relative identity, of a certain sort, is a coherent idea and that a priori objections to it (such as those found in [12] and [13]) are not correct. In section IV, I try to show how certain

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persistent problems about identity may be resolved by appealing to relative identity in the form derived from the ideas set forth in section II. These include one of the problems about change over time and the problem of contingent identity.

II. A Logic of General Similarity

Let L be the language of first-order logic with identity (but, for the sake of simplicity, without individual constants or operation symbols). And let M = (A, g) be a model for L. Then A is a non-empty set and g is a function assigning n-place relations on A to the n-place predicate symbols of L.

Add to M a function d that associates with each subset B of A a family d(B) of pairwise disjoint subsets of A among which is B itself. Note that such a function is always available. Call d(B) *the determinable for* B and B and the other members of d(B) the *determinates of* d(B). If F is any monadic predicate symbol of L, abbreviate the expression 'd(g(F))' by 'd(F)'. Intuitively, if, for example, F is the determinate predicate 'round', then g(F) is the extension of F, and d(F) is the disjoint family containing the extensions of the shape-determinate predicates—that is, the predicates representing particular shapes.

Expand L to contain binary predicate symbols of the form '$=\mathrm{d}_{\mathrm{F}}$', generating atomic formulas of the form '$x =\mathrm{d}_{\mathrm{F}}\, y$', where F is any monadic predicate symbol. If F is the predicate 'round', then '$x =\mathrm{d}_{\mathrm{F}}\, y$' would be read as asserting that x and y have the same shape. Note that '$x =\mathrm{d}_{\mathrm{F}}\, y$' does *not* say that "$x$ and y are the same F." Rather, the relation expressed by '$x =\mathrm{d}_{\mathrm{F}}\, y$' invokes a determinable of which F is a particular determinate. Thus, if F and G represent distinct determinates belonging to the same determinable, then '$x =\mathrm{d}_{\mathrm{F}}\, y$' and '$x =\mathrm{d}_{\mathrm{G}}\, y$' express the same relation.

In addition, we need a new syntactic notion, that of a "subscripted predicate." For each monadic predicate symbol F of L we add infinitely many new monadic predicate symbolsP_{F},Q_{F}, ... Such predicates are called "F-subscripted predicates." It is intended that the F-subscripted predicates express the "basic" indiscernibility properties of the relation expressed by '$x =\mathrm{d}_{\mathrm{F}}\, y$'. In addition, we need a new symbol, **d**, that combines with a monadic predicate symbol F to produce a new monadic predicate, **d**F, and new atomic formulas of the form: **d**Fx. It is intended that the expression '**d**F' represent the extension of the determinable of which F is a determinate. If, for example, F is a color-determinate predicate such as 'red', then '**d**Fx' asserts that x is colored, or that x has a color. The symbol '**d**' thus functions as a predicate operator or modifier.

Given d(B), let d(B)′ be the family of sets C′ defined by the following two conditions:

(9) (a) C′ is a subset of A;
 (b) for each element C of d(B), if the intersection of C and C′ is non-empty, then C is a subset of C′.

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Extend the function g to a new function g' exactly like g except that $g'(P_F)$ is in $d(F)'$, for each subscripted predicate, P_F. Note that this is possible since $d(F)'$ is nonempty (by definition, $g'(F)$ is an element of $d(F)$, and $d(F)$ is a subset of $d(F)'$). As we will see, these stipulations guarantee the appropriate indiscernibility principles. To get the full effect, however, we will need relational subscripted predicates and a modified definition of $d(F)'$. This is easily done, and we can proceed as if it has been done.[4]

Call the expanded language "L(S)" ("S" for similar or same); and call a structure for L supplemented by the addition of the functions d, and $'$, and with g extended to g' as indicated to apply to the subscripted predicates, a "structure for L(S)," and denote it by 'M(S)'. Then a structure M(S) for L(S) is a quadruple (A, g', d, $'$), with the components defined as above. The new atomic formulas of the forms '$x =d_F y$' and '$\mathbf{d}Fx$' are interpreted in M(S) as follows: Let v be an assignment of values in A to the individual variables of L(S), then

(10) M(S) satisfies '$x =d_F y$', relative v, if and only if there is a set C in $d(F)$ such that $v(x)$ and $v(y)$ are elements of C;
(11) M(S) satisfies '$\mathbf{d}Fx$', relative to v, if and only if $v(x)$ is an element of the union of $d(F)$.

Apart from (10) and (11), the definitions of satisfaction, validity, and logical consequence are as usual. Call this logical theory 'GS' (for "general similarity").

These definitions should not seem in the least mysterious. '$x =d_F y$' is notation for the natural equivalence relation determined by the disjoint family $d(F)$; 'P_F' is notation for the sets "preserved" by '$x =d_F y$'. We can interpret '$x =d_F y$' to mean that x and y have the same shape (or the same color, etc.), where F represents some determinate shape (or color, etc.), and (10) defines an equivalence relation on the union of $d(F)$, though not necessarily on the whole domain A of M(S). So, (10) yields a restricted form of reflexivity, as recorded in the following "theorem". (The theorems that follow are universal closures of the formulas listed below.)[5]

(T1) (a) $x =d_F y \rightarrow x =d_F x$
(c) $x =d_F y \rightarrow y =d_F x$
(d) $(x =d_F y \;\&\; y =d_F z) \rightarrow x =d_F z$

But '$x =d_F x$' is not valid. A colorless object does not have the same color as itself. Or better: A person who lacks scruples does not have the same scruples as himself. The same is true of identity as usually construed. If 'x and y are the same number' reduces to 'x and y are numbers and $x = y$', then no non-number is the same number as itself.

The following theorem underwrites certain inferences long thought to depend on analytic connections or meaning postulates.

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(T2) (a) $x =_{\mathrm{d}_F} y \rightarrow (\mathbf{d}Fx \;\&\; \mathbf{d}Fy)$
(b) $Fx \rightarrow \mathbf{d}Fx$

T2(a) asserts, for example, that if x and y are the same color, then x and y are colored objects; and if F is the determinate predicate 'red', then T2(b) asserts that whatever is red is colored.

Now consider

(T3) (a) $x =_{\mathrm{d}_F} y \rightarrow (Fx \rightarrow Fx)$
(b) $x =_{\mathrm{d}_F} y \rightarrow (P_F x \rightarrow P_F x)$.

We can think of (3) and (4) as natural language instances of T3(a) and T3(b), respectively. Let us see why T3(b) is valid. Suppose that '$x =_{\mathrm{d}_F} y$' and '$P_F x$' hold in M(S), for some values of x and y—and let these be a and b, respectively. Then according to (10), a and b are elements of some set C in d(F) and a is an element of some set $C' = g'(P_F)$ in $d(F)'$. But then C and C' overlap, and hence, by (9), C is subset of C'. Since b is in C, b is in C' and so since $C' = g'(P_F)$, b is in $g'(P_F)$, and '$P_F y$' holds in M(S), as required.

