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QUESTIONS IN MONTAGUE ENGLISH

In a paper [8] that must surely be regarded as a milestone in formal linguistics[1], Richard Montague constructed a complete syntactic and semantic theory of a formal language that "may reasonably be regarded as a fragment of ordinary English." Taking as building bricks basic linguistic items of the categories *proper name* (prn), *formula* (fml), *one-place verb* (1vb), *two-place verb* (2vb), *common noun* (cmn), *adformula* (adf), *adverb* (adv) and *adjective* (adj)[2], he gives rules for concatenation of these into non-basic items of the same categories and, in parallel, the recursive definition of *denotations* of non-basic items in terms of those of the basic ones. Let '$D_{prn}(a)$' mean 'the denotation of *a*, taken as a proper name', and similarly '$D_{fml}(a)$', '$D_{1vb}(a)$' and so on. (This multiplicity of denotation-functions is necessary because a word may be meaningful in more than one category; for example 'orange' may be either a colour-adjective or a common noun denoting a fruit.) The denotation $D_{prn}(a)$ of a proper name *a* is an individual; and the denotation $D_{fml}(a)$ of a formula *a* is a proposition, in turn identified (as commonly in logic) with a set of possible universes. The denotations of items of other categories are *functions*; thus:

> the denotation $D_{1vb}(a)$ of a one-place verb *a* is a function that maps individuals on to propositions. (The idea is that the denotation of the one-place verb 'walks' is the function that maps the individual Mary on to the proposition that Mary walks, the individual Rover on to the proposition that Rover walks, and so on.)
>
> the denotation $D_{2vb}(a)$ of a two-place (that is, transitive) verb *a* is a function that maps pairs of individuals on to propositions. (The two-place verb 'walks' maps the pair consisting of Mary and Rover on to the proposition that Mary walks Rover.)
>
> the denotation $D_{cmn}(a)$ of a common noun *a*, like that of a one-place verb, is a function that maps individuals on to propositions.

[1] I have chosen to discuss [8] rather than his comprehensive paper [11] because it works out particular proposals in detail on the side of language, as distinct from logic. Some remarks on what is new in the later paper appear below.

Montague's disturbing death in 1971 was felt as a loss by all who knew his work and were following with interest the direction of his thought.

[2] The notation of this article is mine, not Montague's.

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(The denotation of 'man' maps John on to the proposition that John is a man.)

the denotation $D_{adf}(a)$ of an adformula a is a function that maps propositions on to propositions. (Adformulae are items such as 'not' and 'necessarily' that modify whole formulae.)

the denotation $D_{adv}(a)$ of an adverb a is a function that maps denotations of one- or two-place verbs on to denotations of one- or two-place verbs respectively.[3]

the denotation $D_{adj}(a)$ of an adjective a is a function that maps denotations of common nouns on to denotations of common nouns.

The rules of construction of the language, syntactic and semantic together, can now be stated as follows.[4] Concatenation is indicated by '$\frown$' and single quotes are equivalent to Quinean corners.

1. RULES CORRESPONDING TO FUNCTIONAL APPLICATION

(1) If a is a proper name and b a one-place verb, $a\frown b$ is a formula and
$D_{fml}(a\frown b) = D_{1vb}(b)[D_{prn}(a)]$
Example: 'Mary walks'. The semantic rule says that the denotation of the whole is the result of operating on the denotation of a (of 'Mary') with that function that is the denotation of b (of 'walks').

(2) If a and b are proper names and $c\frown d$ is a two-place verb, where c is a basic two-place verb and d is possibly null, $a\frown c\frown b\frown d$ is a formula and
$D_{fml}(a\frown c\frown b\frown d) = D_{2vb}(c\frown d)[D_{prn}(a), D_{prn}(b)]$
Examples: 'Mary walks Rover', 'Mary walks Rover rapidly'. In the latter case 'walks rapidly' is a non-basic two-place verb and the object is inserted after the basic part of it.

(3) If a is an adformula and b a formula,
(i) if a is 'not' and b does not end with 'not', $b\frown a$ is a formula; and if a is not 'not', $a\frown b$ is a formula;

[3] Montague distinguishes *ad-one-verbs* from *ad-two-verbs*, but remarks that the categories in practice coincide.

[4] In giving an exposition of Montague's formal language I have been guided partly by the fact that many readers would appreciate one that is as simple as possible. (Montague's symbolism is uncompromising.) So I have omitted some rules that can be taken for granted, and slightly fudged some issues such as the denotations of variables. The reader who objects must tackle Montague's paper for himself.

