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Foundations of reference and predication

Anne Reboul

1. Introduction

Reference and predication can be seen as species of speech acts which, at the logico-linguistic level, yield referring expressions and predicates. We will deal here mainly, but not only, with referring expressions and predicates.

We will begin by a sketch of the speech acts view of reference and predication as given in Searle (1969). We will then give an overview of the history of the distinction, with two main landmarks, Aristotle and Frege. We will afterwards discuss the apparent parallelism between logic and grammar and show that it is only surface deep. This comes, among other things, from the fact that all NPs do not refer and we will turn back to reference and to the conditions of its success. This will lead us to the distinction between sentence and proposition.

We will then turn to yet another foundation for the distinction, i.e. ontology and the distinction between particulars and universals. The distinction between referring expressions and predicates can nevertheless still be attacked through apparent
counter-examples to Buridan’s law. We will show that these counter-examples are only valid at the linguistic level, but not at the relevant level of logic.

We will then treat events, their relation to particulars and, hence, to reference and will deal with the paradox of the imperfective. Finally, we will expose Kripke’s notion of rigid designators and discuss the application of the reference/predication distinction in possible worlds logic.

2. Reference and predication as propositional acts

2.1. The reference act

Searle (Ibid.) has argued that reference and predication are two varieties of propositional acts, that is, acts which, conjointly, produce propositions. We will begin, as Searle himself does, by the reference act. Searle is only concerned with what he calls unique definite reference (i.e. proper names and definite descriptions), of which a standard example could be:

(1) Pussy is on the mat.

In (1), we have two uniquely referring expressions, Pussy and the mat, one a proper name and the other a definite description.

Searle, however, is careful to set aside some uses of proper names or definite descriptions, such as those in (2b) and (3b):

(2) (a) Socrates was a philosopher.
   (b) « Socrates » has eight letters.

(3) (a) Sam kicked the bucket. It fell down with a crash.
   (b) Sam kicked the bucket. The funeral will take place next saturday.

(2b) is a case of mention - as indicated by the inverted comas - (where Socrates does not refer), as opposed to (2a) which is a case of use (where Socrates refers). Kicked the bucket in (3b) is an idiom (where the bucket does not refer) as opposed to a standard use in (3a)(where the bucket refers).
Searle gives a whole range of conditions for the accomplishment of a propositional act of reference. Here, given that the reference act consists in an utterance, by a speaker $S$, speaking to an addressee $A$, and using an expression $R$ denoting an object $X$, we will primarily be concerned with what Searle calls the semantic rules:

1. $R$ only occurs in the context of a sentence whose utterance can constitute the accomplishment of an illocutionary act.
2. $R$ is only used if there exists an object $X$ such that, either $R$ contains an identifying description of $X$ or $S$ can complete $R$ by such a description of $X$, and such that, through the use of $R$, $S$ has the intention of isolating or identifying $X$ for $A$.
3. Uttering $R$ is tantamount to identify or to extract $X$ for $A$.

Expression $R$ is what is called below a referring expression.

### 2.2. The predication act

Let us now turn to the predication act. Just as the referring act produces at the logico-linguistic level a referring expression, the predication act produces at the logico-linguistic level a predicate. Searle begins by a three parts distinction between (a) a predicate (or predicative expression), (b) a property and (c) the use of a predicate to attribute a property. Just as he gives rules for the act of reference, Searle gives rules for the act of predication. Again, we will only be concerned here with the semantic rules:

1. $P$ (the predicate) is only used in the context of a sentence, $T$, whose utterance can constitute the accomplishment of an illocutionary act.
2. $P$ is only uttered in $T$ if the utterance of $T$ implies an actual reference to $X$.
3. $P$ is only uttered if $X$ belongs to a category or a type such that it is logically possible that $P$ is true or false of $X$.
4. The utterance of $P$ is tantamount to questioning the truth or falsity of $P$ about $X$. 
We will not be widely concerned here with illocutionary acts as such (but see § 6.1.) and we will mainly note that reference entails uttering a referring expression under some conditions and that predication entails uttering a predicate under some conditions. The distinction between referring expression and predicate has a long and venerable history, as we will now see.

3. A brief history of reference and predication

We turn to an history of the logico-linguistic distinction between referring expression and predicate, with two main characters in the history of logic, e.g. Aristotle and Frege.

3.1. Aristotle

Aristotle has come down in the history of philosophy as the founder of logic (see his Organon in Aristotle 1984) Intriguingly enough, he was not concerned with what is usually called propositional calculus (which deals with the combination of propositions and connectives to produce other well-formed propositions), but rather with what might be called (in a rather anachronistic way) predicate calculus. That is, Aristotle was mainly interested in the internal structure of simple propositions in as much as it plays a role in syllogistic reasoning. In other words, Aristotle was interested in what is common between examples (4) and (5):

(4) All men are mortal
    Socrates is a man
    So Socrates is mortal.

(5) All horses bite
    Eclipse is a horse
    So Eclipse bites.

Obviously, these examples have the same form, i.e. « All Fs are G, a is F, so a is G ». The problem here is to know how to combine elements (the letters in the form above) to yield correct sentences which can then be used in syllogisms.
The notion which Aristotle introduced was the notion of a predicatable, or, in other words, of what can be predicated of something. Aristotle established a list of the kinds of things which can be predicated:

(a) a definition of the essence of the thing,
(b) a distinctive property of the thing,
(c) the genus of the thing,
(d) a differentiating property of the thing,
(e) an accidental property of the thing.

