Jeff Bernard
János Kelemen
(Hg.)

Redaktionelle Mitarbeit:
Katalin Neumer, Gloria Withalm

Zeichen, Denken, Praxis

Österreichisch – Ungarische Dokumente zur Semiotik und Philosophie

Wien–Budapest: ÖGS / ISSS 1990

In Kooperation mit dem Institut für Philosophie der Ungarischen Akademie der Wissenschaften / DOXA Library

CIP-Kurztitelaufnahme der Deutschen Bibliothek

Zeichen, Denken, Praxis: Österreichisch-Ungarische Dokumente zur Semiotik und Philosophie / Jeff Bernard, János Kelemen [Hg.]. – Wien; Budapest: Österreichische Gesellschaft für Semiotik, Institut für Sozio-Semiotische Studien, 1990

(S – Addenda. Semiotic Studies, Études Sémiotiques, Semiotische Studien)
Einheitssacht.: Signs, Thought, Practice (dt.)
ISBN 3 900494 10 X

NE: Bernard, Jeff; Kelemen, János (Hg.); Redaktionelle Mitarbeit: Katalin Neumer, Gloria Withalm;

Gefördert durch das Bundesministerium für Wissenschaft und Forschung, durch das Kulturamt der Stadt Wien und durch die Österreichische Forschungsgemeinschaft

Printed in Austria by KOPITU/Vienna

ISBN 3 900494 10 X

In Memoriam
Ilse Hanl, Zoltán Kanyó

Inhaltsübersicht

János KELEMEN

Zum Geleit

Dieses Buch verwirklicht eine echte Begegnung mehrfacher Art, d.h eine Begegnung in interdisziplinärem wie auch in kulturellem Sinne: in interdisziplinärem Sinne, weil es semiotische und philosophische (und „semio-philosophische") Schriften vereinigt, und in kulturellem, weil es als Resultat der Zusammenarbeit österreichischer und ungarischer Autor/inn/en zustande gekommen ist.

Dieses Zusammentreffen ist freilich nicht das erste und somit nicht beispiellos: Die Wechselwirkung der semiotischen Forschung und der philosophischen Reflexion ist eine wichtige Tradition in der Geschichte des Denkens. Eines der Ziele der österreichisch-ungarischen Zusammenarbeit ist eben, zur Vertiefung dieser Tradition beizutragen, und die Vereinigung der österreichischen und ungarischen Autor/inn/en dieses Buches ist auch nicht die erste ihrer Art. Die bisherigen bilateralen Konferenzen, sowohl in Budapest als auch in Wien abgehalten, sowie die gemeinsamen Publikationen der Österreichischen Gesellschaft für Semiotik und des Filozófiai Intezet / Magyar Tudományos Akadémia (Philosophisches Institut der Ungarischen Akademie der Wissenschaften), d.h. die beiden joint issues der *Semiotischen Berichte* / Wien mit *ΔΟΞΑ Philosophical Studies – DOXA Filozófiai Mühely* / Budapest, haben schon vor Jahren die Bedingungen dieser produktiven Zusammenarbeit geschaffen.

Dieses Buch ist somit gleichzeitig eine wichtige, aber sicher nicht die letzte Station auf dem Wege der bisherigen Interaktionen *und* eine Synthese der bisherigen gemeinsamen denkerischen und forscherischen Bemuhungen in ihrem unbezweifelbaren Reichtum der Zugangsweisen und Gesichtspunkte. Ich empfehle dieses Buch daher den Leserinnen und Lesern in der Hoffnung, daß dieses interkulturelle wie interdisziplinäre Zusammentreffen einen fruchtbaren Anlaß für die Fortführung des Dialoges zwischen Semiotik und Philosophie bietet und beispielgebend fur andere gleichartige Projekte in anderen Feldern des kulturellen und wissenschaftlichen Austauschs in bzw. zwischen unseren und anderen Ländern sein moge.

Knowledge is the goal, or rather one of the goals, and not the starting point of our life and actions. And in the same way that we do not know everything we cannot doubt everything, otherwise we would be paralyzed. We need, therefore, not only the objective certainty of knowledge, but also the subjective certainty of belief, in order to assure us that certain facts may be obtained even when we cannot certify them. As if we were to make a gift of our confidence to the world, our senses, and our fellow men. Religious faith, or belief in God, is a form of this every knowledge and action preceeding trust. The need for religion (so much discussed in modern Marxist religious theory), is a necessary but not sufficient condition for the explanation of religious phenomena. That need which is satisfied by religion makes its appearance in certain socio–historical circumstances, but *that* it can be satisfied in the form of religious faith is so because the prior–to–knowledge belief, and our trust invested in the world — in a manner similar to knowledge — is rooted in the conditions of the elemental human relations to the world. Religion is the objectification of the original belief–relation, which also finds expression in the linguistico–logical system.

From the indispensability of belief does not follow the indispensability of religion. What is prior–to–knowledge belief and what is knowledge is dependent on the context. There is no such thing which can be an object uniquely of "belief in" or uniquely of knowledge. "Belief in" and knowledge become fixed as two different and opposing spheres only when a given historical context becomes rigidified, petrified, as if achieving absolute validity. "Belief in" takes on in these instances the form of an objectifying religion. The becoming absolutely independent of "belief in", its immunization against doubt: dogmatism. Needless to say, this is typical not only of religious objectification, but of all similar belief-structures: religious atheism, revolutionary messianism, ritualized Marxism, among others.

If it is true that it is meaningless to doubt everything, and that we cannot do without belief, it is also true that we cannot know anything if we do not dare to doubt.

Gyula KLIMA

Approaching Natural Language Via Mediaeval Logic

Je prend mon bien où je le trouve ...