It is not possible to substitute an arbitrary formula of L(S) for either the predicate F in T3(a) or the subscripted predicate P_F in T3(b). Hence, the rule of substitution (of formulas for predicate symbols) fails in GS. Perhaps this is a reason to deny that GS is a pure logic. But I would point out that the subscripted predicates have the character of logical constants, since their interpretation is restricted by the requirement that $g'(P_F)$ be an element of $d(F)'$. We do not expect substitution to hold for logical constants. Similarly, since $g'(F)$ is required to be an element of d(F), their relation is one of logical constancy.

Nevertheless, T3 can be shown to generalize to a well-defined class of formulas. Specifically, given any monadic predicate symbol F of L(S) and any individual variables x and y, a formula ϕ of L(S) is an F-*subscripted formula* if ϕ is either one of the atomic formulas 'Fx', '$P_F x$', '$x =_{\mathrm{d}_F} y$', '$\mathbf{d}Fx$', or else ϕ is constructed from exclusively F-subscripted formulas by means of the connectives and quantifiers of L. Then we have

(T4) $x =_{\mathrm{d}_F} y \rightarrow (\phi \rightarrow \phi')$,

Where ϕ' comes from ϕ by proper substitution of y for x. A replacement theorem can be proved for GS and hence T4 continues to hold when ϕ is replaced by any formula χ logically equivalent to ϕ, whether χ is F-subscripted or not. It follows that GS is compatible with the fact that the consequent of T4 holds when ϕ is any logically true or logically false formula.

T4 can be proved directly by induction on the construction of ϕ. But a more revealing approach is to first prove

(T5) $\exists x(x =_{\mathrm{d}_F} y \;\&\; \phi) \rightarrow \forall x(x =_{\mathrm{d}_F} y \rightarrow \phi)$;

T4 then follows from T5 and T1(a).

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As for the proof of T5: The basis of the induction follows from T1, T2, and T3, and the inductive steps use only elementary properties of pure quantification theory.

T5 is, in a sense, the characteristic theorem of GS. If we ask what properties a pair of objects must share (in the sense that the one has it if and only if the other does) if, for example, the objects have the same color, there are two answers: a material answer—having to do with the nature of color, and a logical answer—having to do with the nature of general similarity. The logical answer is given by T5. The theorem says that the relevant properties are those that "spread" throughout the class of objects possessing a particular determinate color: If some such objects have the property, then they all do. Note that if '$x =\mathrm{d}_{\mathrm{F}}\, y$' is true, then (by appeal to T1(a)), the antecedent and consequent of T5 are equivalent. This means that the relevant properties are the "quantifier blind" ones: Some object possessing a determinate color has one of these properties if and only if all such objects do. One need not be disturbed by the vacuity of T4; that is a characteristic of the deepest theorems (as opposed to metatheorems) of logic! On the other hand, if it is not entirely trivial that T4 and T5 hold of just the F-subscripted formulas, or their logical equivalents, that is because that fact is metatheoretical.

Not all the theorems of GS are analogues of the theorems of the logic of strict identity. For example,

(T6) $(\mathrm{F}x \;\&\; \mathrm{F}y) \rightarrow x =\mathrm{d}_{\mathrm{F}}\, y$

has no such analogue, since the strict identity predicate is not eliminable in L in favor of formulas not containing it, though this is possible in a second order language. In this connection, notice that the converse of T6 is not valid. Despite the likes of T6, the general similarity predicate is likewise not eliminable in favor of formulas not containing it. Notice also that the following formula is *not* valid:

(12) $(\mathrm{P}_{\mathrm{F}}x \;\&\; \mathrm{P}_{\mathrm{F}}y) \rightarrow x =\mathrm{d}_{\mathrm{F}}\, y$.

This is certainly as it should be. That x and y both have smooth boundaries does not imply that they have the same shape. The fact that the difference between the latter false implication and the true one underwritten by T6 emerges in GS as a difference in logical form is another good reason to prefer GS to reduction to higher types.

To round out this sketch of GS, the following are a few additional useful theorems:

(T7) $\exists x(\mathrm{F}x \;\&\; \phi) \rightarrow \forall x(\mathrm{F}x \rightarrow \phi)$
(T8) $(x = y \;\&\; \mathrm{F}x) \rightarrow x =\mathrm{d}_{\mathrm{F}}\, y$
(T9) $(x = y \;\&\; \mathbf{d}\mathrm{F}x) \rightarrow (x =\mathrm{d}_{\mathrm{F}}\, y)$
(T10) $(x =\mathrm{d}_{\mathrm{F}}\, y \;\&\; \mathrm{F}x) \rightarrow (\forall z(\mathrm{F}z \rightarrow \mathrm{G}z) \rightarrow x =\mathrm{d}_{\mathrm{G}}\, y)$

T7 follows from T5 and T6. T8 and T9 reflect the fact that GS respects strict identity. Although strictly *distinct* objects may be the same Np, strictly *identical*

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objects cannot be different Np's, though strictly identical objects may fail to be the same Np in virtue of failing to be Np's at all. T8 asserts, for example, that if x and y are strictly identical, and x is red, then x and y have the same color. T9 asserts, for example, that if x and y are strictly identical, and x is colored, then x and y have the same color. But notice that the following formula is not valid:

(13) $x = y \,\&\, \mathrm{P_F}x \rightarrow x =\mathrm{d_F}\, y$

Suppose x is a number. Then x is not the same shape as x. But x might still have some F-subscripted property, where F is, for example, the determinate predicate 'round'. For observe that by (9), the domain A of M(S) is an element of d(F)$'$. T10 underwrites such inferences as the following: x and y have the same shape, x is round, and whatever is round is red; hence, x and y have the same color.

It remains to be seen whether GS has the metatheoretical properties common to first-order systems. I strongly suspect it does. T4 together with T1(a), T2, T6, and T9, might yield a complete axiomatization of GS, but I have not verified this. In light of (10), the notation '$x =\mathrm{d_F}\, y$' may be viewed as containing a "hidden" second order quantifier. What effect that has is unknown—at least to me. It is clear, however, that no formulas of L, i.e. of standard quantification theory with identity, are valid according to GS that are not already valid in quantification theory. The satisfaction conditions of such formulas remain unaltered in GS.

It may be protested that all I have done here is introduced notation for a family of restricted equivalence relations, and the definable sets "preserved" by them, turning them thereby into logical constants by building the necessary interpretive devices into the structures for L(S). So be it. It is worth doing.

