Reference and Quantification

1. Inscrutability and irrelevance

1.1. It is a widespread view that the task of semantic theories is nothing more than to assign truth-conditions to declarative sentences in a compositional fashion. We do this by giving *semantic values* to lexical items and pairing *semantic rules* with syntactic ones. Semantic values are what words and phrases contribute to the truth-conditions of declarative sentences, while semantic rules are the truth-conditional contribution of their syntactic structure. Unlike 'truth-condition', 'semantic value' and 'semantic rule' are terms that have no claim to correspond to anything in the actual workings of language.

1.2. To illustrate this idea, consider a small fragment of a language with just three proper names and a single verb. Assume predication is interpreted as set-membership.

Normal semantics:

$[\![Frege]\!]^{w} = \text{Frege}$
$[\![Russell]\!]^{w} = \text{Russell}$
$[\![Tarski]\!]^{w} = \text{Tarski}$
$[\![walks]\!]^{w} = \{x: x \text{ walks in } w\}$

Twisted semantics:

$[\![Frege]\!]^{w} = \pi(\text{Frege}) = \text{Russell}$
$[\![Russell]\!]^{w} = \pi(\text{Russell}) = \text{Tarski}$
$[\![Tarski]\!]^{w} = \pi(\text{Tarski}) = \text{Frege}$
$[\![walks]\!]^{w} = \{x: \pi^{-1}(x) \text{ walks in } w\}$

Quine and Davidson think there are no empirical reasons to choose between the normal and the twisted semantics – reference is *inscrutable*. Others do not rule out that there is such evidence but they think it is beyond the ken of ordinary speakers – reference is *irrelevant*. In my view, the first option is unpalatable and the second is unmotivated.

2. What is a referring expression?

Claim: we do not have a satisfactory account of what referring expressions are.

2.1. Suppose, contrary to the widespread view mentioned above, that semantics should account for facts of reference. What are the referring expressions? (Let's try to do better than just giving a list.) Here are two minimal conditions we want to satisfy:

i. Some expressions refer, some don't. For example, 'Neptune' refers but 'Vulcan' doesn't.
ii. Some expressions are for referring, some aren't. For example, 'Neptune and 'Vulcan' are referring expressions but 'orbits the Sun' and 'Neptune orbits the Sun' aren't.

2.2. Neither Frege nor Tarski have theories that meet these minimal constraints. According Frege, all expressions refer; according to Tarski, none does. Neither of these views is compatible with the idea that referring is the function of a non-trivial class of expressions.

2.3. There is no obvious way to define the category either ontologically (by situating it in a standard type-theory) or syntactically (by declaring them the index-bearing expressions). The main problem for the former is that it is hard to deny that we can introduce names for any kind of semantic value (e.g. for the semantic value of 'the semantic value of 'is a horse"). The main problem for the latter is that the category seems syntactically heterogeneous (e.g. includes proper nouns but not common nouns, definite descriptions but not indefinite descriptions).

Half-hearted proposal: referring expressions are tags attached to an object.

2.4. Tags are guaranteed to refer and they say nothing about their referents. The hope is that we might be able to characterize tags in terms of what it takes to understand them. Russell suggested that one cannot understand tags (he called them *logically proper names*) unless one is *acquainted* with their bearers. But what is acquaintance?

2.5. On Russell's view, acquaintance is *individualistic*: I cannot be acquainted with something just because you are and I am related to you in some way. It is also *discerning*: if *x* and *y* are not identical and I am acquainted with both then I know that *x* and *y* are not identical. These are very strong requirements – they rule out acquaintance with ordinary objects.

2.6. We need a liberalized and extended notion that allows us to say that, (i) ordinary speakers of English are acquainted with Neptune, (ii) no one can be acquainted with Vulcan, (iii) there is a difference between being acquainted with a particular and a universal. Then we can say that referring expressions are expressions that refer to a particular. Empty names abbreviate definite descriptions. They are not referring expressions (so we don't really meet the second requirement) but we can say that they too designate a particular.

3. What is a quantifier?

Claim: we do not have a satisfactory account of what quantifiers are.