I. ANOMALIES OF A PARADIGM

> Are quantification and cross reference in English well represented by the quantifiers for 'every' and 'some', the usual propositional connectives and the equals sign? It's my impression that many philosophers and logicians think that - on the whole - they are. In fact, I suspect that the following view of the relation between logic and quantificational and referential features of natural language is fairly widely held: No one (the view begins) can think that the propositional calculus contains all there is to logic. Because of the presence in natural language of quantificational words like 'all' and 'some' and words used extensively in cross reference, like 'it', 'that' and 'who', there is a vast variety of forms of inference whose validity cannot be adequately treated without the introduction of variables and quantifiers, or other devices to do the same work. Thus everyone will concede that the predicate calculus is at least a part of logic. Indispensable to cross reference, lacking distinctive content, and pervading thought and discourse, *identity* is without question a logical concept. Adding it to the predicate calculus significantly increases the number and variety of inferences susceptible of adequate logical treatment. And now (the view continues), once identity is added to the predicate calculus, there would not appear to be all that many valid inferences whose validity has to do with cross reference quantification and generalization which cannot be treated in a satisfactory way by means of the resulting system. It may be granted that there are certain valid inferences, involving so-called "analytic" connections, which cannot be handled in predicate calculus with identity. But the validity of these inferences has nothing to do with quantification in natural language, and it may thus be doubted whether a logic that does nothing to explain their validity is thereby deficient. In any event (the view concludes), the variety of inferences that cannot be dealt with by first-order logic (with identity) is by no means as great or as interesting as the variety that can be handled by the predicate calculus, even without identity, but not by the propositional calculus.[1]

I think it is significant, and generally characteristic of the change of attitudes taken by logicians and philosophers of language in the last two decades towards the relationship between quantification theory and natural languages, that George Boolos, from whom this lengthy quotation derives, gives this detailed description of what may be called the paradigmatic view of this relationship only to raise several objections to it.

This change of attitudes was mainly prompted by the recognition of a steadily growing body of anomalies in the application of quantification theory to natural languages. These anomalies may be gathered, roughly, under the following headings:

1. Mismatch of syntax

As is well-known, natural language sentences of evidently the same syntactic structure are represented by formulae of quantification theory of entirely different structure, while the same formula may have different "readings", expressible by natural language sentences of widely different syntax.

Regarding these discrepancies, of course, one might say that there is no justifiable need of a strict correspondence between the syntactic structure of natural language sentences and the formulae representing them. After all, a logical semantics, which is to be a general semantics for all kinds of human languages, should precisely disregard accidental grammatical features of particular natural language expressions, and hence also the delusive grammatical structure of natural language sentences in general. All that is required for correspondence is that the formula should state correctly the truth conditions of the sentence which it represents, since it is only these truth conditions that determine the logical relations of sentences among each other.

Along these lines, mismatch of syntax may be made to appear entirely harmless, by making a distinction between logical form on the one hand, and grammatical form on the other, placing much confidence in the capability of quantification theory to express the former, and thereby justifiably ignoring the latter.[2]

2. Unrepresentable sentences

There is, however, a further set of anomalies, which comes as a fatal blow to this interpretation of the relationship between quantification theory and natural languages. For, as it turned out, some apparently simple quantified sentences of natural languages are demonstrably unrepresentable in first order quantification theory in the sense that no first order formula is able to give their correct truth conditions.[3]

As is well-known, examples of such sentences are those containing the determiners 'most' or 'more than half of', and so on. But if there are no formulae giving the correct truth conditions of such sentences, then quantification theory is simply unable to supply their logical form, and so the above-mentioned rationale for drawing the distinction between logical and grammatical form breaks down with these sentences.

3. Variables vs. anaphoric pronouns

But there are also other types of natural language sentences that pose a serious challenge to the claim that quantification theory has all types of quantificational and cross-referential resources that natural languages may possibly have. Recent discussions of the troubles caused by the so-called "donkey-

sentences" supply ample evidence against the claim that variables of quantification theory can do everything that natural language pronouns can do.[4]

4. Intensional and intentional contexts

To be sure, the above-mentioned "anomalies" may be considered as such only because they pose problems to quantification theory that everyone feels it should handle but cannot. It was clear from the beginning that there are large portions of natural language reasonings that simply fall outside the authority of quantification theory, namely those involving intensional contexts. Nevertheless, Frege's relegation of modal notions to the sphere of psychology notwithstanding, logicians have been working on expanding formal logic even to these contexts. Possible worlds semantics produced interesting results concerning modal notions and still seems to have some resources concerning tensed modal contexts. However, in virtue of the coarse-grained character of intensions available in possible worlds semantics, several intentional contexts, namely those created by attitude verbs, seem to defy analysis in terms of these intensions.[5]

5. Conflicts with traditional logic

The growing recognition of these and similar difficulties in the application of quantification theory to natural languages gave occasion to some historically-minded logicians to make comparisons between quantification theory and traditional logic showing traditional logic in a much more favourable light than before. The well-known differences between traditional and quantificational analyses of categorical propositions resulting in the invalidation by quantification theory of the Square of Opposition and several syllogistic forms were no longer regarded by these logicians as revelations of mistakes of an antiquated theory in the light of a better, new theory, but rather as adding to the growing evidence against the capability of quantification theory to represent natural language reasonings.[6]

II. THE SPLITTING UP OF THE PARADIGM

As a matter of course, all the above-mentioned troubles occasioned several new developments providing more or less conservative extensions of, or more or less radical departures from the usual construction of quantification theory.

Richard Montague's grammar and intensional logic may be regarded as answers to the challenge posed by mismatch of syntax and intensional contexts.[7] Generalized quantification theory, taking a cue from Montague, is intended to cope with the troubles caused by "pleonotetic" determiners and common noun phrases of natural languages in general.[8] Donkey sentences provided the main motivation for discourse representation semantics.[9] Also several efforts have been made to construct systems in keeping with some basic principles of traditional logic that would match in power the resources of quantification theory.[10] Game theoretical semantics tries to take an entirely fresh look at questions of natural language semantics in general.[11] Situation semantics, beyond trying to provide answers to all semantic troubles of classical quantification theory and intensional logic, intends to account also for pragmatic aspects of communication within the framework of a general theory of meaning and information.[12] There are even attempts at breaking with extensionalism and set theory in logic in general, by constructing intensional logics with an avowedly platonistic ontology claimed to be the most fitting model for handling intensional and intentional contexts of natural languages.[13]

So what we experience nowadays in formal semantics may be described in Kuhnian terms as the splitting up of an old paradigm in consequence of the accumulation of its unsolved puzzles and a search for new unifying perspectives.

Historically, in such and similar situations scholars tend to seek for exemplars from earlier paradigms: as is well-known, the Copernican revolution was almost as much prompted by Copernicus's sympathies with pre-Aristotelian, Platonic and Pythagorean cosmological ideas as by his calculations.

To be sure, such historical examples alone in our case would by no means justify more than mere historical interest in traditional logic.[14] After all, even if quantification theory has its own problems in its application to natural language semantics, it has sufficiently proved its superiority over traditional logic in its capacity to handle inferences involving relational expressions and multiply quantified sentences like the following:

1. A man sees every horse
2. A horse of the king is a horse

---

3. Thus, a man sees a horse of the king

Now I think that the mediaeval flavour of the example, familiar to many at least from Umberto Eco's best-seller, *The Name of the Rose*, already suggests my intention to raise certain doubts concerning the usually unquestioned superiority of quantification theory in these matters.