III. Identity

Suppose that x and y are the same dog. For what properties are x and y indiscernible? Reduction dictates that the answer will have to be: All properties (of individuals) whatsoever. But the task of reconciling that answer with the facts about change has yet to be accomplished to anyone's satisfaction. According to common sense, young Fido and old Fido are not wholly indiscernible, and philosophers have long struggled to explain how that is possible in light of reduction.

I want to suggest a different answer—and one that has a certain logical priority.

Let F be the property of *being Fido*, where Fido is some one individual dog. And consider the hypothesis that the relation between F and other like properties, such as *being bowser* or *being spot*, is analogous to the relation between a particular determinate property belonging to a certain determinable, and the other determinates belonging to it. This hypothesis is plausible. Like other pairs of distinct determinates (e.g. *being red* and *being green*), the properties of *being Fido* and *being Bowser* are disjoint; and taken together they add up, so to speak, to the property of being a dog. Thus, we may view the class of all such properties as a determinable for F, and we can express the identity 'x and y are the same dog' by means of the formula '$x =\mathrm{d_F}\, y$', with F, as mentioned, standing for the deter-

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minate property *being Fido*. The answer to the question about Fido's indiscernibility properties is then given by T5 (or T4). Hence, as common sense demands, x and y may be the same dog and yet fail to be indiscernible with respect *all* properties, since it may be that not all properties are *being Fido*-subscripted properties, where the latter are the properties satisfying T4. To put it bluntly, the point is that T5 is compatible with the demands of common sense, whereas Leibniz's Law for strict identity is not.

If, however, one insists that the extensions of properties like *being Fido* must be singletons, then we are back to reduction. Any property "spreads" in a singleton (if one element has it, all do). This means that we are able to purchase compatibility with common sense only at the price of contradicting philosophers who maintain that strictly distinct objects cannot each have a property such as *being Fido*, since then there would be a multitude of Fidos where there should be only one.

There are two replies to this objection, a direct one and an indirect one. The direct reply is that there simply *are* "non-trivial principles of identity." That is, there are cases in which strictly distinct objects are counted as *one* K, where K is an Nt-noun (and these are not cases of relations of indefinite similarity); once we recognize this, we are free to view the possibility of change over time in that light. I shall develop the direct reply in more detail in the next section. The indirect reply runs as follows:

Never mind about the apparent multitude of Fidos. There is still only one dog amongst them all. Each particular Fido is linked to any other in virtue of being the same dog and in that sense there is really only one dog—namely, Fido. The apparent multitude of Fidos is just a logician's trick—a set theoretical device—for bringing logic and everyday discourse about continuant objects into alignment.

Any of the several extant explanations of how change over time is logically possible is isomorphic to the explanation provided by GS. Suppose we have two photographs of Fido. In one he has a gray muzzle, in the other he does not. Common sense requires that the photographs be photographs of the same dog, despite the difference in muzzles. Standard logic, unaided by some further explanation, is not compatible with this requirement. One needs to say that having or not having a gray muzzle are not what they seem to be—simple properties of Fido—but rather relations he bears to time. Or, one needs to say that the photographs are of different "temporal parts" of Fido, and that Fido is not "wholly present" in either photograph. But where one might rely on relations to distinct times, or distinct temporal parts to gain consistency, GS supplies distinct objects, each being the same dog. Fido is wholly present in each photograph, and in one of them he possesses the simple property of having a gray muzzle. But the photographs are photographs of distinct objects. GS provides a "modeling" that yields this result, but it needn't be taken literally. Where GS sees distinct objects that are the same dog, you can see distinct temporal parts, or distinct relations to times. The crucial difference, however, is that temporal parts and relations to time, are not artifacts of extensional logic, and sets of individuals are. If we can account for the possibility of change using only sets of individuals, so much the better.

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There is a tendency to suppose that any relation of identity, properly so-called, must satisfy an unrestricted indiscernibility schema, i.e. "Leibniz' Law", and so must be the relation characterized by the axioms for '=' in first-order quantification theory. Wiggins has repeatedly insisted on this (see [13) and subsequent works of Wiggins' on identity), and Perry assumes it in his arguments against relative identity in [12]. Philosophers frequently fail to acknowledge that the first-order axioms do not succeed in defining the intuitive relation of strict identity, but succeed only in defining a congruence compatible with the definable relations. In view of this fact, the claim that Leibniz' Law is a defining feature of identity seems unjustified. If Leibniz' Law does not even characterize strict identity, why should we expect it to characterize pretheoretical identity? I am proposing that we can substitute T4 for Leibniz Law in a first-order treatment of identity. T4 and T1(a) characterize a congruence compatible with *some* but not necessarily *all* of the definable relations. For mathematical applications, we do need the full strength of Leibniz' Law, and so GS retains '=' and the standard axioms for it. But for non-mathematical applications, T4 seems preferable, since it allows that identical K's need not be wholly indiscernible.

There may seem to be an obvious difficulty with this point of view. If, as I claim, the *logic* of identity and of general similarity are the same, then what becomes of the difference between identity and general similarity? If Leibniz Law is not what distinguishes identity from general similarity, what does? The answer, no doubt, is that the difference lies in the distinction between substance and attribute. That is the distinction, after all, that informs the difference between Np-noun and Nt-noun. I cannot claim to know what the distinction between substance and attribute comes to ultimately, but it might help to compare the meanings of some "counting" formulas of GS when these are interpreted in terms of general similarity, on the one hand, and identity, on the other.

The need for the predicate modifier **d** becomes apparent when we attempt to express the idea that despite the multitude of Fido-objects, Fido is but one dog. Compare the meanings of the following four formulas, when F stands for Fido and **d**F represents the class of dogs:

(14) (a) $\exists x(\mathrm{F}x \mathbin{\&} \forall y(\mathrm{F}y \rightarrow x =_{\mathrm{d_F}} y))$
(b) $\exists x(\mathbf{d}\mathrm{F}x \mathbin{\&} \forall y(\mathbf{d}\mathrm{F}y \rightarrow x =_{\mathrm{d_F}} y))$
(c) $\exists x(\mathrm{F}x \mathbin{\&} \forall y(\mathrm{F}y \rightarrow x = y))$
(d) $\exists x(\mathbf{d}\mathrm{F}x \mathbin{\&} \forall y(\mathbf{d}\mathrm{F}y \rightarrow x = y))$

The formula (b) asserts that there is exactly one dog, whereas (d) asserts that there is exactly one object that is a dog. Since any number of objects, each of which is a dog, may be the same dog, (b) may be true and (d) false, though (d) entails (b). Apparently, the distinction between (b) and (d) has long been familiar to theologians contemplating the doctrine of the Trinity.[6] Similarly, (c) asserts that there is but one object having the property of *being Fido*, while (a) expresses the solidarity of the Fido-objects, each being the same dog as any other; (a) may be true and (c) false.