(ii) $D_{fm1}(c) = D_{adf}(a)[D_{fm1}(b)]$

where c is the formula specified in (i).

Examples: 'necessarily Mary walks Rover', 'Mary loves John not'. The archaic negation idiom is simpler than the modern one (though the latter could be specified if desired) and the avoidance of iteration of 'not' has a further rationale in avoiding some kinds of ambiguity in case of simultaneous negation in embedded clauses.

(4) If a is an adverb and b a one-place verb, or a two-place verb other than 'is', $b^\frown a$ is a one- or two-place verb respectively and

$D_{1vb}(b^\frown a) = D_{adv}(a)[D_{1vb}(b)]$

$D_{2vb}(b^\frown a) = D_{adv}(a)[D_{2vb}(b)]$

Examples: 'sleeps soundly', 'loves passionately'. Adverbial modification of 'is' apparently does not occur in English.

(5) If a is an adjective and b a common noun,

(i) if a is one word long $a^\frown b$ is a common noun, and if a is more than one word long $b^\frown a$ is a common noun;

(ii) $D_{cmn}(c) = D_{adj}(a)[D_{cmn}(b)]$

where c is the common noun specified in (i).

Examples: 'big dog', 'man in Havana', 'man over six feet tall', The adjectives permitted in the language must be of a rather restricted kind, excluding "indexical" adjectives such as 'former' and "quantificational" ones such as 'three'; and others that would require different treatment.

2. Rules of quantification for formulae

As a structural expedient it is convenient to permit individual variables 'v_0', 'v_1',... to count as proper names; and there is further no reason why these variables should not occur as parts of items of other categories: Montague lists 'brother of v_0' as a basic common noun, 'v_0 believes that' as a basic ad-formula and 'in v_0' and 'with v_0' as basic adverbs and adjectives. It may be assumed that proper names are eventually substituted for variables. The denotation of any item containing variables is not a constant, but a function of an *allocation* of individuals as the denotations of the variables. In the case of the following rules for quantification we are required to consider the set of all possible such allocations.

Up to this point the syntactic parts of the rules have been consistent with formulation in a context-free grammar; but the rules that follow introduce an element of context-sensitivity.

(6) Let $a^\frown b^\frown c$ be a common noun, where b is the first basic common noun that occurs in it, and a and c may be null. If d is a formula containing a variable v, and e is the result of replacing v at its first occurrence with 'every'$^\frown a^\frown b^\frown c$ and at later occurrences if any with 'that'$^\frown b$,

(i) e is a formula;

(ii) $D_{fml}(e)$ is the intersection of the sets of universes
$-D_{cmn}(a^\frown b^\frown c)[D_{prn}(v)] \cup D_{fml}(d)$

for all possible allocations to $D_{prn}(v)$.

Examples: from the common noun 'bird' and the formula 'v_0 flies' we can get 'every bird flies'; and from 'tall man in Amsterdam' and 'v_3 loves a woman such that that woman loves v_3' we can get 'every tall man in Amsterdam loves a woman such that that woman loves that man'. The semantic rule says that if we consider all possible allocations to the variable v, the denotation of the end-formula e is that proposition that is true if every such individual either does not yield a true proposition when taken as an argument of $D_{cmn}(a^\frown b^\frown c)$, or does satisfy the formula d.

(7) As (6), with 'a' or 'an' in place of 'every' (depending on whether the following word begins with a consonant or a vowel), and with clause (ii) replaced by

(ii) $D_{fml}(e)$ is the join of the sets of universes
$D_{cmn}(a^\frown b^\frown c)\,[D_{prn}(v)] \cap D_{fml}(d)$

for all possible allocations to $D_{prn}(v)$.

Examples: substitute 'a' for 'every' in examples in (6).

(8) As (6), with 'the' in place of 'every', and with clause (ii) replaced by

(ii) When the individual α is allocated to $D_{prn}(v)$ let σ_α be the set of universes $D_{cmn}(a^\frown b^\frown c)[\alpha]$ less any universes that would be members of the corresponding set on any other allocation than α. $D_{fml}(e)$ is the set of universes
$\sigma_\alpha \cap D_{fml}(d)$
for all possible such allocations α to $D_{prn}(v)$.

Examples: substitute 'the' for 'every' in examples in (6). This is Russellian definite description, but Montague seems to be the first to point out the parallel between 'the' and quantifiers in English.