As a matter of fact, the example derives from Jean Buridan's *Tract on Suppositions*,[15] where the famous 14th-century master is not at all at a loss to account for the validity of this inference in terms of the mediaeval theory of reference, the theory of supposition. Indeed, supposition theory is only one, although unquestionably the most important one, of those highly sophisticated, peculiarly mediaeval semantic theories that place mediaeval logic high above the relatively shallow standards of the so-called traditional logic of the last century, recently eliciting an ever growing appreciation of the achievements of mediaevals among contemporary scholars.[16] The increasing contemporary interest in supposition theory is amply testified by the proliferation of both historical and systematic studies on this theory, as well as of its reconstructions in terms of, or comparisons with modern logic.[17] As far as I know, however, thus far nobody has tried to *use* supposition theory as what in my view it was really meant to be: namely (at least a starting point of) a unified theory of reference in natural languages.[18] Now my intention is to do precisely this in the rest of this paper.

III. COMMON PERSONAL SUPPOSITION AND SUPPOSITIONAL DESCENTS

Supposition theory, as it appears in mediaeval logic textbooks from the 12th century up to the 17th, usually begins with a series of definitions and divisions exhibiting sometimes considerable variations from author to author, or even explicit disagreements among the authors. So, properly speaking, there are several theories of supposition held together by a common phraseology, a common stock of background assumptions rooting mainly in Aristotelian metaphysics, psychology and epistemology, and a common intention to give a unified account of the referring function of terms in widely different contexts. For our present purposes, however, these various teachings possess a sufficient unity, so that I shall treat supposition theory rather indistinctly, even at the risk of some slight historical incorrectness to be noted when necessary. I base my treatment mainly on the accounts given by William Ockham and Jean Buridan, the two most influential authors in late mediaeval logic. Nevertheless, most of what I will say applies quite well to mediaeval authors of logic texts in general.

Supposition was commonly characterized by our authors as a property of terms in propositions, namely the taking of a term for something in a proposition, that is, as *we* would put it, its referring function. Generally three main types of supposition were distinguished: 1. material, when the term in a proposition stands for itself (or for some other token-term of the same type), like the term 'man' in the proposition 'man is a noun', 2. simple, when the term stands for a universal, whatever a universal is, like 'man' in 'man is a species' and 3. personal, when the term is taken for those things upon which it is imposed, and of which, consequently, it is truly predicated.

Personal supposition was commonly divided further into discrete and common supposition. Discrete supposition is the referring function of singular terms, which, by reason of their meaning can be truly predicated only of one thing. Examples of this type are proper nouns, say 'Socrates', or common terms combined with demonstrative pronouns like 'this man' or 'this horse', pointing at a particular man or a particular horse. Common personal supposition is the referring function of common terms in propositions, which, by reason of their meaning, can be truly predicated of many particular things, like 'man' or 'horse'.[19]

Now common personal supposition was divided further according to the different manners in which common terms may refer in different propositional contexts. These different manners, and correspondingly the different subdivisions of common personal supposition, were characterized by late mediaeval logicians by so-called suppositional descents, *descensus ad inferiora*; that is to say, by certain types of inferences in which the common term, of which the mode of supposition is being characterized, is replaced by singular terms falling under it, appearing in either nominal or propositional conjunctions or disjunctions. These several types of conjunctions and disjunctions of singular terms, or of propositions formed with these singular terms, served then both to characterize the mode of supposition of the original common term under which the descent was made and to give the truth conditions of quantified sentences in terms of the truth or falsity of several singular ones. The main divisions of common personal supposition may be given as follows:

1. Determinate supposition

1.a. Some *man* is an animal, therefore this man is an animal or that man is an animal or ..., and so on for every man, and also the converse ascent holds.

2.b. Some man is an *animal*, therefore some man is this animal or some man is that animal or ... and so on for every animal, and also conversely.

2. Confused and distributive supposition

2.a. Every *man* is an animal, therefore this man is an animal and that man is an animal and ... and so on for every man, and also conversely.

2.b. Some man is not an *animal*, therefore some man is not this animal and some man is not that animal ... and so on for every animal, but not conversely.[20]

3. Merely confused supposition

3.a. Every man is an *animal*, therefore every man is this animal or that animal or ... and so on for every animal, and also conversely, *but not*

3.b. ... therefore every man is this animal or every man is that animal or ... and so on for every animal.

Some later schoolmen also added a fourth mode of supposition:[21]

4. Suppositio copulatim

4.a. Some man is not an *animal*, therefore some man is not this animal and that animal and ... and so on for every animal,
and also conversely,

4.b. Some man is not this animal and that animal and ... and so on for every animal, therefore some man is not an *animal*.

That is to say, a term has determinate supposition in a proposition if one can descend under it to the singulars with a disjunctive proposition and conversely. A term has confused and distributive supposition, if one can descend under it by a conjunction of singular propositions, and conversely (with the exception of the controversial case of 2.b., of which, however, see n.26. below). A term has merely confused supposition, if one can descend under it with a proposition with a disjunct term (and conversely) but one cannot do the same by a disjunctive proposition. Finally, a term has copulative supposition if one can descend under it by a proposition with a conjunct term and also, conversely, one can ascend from this proposition to the original one, but the same cannot be done with a conjunctive proposition.[22]

I think there are two things that should strike the modern logician in these descents: the first is their suggesting the idea of restricted quantification, and the second is the problem whether in some sense they give a complete set of truth-conditions for categorical sentences. Let me elaborate on these points.

IV. COMMON TERMS AS RESTRICTED VARIABLES

I think the idea of replacing a common term by a series of demonstratives in these descents should remind a modern logician of the way variables of quantification theory pick up their values from the domain of a model. Indeed, we might even say that the several assignments of values of a variable may be conceived as several acts of pointing at several individuals, thereby associating a variable with these individuals. In this way, we may explain the

function of a variable in different assignments as that of a demonstrative pronoun in different acts of pointing at a thing. So, for example, the formula representing the sentence: 'Every man is an animal', namely the one which reads 'For every x, if x is a man then x is an animal' $((\forall x)(Mx \ -> Ax))$ may be explained as saying: this thing, if it is a man, then it is an animal and that thing, if it is a man, then it is an animal ... and so on, pointing at each and every thing in the world. And this explanation of the quantificational formula, in comparison with the suppositional descents presented above, shows us immediately the basic difference between the mediaeval and the modern approach: while the variables of quantification theory range over all the objects of the universe, the common terms of mediaeval logic range only over objects falling within their extension: that is, they function as restricted variables.