They are respectively illustrated by the examples under (6):

6. (a) Man is a rational animal
   (b) Man is a laughing animal.
   (c) Man is an animal.
   (d) Man is rational.
   (e) Man is white.

3.2. Frege

Frege was the greatest innovator in logic since Aristotle and was indeed the founder of modern logic. He introduced the notion of predicate (see Frege 1980a), defining it as a function which would take one or more argument (see § 4.2.). On his view, a predicate is any expression which, in conjunction with a singular term (a referring expression), yields a sentence. In other words, though for Aristotle, sentences such as «Socrates is mortal» are to be represented as a is M, for Frege, they must be represented as Ms where M is a predicative function which takes as an argument a singular term, in this instance s, to yield the proposition Ms (Mortal(Socrates)). Frege thus founded the predicate calculus, which deals with the internal structure of propositions.
4. The apparent parallelism between logic and grammar

4.1. Reference and predication in logic and grammar

The first thing to point out, as far as the parallelism between logic and grammar is concerned, is that whereas reference is a logical notion, predication is both a logical and a grammatical notion. At first glance, this might throw doubt on the parallelism between grammar and logic. However, there are distinctions which seem closely similar: the first one, between subject and predicate, belongs to grammar in the traditional sense, while the second one, between topic and comment, belongs to linguistics and is based on the difference between what it is that we talk about and what it is that we say about it. There is yet another distinction in linguistics, and more precisely in syntax, which seems to mirror the reference/predication distinction: it is the distinction between NPs (Noun Phrases) and VPs (Verb Phrases), where it may seem, at first glance, that NPs correspond to referring expressions, while VPs correspond to predicates.

If we come back to Aristotle, it might seem that the parallelism is strong. Let us examine example (7):

(7) a. All humans are mortal.
   b. Socrates is human.
   c. Thus, Socrates is mortal.

In each of sentences (7a-c), there is a referring expression, subject, topic or NP (Socrates, men, Socrates) and a predicate, comment or VP (is a man, are mortal, is mortal). Thus, it does seem that the grammatical distinction between subject and predicate, the linguistic distinction between topic and comment and the syntactic distinction between NP and VP closely mirror the logical distinction between referring expression and predicate.
4.2. Binary and n-ary predicates in logic and grammar

On the whole, the sentences which we have examined until now have had a fairly simple structure, of type \([x \text{ is } G]\) where \(x\) is a referring expression and \(is\ G\) is the predicate. It should be noted however that the verb to be can have several meanings, as can be seen in examples below:

(8)  
(a) Socrates is human.  
(b) This bracelet is gold.  
(c) Hesperus is Phosphorus.

The first is, in (8a), is the copula: it is the link between the referring expression and the adjective which is applied to it and it can either be seen as a part of the predicate or as a dummy linguistic element which can be omitted in the logical representation of (8a) (as in Frege’s analysis, where (8a) is represented not as \(s\ is M\) but as \(Ms\)). The second is is the is of constitution: that is, it says what kind of material an object (or a type of object) is made of (what it is which constitutes it). The third is is the is of identity: it says that two referring expressions refer to the same object (see below, § 9.1. and § 9.2.). What is of interest right now is mainly the first is, the copula.

Indeed, the sentences which we have met with until now, such as those in (7), are quite simple and all have the same linguistic structure (NP-copula-NP/adjective), which strongly mirrors the referring expression/predicate distinction of logic. There are however sentences with much more complicated structure as far as the distinction referring expression/predicate is concerned. The predicates in (7a-c) all allow only one referring expression: in other words, they are unary predicates, i.e. predicates with a single argument place. There are, however, also predicates which allow more than one argument place, as the examples in (9) show:

(9)  
(a) The cat ate the mouse.  
(b) John gave Mary the book.
The predicate in (9a) is a binary predicate, i.e. a predicate with two argument places (respectively the cat and the mouse) and the predicate in (9b) is a trinary predicate, i.e. a predicate with three argument places (respectively John, Mary and the book). In principle, predicates can have any number of argument places, though the number of argument places that predicates actually have is probably limited.

It should be noted that the number of argument places of a predicate does not alter the apparent parallelism between grammar and logic. If the logical distinction actually is between referring expressions and predicates, the grammatical/syntactic distinction is between NPs and VPs. Just as predicates in logic can be unary, binary or n-ary, verbs can have a subject NP and any number of complement NPs or PPs. It should be noted that this has been taken into account in various types of syntax, such as, for instance, Government and Binding (Generative Grammar) where it appears as the question of thematic roles (or $\theta$-roles) (see Higginbotham 1985) and in Case Grammar (see Fillmore 1987), where it has a central place.

Thus the difficulty for the parallelism between logic and grammar does not come from the number of argument places of the predicate.

5. Parallelism debunked

5.1. Apparent parallelism

As was pointed out before, as long as referring expressions are considered as equivalent to NPs, there is no problem with the parallelism between logic and grammar. But in order for the parallelism to stand, NPs must refer. Is that always the case? Let us have a look at one type of NPs, indefinite descriptions. Indefinite descriptions can appear in any position, but, notably, in subject or complement position or inside the predicate with a copula (the verb to be). Let us cast our minds back to (4), Socrates is a man. A man in (4) is an indefinite description, which appears inside the predicate (as would an adjective, human, for instance) and is used as an
attribute of Socrates. As an indefinite description, it is an NP and thus apparently a referring expression, yet it is obvious that it does not refer.

