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FACTS AS TRUTHMAKERS

Facts, I am pleased to observe, are back in fashion. For some time now they have had staunch friends in the American Midwest,[1] and these days they are embraced as far afield as Sydney[2] and San Francisco.[3] But what are facts, and what facts are there? My answer to the first part of this question, which I shall not pursue further, is the same as Russell's and the early Wittgenstein's[4]: Facts are what constitute the objective world, and what make true sentences and thoughts true and false sentences and thoughts false. (This is largely what is meant, I think, when it is said that you cannot argue with them.) But what is the nature of the relation between facts and truths whereby the former make the latter true?[5] This is the central question of my paper. I naturally do not claim to give a full and adequate answer to it, but only to present some considerations which tend to favour one type of answer over another. The main burden of the paper is to show that it is in principle neither necessary nor desirable to admit negative, molecular, and general facts in order to allow for an adequate account of *making true*.

The naive view of the making true relation is, firstly, that it must be 1-1—or at any rate would be were it not for unthought and unrecorded facts, and for equivalent and equivocal thoughts and sentences—and, secondly, that this 1-1 correspondence arises from more basic correspondences between the components of the fact and matching components of the thought or sentence. Thus the naive fact ontologist is committed to a thoroughgoing isomorphism between the structure of the world and the structure of our thought and talk about it. But for those of us who do not regard facts as artefacts of thought and language, this is surely, on reflection, incredible. I find it far more plausible to assume that a relatively simple thought or sentence may be made true by a relatively complex set of facts, and *vice versa*. The set of facts that makes it true that Smith is a bachelor is clearly far more complex than the thought that he is. On the other hand, an enormously complex disjunction may be made true by a very simple fact. The 1-1 theory cannot account for such intuitions. Nor can it account for the circumstance that everyday thoughts and sentences are frequently *vague*. For to do so it would have to assume that there are vague facts. But it is surely our thought and talk that is vague, not the world itself.[6]

Henceforth I restrict myself to the case of sentences, and I set out to show that it is not at all necessary to suppose that true sentences mirror the structure of the facts which make them true. In section A I present a formal theory of making true for a first-order language (without identity) which we think of as "logically perfect" in the sense that its true *atomic* sentences mirror the structure of the minimal facts which make them true. (The qualifier 'minimal' is necessary because I shall assume that if some fact f makes a sentence ϕ true, then any collection of facts which includes f also makes ϕ true.) It will be evident that this theory (to be referred to as 'T1') makes room only for atomic facts, and thus requires no general isomorphism between the structure of language and the structure of the world. In section B I modify and extend T1 to allow for the possibility of our language not being logically perfect in the above sense. The result (to be referred to as 'T2') is still an idealized model, but a far more realistic one which can be adapted, as I shall briefly argue, to handle important features of natural language such as predicate modification and vagueness.

A

1. Let L be a standard first-order language composed in the normal way from individual constants, n-place predicates (for $n \geq 1$), denumerably many individual variables, $\sim$, v, &, $\exists$, and $\forall$. Our understanding of the logical signs of L is classical. I define a *logical space*, K, for L as an ordered pair $<D, \{P_1, P_2, \ldots, P_n, \ldots\}>$ such that

(a) D is a non-empty set (which we think of as the set of individuals),

(b) for all $n \geq 1$, (i) P_n is a set (which we think of as the set of n-place properties), and (ii) P_n is not empty if there are any n-place predicates in L, and

(c) $D, P_1, \ldots, P_n, \ldots$ are pairwise disjoint.

A logical space, then, is in effect a collection of all the individuals and properties which may be constituents of our facts. Clause (b) (ii) (which will be dropped in T2) is included in the above definition only to ensure that there is at least one suitable property for every predicate in L to signify.

The set of *situations* in a logical space K is (by definition) the smallest set S_K of 2 or more place sequences such that

$<p, x_1, \ldots, x_n> \in S_K$ iff $p \in P_n$ and $x_1, \ldots, x_n \in D$.