3. Rules of quantification for common nouns

Montague gives separate rules, which we many omit in virtue of their close parallel with those just stated, for the case in which the scope of the quanti-

fication is a common noun rather than a formula. Example: from 'man such that that man loves v_4' we may get 'man such that that man loves every woman'.

4. Rule of relative clauses

(9) Let $a^\frown b^\frown c$ be a common noun, where b is the first basic common noun occurring in it and a and c may be null. If d is a formula containing a variable v and e is the result of replacing v at all occurrences with 'that'$^\frown b$,

(i) $a^\frown b^\frown c^\frown$'such that'$^\frown e$ is a common noun;

(ii) $\mathrm{D}_{\mathrm{cmn}}(f)$, where $f = a^\frown b^\frown c^\frown$'such that'$^\frown e$, is the function such that

$$\mathrm{D}_{\mathrm{cmn}}(f)[\mathrm{D}_{\mathrm{prn}}(v)] = \mathrm{D}_{\mathrm{cmn}}(a^\frown b^\frown c)[\mathrm{D}_{\mathrm{prn}}(v)] \cap \mathrm{D}_{\mathrm{fml}}(d)$$

for every possible allocation to $\mathrm{D}_{\mathrm{prn}}(v)$.

Example: from 'tall woman in Amsterdam' and 'v_0 loves v_1' get 'tall woman in Amsterdam such that that woman loves v_1'.

5. Rule of predicative adjectives

(10) If a is a proper name and b an adjective, $a^\frown$'is'$^\frown b$ is a formula, and

$$\mathrm{D}_{\mathrm{fml}}(a^\frown\text{'is'}^\frown b) = \mathrm{D}_{\mathrm{adj}}(b)[\phi][\mathrm{D}_{\mathrm{prn}}(a)]$$

where ϕ is that function whose value, for any individual argument, is the set of all possible universes. Here ϕ is the denotation of the common noun 'entity'; $\mathrm{D}_{\mathrm{adj}}(b)[\phi]$ is accordingly the denotation of the common noun $b^\frown$'entity' (or 'entity'$^\frown b$, if b is more than one word long); and this is in turn a function of $\mathrm{D}_{\mathrm{prn}}(a)$. In effect $a^\frown$'is'$^\frown b$ is synonymous with $a^\frown$'is a'$^\frown b^\frown$'entity' (or $a^\frown$'is an entity'$^\frown b$).

6. Semantic rules for particular items

The word 'entity' is an example of a word with special semantic properties, and Montague specifies explicitly that 'not' should have the properties of negation, thus

$$\mathrm{D}_{\mathrm{adf}}(\text{'not'})[x] = U - x$$

and that 'is' as a two-place verb should have the properties of identity, and that 'necessarily' should have those of Leibnizian necessity, that is, truth in all possible universes. This completes the rules for the language.

Because of ambiguities, the rules do not attach a unique denotation to

every formula. For example, 'every man loves a woman' can derive from 'v_0 loves a woman' by (6), or from 'every man loves v_1' by (7), and has different denotations in the two cases. In general a unique denotation attaches only to a "reading" of a formula, that is, to a tree that gives an analysis of it.

7. MONTAGUE'S ENVISAGED EXTENSIONS

Montague says ([8], p. 189):

> I have restricted myself to a very limited fragment, partly because there are portions of English I do not yet know how to treat, but also for the sake of simplicity and the clear exposition of certain basic features. It is already known how to extend the treatment rather widely in various directions, and some of the extensions will be sketched in Part II of this paper; ...

and later (p. 221):

> Certain extensions, comprehending larger portions of English (for instance, indexical or context-dependent portions), will be given in Part II; and still wider extensions are known.

But Part II, it seems, was never written. If we want to guess what might have been in it we must turn to Montague's other writings. In [9] and [10] he was concerned particularly with what he called "intensional logic": a consequent proposal for a syntax and semantics of verbs taking a propositional object, such as 'believe', 'assert', 'deny', 'know', 'prove', was worked out in some detail in [11]. Elsewhere [7] he formulated a rather general semantic model to deal with tenses, certain indexical terms such as demonstratives and personal pronouns, modal and deontic terms, and "inductive logic", namely, the probability calculus. It is not difficult to imagine that with patience in the working out of detail these terms and theories could be incorporated in the language we have been describing. But two considerations make it likely that much of ordinary English would never find its way into Montague's program.

The first can be hung on the remark ([8], p. 189):

> Like Donald Davidson I regard the construction of a theory of truth – or rather, of the more general notion of truth under an arbitrary interpretation – as the basic goal of serious syntax and semantics; ...