Let us now have a look at an indefinite description in a subject position:

(10) A cat was sitting under the table.

In (10), the indefinite description a cat is in subject position. The question is, does it refer? This brings us to another question: what is it to refer? Or, more specifically, how should we define reference? Before we answer that question, we should outline Russell’s analysis of indefinite descriptions (see Russell 1994). According to Russell, indefinite descriptions, such as a cat, do not refer to any specific individual: what they do is saying that there exists an (indefinite) individual which belongs to the N category, i.e. for a cat, there exists an (indefinite) individual which is a cat. Thus the proper analysis of (10) would not be 11a), but (11b):

(11) (a) was sitting under the table (a cat).

(b) $\exists x (\text{cat}(x) \& \text{sitting under the table}(x))$

(There exists $x$ such that $x$ is a cat and $x$ is sitting under the table)

In other words, indefinite descriptions do not refer, they just assert the existence of an individual of a given kind, without specifying which particular individual.

5.2. NPs do not always refer

Apart from indefinite descriptions, do all NPs refer? The first thing to note is that if, in order to refer, referring expressions must designate specific individuals in the world, then any referring expression which refers to a fictional or mythical individual (for instance, Sherlock Holmes or unicorns) does not refer. This, however, does not mean that all referring expressions which are not indefinite descriptions and which do not designate fictional or mythical individuals do refer (but see below, § 9.4.).

Let us examine definite descriptions (e.g. the cat). In his famous Theory of descriptions, Russell (Ibid.) did not only deal with indefinite descriptions. He also
turned his attention to definite descriptions and proposed an existential analysis of them, just as he had done for indefinite descriptions. He, however, did not think that definite and indefinite descriptions are entirely equivalent from a semantic point of view. Though indefinite descriptions have a simple existential analysis, according to which the proposition would be true if there exists at least one object which satisfies both the description and the predicate applied to it, definite descriptions have a mixed existential reading, according to which the proposition would be true if there is one object, and only one, which satisfies both the description and the predicate applied to it. Thus The cat was sitting under a table would be interpreted as There is one and only one x, such as x is a cat and x is sitting under the table. Hence, on Russell’s view, a definite description is not a referring expression anymore than an indefinite description is.

This thesis has been challenged in part by Donnellan (1966) who proposes a distinction between attributive and referential uses, with a specific application to definite definitions. Donnellan’s pet example is (12):

(12) Smith’s murderer is mad.

Donnellan points out that the expression Smith’s murderer can be interpreted in two widely different ways: a) as Smith’s murderer whoever he is, that is the speaker does not know (or believe that he knows) who Smith’s murderer is; b) as Smith’s murderer standing there in the dock, that is the speaker knows (or believes that he knows) who Smith’s murderer is. The first use corresponds to Russell’s analysis of definite description, that is, it asserts the existence of a single individual who both is Smith’s murderer and is mad: this use of definite descriptions was called by Donnellan the attributive use and it certainly is not referring. By contrast, the second use is referring and was named by Donnellan the referential use.

Thus, there does seem to be quite a number of NPs which, indeed, do not refer: indefinite descriptions, which never do, and all the attributive uses of definite
descriptions. What about other kinds of NPs, such as pronouns or proper names? We will come back to proper names later on, when we discuss the notion of rigid designator below (see § 9.3.). Let us just say for now that proper names generally refer. Pronouns are usually supposed to refer as well as do demonstrative descriptions (this/that cat), though it has been argued (see Reboul 1994, Bezuidenhout 1997) that the referential/attributive distinction can be applied to personal pronouns (indexicals included) as well as to definite descriptions. I will not discuss this here: let us just say that the matter can only be approached through a pragmatic view of attributive and referential uses, an issue about which Donnellan has been rather cautious.

Still, the main thing is that some NPs do not refer and that the one-to-one correspondance between NPs and refering expressions flounders. If this is the case then there is no true parallelism between logic and grammar and this leads us to the distinction between sentence and proposition and to the definition of reference.

6. Propositions and reference

6.1. Logic vs. grammar: proposition vs. sentence

The distinction between sentence and proposition has a one-to-one correspondence with the distinction between grammar and logic. Or, in other words, propositions are to logic as sentences are to grammar. A sentence can be defined from a syntactico-linguistic point of view as a complete and grammatical sequence of words, both completeness and grammaticality being determined through the putative sentence compliance with linguistic rules. Just as sentences are well-formed sequences according to grammar, propositions are well-formed formulae according to logic. This could be thought as restauring parallelism. But as we shall see, it does not.

Let us come back to example (12):

(12) Smith’s murderer is mad.
As pointed out above, the sentence in (12) can receive two different interpretations depending on whether the definite description Smith’s murderer is used attributively or referentially. These two different interpretations correspond to two different propositions, the attributive interpretation to (13a) and the referential one to (13b):

(13) (a) There is one and only one x, which is such that x is Smith’s murderer and X is mad.
    (b) Is mad (Smith’s murderer).

Thus, we have here a single sentence, but two propositions corresponding to two possible interpretations of the sentence in question. This is the first indication that there is some problem with the putative parallelism between logic and grammar.

There is more however: just as a single sentence can correspond to two (or more) different propositions, two sentences can correspond to one and the same proposition as shown by the examples below:

(14) (a) The cat ate the mouse.
    (b) The mouse was eaten by the cat.

These two examples correspond to the same proposition:

(15) There is a single x, there is a single y, such that cat(x) and mouse(y) and ate (x, y).