Now since common terms as restricted variables pick up their values from their extension, the question naturally arises: what is their value when their extension is empty? Well, the answer is quite simple: nothing. For a value, that is, a suppositum of a term in a proposition, according to the mediaevals, is a thing of which, when pointed at, the term is truly predicable by means of the copula of the proposition.[23] For example, the term 'centaur' in the proposition: 'Every centaur is running' refers to nothing, for whatever is pointed at we cannot truly say: 'This is a centaur'. But so even the singular terms: 'This centaur' or 'That centaur' refer to nothing, and thus, all the singular propositions formed with them, like 'This centaur is running' and 'That centaur is running' are false, in the same way as Russell's 'The present King of France is bald' is false. But in this way even the universal proposition: 'Every centaur is running' must be false, since all the singulars to which we can descend from it and from which we can ascend to it are false. So we can easily understand why the mediaevals attributed existential import to universal affirmatives, and why they held the relations among categorical propositions to be those determined by the Square of Opposition.

Now as I have shown in some of my earlier papers, we can give formal expression to these informal ideas by a rather conservative extension of standard quantification theory. All we have to do is the following:

1. we have to add restricted variables to the language of the theory, that is, terms formed from open sentences by the following rule: if v is a variable and A is a formula in which v occurs free, then 'v.A' is a term,

2. we have to extend the definition of assignment to these terms so that they pick up individuals as their values of which their matrix is true, and nothing, that is, a zero-entity, if their matrix is true of nothing, by the following clause: $f(v.A)=f(v)$ if $f(A)=1$, otherwise $f(v.A)=0$, where 0 falls outside the domain of the model, and

3. we have to adjust the clause determining the value of a quantified formula in an assignment as follows: $f((Qv.A)(B))=1$ iff for Q'u (u being an element of $RG_f(v.A)$), $f[v.A:u](B)=1$, where Q' is the natural language equivalent of Q, and $RG_f(v.A)$, the range of v.A with respect to f, is either identical with the extension of A with respect to v and f, if it is not empty, or is a set containing the zero-entity alone, if this extension is empty.

With these clauses added to a standard construction of quantification theory we get a powerful system, which, beyond restituting the Square of Opposition and all the syllogistic forms previously invalidated by quantification theory, is able to handle problems caused by complex noun phrases with relative clauses using any types of determiners and the problems caused by anaphoric pronouns in 'donkey-sentences' in perfect accordance with what the mediaevals said concerning the supposition of relative pronouns.[24]

If we also add terms representing common terms combined with demonstratives and interpret them relative to an index function (modelling the acts of pointing at different objects) we can provide faithful representations of the above descents. Indeed, it can be shown that these descents along with the corresponding ascents give the correct truth conditions of the corresponding quantified formulae (except for the much debated case of 2.b., but this is why we need the addition of 4.)[25] And this remark leads us to the other point I mentioned above, the problem of the completeness of suppositional descents.

V. THE COMPLETENESS OF DESCENTS

If we examine carefully the above descents, then we can see that they are basically of four kinds. Two of them lead to conjunctive and disjunctive propositions, while two of them lead to propositions with conjunctive and disjunctive terms. The conjunctive forms result from what we would call universally quantified terms, while the disjunctive forms from existentially quantified ones. The difference between the propositional and the term-descents, as can be seen, is that of scope: if the quantifier binding the term under which the descent is made has wider scope than the quantifier binding the other term, then the descent is propositional, if, however this quantifier has narrower scope than the other, then the descent is to be made to a proposition with a disjunctive or conjunctive term.[26] Schematically, if x and y are variables ranging over some countable domain, that is, from the point of view of supposition theory, variables representing terms of universal extension,[27] related by a relation R and Arabic numerals are names of individuals of the domain, we have the following four cases:

$$
\begin{aligned}
&(1)\ (Ex)(\forall y)(R(x)(y)) <=> (\forall y)(R(1)(y))\mathrm{v}(\forall y)(R(2)(y))\mathrm{v}\ldots\\
&(2)\ (\forall y)(Ex)(R(y)(x)) <=> (Ex)(R(1)(x))\&(Ex)(R(2)(x))\&\ldots\\
&(3)\ (\forall y)(Ex)(R(y)(x)) <=> (\forall y)(R(y)(1\mathrm{v}2\mathrm{v}\ldots))\\
&(4)\ (Ex)(\forall y)(R(x)(y)) <=> (Ex)(R(x)(1\&2\&\ldots))
\end{aligned}
$$

To be sure, for a correct incorporation of these equivalences into a formal theory we should interpret the formula schemata standing on the right side of these equivalences as standing for formulae with an appropriate number of conjuncts and disjuncts that are materially equivalent to the left hand side formulae in particular models. (Of course, using restricted variables in the proper sense, this appropriate number will be the cardinality of their range in the given model.)[28] But if we do give this interpretation, then these equivalences provably hold. Now given the mediaeval logical-grammatical analysis of categoricals as consisting of two terms prefixed by an explicit or implicit universal or particular determiner joined by the copula (interpreted by late

mediaevals as expressing identity), these equivalences provide complete truth conditions for any conceivable categorical sentence. And note here that apparent counterexamples with verbal predicates were explained away by analysing verbs into copula and participle, and that the two terms were conceived to be of any complexity possibly involving relative clauses of any sentential complexity, so this conception involves a large class of natural language sentences indeed.

So far, so good, one might say, but, despite my sweeping claim about the possible fundamental role of supposition theory, all I have done thus far was not so much using supposition theory as a foundation of a unified theory of reference, as using it as an informal motivation for a particular sort of restricted quantification theory and using this formal theory for a (rather sketchy) reconstruction of suppositional descents. So instead of using the horse to pull the car, I fixed the car to pull the horse (admittedly, taking tips from the horse).

Well, I accept this criticism regarding what I have said thus far, so to substantiate my claim let me show now where I think suppositional descents may, indeed should, have priority over restricted quantification, for the reason that they can serve as explanations for the behaviour of certain common noun phrases much better than the idea of restricted quantification. Indeed, I wish to show how common noun phrases as restricted quantifiers can be interpreted as special cases of such descended forms, and why this interpretation is preferable particularly with regard to two special contexts: namely the context of intentional verbs and the context of numerically quantified ambiguous sentences.