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Now let F represent the determinate adjective 'red', and let **d**F*x* represent the class of colored objects. The interpretation of (c) and (d) is clear: (c) asserts that there is exactly one red object and (d) asserts that there is exactly one colored object. Call a color *instantiated* if some object has it. Then (b) asserts that there is exactly one instantiated color. So this is a way of asserting that there is only one color, or only one color represented in the population of objects. (a) asserts the solidarity of the red objects, each being the same color as any other.

In view of these parallels, we gain a certain generalization by assimilating the logic of identity and of general similarity to one another. At one time I had thought I would title this paper "Identity Generalized." Generalization, if natural and principled, is a good thing, since it teaches us what lies at the heart of a concept. In case of emergency, we still have the notion of strict identity, and I doubt we will start down a slippery slope whereby we end up counting generally similar things as identical.

IV. Relative Identity

Let us try to take literally the idea that strictly distinct objects may be the same Nt—and see what happens. So this is the faintly disreputable notion of relative identity. It is not the most extreme form of relative identity, however. More extreme still is the claim made, for example, by Anil Gupta in [8], that strict identicals may be distinct Nt's. This is ruled out by GS, as T8 and T9 attest. The two kinds of relative identity are often run together. Neither Perry nor Wiggins acknowledges the difference. GS makes the difference plainly apparent. Strict identicals can no more be different Nt's than strict identicals can differ with respect to some Np. Strict identicals cannot differ in color. But just as strictly distinct objects may have the same color, so, perhaps, may strictly distinct objects be the same bell, book, or candle.

A defense of relative identity usually consists in giving purported examples of it and then railing against shortsighted critics. The opposition then argues that the examples are not what they seem, and indeed *cannot* be what they seem, since relative identity can be shown a priori to be incoherent. The very existence of GS answers the latter charge directly, as does the existence of Gupta's systems. Let us first see where, from the standpoint of GS, one of these alleged a priori refutations goes wrong. Following that, I will argue that relative identity (of the sort sanctioned by GS) is to be respected because it *solves problems*, and in fact does so very briskly and informatively. I have in mind three problems: (1) the problem, already touched on, of the possibility of change; (2) The problem of the identity of "allographic" objects—objects such as words, sentences, books, articles, and the like; (3) the problem of contingent identity as elaborated originally by Gibbard in [5]. In the last part of the present section ("Gupta on Identity"), I discuss Anil Gupta's very interesting approach to identity developed in [8].

Perry's Argument. In [12], Perry argues that any purported statement of relative identity—"*x* and *y* are the same F but different G's"—entails that the relation expressed by '*x* and *y* are the same G' is not even "weakly reflexive", i.e. does

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not even satisfy T1(a) and that this would imply that it is either not symmetrical or not transitive:

> The second conjunct says that *x* and *y* are different G's. If we make the substitution in this conjunct that the first conjunct licenses us to make, the result is "*x* and *x* are different G's." To accept this result is to deny that the relation expressed "the same G" is even weakly reflexive, which requires either that such relations are not transitive or are not symmetrical. ([12], p.186)

Perry adds that "To deny the substitution is to deny that these relations confer substitutivity."

Now, since we have T1 (weak reflexivity, symmetry, transitivity), and since T4 *does* confer (a restricted form of substitutivity), Perry's main claim that relative identity must fail to be weakly reflexive and thus must be either not transitive or not symmetrical, is not correct. For the same reasons, Perry's final claim that "If we accept Geach's view, we shall have to abandon some traditional and rather plausible logical doctrines" is also incorrect. No such "traditional and rather plausible logical doctrines" are abandoned by GS. From the standpoint of GS, the difficulty with Perry's argument is that '*x* and *y* are different G's' is not a subscripted predicate associated with the relation expressed by '*x* and *y* are the same F'; for this reason we can safely deny the validity of Perry's substitution. Referring to T4, if such substitutions were allowed, we could infer from the fact that *x* and *y* are the same color but differ in shape, that the "same shape" relation is not weakly reflexive, and hence either not symmetrical or not transitive.

It may be replied that Perry never intended his argument to apply to relations of general similarity. Granted; but the point is that his argument simply does *not* show that relative identity would fail to be weakly reflexive. It shows only that a logic of relative identity would need to impose some restriction on substitutivity—as in the case of general similarity. In the absence of an inkling of the form such a restriction should take, even this conclusion would have seemed to be damning evidence against relative identity. But with the example of general similarity in mind, and T4 at hand, the picture is very different. The prospects for relative identity are quite good. It seems to me, in fact, that there never was a good reason to reject relative identity out of hand, except that the "relative identity man" (as Geach might say) was talking about he knew not what—because he could not supply a principled restriction on Leibniz' Law.

Change. The are several problems about change, some harder, some easier. A harder problem is to account for the *becoming* relation. Young Fido became old Fido, and did not become the chair I am sitting on. The problem is to spell out the types of causal relations between young Fido and old Fido that make this true. The problem of accounting for the sheer logical possibility of change is easier. Any change involves the attribution of incompatible properties. The problem is to explain how that is possible. In [9], Mark Hinchliff neatly characterizes the difference between the two most common reductionist solutions: perdurance and

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endurance. Fido has a gray muzzle at t_2 but does not have one at t_1. The perdurance solution is that this statement means that Fido-at-t_1 lacks a gray muzzle, whereas Fido-at-t_2 has one. Fido-at-t_1 and Fido-at-t_2 are distinct objects. They are distinct parts of the same whole. The endurance solution treats the statement as meaning that Fido has a gray-muzzle-at t_2 but not at t_1; or as meaning that (on the "relativized properties" version) Fido has a gray-muzzle-at-t_2 but not at-t_1. The difficulties with these solutions are well-known. According to perdurance, Fido is never "wholly present," only parts of him are ever present. And according to endurance, having a gray muzzle is not a simple property—as it seems to be—but rather a relation Fido bears to time. There is no such thing as having a gray muzzle, there is only having a gray muzzle at t, or at-t. Hinchliff's own solution is that if t_2 is the present, then Fido has the simple property of having a gray muzzle and he has the simple property of having once had a black muzzle instead. But as Hinchliff would say, strikingly, having had a black muzzle is not a way of having a black muzzle in the past any more than not having a black muzzle is a way of having a black muzzle in a realm of non-being. Hinchliff holds that the past (and future) are as unreal as any realm of non-being. I find Hinchliff's idea intriguing, but I wonder how it might be developed; and I would point out that realms of non-being have been invoked, with profit, for example, in the semantics of negation and entailment in relevant logics.