This is where the parallelism between grammar and logic falls through. Sentences do not have a one-to-one correspondance with propositions: they tend to be ambiguous, either, as we have just seen, at the pragmatic level, or at the syntactico-semantic level. This means that the same sentence can be interpreted in a range of way, depending on the number of syntactic, semantic or pragmatic ambiguities which it can give raise to.

There is more however to the notion of proposition. Let us have a look on examples (16):
(a) How beautiful this building is!
(b) Is this building beautiful?
(c) I wish that this building were beautiful.
(d) I believe that this building is beautiful.

In all examples under (16), the same proposition (*this building is beautiful*) is expressed in either a non-embedded ((16a) and (16b)) or an embedded position ((16c) and (16d)), but different attitudes are expressed relative to it: astonishment in (16a), ignorance in (16b), desire in (16c) and belief in (16d). Thus another way of characterizing propositions (which is entirely compatible with the definition in terms of well-formedness indicated above) is that the proposition is the thing which is common to all the examples under (16), no matter what attitudes are taken by the speakers relative to that proposition.

The same thing can be said about illocutionary force. Searle (*Ibid.*) distinguished two parts in any utterance, the *illocutionary force indicator* and the *propositional content indicator*, which correspond respectively in example (17) below, to the preface (*I order that…*) and to the complement sentence (*John leaves*):

(a) I order that John leaves.
(b) I promise that John will leave.
(c) John will leave and that is a menace.

Thus propositions not only can be the object of different attitudes (called, for that reason, *propositional attitudes*), they can also be the object of different illocutionary forces.

Yet another way of characterizing the proposition is to say that it can be evaluated as to its truth value: that is a proposition is by definition something
which is true or false. This, it should be noted, does not entail that the speaker or
the addressee is actually able to evaluate the truth-value of the proposition.

We thus seem to arrive at a four-fold definition of proposition:

(i) A proposition is a well-formed formula, subject to the laws of logic.

(ii) A proposition can be evaluated as to its truth or falsity.

(iii) A proposition can be the common element in sentences expressing different
attitudes.

(iv) A proposition can be accompanied by different illocutionary forces and can be
the common element in the utterances expressing them.

6.2. A definition of reference

Let us now come back to reference and non-reference: as seen above, refer-
ing expressions and non-refering expressions do not make identical contributions
to the propositions in which they occur. This was shown in the analysis of example
(12), which corresponded to two different propositions, depending on whether the
definite description is taken to be used attributively or referentially. According to
the direct reference theory (see Recanati 1993), what enters the proposition, when
the NPs in the sentence are refering, are not so much refering expressions but the
referents themselves, that is the object in the world to which the refering expres-
sions in the sentence refer. What enters the proposition in the case of non-refering
NPs is a variable bound by a quantifier (in the case of definite and indefinite des-
criptions, usually, the existential quantifier, $\exists$), and a predicate, which is something
quite different. This allows us to give a definition of reference:

A definition of reference

An NP is refering if and only if its contribution to the proposition expressed by the
utterance where it occurs is an individual.

NPs which always refer are generally considered to be proper names, de-
monstratives and pronouns, while NPs which never refer are indefinite descrip-
tions. Some NPs, such as definite descriptions, may refer or not refer depending on
the use the speaker is making of them.

7. An ontological basis for the distinction between reference and predication

7.1. Particulars versus universals

Given what has just been said regarding the contribution of refering and non-
refering NPs to propositions, it should be clear that NPs which refer contribute
reference to propositions, while NPs which do not contribute bound variables and
predicates. This difference between reference and predication can be seen from the
point of view of the attribution of truth value. For instance, the evaluation of the
truth-value of the proposition expressed in (12) may be very different depending
on whether (12) is taken to express proposition (13a) or proposition (13b): if it is
taken to express proposition (13a), then it is true if and only if there exist a single
individual who both is Smith’s murderer and is mad; if it is taken to express propo-
sition (13b), it is true if only if the specific individual who is taken to be Smith’s
murderer, Jones for instance, is mad.

Truth-valuation has to do with what is taken to be the structure of the world
and the difference between referent and predicate has often been seen as closely
corresponding to the old philosophical and ontological distinction between part-
culars (specific objects in the world) and universals (properties) (see, for instance,
Strawson 1992). Thus the reference part of a proposition would be constituted by
particulars, while the predicate part of a proposition would correspond to univer-
sals. This, however, supposes that the ontology accepts universals, something
about which, to say the least, some philosophers have been rather reluctant. This
would mean that over and above red things in the world, there would also be an
object which is redness.

There is however an alternative view according to which the truth value of
the proposition would be evaluated by ensuring that the particular designated by
the referring expression has the property described by the predicate. On this view, there would only be red objects, belonging to the set of all red objects in the world and there would be no need of an additional entity of redness. Thus, truth-evaluation would proceed through ensuring that the particular belongs to the extension of the property, that is, that it belongs to the set of all things which have the property in question. In (13b), this would mean that the particular designated by Smith’s murderer belongs to the extension of the property being mad. In (13a), where there is no authentic referring expression, the attribution of the truth-value would depend on ensuring that the intersection between the set of things which have the property of being Smith’s murderer and the set of things which have the property of being mad is not the null set.

Thus there is an ontological foundation for the difference between reference and predication. This ontological foundation, as well as the direct reference view, has some consequences on the relation between reference and predication.

