New Semantics and Deductive System for Natural Language*

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In this paper I present some results of my recent work in logic and semantics, published in my book *Logic & Natural Language* and some subsequent papers.

1 The first-order predicate calculus distinguishes two kinds of expression that are not logical constants or variables: predicates and singular terms. Singular terms translate the proper names and other singular referring phrases or expressions of natural language, and can thus be said to refer to or designate particulars.

If we do not consider the predicate calculus as a language by whose means we aim to represent the semantics of some other language, then this classification of expressions is unproblematic. However, in philosophy and linguistics the predicate calculus is also used for analyzing the semantics and logic of natural language. Translation of natural language sentences into the calculus is taken to reveal or represent perspicuously the "logical form" of the translated sentence. The way expressions and structures contribute to the meaning of a natural language sentence is supposed to be determined and shown be means of its translation into the calculus.

In order to achieve that, the semantic categories of the calculus have to correspond to those of the sentences of natural language that it purports to translate. But, I shall now argue, this is not the case.

Let us examine the sentence

1 Paul is asleep.

It is translated into the predicate calculus as

2 *Pa*

where '*a*' translates 'Paul' and '*P*' 'is asleep'. 'Paul' is taken to be a referring expression, and it is translated by the singular term '*a*'. Although the speaker would usually identify Paul by some of his properties (including the way he looks), 'Paul' is not a predicate attributing these properties but an expression used to refer to Paul. And even if one maintains that a proper name has something like what Frege called '*Sinn*', 'Paul' does not designate a *Sinn* but Paul.

Similarly, the sentence

3 He is asleep,

uttered, say, while pointing at Paul or as an answer to the question 'Where is Paul?', is also translated as '*Pa*', where '*a*' translates 'he', which is taken to be a referring expression, used on this occasion to refer to Paul. Perhaps, as has been suggested by some, singular terms of a different kind should be introduced into the calculus in order to translate pronouns and demonstratives, so that they will be distinguished from proper names; but the function of these terms would still be to refer. And as with the name 'Paul', the fact that the speaker would usually identify the person whom the pronoun designates by certain of his properties does not turn this pronoun into a predicate attributing these properties.

Let us now look at the sentence

4 They are asleep,

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* This is a slightly expanded and revised version of a paper of the same title, published in *The Logica Yearbook 2003*, edited by Libor Behounek, Filosofia, Prague 2004, pp. 59-71.

uttered, say, while pointing at an unknown number of people sleeping in a room. The speaker uses the word 'they' to refer to these people—'they' is a referring expression. Again, the speaker would usually identify the people referred to by means of some of their properties; but as with 'Paul' and 'he' above, this is no reason to consider 'they' a predicate attributing these properties. The only important semantic distinction between 'they' and the singular expressions 'Paul' and 'he' is that 'they' is a *plural* referring expression, denoting *several* particulars. If language and its use justify considering 'Paul' and 'he' referring expressions, then they equally justify considering 'they' a referring expression.

Can one translate (4) into the predicate calculus? Since the calculus does not contain *plural* referring expressions, one would have to substitute other expressions for 'they'. Should one substitute a predicate for it, say 'Q', and then translate (4) as, for instance:

5 $\quad$ (every x)($Q\ x \rightarrow$ Asleep x)?

Even if a predicate that yields the same truth conditions can be found, this will not justify the claim that 'they' in sentence (4) is actually this predicate, or part of a construction in which this predicate is used, albeit in a non-perspicuous way. Since such a claim was not justified when translating (1) and (3), it is not justified here either. Moreover, no predicate is explicit in sentence (4), so the meaning of a claim that a predicate is in some sense implicitly contained in it is unclear. Of course, the speaker may be thinking all sorts of things—as he or she has done while uttering sentences (1) and (3)—but the question is, what does the *sentence* contain.

I believe it is clear that no sentence of the form of (5) adequately represents the semantics of sentence (4). And no other sentence of the predicate calculus can: the predicate calculus cannot translate sentence (4) by a semantically isomorphic translation because it lacks plural referring expressions.

Natural language, by contrast to the predicate calculus, contains not only *singular* referring expressions, but *plural* referring expressions as well. These include plural pronouns (in English, 'we', 'you', 'they', 'us' etc.), plural demonstratives and demonstrative phrases ('these', 'those', 'these books'), plural definite descriptions (e.g., 'my children', 'the students'), some phrases that resemble both definite descriptions and proper names ('the Knights of the Round Table', 'the Simpsons'), and conjunctions and disjunctions of singular and plural referring expressions (e.g., 'Peter or Jane', 'Mary and the children'). The predicate calculus cannot adequately represent the semantics of natural language sentences containing plural referring expressions, because it lacks such expressions.