VI. COMMON NOUN PHRASES AND INTENTIONAL VERBS

Consider the following sentence: 'I owe you a horse'. According to one of its possible interpretations, this sentence is true even if no horse is such that I owe it to you - namely, when my obligation does not concern some particular horse (possibly specified by name or description in a contract), but only a horse in general, that is, any horse whatever.[29] However, if we try to formalize this sentence in quantification theory, whether we use restricted or unrestricted quantification, we cannot give the correct truth conditions for this interpretation. (For (Ex)(Hx & O(a)(x)(b), would read like this: 'Something is a horse and I owe it to you', while (Ex.Hx)(O(a)(x.Hx)(b)) like this: 'Some horse is such that I owe it to you', which are clearly not equivalent to the intended interpretation. 'x.Hx' is a restricted variable picking up its values from the extension of 'Hx' in a model. Cf. my papers referred to in nn. 24. and 25.) Notice that with this example it would be highly unintuitive to try something similar to Montague's trick with 'John seeks a unicorn', analysing it essentially in terms of 'John tries to find a unicorn', since for this sentence there seems to be no obvious paraphrase of this kind, and, in any case, even if there were such a paraphrase, the formal analysis would apply only to the exponent sentence, leaving the semantic function of the problematic noun phrase in the original unexplained.[30]

Mediaeval logicians, instead of trying to avoid accounting for the semantics of this sentence by paraphrasing it away in terms of "easier" ones, faced directly the problem in terms of supposition theory. As a matter of fact, the equivalent of the above sentence receives extensive treatment by Buridan in his *Sophismata*, while Ockham in his *Summa Logicae* discusses at some length the supposition of 'horse' in a similar sentence: 'I promise you a horse'.[31] In his discussion Ockham writes as follows:

> ... we have to say that propositions like this: 'a horse is promised to you', 'twenty pounds are owed to you', according to their proper meaning are false, because any of the singulars is false, as is clear inductively. However, if their terms like these are placed on the part of their predicate, they can be conceded in a sense. And then we have to say that the terms following these verbs, in virtue of these verbs have merely confused supposition, and so we cannot descend to the singulars by a disjunctive proposition, but only by a disjunct predicate, enumerating not only present things, but also future ones. So this is not a valid inference: 'I promise you a horse, therefore I promise you this horse or I promise you this horse and so on ... So we have to know that in such a proposition ... the common term in question does not supposit determinately, taking 'suppositing' in the sense in which also a part of an extreme can supposit, that is, you cannot descend under that term to the singulars by a disjunctive proposition, but only by a proposition with a disjunct extreme, or a disjunct part of an extreme.[32]

Now comparing Ockham's analysis with the descent schemata above we can clearly see why we have troubles with these propositions in a quantificational approach: a term having merely confused supposition, in (restricted) quantification theory is like a quantified variable bound by a narrow scope existential quantifier; but in this case the quantifier binding (the restricted variable representing) the term 'horse' should have narrower scope even than the verb, indeed, the quantifier should not get out of the argument place of the verb, which is impossible already for mere syntactic reasons in any sort of quantification theory.

Indeed, the same is shown further if we consider the sentence 'I owe you two horses', which, in the vein of Ockham's above analysis, is clearly not equivalent to 'Two horses are such that I owe them to you', which, however, is the only possible reading of the corresponding quantified formula. ('(2x.Hx)(O(a)(x.Hx)(b))')

On the other hand, 'I owe you a horse' seems to be intuitively clearly equivalent to 'I owe you this horse or that horse and so on' without being equivalent to 'I owe you this horse or I owe you that horse and so on'.

Again, 'I owe you two horses' seems to be equivalent in the same way to 'I owe you this horse and that horse or that one and that one and so on' without being equivalent to 'I owe you this horse and that horse or I owe you that one and that one and so on'.

So in this case (a generalized form of) Ockham's account seems to be clearly preferable to a quantificational account, provided that we are able to explain why and how these verbs cause merely confused supposition in contradistinction to other, extensional verbs, and that we can supply a working semantics for the nominal disjunctions and conjunctions involved. So let me turn to these topics.

VII. BURIDAN'S APPELLATIO RATIONIS

In his treatment of intentional verbs, Buridan explains the peculiarities of these verbs in the framework of his theory of appellation, which may be characterized roughly as a general theory of connotation.[33] However, without going into the details of this otherwise highly interesting doctrine, let me deal here only with that part of it which concerns the context of intentional verbs. According to Buridan, the peculiarity of these verbs is that they make the terms following them connote their *rationes*, i.e., the concepts according to which they signify external things.[34]

In some of my earlier papers I made a proposal concerning how an exact reconstruction of Buridan's concepts or *rationes* can be given within the framework of a general formal semantics, so that we shall have no troubles in the identification of concepts in a semantic model. But lack of space does not allow me to elaborate this proposal here.[35] Nevertheless, whatever we take Buridan's *rationes* really to be, it is quite clear that insofar as we are able to identify them and correctly distinguish them from one another, they may present a good explanation for the peculiar behaviour of noun phrases in the context of intentional verbs.

For if we suppose that we give an account of these *rationes* according to which the term 'horse' and the disjunct term 'this horse or that horse or ...' (giving a complete enumeration of horses including even future ones, as Ockham said) have the same *ratio*, while all the singular terms of these disjunctions have different *rationes*, and we determine the truth conditions of sentences with intentional verbs so that they should depend also on these *rationes*, then clearly, substituting the complete disjunction for the term following such a verb will not affect the truth value of the proposition, while substituting any of the singulars will. But it is precisely substitutions of these kinds that we make in the different descents: when we descend from 'I owe you a horse' to 'I owe you this horse or that horse and so on' (giving complete enumeration), we substitute for 'horse' a term with the same *ratio*, so this substitution preserves truth value, consequently the inference is valid; however, when we descend to 'I owe you this horse or I owe you that horse and so on' in each member of this disjunction 'horse' is replaced by a term with a different *ratio*, so each member of the disjunction may be false while the premise is true, whence the consequence is not valid, just as Ockham said.[36]