7.2. Buridan’s law

The philosopher Buridan proposed a law according to which the reference of an expression must be specifiable in a way which does not involve first determining whether the proposition in which the expression occurs is true (see Geach 1980). In other words, the referring expression should determine its referent (the particular to which it refers) independently of the predicate and of the fact that the predicate does or does not apply to the particular, i.e. without ensuring first that the proposition is true. The basis for this law is obvious: truth-valuation of propositions in which authentically referring expressions occur depends on whether the particulars designated by the referring expressions in question belong or not to the extension of the predicates which are applied to them in the proposition. Thus, accepting that the identity of the particular should be determined via its appertainance to the extension of the predicate would amount both to evaluating the truth-value
of the proposition before identifying the particular, which seems to be impossible and to a weakening of the difference between reference and predication or between particulars and universals.

Hence, on the face of it, it seems that Buridan’s law should be enforced. Yet, there does seem to be quite a few counter-examples to it, some of them having to do with the identification of the particular being referred to, while others have to do with the identification of the type of the particular. Let us look at the examples below:

(18) (a) The boss fired the worker because he was a convinced communist.
(b) The teacher has punished John because he is short-tempered.
(c) The teacher has punished John because he was ill-mannered.

(19) (a) Have a look at John’s sonata. It is lying on the piano.
(b) Have you heard John’s sonata? It’s atonic.
(c) I listened to John’s sonata yesterday. It lasted half an hour.

In the examples under (18), the problem is with the assignment of the third person pronoun. In (18a), not only can the pronoun not determine its referent independently, it is not clear whether it refers to the boss or to the worker if one does not take into account both the predicate (was a convinced communist) and the context: the pronoun will be interpreted as referring to the boss if the fact described occurs in Pre-Gorbatchev USSR, while it will be interpreted as referring to the worker if the fact described occurs in the USA. In (18b), the pronoun could refer to John’s teacher, rather than to John, if the predicate (is short-tempered) is taken into account as an explanation of the teacher’s behaviour, while in (18c) the pronoun probably refers to John if the predicate (was ill-mannered) is taken into account. In other words, the third person pronoun, though it can and very often is solved without taking account of the predicate, may also in a fair number of cases, be resolved only through the predicate which is applied to it.
The examples under (19) are slightly different in that there is no doubt what the referent is in all of them: it is John’s sonata. Unfortunately, the expression *John’s sonata* is ambiguous in that it can designate either the *material object* (the musical partition), as in (19a), the *cognitive object*, as in (19b), or the *event* which is the execution of the partition as in (19c). What discriminates between these interpretations is, in each case, the predicate: only a material object can be lying on the piano, while only a cognitive object can be atonic, and only an execution can be an event and have a duration.

Thus, it seems that Buridan’s law meets with a number of counter-examples and the distinction between reference and predication appears to be rather harder to sustain than it looked on first glance.

7.3. Buridan’s law and the sentence/proposition distinction

Let us come back to the sentence/proposition distinction. According to Buridan’s law, the reference of an expression must be specifiable in some way that does not involve first determining whether the proposition in which the expression occurs is true. The question is: is Buridan’s law truly put in jeopardy by examples like those in (18) or in (19)? A first answer to that question, which will have to be improved afterwards, is that all these examples are examples of sentences and not of propositions and that Buridan’s law applies at the level of proposition and not at the level of sentence. This, it should be noted, is tantamount to saying that Buridan’s law is a law of logic and not a law of grammar or linguistics.

So far, thus, our answer to the challenge apparently raised against Buridan’s law by examples such as (18) and (19) is to say that Buridan’s law must be complied with, but at the level of logic. There is, indeed, some doubts as to whether it could be obeyed at the level of grammar. I will rapidly develop this argument. It has to do, it should be noted, with the well-known notion of the underdetermination of language. We already have met with examples of linguistic underdetermination:
examples of definite descriptions which can be interpreted as either attributive or referential are quite good examples of what is meant by linguistic underdetermination. Indeed, it can be said that linguistic underdetermination occurs whenever a given sentence can receive several different interpretations, i.e. whenever it is ambiguous. It should be noted that, though the sentences in (19) contain an ambiguous NP, John’s sonata, these sentences themselves are not ambiguous: this comes from the fact that the predicates grammatically select one meaning of the ambiguous NP rather than another as was explained before. It does it through what has come to be known as the restriction selections of a verb. For instance, the restriction selections of the verb to eat impose that the agent of the action (i.e. the subject of the active verb) should be an animate being and that the patient (i.e. the complement of the active verb) should be an edible substance. In the same way the restriction selections of the predicate in the sentences under (19) respectively select the meaning John’s sonata as a material object, John’s sonata as a cognitive object and John’s sonata as an event.

The picture is rather different for the examples under (18) and the linguistic underdetermination is more important there (just as it is for example (12)), as the predicate, though it helps attributing the right referent to the pronoun, can only do so with the assistance of contextual or encyclopaedic knowledge. I will not go here in the details of the model one could propose of how this is done. I shall only remark that the linguistic underdetermination of referring expressions (among other linguistic expressions) could only constitute a counter-example to Buridan’s law if it contaminated the proposition. But there is no reason to think that this is the case (the interpretations of (18) can be given through quite straightforward propositions, with no ambiguity in them) and thus Buridan’s law, as long as it is considered, as it should be, as a logical law and as long as one keeps in mind the distinction
between sentence and proposition, stands as it is. So does the distinction between
reference and predication at the logical level.