In other words, $<p, x_1, \ldots, x_n>$ is a situation in K iff p is an n-place property and $x_1, \ldots, x_n$ are individuals in K. I shall say that a situation s *involves* a property or individual α iff, for some n, α is the nth item in s. Intuitively, a situation is a possible atomic fact, and the constituents of a situation are the properties and individuals it involves.

2. We may now define a (possible) *world* as follows: A set W is a world in a logical space K iff

(a) $W \subseteq S_K$, and

(b) for every $x \in D$, there is some $f \in W$ such that f involves x.

The basic idea is that we specify a world simply by saying which situations are facts in that world. The world itself is the totality of these facts. We could if we like define 'fact in W' as 'member of W'. To anticipate, I shall say that an atomic sentence ϕ in language L is true in a world W iff there is a fact in W which exactly corresponds to ϕ. If there is such a fact—call it f—then ϕ is made true by every set of facts in W which includes f. My reason for treating collections (or sets) of facts rather than individual facts as truthmakers is simply that it allows me to say, e.g., that a true disjunction is made true by all collections of facts which make either disjunct true, and that a true conjunction is made true by all collections of facts which make both conjuncts true. The strategy is promising. The problem is to extend it to the more difficult cases of quantification and negation.

It is first necessary, however, to give formal cash value to the above notion of exact correspondence, as well as to make some comments on clause (b) in our definition of a world. The former task is the business of the following subsection. As to clause (b), this is included in the definition merely to sidestep the question of how to handle singular terms which fail to denote an actual individual. It achieves its end by stipulating in effect that all individuals in a logical space are actual (i.e., involved in at least one fact) in all worlds in that space. While this assumption is technically very convenient, it is not in principle essential to the present exercise.

3. Let us now define a *meaning function* M for language L with respect to logical space K as a function the domain of which consists of individual constants and n-place predicates of L, and which is such that

(a) if t is an individual constant, $M(t) \in D$, and

(b) if F is an n-place predicate, $M(F) \in P_n$.

In other words, the "meaning" of an individual constant is an individual, and that of an n-place predicate is an n-place property. Of course meaning functions do not actually give full-blown linguistic meanings. I prefer the expression 'meaning function' over 'interpretation' only because standard interpretations collapse the jobs done separately here by worlds and meaning functions. It is noteworthy, incidentally, that it is the above definition of a meaning function which makes L logically perfect in the sense noted at the outset.

A *variable assignment* A for L with respect to K is, as usual, a function from the set of individual variables of L into D (the set of individuals). Given the definition of a meaning function M and an assignment A, we can say that the *denotation* of a term t of L is $A(t)$ if t is a variable, and $M(t)$ if t is an individual constant. Since the denotation of a term is relative to a logical space K, a meaning function M, and a variable assignment A, we should strictly represent the denotation of a term t by an expression such as

$\mathrm{Den}_{K,M,A}(t)$

However, where it is convenient I shall henceforth omit explicit references to logical spaces and meaning functions. Where t is a term I shall write '$/t/_A$' for '$\mathrm{Den}_{K,M,A}(t)$', and where 'F' is an n-place predicate, I shall write '$/F/$' for '$M(F)$'. And for any atomic sentence $Ft_1 \ldots . t_n$ of L, '$/Ft_1 \ldots . t_n/_A$' will, by convention, abbreviate '$</F/, /t_1/_A, \ldots, /t_n/_A>$'. Thus $/Ft_1 \ldots t_n/_A$ is a situation in K. More specifically, it is *the* situation which exactly corresponds to the atomic sentence $Ft_1 \ldots . t_n$. For the constituent property in this situation is none other than the property which the predicate "means", and the constituent individuals (taken in order) are none other than the individuals which the terms denote.