However, to complicate matters, at one place Buridan does not allow descent even to a proposition with a disjunct term, because he probably does not take the *ratio* of this term to be identical with that of the original one.[37] On the other hand, contrary to Ockham, he allows the inference from 'I owe you a horse' to 'A horse is such that I owe it to you', indeed, to 'Every horse is such that I owe it to you' for the reason that through the general concept of 'horse' my obligation is related to every particular horse, which, however, does not imply that I have to give you every particular horse.[38]

But this difference between their particular intuitions and decisions on this matter notwithstanding, Buridan's theory, as we could see, can be used to explain even Ockham's rules. And even further, if we took sides with Ockham, we could explain even the apparent validity of the passage from 'I owe you two horses' to 'I owe you this horse and that horse or that one and that one and so on' (giving a complete enumeration of all pairs of horses) without committing ourselves to the truth of 'Two horses are such that I owe them to you', or 'I owe you this horse and that horse or I owe you that horse and that horse, and so on', provided we would work out an account of the *rationes* of the noun phrases involved parallel to the above case. But without going into the technical problems of assigning the appropriate *rationes* to these noun phrases, one thing may be interesting in these descents even regarding other contexts, namely the analysis of a numerical quantifier in terms of a disjunction of conjunctions. So let us turn now to this topic.

VIII. AMBIGUOUS SENTENCES WITH NUMERICAL QUANTIFIERS

Recently several papers appeared that were addressed to the problems involved in the analysis of numerically quantified ambiguous sentences like 'Two examiners marked six scripts'.[39] In this section I only try to indicate very briefly how I think a generalized theory of suppositional descents could provide a unified framework for handling sentences of this kind.

The basic idea can be put in one sentence as follows: we can treat all common noun phrases with numerical determiners as nominal disjunctions of nominal conjunctions having as many members as the cardinality of the numerical determiner, while we can determine scope relations by allowing further descents to disjunctive and conjunctive propositions. Semantically, we can determine the import of such a complex nominal phrase by saying that a complex predicable is true of a nominal disjunction if and only if it is true of at least one of its members, while it is true of a nominal conjunction, if and only if it is true of each of its members. But this latter holds only of the distributive reading of nominal conjunctions: further ambiguities can be accounted for by distinguishing between distributive, collective and divisive readings of nominal conjunctions, or rather of argument places of predicates in which these conjunctions occur, just as the mediaevals did.[40] In this way from the general nominal descent scheme of an ambiguous numerically quantified sentence we can get specifications of its possible readings by the further possible propositional descents and these distinctions.

So e.g. the general nominal descent scheme of 'Two examiners marked six scripts' may be given as follows:

$$(e_1\&e_2 \vee ...)M(s_1\&s_2\&s_3\&s_4\&s_5\&s_6 \vee ...)$$

or, in general, for any terms S and P, and any relation R,

$$(s_i\&s_j... \vee s_k\&s_l...)R(p_m\&p_n... \vee p_o\&p_q...)$$

where the number of conjuncts is that of the numerical determiner, the range of the numerical subscripts relative to a model is identical with the cardinality of the extensions of the original terms (in our example the terms: 'examiner' and 'script') in that model, while the number of disjuncts is to be such that the set of referents of the singular terms should be identical with the extension of the original common term in this model, if the set of singular

terms occurring in the conjunctions varies from disjunct to disjunct, and arbitrary, if the same set of terms makes up the conjunctions in each disjunct. Indeed, we may take this as a degenerate case, and take here a one-member disjunction instead of one with several members, that is, one conjunction alone. As a matter of fact, this treatment of degenerate cases shows us that noun phrases with the ordinary quantifiers can be regarded as degenerate cases of the above general scheme. A universally quantified noun phrase may be regarded as a one-member disjunction of conjunctions in which all members are different and their referents together exhaust the extension of the quantified term. An existentially quantified noun phrase may be regarded as a disjunction of one-member conjunctions (that is conjunctions with the same members), but such that the referents of the disjuncts are different, and together exhaustive of the extension of the quantified term. I think it is easy to see how several other determined noun phrases of natural languages could be defined along these lines, but I do not want to linger on this point here. Instead, I would like to indicate how we can get from the above general nominal descent scheme the possible different readings of the same ambiguous sentence.

As we could see from the four types of descent schemata (1)-(4) above, descent to propositional disjunctions and conjunctions expresses the larger scope of a noun phrase in comparison with descent with nominal conjunctions and disjunctions. So descending to disjunctive propositions once under the left and once under the right side argument of M gives us two scope-differentiated readings of the restricted quantifier analysis of 'Two examiners marked six scripts', satisfiable either by a situation possibly involving two examiners and twelve scripts, each of them being marked by one of the examiners, or by a situation involving six scripts and twelve examiners each of the scripts being marked by two examiners and each examiner marking exactly one script.

However, we can descend by disjunctive propositions also on both sides, so that neither of the noun phrases of the original sentence gets wider scope than the other like this: 'this and that examiner marked this and that and so on, that is, *these* six scripts, or that and that examiner marked *those* six scripts, and so on', in which case our sentence says that we have some set of two examiners and some set of six scripts each of which was marked by each of the examiners, which is the branching quantifier reading of this sentence.

But we can get even further possible readings if we consider the collective and divisive interpretations of nominal conjunctions, or rather of argument places of predicables in which these conjunctions occur, as I have said. For, as is well-known, certain predicables can apply only to groups of individuals without applying to the members of these groups. For example, even if we can truly say that six wolves surrounded two deer, it is not true of any of these wolves that it surrounded two deer, or for that matter, any number of deer. So in this case we cannot think of the predicable 'surrounded two deer' as applying to the conjunction enumerating six wolves if and only if it applies to all of its members, but as applying to what the conjunction as a whole applies to, namely the six wolves enumerated by it together. In general, we can say that a predicable is true of a nominal conjunction taken collectively if and only if it is true of what the conjunction as a whole applies to, namely of the collection of the individuals enumerated in the conjunction. Note here that while the first argument place of 'surrounded' is necessarily collective, the other may be taken either as collective or as distributive. In the latter case the sentence 'Six wolves surrounded two deer' may be true in a situation in which one deer is surrounded by six wolves and another by other six wolves.

But it may also be the case that six wolves so surround two deer that three of them surrounds one deer and the other three the other one. In this case neither six wolves taken one by one, nor six wolves taken together can be said to have surrounded two deer, rather we can say that some subgroups of a sum total of six wolves surrounded a sum total of two deer. In general, we can say that if we attribute divisive readings to the two argument places of the relation R, then the truth condition of (the particular formula instantiating in a particular model) the general descent scheme of a sentence (NS)R(MP) is that there be some together exhaustive subconjunctions of some of the N-member and M-member conjunctions of (the formula instantiating in that model) the general scheme such that R holds of all of these subconjunctions either collectively or distributively. For example, on a divisive reading of 'Twelve wolves surrounded three deer' this sentence may be true in a situation in which, say, six wolves surrounded one deer and six others surrounded two other deer.