The reference is to Davidson's paper [4] and is in a context of criticism of "the developments emanating from the Massachusetts Institute of Technology". This criticism is more than just, but in setting his goal merely as a "theory of truth" Montague has unnecessarily limited his terms of reference. What of the many uses of natural language for purposes incidental to, or with other goals than, the embodiment of truth, as in questions? commands, requests, advice? greetings, promises, exhortations? And what of the variant

kinds even of declarative utterance such as the satirical, vicarious, jocular?

Secondly, something can be deduced from Montague's use of the word "pragmatics". At the beginning of [10] he refers to Bar-Hillel's suggestion (in [1]) that pragmatics concern itself with indexical exprsssions, and says that

> ... pragmatics should at least initially follow the lead of semantics – or its modern version, model theory – which is primarily concerned with the notions of truth and satisfaction ... though here we should speak about truth and satisfaction with respect not only to an interpretation but also to a context of use.

I do not want to involve Bar-Hillel or Davidson in the defence of positions stated on their behalf. (For some discussion see the remarks of Bar-Hillel [2] – and also those of Cohen [3] – to the symposium to which Montague's paper was directed.) It seems to me important, however, to defend pragmatics from this weakened interpretation. (Or, which amounts to the same thing, to affirm or reaffirm that a much wider conception of language should be taken than that currently adopted by most logicians and even theoretical linguists.) Pragmatics is the study of the *use* (not just reference) of language of all kinds; or, if it is not, we need a new name for the study that complements syntax and semantics. Montague's "pragmatics" would be better classed as a special part of semantics.

In what follows, this paper is a contribution to semantics too, and is without prejudice to any program of study of pragmatics proper.[5] But it represents a part of semantics that Montague, perhaps because of his conception of the field, has not dealt with in this connection. The study of *questions* leans out to pragmatics in the sense that someone who thinks the exclusive purpose of language is to state truths may be led by it to think again. But it is remarkable that it is possible to produce a semantics (or model theory) of questions, and that this dovetails surprisingly neatly with Montague's own semantics of statements.

8. Extension to questions

The basic interrogative words of English nearly all fit more or less neatly into Montague's categories. Thus 'who' (or 'whom') and 'what', with a qualification to be noted later, are interrogative proper nouns, in the sense that they take the same positions in sentences as proper nouns do; 'what' may also do duty in standard compounds as one-place verb ('does what'), two-place verb ('does what to'), adjective ('of what kind') and even common noun (as in 'what is Rover', or with 'a' as in 'Rover is a what'). The terms 'how', 'when'

[5] Such as that to which my [6] is a contribution.

and 'where' can stand on their own feet as adverbs, though they also have synonyms with 'what'. Only 'why' seems to lead us outside the bounds of Montague English (and we shall ignore it in what follows). Most importantly, there are also interrogative quantifiers; since for example 'what man' (or 'which man') may take the same positions as 'every man', 'a man' and 'the man'.

Although standard English word-order places the interrogative word or phrase (or the main one, if there are more than one) first, with inversion of the verb, there is no real need for an order different from that appropriate to indicatives.[6] So let us assume that no special rules about word-order are needed. It now seems that to introduce questions into Montague English *all* we need to do syntactically is supplement the vocabulary with interrogative terms. Ordinary yes-no questions can be incorporated by the use of 'is it the case that' as a prefix. This can be treated as a species of adformula, though it must be distinguished from the others since it cannot be preceded by them.

So let us turn to semantics. Here we must make some departure, since although we are inclined to class 'who' and 'what' with proper names we cannot by any stretch regard them as denoting individuals. But there is a simple alternative: they *can* be regarded as denoting *sets* of individuals, namely the set of humans and the set of non-humans respectively. This does not mean, of course, that the formula 'who walks' asserts that the set of human individuals walks: we must modify other stipulations in sympathy. We shall need to regard 'who walks' as itself denoting a set, namely, the set whose members are the propositions denoted by 'Mary walks', 'John walks',... and so on for all individuals. Pragmatically speaking a question sets up a choice-situation between a set of propositions, namely, those propositions that count as answers to it.