4. We are now ready to define *making true* formally for sentences of L not involving negation. Making true is always relative to a world W, a meaning function M, and an assignment A. We accordingly write

$s\,\mathrm{MT}_{W,M,A}\phi$

and, suppressing reference to W and M, read this as "on assignment A the facts in s jointly make ϕ true." In the formal definition we take it for granted that the metalinguistic variable s ranges over sets of situations, that is, subsets of S_K. We can think of a set of situations as a possible state of affairs, and a set of facts as an actual state of affairs.

The clauses of the definition of making true for atomic sentences, disjunctions, and conjunctions of L are obvious given my informal remarks in subsection 2 about which sets of facts make such sentences true when they are true. Thus we have the following:

(a) *Atomic Sentences:* $s\,\mathrm{MT}_{W,M,A}\, Ft_1 \ldots . t_n$ iff $s \subseteq W$ (i.e., s is a set of facts) and $/Ft_1 \ldots . t_n/_A \in s$ (i.e., the situation which exactly corresponds to the atomic sentence belongs to s).

(b) *Disjunctions:* $s\,\mathrm{MT}_{W,M,A}\,(\phi \vee \psi)$ iff $s\,\mathrm{MT}_{W,M,A}\phi$ or $s\,\mathrm{MT}_{W,M,A}\psi$.

(c) *Conjunctions:* $s\,\mathrm{MT}_{W,M,A}\,(\phi \,\&\, \psi)$ iff $s\,\mathrm{MT}_{W,M,A}\phi$ and $s\,\mathrm{MT}_{W,M,A}\psi$.

Our next problem is that of handling the quantifiers. But given that our clauses for disjunctions and conjunctions almost exactly mirror the usual

clauses for disjunctions and conjunctions in standard definitions of satisfaction, the most natural approach to quantified sentences is surely to mimic the usual satisfaction clauses for *them*. The effect is as follows:

(d) *Existential Sentences:* $s\,\mathrm{MT}_{W,M,A}\,\exists v\phi$ iff for some $x \in D$, $s\,\mathrm{MT}_{W,M,A[v/x]}\phi$. (Here and elsewhere '$A[v/x]$' stands for that assignment which is exactly like A save that $A[v/x]\,(v) = x$.)

(e) *Universal Sentences:* $s\,\mathrm{MT}_{W,M,A}\,\forall v\phi$ iff for all $x \in D$, $s\,\mathrm{MT}_{W,M,A[v/x]}\phi$.

Making true as it is (in part) defined here is of course relative to variable assignments. For closed formulas of L we may define a sense of making true which is not so relativised, as follows:

$s\,\mathrm{MT}_{W,M}\phi$ if and only if for every assignment A, $s\,\mathrm{MT}_{W,M,A}\phi$.

If is of course the non-relativized sense of making true that is our chief concern.

Clauses (a)–(c) of our definition of making true call for no further comment. It is, however, a question whether clauses (d) and (e) give us what we want. In the rather simple case in which v is the only variable free in ϕ, the effect of (d) is that a set of facts s makes $\exists v\phi$ true iff s makes ϕ true on some variable assignment or other. Likewise, s makes $\forall v\phi$ true iff s makes ϕ true on every variable assignment. In both cases the true-making sets of facts are *atomic*, not general, facts. Thus e.g., in a world W containing just three individuals, a, b, and c, if $</F/, a>$, $</G/, b>$, and $</F/, c>$ are facts, then these atomic facts jointly make the universal sentence

$\forall x(Fx \vee Gx)$

true, and no further facts are needed for it to be true. This is, I believe, as it should be. But the approach does have the effect of allowing that someone could know a collection of facts which happens to make a universal sentence true without also knowing that it *is* true. This should not bother us, since making true is an ontological, not an epistemological matter. It was indeed Russell's failure to separate the ontological clearly from the epistemological which led to his unfortunate acceptance of general, as well as negative, facts.