8. Events

We have already met with the notion of event when we discussed John’s so-
8.1. Davidson and the logical form of action sentences

Quite a lot of our examples have been of the type NP copula NP/adjective. How-
ever, in natural language, a good number of sentences are action sentences, sen-
tences which describe actions or events such as John’s taking a walk in the parc,
Shem’s kicking of Shawn, John’s gift to Mary, or the fall of Constantinople. David-
son interested himself in the problem of what logical form one should attribute to
such sentences (see Davidson 1980). His approach consisted in pointing out that,
just as NPs are divided between refering expressions and non-refering expressions
(notably indefinite descriptions), the description of actions and events in discourse
can be divided between non-refering descriptions (action sentences) and refering
description (for instance definite descriptions refering to events).

Thus, according to him, action sentences such as (20) should be interpreted as
(21) indicates, that is as asserting the existence of an event which is such and such:
(20) John came.
(21) $\exists x \((\text{came (John) } x)\)
(There is an x which is such that it is a coming by John).

Thus, Davidson introduces a new type of entity in the ontology: events. The ques-
tion as far as the distinction between reference and predication is concerned is
whether the introduction of events in the ontology affects or weakens in any way
the distinction.
As a matter of fact, there is no reason to suppose it does. What the propositional form of action sentences such as (20) says is just that there exists an individual which belongs to the extension of the predicate *being a coming by John*. It certainly modifies the relation between reference and predication in as much as, before Davidson, the logical form of a sentence such as (20) would simply have been taken to be (22):

(22) Came(John)

It should be noted, however, that (22) can be found embedded in (21) and that, indeed, what (21) says is both that John (a particular) belongs to the extension of the universal *came* and that there is an (indefinite) particular which is such that it belongs to a subset of the set of *comings*, the subset of *comings by John*. This entails that (22) must be true if (21) is. Thus, Davidson’s extension of the ontology to include events does not menace the reference/predication distinction in logic anymore than do linguistic supposed counter-examples to Buridan’s law.

### 8.2. **Vendler’s ontology of events**

Before Davidson’s reflexions on events, Vendler (1957) had made a classification of event types (which are dumped together by Davidson), organising them in an ontology. That ontology can be said to depend on the fact that the event is or is not leading to a change of state and on whether its duration is or is not limited to the moment when the change occurs. Let us look at the examples under (23):

(23) (a) John ran.

(b) John built a house

(c) John won the 100 meters race.

In (23a), what happens is identical all along the duration of the event described: at all instants during the event which is John running, John ran. The event does not imply a change of state in John or in anything else. This type of event is called by Vendler an *activity*. In (23b), by contrast, what happens is not identical all along the
duration of the event described. This event, the building of a house by John, is made of a great number of different sub-events and it does imply a change of state, namely the existence of a house where there was no house before. The apparition of this change of state at a given moment in a durative event is called by Vendler a *culmination* and events that culminate are called *accomplishments*. In (xc), we have a third kind of events which has the peculiarity of implying a change of state (after the event, John is the winner of the hundred meters race, which he was not before), though it has no duration: it only describes the culmination of the event. These events are called *achievements*.

The three-fold vendlerian distinction between activities, achievements and accomplishments has been used by a lot of people working on time and events. It has led to a definition, by Asher (1997) of an *event* (reduced here to achievements and accomplishments) as what it is that implies a change of states in an object or a situation, and of a *state* as what obtains in an object or a situation between events. As we shall see in the next section events are very important for the refering expressions/predicates distinction, and not only on the basis of their contribution to the proposition (see § 8.1.).

8.3. Evolving reference

The role that events play in the refering expressions/predicates distinction can best be seen from the point of view of *evolving reference*. Evolving reference can be easily described from example (24):

(24) John has caught the fat and lively chicken which lives in his back yard. He has killed it, he has prepared it for the oven, he has cut it into four pieces and he has roasted it with thyme for an hour.

In (24), the thing which is refered to via the third person pronoun in the last clause (i.e. *he has roasted it with thyme for an hour*) does certainly not share all the properties of the thing which was refered to in the first sentence through the (refering) defi-
finite description *the fat and lively chicken which lives in his back yard*. In fact, it certainly does not share with it the properties of being fat, lively and of living in John’s back yard, and, though it may still be called *a chicken*, it certainly does not belong to the same category as the specimens of poultry which are called by that name when they are alive.

Quite generally, the problem of evolving reference is the problem raised by reference to an object through a description in a sentence or a sequence of sentences describing one or more events which have changed the state of the object to such an extent that it does not satisfy the description anymore, though it still referred to as if it did. It is especially central to third person pronoun interpretation as it is generally considered that third person pronouns are interpreted through substitution of their antecedent NP. It is thought that, given that third person pronouns and their antecedents generally are coreferential, the object they refer to has the same properties, no matter when it is referred to. Here, however, though there is no ambiguity about which NP the antecedent of the third person pronoun is, the substitution can certainly not be said to preserve truth value, because the properties of the object have not been preserved. Evolving reference thus raises two problems: how are third person pronouns actually interpreted and how is the identity of the object preserved throughout the changes which it is submitted to? We will only answer the first one: this means pointing out that third person pronouns, when they are not in the scope of a quantifier, are probably interpreted much more directly than has generally been thought.

8.4. The paradox of the imperfective

Apart from evolving reference, action verbs do play an important role in the proposition expressed. As seen above (see § 8.1.), they describe events which can be integrated in the proposition under an existential quantifier. This is generally true of all verbs, though at some tense the generalization may fail.
Let us look at examples (25):

(a) Mary pushed the cart.
(b) Mary was pushing the cart.
(c) Mary built a house.
(d) Mary was building a house.