It would be possible to make semantic rules for interrogatives quite separately from those for indicatives. But a unified set of rules can be constructed quite simply if indicatives are regarded as equivalent to one-alternative or Hobson's-choice interrogatives.[7] All we need to do is to resolve to say that an indicative proper name such as 'Mary' stands not for the individual Mary but for the set whose sole member is Mary; that 'Mary walks' stands not for the proposition that Mary walks but for the set whose sole member is this proposition; and so on. The discomfort some might feel at saying that proper names such as 'Mary' denote not individuals but unit sets

[6] In many languages, for example all Melanesian ones, word-order is always that of the corresponding indicative and there is not even a distinct inflexion.

[7] I do not feel impelled to apologise for having elsewhere [5, 6] given an account of questions different from this one. Either account is tenable.

can be alleviated by alteration of our terminology to speak of *denotation-sets* rather than *denotations*.

So let us write 'E_{prn}', 'E_{fml}',... for functions forming the denotation-sets of linguistic items of the various categories, indicative or interrogative. In the case of indicatives we shall have

$$E_{prn}(a) = \{D_{prn}(a)\}$$
$$E_{fml}(a) = \{D_{fml}(a)\}$$

and so on.

In formulating semantic rules we shall need the operation of forming a set whose members are the result of operating with members of a given set of functions on members of a given set. So let us write

$$E_{1vb}(b)\text{“}\text{“}E_{prn}(a)$$

for the set whose members are the result of operating with members of the denotation-set of the one-place verb b on members of the denotation-set of the proper name a.[8] If a and b are indicative the denotation-sets are one-membered and the operation yields a one-membered result, the denotation-set of the indicative formula $a^\frown b$. If either $E_{prn}(a)$ or $E_{1vb}(b)$ is multimembered the result will in general be multimembered.

We are now in a position to set down a complete set of syntactic-semantic rules for the language as supplemented with questions, in parallel with those above and containing them as special cases. It will not be necessary here to state them all, but several will be given for the purpose of illustration and in order to make some special points.

(1Q) If a is a proper name and b a one-place verb, $a^\frown b$ is a formula and

$$E_{fml}(a^\frown b) = E_{1vb}(b)\text{“}\text{“}E_{prn}(a).$$

Examples: 'Mary walks rapidly', 'who sleeps', 'John does what', 'who does what'. This is a generalisation of (1).

Rule (2) needs some recasting. Let us redefine the denotation of a two-place verb as a function from individuals to denotations of one-place verbs. Now the rule may read:

(20) If a is a proper name and $b^\frown c$ is a two-place verb, where b is a basic two-place verb and c may be null, $b^\frown d^\frown c$ is a one-place verb (where $d = a$ except that if a is 'who', d is 'whom') and

$$E_{1vb}(b^\frown d^\frown c) = E_{2vb}(b^\frown c)\text{“}\text{“}E_{prn}(a).$$

[8] Formally $a\text{“}\text{“}b = \mathrm{Df}\{c\colon(\exists d \varepsilon a,\ e \varepsilon b)(c = d(e))\}$. We might call $a\text{“}\text{“}b$ the *joint image* of b by a: it is the union of the set of images $d\text{“}b$ of b by members d of a.

Examples: 'loves John', 'walks what', 'does what to Rover', 'does what to whom'. Besides easing the symbolic formulation this version of the rule has the effect, which a precise parallel of (2) would not have, of making the denotation of a formula such as 'Mary walks Rover' a member of the denotation-set of 'Mary does what', and this is of some importance when we come to consider the answer-relation.

Now let us define the denotation-set of the adformula 'is it the case that'. The denotation-set of 'is it the case that'$^\frown a$ must have as members just the denotation of a and the denotation of the negation of a; hence

$$E_{adf}(\text{'is it the case that'}) = \{I, D_{adf}(\text{'not'})\}$$

where I is the identity function. Now we can write:

(3Q) If a is an adformula and b a formula that does not begin with 'is it the case that', (i) if a is 'not' and b does not end with 'not', $b^\frown a$ is a formula; and if a is not 'not', $a^\frown b$ is a formula;
(ii) $E_{fml}(c) = E_{adf}(a)^\frown E_{fml}(b)$
where c is the formula specified in (i).
Examples: 'John sleeps not', 'is it the case that it rains', 'is it the case that necessarily it rains not', 'is it the case that John does what'. Perhaps the last of these is unacceptable and 'is it the case that' should be prefixable only to indicatives, but I leave this decision to the reader.