5. The clauses in the T1 definition of making true for sentences involving negation are as follows:

(a') *Negations of Atomic Sentences:* $s\,\mathrm{MT}_{W,M,A} \sim Ft_1 \ldots . t_n$ iff
 (i) $s \subseteq W$,
 (ii) $/Ft_1 \ldots . t_n/_A \notin s$, and
 (iii) for some m $(1 \leq m \leq n)$, s includes all the situations in W which involve $/t_m/_A$.

(b′) *Negations of Disjunctions*: $s\ \mathrm{MT}_{W,M,A} \sim (\phi \vee \psi)$ iff $s\ \mathrm{MT}_{W,M,A} \sim\phi$ and $s\ \mathrm{MT}_{W,M,A} \sim\psi$.

(c′) *Negations of Conjunctions*: $s\ \mathrm{MT}_{W,M,A} \sim(\phi\ \&\ \psi)$ iff $s\ \mathrm{MT}_{W,M,A} \sim\phi$ or $s\ \mathrm{MT}_{W,M,A} \sim\psi$.

(d′) *Negations of Existential Sentences*: $s\ \mathrm{MT}_{W,M,A} \sim\exists v\phi$ iff for all $x \in D$, $s\ \mathrm{MT}_{W,M,A\,[v/x]} \sim\phi$.

(e′) *Negations of Universal Sentences*: $s\ \mathrm{MT}_{W,M,A} \sim\forall v\varnothing$ iff some $x \in D$, $s\ \mathrm{MT}_{W,M,A[v/x]} \sim\phi$.

Clauses (b′)–(e′) handle negations of molecular and general sentences by appealing to the "fact" (in the everyday, non-technical sense) that every sentence in language L which involves negation is equivalent to one in which all negation signs have minimal scope and thus apply only to atomic sentences. The acceptability of the T1 treatment of negation therefore depends entirely on the acceptability of clause (a′).

Consider, then, the case of the elementary atomic sentence $\sim Ft$ being true. Our machinery allows for no fact in W which directly corresponds to $\sim Ft$. So $\sim Ft$ is not made true by a negative fact. (A theory allowing for negative facts such as, e.g., Clark's[7] is compatible with the view that the structure of language and the structure of the world are not isomorphic. I do not allow negative facts because I do not see that they are any more acceptable than general facts.) By clause (a′), $\sim Ft$ is also *not* made true by the *non-existence* of a fact, that is, by its *not* being the case that the situation $/Ft/_A$ is a fact in world W. For this is not *itself* a fact in W, and it is only facts that make true according to T1.[8] Which facts, then, make $\sim Ft$ true? What (a′) tells us is that *all* the facts involving $/t/_A$ do so jointly. For $/Ft/_A$ is not included amongst these, and if it were a fact it would be. In the case of a true negated atomic sentence involving more than one term, (a′) tells us that all the facts involving any one of the individuals denoted by one of the terms together the sentence true. Thus if $\sim Ftu$ is true, then all the facts involving $/t/_A$ make it true, *and* all the facts involving $/u/_A$ make it true. And, of course, any collection of facts including either of these collections also makes it true. It is possible to complicate (a′) to allow e.g., that all the *one-place* facts involving $/t/_A$ make $\sim Ft$ true (if there are any one-place facts involving $/t/_A$ and $\sim Ft$ is indeed true), and that all the two-place facts involving $/t/_A$ "in the first position" make $\sim Ftu$ true (if there are any such facts and $\sim Ftu$ is true), and so on. But adding such complications would not particularly serve my present purpose, which is only to show that we need not suppose that true sentences mirror the structure of the facts that make them true.