3.1. One might try to characterize natural language expressions as quantifiers depending on whether they are alike their formal counterparts. But quantifiers in formal languages are all over the place both syntactically and semantically.

3.2. The standard proposal for identifying quantifiers in natural languages comes from generalized quantifier theory. It goes as follows: quantifiers belong to the semantic type $\langle\langle e,t\rangle,\langle\langle e,t\rangle,t\rangle\rangle$, and are logical (i.e. their semantic values satisfy certain invariance conditions).

(EXT) For each $A; B \subseteq M \subseteq M'$, $Q_M(A; B) \leftrightarrow Q_{M'}(A; B)$

(ISOM) For any M and M′, if $\iota : M \rightarrow M'$ is a bijection, then for each $A; B \subseteq M$, $Q_M(A; B) \leftrightarrow Q_{M'}(\iota[A]; \iota[B])$

3.3. A problem with the standard view is that it is syntactically parochial: it implies that there are no quantifiers other than the quantificational determiners. The problem can be fixed by allowing quantifiers in other semantic types as well. But presumably not in all – otherwise the category of quantifiers collapses into the category of logical constants.

Proposal: quantified sentences express generalizations over their instances.

3.4. Here are the semantic clauses for the quantifiers in first-order languages:

$[\![\forall x. F(x)]\!]^{M,g} = 1$ iff for every object $\boldsymbol{a} \in M$, $[\![F(x)]\!]^{M,g[x:\boldsymbol{a}]} = 1$
$[\![\exists x. F(x)]\!]^{M,g} = 1$ iff for some object $\boldsymbol{a} \in M$, $[\![F(x)]\!]^{M,g[x:\boldsymbol{a}]} = 1$

Instances can be pairs of open sentences and objects from the model:

$[\![\langle F(x), \boldsymbol{a}\rangle]\!]^{M,g} = 1$ iff $[\![F(x)]\!]^{M,g[x:\boldsymbol{a}]} = 1$

A universally quantified formula is true just in case all its instances are, and an existentially quantified formula is true just in case some of its instances are.

3.5. To apply this idea to natural languages we need three assumptions. First, let's hypothesize that for any quantifier *Q* there is a demonstrative expression D_Q which can be substituted for it. Second, let's posit that a demonstrative phrase is a referring expression, and that it refers to whatever it demonstrates as long as the thing satisfies its complement. Otherwise, it remains undefined. Finally, let's say that if an expression contains an undefined constituent it too is undefined.

An instance of a quantified sentence *S* with respect to an occurrence of *Q* in *S* is a pair whose first component is $S[Q/D_Q]$ and whose second component is something D_Q could demonstrate. Instances are interpreted as follows:

$[\![\langle [_S \ldots D^Q \ldots], \boldsymbol{a}\rangle]\!]^{M,g} = 1$ iff $[\![[_S \ldots D^Q \ldots]]\!]^{M,g[D^Q:\boldsymbol{a}]} = 1$

For example, the instances of <u>*Two*</u> *coins are in my pocket* are pairs of the form ⟨<u>*That*</u> *coin is in my pocket*, **o**⟩, where **o** is some object or other. (I underline the occurrence with respect to which the instances are taken.) The instances of <u>*Two coins*</u> *are in my pocket* are pairs of the form ⟨<u>*That*</u> *is in my pocket*, **o**⟩. *Two* occurs in the sentence as a quantifier, *two coins* does not.

3.6. The proposal explains why *or* is not a quantifier: disjunctions don't have instances. It leaves room for vague quantifiers: generalization needn't be precise.

3.7. There are also salutary predictions. Consider the sentence *Jack used my coins to pay for coffee*. Whether this sentence is true depends on which coins are mine, and so, its truth-value can change even if the number of coins Jack used to pay for coffee and the number of coins he did not use to pay for coffee remains the same. The conclusion is that *my* does not occur in this sentence as a quantifier.

The situation is even more interesting when it comes to *only*. Whether *Jack used only coins to pay for coffee* is true depends on whether he also used something else, say, a dollar bill. The sentence can change its truth-value even if we hold the number of coins Jack used to pay for coffee and the number of coins he did not use to pay for coffee fixed. It follows that *only* does not occur in this sentence as a quantifier.