What is involved in plural reference, vis-à-vis singular reference, is, I think, straightforward. Whatever is achieved in referring to a single person or thing can be achieved with respect to several persons or things, and we then have plural reference.

When I talk about plural reference I mean referring to more than a single person or thing. I do *not* mean referring to a set with many members, to a complex individual, or to any other variation on these ideas. I mean achieving with respect to more than a single thing what is achieved by reference to a single thing.

It remains to be shown that plural referring expressions cannot be reduced to constructions that the only referring expressions which they contain, if any, are singular ones. For lack of space I shall not do that here. For a discussion of this topic, as well as for a much more detailed discussion of the subjects mentioned above, I refer the reader to Chapter 2 of my book. In that chapter I show not only the implausibility of such reductive analyses, but also that they are not motivated by any linguistic phenomenon but by the unjustified conviction that the predicate calculus must be capable of translating the relevant sentences.

2 My main claim above was that, in contrast to the predicate calculus, natural language has not only singular referring expressions but also plural ones. That is, I claimed that natural language has expressions belonging to a semantic category absent from the predicate calculus.

As far as this claim is concerned, it might seem that one would only need to enrich the calculus in order to make it capable of supplying semantically adequate translations of natural language sentences. Moreover, my claim might seem not to disagree with any of the semantic claims of Frege that were essential for the development of his calculus.

However, I shall now make a more radical claim, which plainly disagrees with some of these claims. I shall argue that in many cases, *common nouns in quantified noun phrases are not predicative, but plural referring expressions*. Frege, by contrast, maintained that they are predicative. Already in his

Begriffsschrift (§ 12) he translated the subject terms of the four Aristotelian quantified sentences by predicates, and several times in his later writings he argued for this analysis.

For instance, in 'Some children are asleep', I claim that, *pace* Frege, 'children' is not predicative; i.e., it is not used to say something about particulars referred to in some other way. Rather, 'children' is used in this sentence to *refer* to children; it is a *plural referring expression*. Similarly, in 'John met several members of my college', 'members of my college' is not predicative, but used to refer to persons, several of whom John met. (*NB*: It is used to refer not to those met by John, but to *all* members of my college.)

Let us look at the following sentence:

These books are interesting.

Many authors today would agree that the demonstrative phrase 'these books' is used in this sentence to refer to some books. In this use it is a plural referring expression. But now let us make a small addition to this sentence:

Some of these books are interesting.

I think it is plausible to claim that the phrase 'these books' did not change its function due to this small addition. It is still a plural referring expression. But if so, then we have here an example of a general noun, following a quantifier in a noun phrase, that is used not as a logical predicate but as a logical subject term, a plural referring expression. Such considerations lend initial plausibility to my claim, that common nouns in quantified noun phrases are often plural referring expressions. (They are such when the noun phrase is in an argument position of a predicate; they have other uses as well, though.)

To go beyond this initial plausibility, we would need to analyze in more detail the linguistic behavior of such expressions, as well as consider the few arguments in favor of their predicative nature found in Frege's writings and in a few other places. I shall again excuse myself from doing that, because of space limitations, and instead refer the reader to chapters three to five of my book and to my paper, 'A Critique of Frege on Common Nouns'. Here I shall proceed to show how the analysis of common nouns as plural referring expressions explains away an alleged ambiguity of the copula, or of the copulative structure.

Starting with Frege's *Begriffsschrift* (§ 9, p. 17), it has commonly been maintained that despite linguistic appearances, the copula, or the copulative structure, has different meanings in singular and quantified subject–predicate sentences. For instance, in the two sentences

1 Socrates is mortal
2 Socrates and Plato are mortal

the copulas are used to indicate predication, mortality being predicated of Socrates and Plato. By contrast, in the sentences

3 Every Greek is mortal
4 Some Greeks are mortal

no predication is involved, but rather a determination of relations between concepts. While according to some semantic approaches the copula in (1) should be seen as expressing a relation synonymous with set-theory's membership, expressed by '$\in$', sentence (3) should be read as asserting the inclusion or subordination of one class or concept to another, symbolized by '$\subset$'. Frege elaborated on these distinctions in his 'Kritische Beleuchtung einiger Punkte in E. Schröders *Vorlesungen über die Algebra der Logik*' (see his third point at the end of that essay; cf. his second note in 'Über Begriff und Gegenstand'), and he also maintained that the lack of this distinction in Euler's diagrams makes them a lame analogue for logical relations (1895, p. 441).