As in the case of general sentences, T1 allows for the possibility of someone's knowing all the facts that make a negative sentence true without knowing that the sentence is indeed true. Consider, e.g., a world W in which the only facts involving $/t/_A$ are $/Gt/_A$ and $/Htu/_A$. Assuming $/F/$ is not the same property as $/G/$, it is clear that someone might know that these facts are facts without knowing that they make the sentence $\sim Ft$ true, for he may not know that they are the *only* facts about $/t/_A$ in W. Again, because making true is not an epistemological relationship, this consequence of T1 should not be unwelcome. However, (a′) does have a parallel ontological consequence which is perhaps harder to embrace, *viz.*

(R) *a set of facts might make a sentence true in one world but not in another even though all members of that set are facts in both worlds.*

Thus $/Gt/_A$ and $/Htu/_A$ jointly make $\sim Ft$ true in the world described above, but they clearly do not make it true in any world in which $/Ft/_A$ is also a fact. Were it not for my (dispensible) stipulation that all individuals in logical space be actual in all worlds (see subsection 2 above), an exactly parallel point would apply to universal sentences. But is (R) an acceptable consequence of T1? I think it is. Indeed, I think it is a small price to pay for the privilege of doing without negative and general facts. For since worlds are themselves defined here as sets of atomic facts, the relativisation of the relation of making true to worlds demonstrably involves no special new ontological commitments.

B

1. The only differences between T1 and T2, the formal theory of making true to be presented in this section, involve the definitions of logical space, a meaning function, and making true. The new definition of a logical space is as follows: A logical space K is an ordered pair $<D, \{P_1, P_2, \ldots, P_n \ldots\}>$ such that

(a) D is a non-empty set (the set of individuals),

(b) for all $n \geq 1$, P_n is a set (the set of n-place properties),

(c) for some $n \geq 1$, P_n is not empty (i.e., there are some properties), and

(c) $D, P_1, \ldots, P_n, \ldots$ are pairwise disjoint.

Because we are no longer treating L as logically perfect with respect to its atomic sentences, we need not require that for every predicate in L there be a property in K with the same addicity, and replace this with the requirement that there be at least one property. Thus on the new definition a logical space is no longer relative to a language.

A meaning function M for L with respect to a logical space K is now defined as a function whose domain consists of the individual constants and predicates of L, and which is such that

(a) if t is an individual constant, $M(t) \in D$, and

(b) if F is an n-place predicate, $M(F)$ is a function from D^n into S_K.

Clause (a) is unchanged. In terms of clause (b), which replaces the old assignment of n-place properties to n-place predicates, each n-place predicate is now assigned a function which takes n-place sequences of individuals in D and yields sets of situations in logical space. For each atomic sentence $Ft_1 \ldots . t_n$, we now regard '$/Ft_1 \ldots . t_n/_A$' as an abbreviation of '$(M(F))(</t_1/_A, \ldots, /t_n/_A>)$'. Thus the value of an atomic sentence (on an assignment) is no longer a situation (i.e., member of S_K), but a possible state of affairs (i.e., set of situations or subset of S_K). Intuitively, the value of an atomic sentence is the set of situations which is such that (i) if any one of its members were a fact, the formula would be true, and (ii) if none of its members were facts, the formula would be false. There are many situations which would make it true to say of a certain surface before me that it is green. If it is false, then none of these situations is a fact. If it is true, then at least one of them is a fact. But any one would do as well as any other. The statement is indifferent between them. There are many different shades which the surface can have and yet be green. But being green is nothing over and above having one of these shades. Being green is not *itself* a property. And in general, $M(F)$ is not a special kind of property. It is merely a set-theoretical device expressing a rule for determining the semantic contribution of F to sentences in which it occurs.

The T2 definition of making true is the same as the T1 definition except with respect to atomic sentences and the negations of atomic sentences. These clauses are now as follows:

(a) *Atomic Sentences*: s $MT_{W,M,A}$ $Ft_1 \ldots . t_n$ iff $s \subseteq W$ and at least one member of $/Ft_1 \ldots . t_n/_A$ belongs to s.

(a′) *Negations of Atomic Sentences*: s $MT_{W,M,A}$ $\sim Ft_1 \ldots . t_n$ iff
 (i) $s \subseteq W$,
 (ii) No member of $/Ft_1 \ldots . t_n/_A$ belongs to s, and
 (iii) For every situation f in $/Ft_1 \ldots . t_n/_A$, there is some $x \in D$ which is involved in f and which is such that all situations in W which involve x belong to s.