Whereas in (25a) and (25b), despite the change of tense from the simple past to the past progressive, the event is supposed to have occurred, in (25c) and (25d), the change from the simple past to the past progressive strongly imply that the event described may not have been completed.

It should be clear that, in Vendler’s terms, *to push a cart* describe an activity while *to build a house* describe an accomplishment. In some verbs of accomplishment, such as *to build a house, to draw a circle, to make a dress*, etc. the passage from the simple past to the past progressive implies that the event was not completed. This has a few disturbing consequences: for instance what was Mary doing while she was building a house if she did not build a house? and what is it that she was building if there is no house which she built?

The answer to such questions are not and cannot be simple. What seems clear is that there is an asymmetry between simple past and past progressive in examples such as (25c) and (25d) in as much as (25c) implies (25d), while (25d) does not imply (25c). This means that (25c) could be given an analysis in terms of Davidson’s proposal regarding action sentences, while (25d) could not.

The peculiarity of such sentences can be seen when it is observed that the logical asymmetry between (25c) and (25d) does not occur between (25a) and (25b): (25a) implies (25b) and (25b) implies (25a). In other words, they are logically equivalent and they can both receive the same Davidsonian analysis.
So how should sentences like (25d) be analysed? The most simple answer to that is that they can be analysed in the standard referring expression/predicate way, as:

(26) (a) was building a house(Mary).

On the other hand, sentences such as (25c) could be analysed in the standard way as (26b) and in a davidsonian way as (26c):

(26) (b) $\exists x \ (\text{house}(x) \ & \ \text{built}(\text{Mary},x))$

(c) $\exists x, \exists y \ (\text{house}(y) \ & \ (\text{built}(\text{Mary}, y) \ & \ x))$.

None of interpretations (26b) and (26c) are available for (25d). Thus the problem raised by some sentences at the past progressive is that of the proposition which they express and which differ from that which they express at the simple past.

9. Reference and predication in possible world logic

What we have been concerned with until now is reference and predication and the propositions which they conjointly produce when evaluated relative to the real or actual world, i.e. the world which we inhabit. How propositions produced through reference and predication should be evaluated relative to other worlds, the so-called possible worlds, is the subject of this section. It should be remembered that Kripke developed possible worlds logic, building on propositions by Barcan Marcus (see Marcus 1993). One of his aims was to account for identity statements and it is toward those sentences which we will now turn, beginning with a quick sketch of the problems they raise and outlining Frege’s solution, before turning to Kripke’s solution. We will then speak about the notion of rigid designator and outline a possible worlds solution to the problem of expressions referring to fictional objects.

9.1. Identity statements and triviality: Frege’s view

The stepping point for Kripke was a question which had exercised Frege’s ingenuity at the turn of the century: essentially it was the question of the triviality
or non triviality of identity statements. Let us take an identity statement such as (27):

(27) Hesperus is Phosphorus.

The question which bothered Frege (see Frege 1980b) was whether or not a statement such as (27) could be informative. Given that it is generally considered that expressions which have the same extension (i.e. which refer to the same thing) are substitutable salva veritate, an identity statement such as (27) can be considered equivalent to (28) or (29):

(28) Hesperus is Hesperus.

(29) Phosphorus is Phosphorus.

Given that Phosphorus and Hesperus both designate the same individual, i.e. Venus, and given the substitutability salva veritate of referring expressions which have the same extension, (27) should be equivalent to both (28) and (29) which are tautologies. Tautologies are propositions which are both necessarily true and obviously necessarily true, hence uninformative or trivial. (28) and (29) are clearly non-informative, but what about (27)?

The solution proposed by Frege was to say that proper names such as Hesperus and Phosphorus do not only have a denotation (their extension or reference): they also have a sense (respectively the Evening Star and the Morning Star). This allows him to distinguish between (27) on the one hand, (28) and (29) on the other hand. Though (28) and (29), being of form \([a = a]\), are truly tautologies (the referential expressions on either side of the is are identical), (27), being of form \([a = b]\) is not (the referential expressions on either side of the is are not identical).

Thus the sense/denotation distinction allowed Frege to solve the problem of the non triviality of (some) identity statements.
9.2. Identity statements and triviality: Kripke’s view

Kripke (see Kripke 1980) was essentially troubled by the same question as Frege was. However he rejected Frege’s solution, denying that, as far as proper names are concerned, they had a sense. According to him a proper name only has a denotation or reference, it does not have a sense. Thus Kripke found himself faced with the problem of the possible triviality of identity statements, even when the names used on either side of is are not identical: given that they refer to the same thing and that their only semantic contribution is their referent, all identity statements seem to be necessarily tautologous, i.e. trivial.

One solution might have been to deny that identity statements are necessarily true: if they are only contingently true, then they are not tautologous. In his modal logic, Kripke used the notion of possible worlds: he hypothesize that, apart from the actual world in which we live, we create possible worlds each time we make a supposition, describe the way things should be rather than the way things are, etc. All these possible worlds (to which there is no limit apart from the fact that they must be possible, i.e. contradictory propositions cannot both be true in the same possible world) together with the actual world (which is obviously possible) make the set of possible worlds. Given this set, Kripke defines possibility for a proposition as the fact that the proposition is true at at least one possible world or at a set or possible worlds. He defines necessity for a proposition as the fact that the proposition is true at all possible worlds.