It is difficult to accept this claim for the ambiguity of the copula, for several reasons. Firstly, consider the sentence

5 Socrates and some other philosophers are Athenians.

What should the meaning of the copula 'are' in this sentence be, according to the ambiguity claim? Since something is claimed about Socrates, it should indicate predication. On the other hand, since something is allegedly claimed about the relation between two concepts—being a philosopher and being an Athenian—it should also indicate some conceptual relation. So should the copula in sentence (5) have some third meaning, a composite of its two other meanings? Or is it ambiguous? Meanings and ambiguities threaten to proliferate. This seems implausible.

Secondly, if a certain grammatical construction were ambiguous in one language, the reappearance of the same ambiguity in a different language that is historically unrelated to the first would be difficult to explain. However, the same alleged ambiguity reappears in all languages I checked, including languages very remote from English both grammatically and historically, such as Hebrew.

By contrast, if common nouns in the subject position in subject–predicate sentences are referring expressions, then the alleged ambiguity does not exist. In (1) to (4) we say of some particulars—one, two, or many—that they are mortal. We refer to particulars, and predicate something of them. The same applies to (5), where both Socrates and some other particular philosophers are classified as Athenians. In all these cases, the copula indicates predication. The analysis of these common nouns as referring expressions explains away the implausible ambiguity of the copula generated by their analysis as predicates. It is thus more reasonable to maintain that the predicate calculus, and not ordinary language, was misleading in this case.

3 I shall now proceed to an analysis of quantification in natural language vis-à-vis quantification in the predicate calculus, on the basis of my analysis of common nouns as plural referring expressions.

The absence of plural referring expressions from the predicate calculus forces quantification to function in the calculus in a way that is significantly different from the way it functions in natural language. When we quantify, we refer to a plurality of particulars, and say that specific quantities of them are such-and-such; quantification involves reference to a plurality. Natural language accomplishes this kind of reference by means of plural referring expressions, which designate the plurality, or pluralities, about which something is said. And by using different expressions, natural language can refer to different pluralities. By contrast, since the predicate calculus uses concepts only as predicates, it has no plural referring expressions. The plurality about which something is said by its sentences has to be presupposed, and different sentences cannot specify different pluralities. In natural language, pluralities are introduced and specified by means of plural referring expressions; in the predicate calculus, a plurality, which is unspecified by the sentence, is introduced by presupposing a domain of discourse.

In order to speak of pluralities natural language sentences presuppose no domain of discourse, in the technical sense in which this concept is used in model theoretic semantics. A domain of discourse is a necessary component of the semantics of the predicate calculus, which has no parallel in the semantics of natural language.

This semantic difference results in a syntactic one as well. If the plurality is referred to by some plural referring expression, the quantifier has to be related in some syntactic way to the plural referring expression, in order to indicate the plurality about which a quantified claim is made. Consequently, in natural language the quantifier is attached to a noun that is used to refer to a plurality, and together they form a noun phrase. However, if no expression is used to refer to a plurality but the plurality is presupposed by the quantified construction, then the quantifier does not have to be attached to any specific component of the quantified sentence. Consequently, in the predicate calculus the quantifier operates on a sentential function.

Let us proceed with an example:

1 All men are mortal

is usually translated by

2 (all x)(Man $x \rightarrow$ Mortal x).

This translation departs in several ways from the semantics of the translated sentence. Firstly, in sentence (1), 'men' is used to refer to all relevant men and to them alone, while 'mortal' is a predicate, used to attribute a property to men. In sentence (2), on the other hand, both 'Man' and 'Mortal' are predicates—as we have already noted, the semantic distinction between reference with a general term and predication with one is lost.

As a result of these differences between (1) and (2), the following additional difference arises, concerning the way the quantifier functions in each. In (1), 'all' is joined to the referring expression 'men' (together they form the noun phrase 'all men'), and it determines that the predicate applies to all the particulars that *the term 'men' designates*. By contrast, in (2), 'all' is joined to the variable '*x*', and it determines that a complex predicate, the sentential function '(Man $x \rightarrow$ Mortal x)', is satisfied by all the particulars *in a presupposed domain*. Sentence (2) does not *specify* any plurality of particulars, but *presupposes* one. In both natural language and the predicate calculus, quantifiers determine to how many particulars from those referred to a predicate applies. But while plural reference in the calculus is introduced by attaching a quantifier and a variable to a sentential function, in natural language it is made by general nouns, to which quantifiers therefore attach.