In slightly less technical language, (a′) (iii) is equivalent to this: For every situation f in $/Ft_1 \ldots . t_n/_A$, s includes all the facts involving at least one of the individuals which is involved in f. The difference between this and the parallel clause in the T1 definition of making true is entirely due to its being the case that the value of an atomic sentence is a single situation, f, in T1 but a set of situations, s, in T2. For the T2 clause in effect places just the same requirement on every situation in s as the T1 clause places on f itself.

The application of (a) and (a′) is worth illustrating briefly with a couple of examples. Firstly, suppose that ϕ is an atomic sentence and that $/\phi/_A$, the value of ϕ, is $\{<p,x,y>, <q,x,z>\}$. Then ϕ is true iff either $<p,x,y>$ or $<q,x,z>$ is a fact. If ϕ is true it is made true by every actual state of affairs which includes at least one of these two situations. But if $\sim\phi$ is true, then no actual state of affairs includes either of these situations and $\sim\phi$ is made true by every actual state of affairs which includes (i) either all the facts involving x or all the facts involving y, and (ii) either all the facts involving x or all the facts involving z. Secondly, consider the case of Ft, where F is understood as a proxy for the English predicate 'is green'. Here the value of Ft will presumably be the set of situations $\{<g_1,x>, <g_2,x>, \ldots\}$, where x is the denotation of t and each g_n is a specific shade of green. By clause (a), Ft is made true by any set of facts which includes one of these situations. But if none of them is a fact then $\sim Ft$ is true, and by (a′) it is made true by all sets of facts which include all the facts involving x. It is thus clear that (a) and (a′) yield the sort of effects that I have indicated I was after.

2. That concludes my exposition of T2. One attraction of the general approach it exemplifies is that it allows for a natural treatment of predicate modifiers.[9] Predicate modifiers (e.g., *quickly*, *bright*) when applied to predicates (e.g., *runs*, *is green*) yield predicates (e.g., *runs quickly*, *is bright green*). We may therefore assume that the semantic values of what predicate modifiers yield are of the same general kind as the semantic values of what they are applied to. In terms of the framework of T, these values are functions from n-tuples of individuals to states of affairs. Thus the semantic values of predicate modifiers are best represented as functions *from* functions of this kind *to* functions of this kind.

Let us restrict our attention to modifiers which apply to one-place predicates to yield one-place predicates. Suppose, then, that m is such a modifier and that F is a one-place predicate. Then $/F/$, the value of F, is a function from individials to states of affairs, and $/m/$, the value of m, is a function from such functions to such functions. $/mF/$ (i.e., $/m/(/F/)$) and $/F/$ will be differently related according to the semantic category of m. If m

is a "standard modifier" such as 'bright' (as it applies to colour predicates), $/mFt/_A$ will always be a subset of $/Ft/_A$. Thus on this account any state of affairs which makes *mFt* (say: "*t* is bright green") true also makes *Ft* ("*t* is green") true. This is, I believe, as it should be.

The framework also allows for a variety of non-standard modifiers. It does not as it stands allow for the important category of "negators", such as 'fake' and 'toy' (as in 'fake certificate' and 'toy gun'). *m* is a negator if a necessary condition of *mF* applying to an object is that *F* does *not* apply to it. We could easily adapt the framework to allow for negators either by allowing for negative facts or, as I would prefer, by complicating the definition of a meaning function for predicates. One way of pursuing the latter alternative would be by setting */F/* as a function from individuals to *ordered pairs* of states of affairs. If $/Ft/_A$ were $<s_1,s_2>$, *Ft* would then be true (relative to *A*) iff at least one situation in s_1 were a fact and *no* situations in s_2 were facts. We could then define a modifier *m* as a negator iff, for any predicate *F* and any term *t*, if $/Ft/_A = <s_1,s_2>$ and $/mFt/_A = <s_3,s_4>$, then $s_1 \subseteq s_4$ and $s_3 \subseteq s_2$. It can be easily verified that this yields the desired results.