Hinchliff does not consider the possibility of a non-reductionist solution. In fact he announces that "there is no defensible position" other than perdurance, endurance, or his own "presentism." That is simply false.

By a "non-reductionist solution" (to the problem of the possibility of change), I mean one that does not involve the assumption that the relation between young and old Fido must be compatible with strict identity. Perdurance imploys this assumption by denying that Fido-at-$t_,$ is Fido; endurance employs it by denying that having a gray muzzle is a simple property; and presentism employs it when it denies that having had a gray muzzle is not a way of having a gray muzzle in the past.

There are two ways—and only two, I think—that one might pursue a non-reductionist solution. One way is to weaken the "same dog" relation (to stick with the case of Fido), so as to allow that strictly distinct objects can be the same dog. That is the approach I have taken. The advantages are clear: Fido is wholly present both at t_1 and at t_2 in the only way he *can* be wholly present. For old, gray muzzled Fido cannot be wholly present at t_1. Furthermore, the property of having a gray muzzle is a simple property that Fido simply has at t_2 and simply lacks at t_1. The disadvantage, I suppose, is that the solution invites the proverbial "incredulous stare." The worry may be that if distinct objects can be the same dog, then Fido could turn into my chair; and it is true that the view I am suggesting is committed to the idea that one thing can turn into another; young Fido turns into old Fido. But this problem, insofar as it is a problem, attends any view about change. Why couldn't one time slice of Fido be my chair? The fact is that the relative identity expressed by 'Fido-at-t_1 is the same dog as Fido-at-t_2' holds under exactly the

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same conditions that would render 'Fido-at-t_1 and Fido-at-t_2 are time-slices of the same dog' true. In this sense the one relation is as mysterious as the other. Only the *logic* of the relations is different. On the relative identity account, both Fido-at-t_1 and Fido-at-t_2 are dogs, and each is Fido; On the perdurance account, neither is a dog, much less Fido.

The second non-reductionist strategy involves the more extreme form of relative identity advocated, as mentioned, by Gupta. This kind of relative identity is discussed in some detail below, but let me try to convey the main idea here as it bears on the problem of change. We want to be able say that Fido-at-t_1 and Fido-at-t_2 are the same dog and yet different. We can do this even if we count "same dog" as a strict identity, provided we are willing to take a very liberal view of the kinds of kinds or sorts of sorts there are. For example, suppose we define "same ur-dog" in the following way: x and y are the same ur-dog if and only if x and y are dogs and x and y have muzzles of the same color. It is possible to maintain that strictly identical dogs may be different ur-dogs, provided we do not demand that the "same ur-dog" relation be even weakly reflexive. It is possible, as Gupta shows, to have "same ur-dog"—like relations that are transitive. (The "same passenger" relation is one of Gupta's examples.) If so, we can account for the difference between Fido-at-t_1 and Fido-at-t_2 by noting that although they are strictly identical, they are not the same ur-dog. I do not mean to suggest that this is a plausible strategy; but it is a logical possibility and we should be aware of that fact.[7]

Allographic Objects. I am sure all have heard the following argument before: Suppose I am holding a copy of "On the Electrodynamics of Moving Bodies" (hereafter "the Article"). If I destroy it, have I—or have I not—destroyed Einstein's famous paper? The answer is supposed to be "No". And we are supposed to conclude that the "Article Itself" and my copy (or your copy) are not identical. The "Article Itself" is something that transcends its copies, as type transcends token.

This argument has always struck me as very odd. It is not that I have anything against abstracta or the type/token distinction. It is just that it has seemed to me that the proper conclusion to draw from these premises is not that the article itself is something else again, but rather that my copy is not the *only* thing that counts as the article itself; your copy counts as well. But if your copy and mine both count as the article itself, then we have distinct objects that are the same article. Strict identity won't stand for that, and so relying on it would force us to "higher types" again. It is worth mentioning that I am not the only one who is inclined to say such things as that each strictly distinct copy qualifies as *the* article itself. Writing of allographic works, Goodman says this (with my emphasis): "Any accurate copy of a poem is as much *the original work* as any other."[8] Amen.

Occasionally, ordinary usage concerning allographic objects favors relative identity rather than strict identity. Suppose I say "I have deleted that word from my manuscript." My implication is that I have deleted all tokens of the word from my MS, and, as far as my MS is concerned, that counts as deleting *the word*

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from it. Apparently, according to ordinary usage, each token counts as *the word* although no one token (or two, or three) *to the exclusion of all others* counts as the word. The simplest explanation of this is that each token is the same word as any other.

The idea that allographic objects must be, given reduction, pure abstracta has driven thoughtful people to distraction. This is vividly illustrated by what I have called elsewhere "the creation problem." (See [2].) We say that poets *create* poems; but Wolterstorff, an advocate of allographic abstracta, says in [14] that is not strictly so, since the abstract poem already exists before the poet writes it, and, strictly speaking, creating a thing entails bringing it into existence. Then Levinson, an opponent of (pure) allographic abstracta, complains in [11] that such a view does not give proper pride of place to creation in art: the idea that works of art, unlike scientific facts, are created (by mortals) is "one of the most firmly entrenched of our beliefs concerning art." And in Levinson's view, creating a thing does entail bringing it into existence. (Perhaps it has not occurred to Wolterstorff or Levinson that the truly important component of the distinction between creation and discovery is not the ontological notion of bringing things into existence (versus finding them there to begin with) but the logical notion of *comprehension*. The poet faces a plenitude of possibilities, whereas the scientist faces only those ordained to be actual. This difference can be formulated in terms of differing constraints on certain logical comprehension principles, as I have tried to show in [2]. The ontological notion of creation has little or no bearing on the distinction between creation and discovery.)

Yet I do agree that poets bring poems into existence and that this conflicts with the results of reduction to higher types. Levinson's solution—similar to one put forward by Fine in [3]—is that allographic objects are impure types of a sort Levinson calls "indicated structures." A piece of music, for example, is a type containing the composer, time of composition, and other features having to with the origin of the piece as *essential* ingredients. Such types are not sempiternal; they can be created (but not destroyed). This view entails, however, that you and I could not possibly compose exactly the same poem or piece of music (unless we collaborated)! Levinson mounts a sensitive defense of this unlikely proposition. Levinson's defense is based on observations such as that a "A work identical in sound structure with Schoenberg's Pierrot Lunaire (1912) [i.e. that would sound exactly the same], but composed by Richard Strauss in 1897 would be aesthetically different from Schoenberg's work." And on Levinson's account, an aesthetic difference makes for a literally different work. This is surely absurd. If Matthew Arnold had written "Among School Children," stanza for stanza, he would have written "Among School Children," not some different poem with the same "word structure." It may be that we should conclude that an aesthetic difference need not spell a literal difference but only a difference in our relation to the work.