In my book I show in this place how my analysis of quantification can explain some facts about quantifiers, facts that are hard to explain if one analyzes quantification in natural language by means of the predicate calculus, including its versions that use generalized quantifiers (on this see also my paper, 'Generalized Quantifiers, and Beyond'). I also generalize my account of quantification to sentences that involve several quantified noun phrases. I go on to explain the semantic and logical significance of the copula, inverse relations and passive form, all redundant from predicate logic's point of view; I then proceed to discuss pronouns and anaphora and contrast them with variables. Since I do not have the space for that here, I shall again have to refer the reader to my book (Chaps. 6-8).

4 I shall now present a simplified form of my deductive system. The system presented below is simplified compared to the one in my book in several respects. Firstly, I do not discuss it application to sentences containing noun phrases anaphoric on quantified noun phrases—natural language's parallel of the predicate calculus's bound variables. (E.g., 'Every man loves *himself*' or 'If a man buys a donkey, *he* vaccinates *it*'.) Secondly, I do not discuss its application to sentences which are formed from quantified sentences by means of the connectives of the propositional calculus. (E.g., '*It's not the case that* some philosophers are immortal' or 'Some philosophers are Greek *and* some philosophers aren't Greek'.) It is also applied to multiply quantified sentences (e.g., 'Some men love every woman') naïvely, according to their order in the sentence from left to right, without discussing the complexities involved in multiple quantification. These are discussed in Chapter 7 of my book.

My deductive system is a system of natural deduction for natural language, based on ideas originally developed by Gentzen (1934-5). My method of writing arguments is based on standard elementary methods such as those found in (Lemmon 1965) and (Newton-Smith 1985).

I adopt the propositional calculus without introducing any modification. I therefore allow myself to use its derivation rules without redefining them. Specifically, I shall employ Negation Introduction in one of the examples below.

The distinctive derivation rules used in the simplified deductive system presented here are those describing the introduction and elimination of quantifiers. They all concern sentences of the logical form '$(np_1, \ldots np_n)$ *is/isn't P*', where np_i is either a singular referring expression (e.g., 'Socrates', 'this man', 'my sister') or a quantified noun phrase ('some philosophers', 'every philosopher'), and '*P*' an n-place predicate. The copula can be either affirmative or negative. Examples are: 'Every man is mortal', 'Some philosophers aren't Greek', 'Every philosopher admires Plato', 'Every man loves some women', 'Some men don't love any woman', 'John sent some letters to Mary', etc. The derivation rules are the following four rules:

> *Universal Elimination*. Suppose the first quantified noun phrase in sentence (i) is 'every *A*' (I shall say in that case that 'every *A*' *governs* sentence (i); see my book for a more accurate definition of governance). Suppose further that sentence (j) is '*a* is an *A*'. Then, in any line (k), one can write the sentence identical to sentence (i) apart from the fact that in it *a* has been substituted for 'every *A*'. Line (k) relies on the lines on which lines (i) and (j) rely. Its justification is written 'UE, i, j'.

Formally ('*u*' stands for the universal quantifier):

α	(i)	$\Phi(uA)$	
β	(j)	*a* is an *A*	
α, β	(k)	$\Phi(a)$	UE, i, j

Constraints: 'uA' governs '$\Phi(uA)$'.

I shall give below only the formal rendering of the derivation rules. An instance of the application of UE:

1	(1)	Every man is mortal	Premise
2	(2)	Socrates is a man	Premise
1,2	(3)	Socrates is mortal	UE, 1,2

Universal Introduction

i	(i)	a is A	Premise
α	(j)	$\Phi(a)$	
α – i	(k)	$\Phi(uA)$	UI, j, i

Constraints: 'uA' governs '$\Phi(uA)$'; 'a' appears only once in '$\Phi(a)$'; the only premise, if any, among α that contains 'a' is (i).

An example:

1	(1)	Mary is a woman	Premise
	(2)	Every woman is a woman	UI, 1,1

Since (2) does not rely on any premise, it is a theorem of my system. Similarly, every sentence of the form 'Every *A* is an *A*' is a theorem of this system.

Particular Introduction

α	(i)	$\Phi(a)$	
β	(j)	a is A	
α, β	(k)	$\Phi(pA)$	PI, i, j

Constraints: 'pA' governs '$\Phi(pA)$'.