But however we would proceed on matters of detail, it is clear that it can be productive for the theory of predicate modification to give up the idea that every predicate stands for a property. The main attractions of theories of predicate modification based on accounts of making true such as T2 are, in brief, as follows:

(a) They allow us to say, e.g., that the very *same* facts that make '*a* is bright green' (or '*a* is a toy gun') true also make '*a* is green' (or '*a* is *not* a gun') true.

(b) They therefore provide a natural account of the "fact" that '*a* is green (or that '*a* is a toy gun' implies '*a* is not a gun').

(c) Unlike standard possible world semantics for predicate modifiers, they allow for the possibility that *mFa* and *mGa* may not have the same truth conditions even if *F* and *G* are intensionally equivalent. Thus, e.g., even though 'coloured' and 'visible and extended' are intensionally equivalent, 'brightly coloured' and 'brightly visible and extended' are not. We do justice to this by recognising that the state of affairs which corresponds to '*a* is coloured', and on which the "meaning" of 'brightly' "operates", is distinct from the state of affairs which corresponds to '*a* is visible and extended'.[10]

3. The machinery of T2 can also be adapted to account for a very pervasive feature of natural language—vagueness. For in the case of an atomic sentence ϕ which is vague, we can always ensure that $/\phi/$ is a "fuzzy set" of situations by setting the value of an *n*-place predicate as a function from *n*-tuples of individuals to fuzzy sets of situations. We can then regard ϕ as clearly true if some situation which is in $/\phi/$ to *degree 1* is a fact, and clearly false if no situation which is in $/\phi/$ *to any degree* is a fact. In the intermediate cases ϕ will be neither clearly true nor clearly false, but perhaps more or less true than ψ (depending on the degree to which *facts* are in $/\phi/$ and $/\psi/$).

A full theory would of course say much more than this, but the important point now is that a framework such as that of T2 is readily adaptabale to handle vagueness. It is not clear that any reasonable way of dealing with it is available to one who holds that true atomic sentences share the structure of the facts that make them true, and thus that every predicate stands for a property. For an individual either has a property or it does not—there is no intermediate circumstance. (The applications of fuzzy set theory to a logic of vagueness have been explored in detail by Machina,[11], who also tackles the problem of how the logical signs are to be treated in such a logic. But because Machina appends his theory to standard model theory, his results take account only of vagueness in a predicate's *extension*, not its "feature expressing capacities". Appending his techniques to a theory such as T2 would yield the richer results.)

4. Most of this paper aims at showing that it is not necessary to suppose that the structure of language mirrors the structure of the world. The considerations mentioned in the preceding two subsections show that it is profitable—and very likely necessary—to assume the contrary.[12]

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NOTES

1. See, e.g., Bergmann, 1964, and Clark, 1975.
2. See Armstrong, 1979.
3. See Barwise and Perry, 1983.
4. See Russell, 1956, and Wittgenstein, 1961.
5. In what follows I discuss only making true, not making false. We may, however, assume that any falsehood is made false by whatever makes its negation true.
6. This is stressed in Machina, 1972, and Machina, 1976.
7. See Clark, 1975.
8. In the *Tractatus* it *is* the non-existence of what I call a situation (this corresponds to a Tractarian *Sachverhalten*) which makes a negative atomic sentence true if it is true. See Wittgenstein, 1961, 2.06, 4.063.

9. Much of what follows in this subsection is based on and presupposes Clark, 1970. See also van Fraassen, 1973, on predicate modification, and Lewis, 1972, on meanings as functions.

10. For further details see van Fraassen, 1973.

11. See Machina, 1972, and 1976.

12. I owe thanks to Romane Clark and David Lewis for their comments on earlier versions of this material.

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