What is needed here is not aesthetic sensitivity but rather sensitivity to the obvious. It is *obvious* that it is logically possible for two poets to write the same

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poem or for two composers to compose the same music, just as it is more than possible for two scientists to independently discover the same scientific fact. It is quite amazing that there now seems to be a consensus among certain aestheticians that this is in fact not possible.[9] If you and I independently write exactly the same stanzas and send them off to an editor, it is unlikely that our poem will be printed twice over—unless the editor wishes to engage in an ironic Pierre Menard exercise.[10] Furthermore, if the matter is pressed, we shall find that the Levinson-Fine view entails that you and I couldn't write even the same stanza, nor, ultimately, even the same word or the same letter of the alphabet!

It may be replied that if writing stanzas or composing music involves creating these things, then strict identity dictates that you and I cannot write the same stanzas or the same piece of music—at least not if we do so at different times. If you create your piece of music first, and it is strictly identical to mine, then mine has already been created before I undertake to do so.

This is another one of those peculiar arguments resulting from a direct collision between ordinary usage and strict identity. And here I think strict identity must give way.

Suppose that against all odds you and I write the same poem. Perhaps the odds of this happening are bettered by the occurrence some event in the news—the death of Princess Diana, for instance. Whatever the circumstances, there seems to be no *contradiction* in the supposition—short of a question begging appeal to reduction. You bring your copy of the poem into existence and I bring mine, both of us having faced, with equal creativity, the same daunting plenitude of possibilities. Then we have both created the poem and have both brought precisely *it* into existence. Your copy and mine are distinct copies but the same poem. So much for that problem.

Contingent Identity. In [5] Gibbard argued that there is such a thing as contingent identity, whereas in [10] Kripke had argued forcefully against the idea. I think Gibbard was right, but not in any sense that contradicts Kripke. I should say immediately that the solution I will suggest to the problem of contingent identity is *not* that relative identity can be contingent; it cannot, at least not as expressed using rigid designators.

Gibbard's example of an alleged contingent identity is as follows: Suppose that at exactly time t I bring into existence both a particular piece of clay and a statue made out of it. This can be done by sticking two pieces of clay together, thereby forming at the same time both a new piece of clay and a clay statue. The next day, I destroy the piece of clay and the statue along with it. Thus, during a certain interval the statue and the piece of clay are *identical*. And this identity appears to be contingent. I might have stuck the pieces of clay together in a different way thereby obtaining the same piece of clay but a different statue, or no statue at all. This apparently contradicts the Kripke-Marcus thesis that identity is a necessary relation.

As Gibbard's paper demonstrates, working through this problem armed only with strict identity and the concept of rigid designation—strict rigid designation—defined in terms of it, is a formidable task.

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Here is the solution: If the same piece of clay can, literally, be two different statues (in different possible worlds), namely, the actual statue and the one I might have made instead, then (by T9 again) that same piece of clay would be two strictly distinct objects. It follows that no singular term denoting *the piece of clay* can be a strict rigid designator, that is, a rigid designator in Kripke's sense. For no such term t satisfies the following condition true of strict rigid designators: For any possible worlds W_1 and W_2,

(15) If t denotes x in W_1 and t denotes y in W_2, then $x = y$.

Let c be a name of the piece of clay. Then c denotes the actual statue, x, in the actual world, W_1, and c denotes the possible statue, y, that I might have made instead, in some other possible world W_2. By hypothesis, x and y are different statues. Hence, by T9, x and y are strictly distinct objects. Thus, c does not satisfy (15) and so it is not a strict rigid designator.

There cannot be a strictly rigid name of the piece of clay if it is literally true that the piece of clay is at one world or time identical to this statue and at another world or time identical to a different statue. There can, however, be a *relatively rigid* name of the piece of clay. This will be a name t satisfying the following condition: For any possible worlds W_1 and W_2,

(16) If t denotes x in W_1 and t denotes y in W_2, then x and y are the same piece of clay.

Suppose then that c_1 and c_2 are two relatively rigid names of the piece of clay; and suppose that 'x and y are the same piece of clay' is true. Let W be any possible world, and suppose that c_1 denotes u in W and c_2 denotes v in W. Then by (16), x and u are the same piece of clay, and y and v are the same piece of clay. By T1, then, u and v are the same piece of clay, and so 'c_1 and c_2 are the same piece of clay' is true in W. Thus, if 'c_1 and c_2 are the same piece of clay' is true, it is necessarily true. In this way we can affirm the (conditional) necessity of the relative identity statement 'c_1 and c_2 are the same piece of clay'. Now consider the strict identity statement '$c_1 = c_2$'. This will be true in the actual world if $x = y$ is true; and it will true in W if u = v. But of course neither of these things need be true. In particular, the truth of 'c_1 and c_2 are the same piece of clay' does not imply the truth of '$c_1 = c_2$'. Also, it may happen that '$c_1 = c_2$' is true in the actual world but false in W (or vice versa). The strict identity '$c_1 = c_2$' is contingent. But this does not contradict the Kripke-Marcus thesis, since c_1 and c_2 are relatively rigid but not strictly rigid. Furthermore, although, given Gibbard's scenario, there cannot be a strictly rigid name of the piece of clay, nothing precludes there being a strictly rigid name of the actual statue. So let s be a strictly rigid name of the actual statue. Then in Gibbard's scenario, '$s = c_1$' is true in the actual world but false in other worlds in which some other statue, or none, is formed out of the piece of clay. Then '$s = c_1$' is true but not necessarily so. Again, however, this does not contradict the Kripke-Marcus thesis, since 'c_1' is not strictly rigid.

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It is possible to develop the general notion of a relatively rigid term. Let K be an Nt-noun. Roughly speaking, a term t is K-rigid if it denotes the same K in every possible world. It follows that if t_1 and t_2 are K-rigid, and the sentence 't_1 and t_2 are the same K' is true, then it is necessarily true. But if t_1 is K-rigid and t_2 is J-rigid, for distinct Nt-nouns K and J, then it can happen that the strict identity '$t_1 = t_2$' is true and contingent. To repeat: This does not contradict the Kripke-Marcus thesis, since in order for '$t_1 = t_2$' to be true and contingent, at least one of the terms t_1 and t_2 must fail to be strictly rigid.

The notion of relative rigidity resembles Gibbard's concept of "sortal rigidity" in that both involve relativization to a sortal concept. But the resemblance ends there. For example, sortal rigidity is defined only for overlapping worlds or worlds that branch from a common trunk. There is no such restriction on relative rigidity.