So in this way from the general nominal descent scheme of a numerically quantified ambiguous sentence by means of the further possible propositional descents and by distinguishing the three possible readings of nominal conjunctions we can generate apparently all possible readings of these sentences. We could also see how sentences with the ordinary quantifiers and possibly also with others can be regarded as special cases of these general descent schemata. We could even see how these descents might work in the thorniest intentional contexts. I think it is also quite easy to imagine how, with reference to the divisive readings of nominal conjunctions, these descent schemata could account for plurals. So I hope by now it seems not so exaggerated to claim that the theory of suppositional descents may indeed serve at least as a starting point of a unified theory of reference in natural languages. But further elaboration of this claim would exceed the limits of this paper.

IX. CONCLUSION

In the first two sections I presented the state of our art as characterizable in terms of the crumbling of an old paradigm in view of the accumulation of anomalies and, at the same time, by a quest for new unifying perspectives. I took justification from this description for seeking different new orientations, occasionally with a view to old exemplars. I repelled an objection to seeking our historical exemplars in traditional logic by pointing to the enormous difference between the traditional logic of last century logic textbooks and that of the mediaeval masters of logic. Making reference to the growing contemporary interest in the mediaeval theory of supposition, I set out to show how in my view this theory could be used also in modern logico-linguistic research as what it was originally meant to be, as a foundation of a unified theory of reference in natural languages. After a brief presentation of the basic definitions and divisions, I pointed out the fundamental agreement of the doctrine of suppositional descents with the idea of a particular sort of restricted quantification. I even sketched how the theory of descents can be reconstructed, and how the completeness of descents in giving the truth conditions of categorical sentences with complex noun phrases can be shown within the framework of such a restricted quantification theory. Then I tried to show that rather than using restricted quantification to explain suppositional descents, we should use descents to explain the behaviour of common noun phrases both in cases in which the quantifier analysis works and in those in which it fails. I selected as test cases the contexts of intentional verbs and those of numerically quantified ambiguous sentences. In the former case I argued that the quantificational analysis should fail of necessity, already for mere syntactical reasons. Then I indicated that Ockham's analysis of these contexts supplemented with Buridan's theory of appellation may give satisfactory results, and may even explain the opposing intuitions of the two authors. However, instead of trying to elaborate here the technical details of appellation theory, I turned to the analysis of numerically quantified sentences in terms of suppositional descents. I tried to show how common noun phrases may be regarded as nominal disjunctions of nominal conjunctions of singular terms in general, and so how the common noun phrases with the usual quantifiers may be regarded as special (degenerate) cases of these nominal disjunctions of conjunctions. I have also made proposals as to the semantic import of these nominal disjunctions and conjunctions in determining the truth conditions of sentences in which they occur, indicating a threefold distinction of the possible readings of nominal conjunctions. Then I tried to show how the several possible readings of a numerically quantified ambiguous sentence may be generated from such a general nominal descent scheme by further possible propositional descents and by making use of the distinctions between the possible readings of nominal conjunctions. I have also remarked that the divisive readings of nominal conjunctions may be useful in the analysis of plurals.

Of course, several claims I made could not receive appropriate treatment within the confines of this paper. Most importantly, I think the following points need further elaboration:

1. an account of Buridan's *appellatio rationis*, which would allow us to explain the peculiarities of the possible descents under common terms in the context of intentional verbs
2. a systematic account of the semantics of nominal conjunctions and disjunctions in general
3. an account of plurals in terms of the divisive reading of nominal conjunctions

The general semantic framework for the elaboration of these points may be, I think, also classical model theoretical semantics. But it is also a tempting idea to regard the several possible descents under common terms in several contexts as describing particular semantic games for the evaluation of a sentence in which these terms occur in a particular model. So from this point of view it seems that a combination of the theory of suppositional descents with game theoretical semantics may provide even more interesting results.[41]

NOTES

[1] G. Boolos: "To Be Is To Be a Value of a Variable (or To Be Some Value of Some Variable)", *The Journal of Philosophy*, 8(1984), pp.430-431.

[2] Indeed, this distinction renders mismatch of syntax the rationale of an interesting research program for linguists: if quantification theory expresses logical form, i.e., deep structure of natural language sentences, then the task of linguistic research may appear to be to reveal the intricate connections between surface and deep structures in particular languages. Cf. e.g. G. Englebretsen: "Logical Form and Natural Syntax", *Indian Philosophical Quarterly*, 11(1984), pp.229-254. What is more, logical form may provide means to distinguish among several senses of crucial concepts hidden by grammatical form, such as the several senses of 'to be'. For discussions of Frege's "ambiguity thesis" in a historical context cf. J. Hintikka-S. Knuuttila: *The Logic of Being*, Helsinki, 1986.

[3] For proof see J. Barwise & R. Cooper: "Generalized Quantifiers and Natural Language", *Linguistics and Philosophy*, 4(1981), pp.159-219.

[4] See e.g. G. Evans: "Pronouns, Quantifiers and Relative Clauses" and "Appendix", *Canadian Journal of Philosophy* 7(1977) pp.467-536. and pp.777-796., B. Richards: "On Interpreting Pronouns", *Linguistics and Philosophy*, 7(1984), pp.287-324.

[5] Cf. D. Lewis: "General Semantics", in: B. Partee: *Montague Grammar*, New York-San Francisco-London, 1976.

[6] Cf. D.P. Henry: *Mediaeval Logic and Metaphysics*, London, 1972; D.P. Henry: *That Most Subtle Question - (Quaestio Subtilissima): The Metaphysical Bearing of Medieval and Contemporary Linguistic Disciplines*, Manchester, 1984; F. Sommers: *The Logic of Natural Languages*, Oxford, 1982; G. Englebretsen: "The Square of Opposition", *Notre Dame Journal of Formal Logic*, 17(1976), pp.531-541.

[7] R. Montague: "The Proper Treatment of Quantification in Ordinary English", in: J. Hintikka-J. Moravcsik-P. Suppes: *Approaches to Natural Language*, Dordrecht, 1973.

[8] Cf. J. van Benthem-A. ter Meulen: *Generalized Quantifiers in Natural Language*, Foris Publications, 1985.