Thus, the problem for the triviality or non-triviality of identity statements reduces itself to the question of whether identity statements, when true, are true at all possible worlds or only at some possible worlds. As Kripke points out, it is hard to see how a statement about the identity of Hesperus and Phosphorus could be true at some possible worlds and false at other possible worlds: it may not have a truth value at possible worlds where Venus does not exist, but at all worlds where
Venus does exist, Hesperus is Phosphorus. The only possibility for Hesperus not to be Phosphorus would be if the rules of English were changed in such a way that either Hesperus or Phosphorues does not refer to Venus anymore. But this would hardly be relevant for the problem of identity statements.

Thus, according to Kripke, not only do proper names only have reference, identity statements, when true, are necessarily true. It seems to leave Kripke in something of a quandary because, given those two hypotheses, it seems that he has no other option than to say that identity statements are trivial.

Kripke, however, rejects this thesis. He distinguishes between necessity and contingency on the one hand and a priori and a posteriori knowledge on the other hand. Although identity statements when true are necessarily true, nevertheless some necessarily true propositions are not knowable a priori: they can only be known a posteriori and this is the case for identity statements which are both necessarily true and knowable a posteriori. Given that a posteriori knowledge is not trivial, identity statements are not trivial either, though they are necessarily true.

9.3. Rigid designators and possible worlds

As we have seen above (see § 9.2.), Kripke rejects the reference/denotation distinction for proper names. He does not think that proper names have anything like a sense and, according to him, their only semantic weight is their reference. What is more, as is shown by the fact that identity statements involving proper names are necessarily true at all possible worlds where their referents exist, proper names refer to the same individual in all the possible worlds where this individual exists. As Kripke pointed out, a big difference between descriptions and proper names is that though proper names refer to the same individual at all possible worlds, descriptions do not: the properties which they attribute to their referents may not be true of that referent in another possible world. Let us look for instance at the examples below:
(30) (a) Helmut Kohl could have lost the last elections.
   (b) The present chancellor of Germany could have lost the elections.

Both (30a) and (30b) happen to be true in the real world and the proper name Helmut Kohl and the description the present chancellor of Germany happen to be coreferential in this world, but in any possible world in which it is true that Helmut Kohl lost the last elections, the description the present chancellor of Germany would not refer to him.

Thus, there is a specificity to proper names: they are always referential and their reference is both the same in all possible worlds and given once and for all. This explains why Kripke calls them rigid designators: they are designators because they are referential and they are rigid because they refer to the same thing at all possible worlds.

Kripke indicates how the link between a given proper name and its referent is created: there is a baptism and it is that baptism (which, of course, does not have to be religious or official, though it does have to be minimally public) which is the cause of the very strong and, indeed, indestructible, link between the proper name and its referent. This account of how the relation between proper names and their referents is established explains why Kripke’s theory is known as the causal theory of reference.

Thus, according to Kripke’s theory, which is generally well received, proper names contribute their referents to the propositions expressed by the sentences where they occur.

9.4. Expressions refering to fictional individuals: the possible worlds solution

To close this investigation on reference and predication, we will now turn to the vexing subject of reference to fictional characters: strictly speaking and in this, our real world, names supposedly refering to fictional character all refer to the same thing, that is, nothing. This, though hardly controversial, is nevertheless a
rather disagreeable conclusion, given that we have strong intuitions to the contrary,
i.e. strong intuitions that when we refer to Sherlock Holmes, we are not at all refe-
ring to the same thing as when we refer to Hercule Poirot.

Searle (Ibid.) proposed a solution to that problem of which I will only say that,
for him, reference to fictional characters is possible because, though these charac-
ters do not exist in reality, they do exist in the fiction. This solution was thoroughly
refined when Lewis tackled the problem (see Lewis 1983) in terms of possible
worlds. Lewis pointed out that though Sherlock Homes and Hercule Poirot do not
exist at our real world, they did exist in (different) possible worlds. He made the
hypothesis that the titles of the books or stories in which fictional characters occur
are a means of selection of the relevant set of possible worlds. For instance, in (31),
the expression In The Aventures of Sherlock Holmes is a way of selecting only the
worlds where the set of propositions expressed in the sentences of which The Ad-
ventures of Sherlock Holmes is constituted are true:

(31) In The Adventures of Sherlock Holmes, Sherlock Holmes is a bachelor.

Incidentally the proposition expressed in (31) is true at the possible worlds con-
cerned.

Thus, there is a solution in terms of possible worlds to the problem of the
reference of names denoting fictional characters.

10. Conclusion

I have been trying here to give a short overview of all the problems raised by
the notions of reference and predication, as well as by indicating their antiquity.
Perhaps a list of a few main points in the exposition above should be given at this
stage:

(i) Reference and predication are propositional acts which jointly yield propositions
and which separately yield respectively refering expressions and predicates.

(ii) Despite the apparent parallelism between logic and grammar, they are in fact quite different and sentences should not be confused with propositions, any-

more than NPs should be confused with referring expressions.

(iii) The representation of events raise specific problems for the referring expres-

sion/predicate distinction though these problems can be solved.

(iv) Reference and predication work in the same way in possible worlds logic,

though possible worlds logic has the advantage of allowing for the notion of ri-

gid designator, which appears to be a good description of proper names.

(v) It also offers a solution to the problem of reference to fictional characters.

11. Literature (selected)


Donnellan, Donald (1966): Reference and Definite Descriptions. In: The Philosophi-
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