Gupta on Identity. In [8], Anil Gupta develops a view about identity very similar to mine. For example, Gupta remarks:

> Why not allow the possibility that the same K may be two different metaphysical entities in different worlds (and different times) and that the principle of identity, instead of being vacuous, ties together those entities that are the same K? ([8], p. 23)

Why not, indeed? That is precisely the viewpoint I have proposed concerning the possibility of change. Gupta does not discuss the problem of change, though he does mention early on a "principle of persistence." Gupta is concerned primarily with the problem of essentialism and trans-world identity—a problem I do not have the space to deal with here (but that presents no special difficulties). Gupta does not give much credence to the extensional cases of relative identity, such as the case of allographic objects. He views principles of identity solely as principles for tracing objects through worlds and times; and in fact his modeling is confined to the case of trans-world tracings, though I suppose all of it would carry over to the case of temporal persistence. These differences make for essential differences between Gupta's approach and mine. Gupta's systems are quantified modal logics, whose extensional fragments, as far as I can tell, are just standard quantification theory with identity. GS, however, is a non-standard extensional logic. The crucial philosophical and technical difference, as I've mentioned, is that Gupta endorses the extreme form of relative identity ruled out by T8 and T9.

For example, Gupta thinks that the same person may at different times be two different *passengers* (since, for example, an airline counting passengers on different flights would count them as such), or two different *students*, and that although "The principle of identity for 'person' may be trivial", the principle of identity for 'passenger' is "clearly nontrivial." (A principle of identity is trivial for Gupta if it reduces to strict identity.) As I say, this sort of case is ruled out by GS. If x and y are strictly identical, then x and y cannot be two different students—or two different *anything*. In fact, here we can legitimately invoke Perry's argument: If strictly identical persons can be two different passengers, then it follows that the relation expressed by 'x and y are the same passenger' is not even weakly

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reflexive. In that case, why should we suppose that it invokes a "principle of identity"? How, then, does Gupta get away with it?

Before answering this question, I want to point out that the principle of identity for a noun such as 'passenger' or 'student' does not necessarily have to do with tracing objects through worlds and times. Suppose that different airlines decide to sponsor the same flight. If each airline keeps its own books, the people on the flight will be counted twice as passengers, just as if they had taken successive flights. Or suppose a person enrolls as a student at two different schools... , etc. So this sort of example does not sit well with Gupta's policy of restricting the possibility of nontrivial principles of identity to those that trace objects through worlds and times.

The fact that we have a special word, 'passenger', for persons traveling in (but not operating) a vehicle, does not mean that passengers form a genuine sort of things—as do mice and men. We can manufacture such fake sorts at will. Call a thing a 'shmapple' if it's an apple and is in some barrel. One could argue, then, that the same apple might be different shmapples if it is found now in this barrel and now in that. But in reality there are no such "different shmapples", only apples in different barrels. It is the barrels that are different, not the apples or shmapples, and this difference is strict.

I am not saying that there are no shmapples—or that the class of shmapples is ill-defined. A shmapple is an apple in a barrel. The definition is just fine. I am saying that there are no *different* shmapples, just different barrels. Similarly, A father is a person who fathers someone. But if a person fathers two sons, we wouldn't say that the same person is two different fathers. The sons are different, not the fathers.

Call x 'passenger #1' if and only if x is the first passenger listed on the passenger roster for flight #1; and call y 'passenger #2' if and only if y is the first passenger listed on flight #2. Clearly, x can be passenger #1 and y passenger #2 and $x = y$. We may be tempted then to say that the same thing may be two different passengers: passenger #1 and passenger #2. But this no counterexample to T9, since once the terms 'passenger #1' and 'passenger #2' are unpacked, the result is simply that x and y are passengers on different flights. The flights are different, not the passengers. The fact that the airlines would count x and y as "different passengers" is no argument that there are such things as different passengers. Hospitals might wish to count fathers in the manner mentioned above. It wouldn't follow that there are such "different fathers."

Nor am I saying that passengers are not persons. Gupta comments that some might take the view that passengers are a kind of abstraction and hence passengers are not persons. He objects to this on the grounds that it results in overcrowded planes filled not only with persons but with passengers as well. I agree that passengers are persons. But they are something else as well—they are persons who stand in the "passenger on" relation, or the "passenger in" relation to some other parameter—flights, planes, cars. The passenger concept is essentially relational not substantival.

The passenger case was supposed to show the need for nontrivial principles of identity. In fact it only muddies the waters. It is possible maintain that all

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principles of identity are trivial and handle the passenger case as well. And, unlike some of the other cases of relative identity I have discussed above—e.g. allographic objects—it is possible to do this without appealing to higher types or distorting ordinary usage. Different airline passengers are merely different persons on the same flight or the same person (or different persons) on different flights.

Now let me turn to the perplexing question of how Gupta circumvents T8 and T9. If 'passenger #1' and 'passenger #2' are defined as above, there is no conflict with T8 or T9. But if we try to directly represent the relation 'x and y are the same passenger' in GS, we run into a problem. GS requires that any determinable associated with a common noun must divide into disjoint determinates. The "natural" determinable for 'passenger', however, would seem to be the class consisting of "things" such as passenger #1 and passenger #2. And this "determinable", is not a disjoint family of "things", since x is both passenger #1 and passenger #2. This means that the relation expressed by 'x and y are the same passenger' cannot be represented directly in GS. And this is as it should be, since that relation is not an equivalence relation. It does not partition a subset of the domain. This fact emerges clearly on Gupta's analysis, though I find his exposition of some of these matters obscure.

In Gupta's technical construction, the extension of a common noun is a set of individual concepts; these are functions (sometimes partial) from worlds to individuals. Let K be an Nt-noun. Gupta never *defines* the "same K" relation in terms of individual concepts but he provides an explanation of sorts (see "proposition 1" in [8]). However, given a fixed set K of individual concepts, we can give an actual definition (in line with what Gupta says) of the "same K" relation *relative to K*. Let '$\mathrm{RK}(x, y)$' abbreviate 'x in W_1 is the same K as y in W_2' (suppressing the world parameters is a harmless concession to readability). Then

(17) $\mathrm{RK}(x, y)$ if and only if there is an i in K such that $\mathrm{i}(\mathrm{W}_1) = x$ and $\mathrm{i}(\mathrm{W}_2) = y$.

Note the similarity of (17) to (10). Of course, without some disjointness condition on the family K of functions, the relation $\mathrm{RK}(x, y)$ need not be transitive. The condition Gupta adopts and calls "weak separation" is this: For any individual concepts i and i$'$ in K, and any world W,

(18) (Weak Disjointness) if $\mathrm{i}(\mathrm{W}) = \mathrm{i}'(\mathrm{W})$, then $\mathrm{i} = \mathrm{i}'$.