An example of the use of Particular Introduction:

1	(1)	Wisdom is rare	Premise
2	(2)	Wisdom is a virtue	Premise
1,2	(3)	Some virtues are rare	PI, 1,2

As will have been noticed, I talk of the *particular* quantifier ('p' in the formulas) and not of an *existential* quantifier. Like Aristotle and unlike Frege, I distinguish between the particular quantifier ('some') and the existential construction, which I do not consider a form of quantification (see section 6.5 of my book).

Referential Import

α	(i)	$\Phi(qA)$	
j	(j)	a is A	Premise
k	(k)	$\Phi(a)$	Premise
β	(l)	Ψ	
α, β – j – k	(m)	Ψ	RI, i, j, k, l

Constrains: (i) does not rely on (j) or (k); (i) does not contain 'a'; (l) does not contain 'a'; the only premises, if any, among β that contain 'a' are (j) and (k).

An example of the use of RI with the particular quantifier:

1	(1)	Some Athenians are philosophers	Premise
2	(2)	All philosophers are wise	Premise
3	(3)	Plato is an Athenian	Premise
4	(4)	Plato is a philosopher	Premise
2,4	(5)	Plato is wise	UE, 2,4
2,3,4	(6)	Some Athenians are wise	PI, 5,3
1,2	(7)	Some Athenians are wise	RI, 1,3,4,6

An example with the universal quantifier (substituting 'every' by 'some'):

1	(1)	John loves every woman	Premise
2	(2)	Mary is a woman	Premise
3	(3)	John loves Mary	Premise
2,3	(4)	John loves some woman	PI, 2,3
1	(5)	John loves some women	RI, 1,2,3,4

Another example, in which we again prove a theorem:

1	(1)	Peter is a Man	Premise
	(2)	Every man is a man	UI, 1,1
1	(3)	Some men are men	PI, 1,1
	(4)	Some men are men	RI, 2,1,1,3

We have now presented all the derivation rules of my deductive system that concern quantification. However, before we examine some more complex examples, another rule should be introduced. Since we use in natural language both an affirmative and a negative copula, the relation between the two should be defined. Now, in case all noun phrases in the sentence are singular referring expressions, copula negation is equivalent to sentence negation: 'It's not the case that John is tall' (abbreviated below as 'Not(John is tall)') means the same as 'John isn't tall'. But if some noun phrases are quantified, then this equivalence does not hold: 'It's not the case that some men are immortal' does not mean the same as 'Some men are not immortal'. We can accordingly introduce the following derivation rules:

> *Negative Copula Introduction*. Suppose sentence (i) is or contains the sentence '*Not((*np_1*, … *np_n*) is P)*', where every 'np_i' is a definite singular noun phrase. Then in any following line (j) the sentence identical to sentence (i), but with '*(*np_1*, … *np_n*) isn't P*' substituted for '*Not((*np_1*, … *np_n*) is P)*', can be written. Sentence (j) relies on the same premises as sentence (i), and its justification is written 'NCI, i'.
>
> *Negative Copula Elimination*. Suppose sentence (i) is or contains the sentence '*(*np_1*, … *np_n*) isn't P*', where every 'np_i' is a definite singular noun phrase, then in any following line (j) the sentence identical to sentence (i), but with '*Not((*np_1*, … *np_n*) is P)*' substituted for '*(*np_1*, … *np_n*) isn't P*', can be written. Sentence (j) relies on the same premises as sentence (i), and its justification is written 'NCE, i'.

We can now proceed with some examples. For instance, let us prove that 'Some *S*'s aren't *P*'s' entails 'It's not the case that every *S* is *P*'—one of the relations in the Aristotelian Square of Opposition:

1	(1)	Some *S*'s aren't *P*'s	Premise
2	(2)	Every *S* is *P*	Premise
3	(3)	*a* is an *S*	Premise
4	(4)	*a* isn't *P*	Premise
4	(5)	It's not the case that *a* is *P*	NCE, 4
2,3	(6)	*a* is *P*	UE, 2,3
3,4	(7)	It's not the case that every *S* is *P*	Negation Introduction, 2,5,6
1	(8)	It's not the case that every *S* is *P*	RI, 1,3,4,7

Secondly, let us prove that ‘Every *S* is *P*’ entails the negation of ‘Every *S* isn’t *P*’ (the partial regimentation in the system of ‘No *S* is *P*’)—i.e., that these sentences are contraries:

1	(1)	Every *S* is *P*	Premise
2	(2)	Every *S* isn’t *P*	Premise
3	(3)	*a* is *S*	Premise
4	(4)	*a* is *P*	Premise
2,3	(5)	*a* isn't *P*	UE, 2,3
2,3	(6)	Not(*a* is *P*)	NCE, 5
3,4	(7)	Not(every *S* isn't *P*)	Negation Introduction, 2,4,6
1	(8)	Not(every *S* isn't *P*)	RI, 1,3,4,7

The canonical translation of these sentences into the predicate calculus does not preserve the validity of this inference: in case there are no *S*’s in the domain, both sentences are (‘vacuously’) true. Aristotelian logic has consequently often been said to rely on some implicit presuppositions, etc.; by contrast, my semantics and logic show, I believe, that this inference is indeed valid, and that the canonical translation into the predicate calculus does not preserve the semantic structure of the translated sentences. All other relation of the Square of Opposition can also be proved in this system.

Let us now prove one of the Aristotelian syllogisms, for instance, Barbara:

1	(1)	Every *S* is an *M*	Premise
2	(2)	Every *M* is a *P*	Premise
3	(3)	*a* is an *S*	Premise
1,3	(4)	*a* is an *M*	UE, 1,3
1,2,3	(5)	*a* is a *P*	UE, 2,4
1,2	(6)	Every *S* is a *P*	UI, 5,3

All other syllogisms, as well as all conversions, can also be proved in this system. This system thus contains Aristotelian Logic (cf. Chapter 10 of my book).

We now move to multiply quantified sentences. Here we shall need another derivation rule. While ‘John loves Mary’ means the same as ‘Mary is loved by John’, this is not the case with sentences like ‘Some men love every woman’ and ‘Every woman is loved by some men’. I shall call the changing of order involved in the change from the active to the passive voice ‘transposition’. This term will also apply to similar reorderings, such as the one involved in the change from ‘John gave the book to Mary’ to ‘John gave Mary the book’, or from ‘John is taller than Mary’ to ‘Mary is shorter than John’. We thus have the following rule:

> *Transposition*. If sentence (i) is or contains the sentence ‘$(np_1, \ldots np_n)$ *is/isn’t P*’, where every ‘np_i’ is a definite singular noun phrase, then in any following line (j) the same sentence with any transposition of *P* can be written. Sentence (j) relies on the same premises as sentence (i). Its justification is written ‘T, i’.

And now, some examples with multiply quantified sentences. Firstly, one can change the order of two consecutive universally quantified noun phrases:

1	(1)	Every man loves every woman	Premise
2	(2)	John is a man	Premise
3	(3)	Mary is a woman	Premise
1,2	(4)	John loves every woman	UE, 1,2
1,2,3	(5)	John loves Mary	UE, 4,3
1,2,3	(6)	Mary is loved by John	T, 5
1,3	(7)	Mary is loved by every man	UI, 6,2
1	(8)	Every woman is loved by every man	UI, 7,3

It can also be proved that the order of two consecutive particularly quantified noun phrases can be similarly changed.

We shall now prove that ‘Some women are loved by every man’ entails ‘Every man loves some women’:

1	(1)	Some women are loved by every man	Premise
2	(2)	Jane is a woman	Premise
3	(3)	Jane is loved by every man	Premise
4	(4)	Peter is a man	Premise
3,4	(5)	Jane is loved by Peter	UE, 3,4
3,4	(6)	Peter loves Jane	T, 5
2,3,4	(7)	Peter loves some women	PI, 6,2
2,3	(8)	Every man loves some women	UI, 7,4
1	(9)	Every man loves some women	RI, 1,2,3,8

The proof of these two last entailment relations, which could not even be formalized within the standard Aristotelian system, was justly considered a great achievement of Fregean Logic. As has just been demonstrated, they can be proved in my system as well.

I shall not give any other example in this paper. Complex examples of additional kinds demand a discussion of anaphora and compound sentences, and this, as was said above, is beyond the scope of this paper (see Chapter 11 of my book).

The deductive system developed here, and its fuller version contained in my book, are sound. A formula language incorporating the approach developed here has been shown to be sound and complete, and to be at least as powerful as the first order predicate calculus (Lanzet 2006). The semantic theory on which this deductive system is based is more faithful than the calculus to the semantics of natural language. These deductive system and semantic theory should therefore, I think, replace the predicate calculus, as the main tool for the study of the semantics and logic of natural language.

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