A dilemma arises concerning whether we want 'John sleeps not' (for example) to count as an answer to 'John does what'. If 'not' can only be an adformula, 'sleeps not' is not a one-place verb and its denotation is not a member of the denotation-set of 'does what'. But if in turn we allow 'not' to count as an adverb so that 'sleeps not' may be a verb, we risk another kind of ambiguity, since if the 'not' in 'John reads every book not' may be either adformula or adverb the meaning may be either that John does not read every book or that John non-reads every book, that is, reads no book. I think this dilemma must be taken by the horns, and reveals a defect in Montague's rules. We *should* allow 'not' to count also as an adverb and remind ourselves that the resulting ambiguity is not uncommon in ordinary English. A supplementary definition of D_{adv}('not') is required but no further change in the rules is needed[9] and in simple cases such as 'John sleeps not' the alternative parsings give identical denotations.

Rules (4)–(9) can be adapted straightforwardly, and (10) needs only minor

[9] Except possibly a rule for word-order among adverbs.

reformulation consequent on the recasting of (2). We may add a rule for the use of 'what' as a quantifier:

(11Q) As (6) with 'what' in place of 'every' and clause (ii) replaced by:
(ii) For given allocation $\{\alpha\}$ to $E_{prn}(v)$ let σ_α be the set of intersections of members of $E_{cmn}(a^\frown b^\frown c)$'''' $\{\alpha\}$ with members of $E_{fml}(d)$. $E_{fml}(e)$ is the join of the sets σ_α generated by the possible allocations $\{\alpha\}$.
Examples: 'what dog walks with Mary', 'John loves what tall woman in Amsterdam such that that woman loves whom'. The semantic rule says for example that the members of the denotation-set of 'what dog walks with Mary' are the propositions that Rover is a dog and walks with Mary, that Fido is a dog and walks with Mary, and so on for all possible individuals. None of these propositions implies that uniquely one dog walks with Mary (as would be the case with members of the denotation-set of the different question 'what dog is the dog such that that dog walks with Mary').

In one respect this rule is controversial. We would like to think that the phrase 'what dog' could be treated as an interrogative proper name denoting the set of *dogs*, and that 'what dog walks with Mary' has as answers just the set 'x walks with Mary' where 'x' is the name of a *dog*. But the composition of the set of dogs does not necessarily remain constant from universe to universe: in some universes Rover may be a horse, and Mary herself a dog. I have taken the attitude that when someone answers 'what dog walks with Mary' with 'Rover' he states not merely that Rover walks with Mary but also implicitly that Rover is a dog, and hence that he states the conjunction. The distinction between assertion and presupposition, if it is to be invoked to resolve the issue, requires pragmatic treatment or, at least, a major elaboration of the model.

Now that 'what human' and 'what non-human' (but do we not need common noun negation for the latter?) can be introduced by (11Q), we no longer need 'who' and 'what' as interrogative proper-nouns; and what we have just said reveals, in any case, the weakness of this conception. Moreover 'who' and 'what' are sometimes used with reflexive pronouns, and need to be analysed as quantificational. Although there are cases in which these complications do not arise, we should suffer no loss in regarding 'who' and 'what' as synonyms of 'what human' and 'what non-human' respectively, so that the language contains no basic interrogative proper names.

The identification of statements with one-answer questions has one paradoxical result. It may occasionally happen that the denotation-set of a phrase

has only one member in spite of the fact that the phrase contains interrogatives. For example, 'what entity is an entity' (though not a question one would commonly want to ask) has as members the denotations of 'x is an entity and is an entity' for all x; but these are all identical, being equivalent to the set U. Hence the denotation-set of 'what entity is an entity' is one-membered, and the apparent interrogative is really an indicative. I leave it to the reader to decide whether this disturbs him enough to make him want to reject the theory.

9. Syntax of the answer-relation

Semantically, an answer to a question on a given reading is any statement whose denotation-set on a suitable reading is contained in that of the question. But there might also be syntactic requirements to the effect that the verbal form of the answer be more or less directly related to that of the question. For example one might stipulate that answers be obtainable from questions by direct substitution of indicative terms for basic interrogative ones (with suitable arrangements for quantificational and yes-no questions).

We cannot insist that *basic* indicative terms be substituted for basic interrogative ones, for there may be no suitable ones in the language; and, on the other hand, it is necessary that the semantic requirement be retained as well, to exclude tautological answers (such as the answer 'a dog such that that dog barks barks' to 'what dog barks'). These problems are, however, easy of solution in a number of logically satisfactory ways. It seems also possible to provide an appropriate analysis of abbreviated answers such as 'yes' and 'Rover'.

I conclude that there is no difficulty in incorporating most kinds of English question in Montague's language; and that the adjustments required to achieve this incorporation raise a number of issues relevant to the formulation of the language.

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