(17) and (18) entail that $\mathrm{RK}(x, y)$ is transitive, as the reader is invited to verify. Curiously, Gupta reverses the point. He assumes that $\mathrm{RK}(x, y)$ is transitive and then argues that K must be weakly disjoint. This garbles logical priorities a bit, doesn't it? In any case, (18) is insufficient to guarantee that $\mathrm{RK}(x, y)$ is symmetric: if $\mathrm{RK}(x, y)$, then $\mathrm{RK}(y, x)$; or that $\mathrm{RK}(x, y)$ is weakly reflexive: if there is a y such that $\mathrm{RK}(x, y)$, then $\mathrm{RK}(x, x)$.

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Suppose that we adopt the following stronger disjointness condition on K: For any individual concepts i and i$'$ in K, and any worlds W_1 and W_2,

(19) (Strong Disjointness) If $i(W_1) = i'(W_2)$, then $i = i'$.

Assume that $RK(x, y)$. Then there is an i in K such that $i(W_1) = x$ and $i(W_2) = y$. Suppose further that x is a K in W_2 and y is a K in W_1. This means that there are i$'$ and i$''$ in K such that $i'(W_2) = x$ and $i''(W_1) = y$. Then by (19), i, i$'$, and i$''$ are the same function. Hence, there is a j in K such that $j(W_1) = y$ and $j(W_2) = x$. Thus, $RK(y, x)$. In this sense, $RK(x, y)$ is symmetric, assuming (19). On the same assumption, $RK(x, y)$ can shown to be weakly reflexive. For suppose that $RK(x, y)$. Then there is an i in K such that $i(W_1) = x$ and $i(W_2) = y$. Assuming, in addition, that there is an i$'$ such that $i'(W_1) = x$, i.e. that x is a K in W_2, it follows from (19) that $i = i'$. It follows that $i(W_2) = x$, and thus $RK(x, x)$. It is also true that if $RK(x, y)$ is assumed to be weakly reflexive and symmetrical in the senses implicit in the foregoing argument, then (19) holds of K.

Gupta rejects (19). His “same K” relation, then, is neither weakly reflexive nor symmetric, in the natural sense that flows from the definition of the relation itself. As Perry might have predicted, but didn’t, the *extreme* form of relative identity turns out to be transitive but neither weakly reflexive nor symmetrical. The moderate form of relative identity, however, retains the “traditional and rather plausible” equivalence properties of identity.

T8 and T9 affirm in different ways the weak reflexivity of the “same K” relation as represented in GS. On the other hand, Gupta has shown that in the intensional setting, we get a very interesting notion of trans-world tracing, (one that solves problems), if we don’t demand weak reflexivity (or weak symmetry, in the sense implicit in the argument of the preceding paragraph). For example, Gupta argues that (19) is incompatible with a basic ontology of space-time manifolds. Could not two distinct men occupy strictly the same space-time manifold in two different worlds? To imagine this all we have to imagine is Smith standing at the bar in W_1 and Jones standing at the bar in W_2, and that Smith and Jones are physical duplicates standing in exactly the same position, so that they occupy the same set of space-time points during a certain interval. If the Smith-concept, i, and the Jones-concept, i$'$, are elements of the extension of ‘man’, and if $i(W_1) = x$, and $i'(W_2) = x$, then according to (19), $i = i'$, i.e., the Smith-concept and the Jones-concept are the same, and so Smith and Jones cannot be different men.

Finally, two brief comments about Gupta’s position. First, as he recognizes, there is a very serious difficulty with it. If man and manifold can coincide in one world and not in another, then they are not the same *thing*. It follows that the extension of the noun ‘thing’ is not weakly disjoint, and hence that the “same thing” relation is not transitive. Let T be the extension of ‘thing’. Then T is a set of individual concepts that includes a very mixed bag of things—such as the Smith-concept, i, the Jones-concept, i$'$, and the manifold x. As an element of the extension of ‘thing’, the manifold is an individual concept, say, j; and the condi-

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tion that was expressed above by '$i(W_1) = x$' must now be expressed as '$i(W_1) = j(W_1)$', where $j(W) = j(W')$, for all worlds W and W′. Yet i is not the same as j, and so the extension of 'thing' is not weakly disjoint.

Secondly, any case of extreme relative identity: *strict identicals, distinct K's*, can be traded in for the moderate counterpart: *strictly distinct objects, same K.* The latter is a condition contrapositive to the former. For example, Gupta's case of "identical manifolds, different men" can be redescribed as a case of strictly distinct men who are relatively the same manifold. This means that Gupta's claim that (19) is incompatible with an ontology of space-time manifolds is false. The ontology itself is compatible with (19). All we need do is treat "same manifold" as moderate relative identity as characterized by GS. If such an exchange is always possible, as intuitively it seems to be, then it should also be possible to prove that requiring just (18) and requiring the apparently stronger (19), are in a significant sense equivalent. While I admire the boldness of Gupta's move, (requiring (18) but not (19)), I suspect it does not get us anywhere we cannot get without it.

Notes

1. A version of this paper was presented at the 1993 meeting of The Society for Exact Philosophy in Toronto. I thank the paricipants for their comments and criticisms. I also want to thank Patrick Francken, Lenny Clapp, and Barbara Coleman for encouragement and advice concerning the preparation of this paper.
2. I mean identity as defined *semantically* in standard logic. Identity in this sense is not an elementary (i.e. first-order) notion. It can be defined in second-order logic, however.
3. Of course, any equivalence relation reduces to the strict identity of its associated equivalence classes. This is not a strictly logical reduction since it relies on the Axiom of Extensionality. By "reduction to strict identity" I mean the logical reduction referred to in the text.
4. For example, such inferences as: x and y are the same size, and z is smaller x, hence, z is samller than y, show the need for relational subscripted predicates.
5. I am using "theorem" in place of the more awkward "valid formula". I am not using the term in its proof-theoretic sense.
6. "...the Father is omnipotent, the Son is omnipotent, the Holy Spirit is omnipotent; nevertheless there are not three omnipotents but one omnipotent." This passage is from the Althanasian Creed as quoted in [1].
7. I am not suggesting that this is Gupta's view. He does not discuss the problem of change—no doubt because he does not see it as amenable to a non-reductionist solution. And even if he did, I doubt that he would employ this strategy since he has equal access to the first and more plausible strategy. See below for further discussion of Gupta on identity.
8. [6] p. 114.
9. For example, Peter Kivy in an abstract in the *Philosophers Index* for a paper "Platonism in Music: Another Kind of Defense," makes the following statement: "It is clear

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that two people can independently discover (say) the same scientific law but two people cannot...compose...the same musical work."

10. Philosophers tend to distort the meaning of Borges' famous story. This is especially true of Levinson. See [11], n.13; and compare [2], n.24.

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