[9] See H. Kamp: "A Theory of Truth and Semantic Representation", in: J. Groenendijk et. al. eds.: *Formal Methods in the Study of Language*, Amsterdam, 1981.

[10] As two main attempts in this direction, Lesniewski's Ontology and Fred Sommers' term logic should be mentioned here.

[11] See e.g. J. Hintikka: *Logic, Language-Games and Information*, Oxford, 1973.

[12] J.Barwise-J.Perry: *Situations and Attitudes*, The MIT Press, 1983.

[13] G. Bealer: *Quality and Concept*, Oxford, 1982.

[14] On the other hand, I think quite good general motivation could be taken from the "natural logic" character of mediaeval logic, in the sense of G. Lakoff: "Linguistics and Natural Logic", in: D. Davidson-G. Harmann: *Semantics of Natural Language*, Dordrecht, 1972. For an excellent discussion of mediaeval logic from this point of view see: A. de Libera: "La Logique du Moyen Age comme Logique Naturelle (Sprachlogik)", in: B. Mojsisch: *Sprachphilosophie in Antike und Mittelalter*, Amsterdam, 1986. Nevertheless, I do not wish to pursue this line here. Instead, I am going simply to try to *show* this character of the mediaeval approach.

[15] Buridanus: *Tractatus de Suppositionibus* (ed. Maria Elena Reina), *Rivista Critica di Storia della Filosofia*, 1957, pp.177-208. and pp.323-352; see pp.191-195.

[16] Characteristic of this attitude is the following short evaluation of Buridan's philosophy from Peter King's Introduction to his translation of two logical tracts by Buridan: "Buridan's mediaeval voice speaks directly to modern concerns: the attempt to create a genuinely nominalistic semantics; paradoxes of self-reference; the nature of inferential connections; canonical language; meaning and reference; the theory of valid argument. It is to be hoped that Buridan can reclaim his lost reputation among contemporary philosophers for his penetrating and incisive views on these and other matters." P. King: *Jean Buridan's Logic*, D. Reidel Publishing Company, 1985. p.4.

[17] For good bibliographies on the topic see N. Kretzmann-J. Pinborg-A. Kenny: *The Cambridge History of Later Mediaeval Philosophy*, Cambridge, 1982; E.J. Ashworth: *The Tradition of Mediaeval Logic and Speculative Grammar*, Toronto, 1978.

[18] This characterization of supposition theory, which among several other attempted characterizations I find the most fitting one, comes from J. Ashworth. Cf. her "Promitto tibi equum", *Vivarium*, 16(1976), pp.62-78. For a similar account with good theoretical and textual support see also G. Priest-S. Read: "Merely Confused Supposition: A Theoretical Advance or a Mere Confusion?", *Franciscan Studies*, 40(1980), pp.265-297.

[19] The addition 'by reason of their meaning' in the characterization of singular vs. common terms is needed for the reason that it may well be the case that a proper noun is predicated of many, but only when used equivocally, being imposed upon different persons. It may also be the case that a common term can be predicated only of one thing because there can be only one thing of its kind. Nevertheless, this occurs not due to the meaning of the term, but because of the nature of the thing, like in the case of the term 'God'. So this determination is added for the exclusion of such apparent exceptions. Cf. Albert of Saxony: *Perutilis Logica*, Hildesheim-New York, 1974. c.X.4d.

[20] Concerning the development of the role of the converse ascents in supposition theory and, in general, the problems involved in the requirement to descend to an equivalent proposition see the excellent discussion in G. Priest-S. Read: "Merely Confused Supposition: A Theoretical Advance or a Mere Confusion?", *Franciscan Studies*, 40(1980), pp.265-297. For a good summary of the arguments against presenting supposition theory as a sort of quantification theory, giving the truth conditions of quantified sentences in terms of descents, precisely on account of the failure of ascents see M. McCord Adams: *William Ockham*, Notre Dame, 1987, pp.367-377. Adams' alternative proposal is that "the divisions of common personal supposition are not the means to the end of giving a contextual definition of quantifiers nor for stating the truth conditions for propositions containing quantified general terms; rather the divisions of supposition generally were marshalled into service for the task of identifying fallacies". op. cit. p.382. To be sure, the development of supposition theory from its very origins was motivated by the need to detect fallacies, as it was convincingly shown by L.M. de Rijk: *Logica Modernorum*, I-II. Assen, 1967. Nevertheless, it may be argued that the need for fallacy detection developed also a relatively independent interest in the referring function of terms in general, which, during the development of supposition theory, evolved, among other things, the explicit requirement of analysing quantified sentences in terms of equivalent descended forms, as we can clearly see this in such later authors as e.g. Paul of Venice. (Cf. his *Logica Magna*, tr.2, ed. A.R. Perreiah, St. Bonaventure, 1971.) However, without going into the debate concerning its real historical role and purpose, let me propose as a "conciliatory characterization" of supposition theory the following: supposition theory is (aimed to be) a unified theory of reference with the original intent of fallacy detection, in its most mature form having the capability of giving (as I shall argue) a complete set of truth conditions for quantified sentences in terms of equivalent descended propositions. It is this inherent capability that I wish to develop in this paper.

[21] See G. Priest-S. Read, op. cit., esp. pp.289-295.

[22] To be sure, this characterization of this mode as such cannot be found in the authors. (Cf. however Paul of Venice op. cit. pp. 90-92.) Nevertheless, considerations of completeness to

be discussed below seem to require it. Cf. n.25. As for the implicational order of these modes, see again Priest-Read, op. cit.

[23] Cf. e.g. Buridan: *Sophismata*, ed. T.K. Scott, Stuttgard-Bad Cannstatt, 1977, p.50.; Marsilius de Inghen: *Treatises on the Properties of Terms*, Dordrecht-London-Lancaster, 1983, p.52.

[24] See "General Terms in their Referring Function" in my *Ars Artium: Essays in Philosophical Semantics, Mediaeval and Modern*, Budapest, 1988.

[25] See "The Square of Opposition, Common Personal Supposition and the Identity Theory of Predication within Quantification Theory" in the collection of my papers mentioned in the preceding footnote.

[26] As a matter of fact, this understanding of the difference between nominal and propositional descents, as expressing scope relations of quantified terms, gives also a clue to resolving the notorious problem of attributing confused and distributive supposition to predicates of O-propositions, like 'Some man is not an animal'. (Cf. 2.b. above.) For the real problem with the corresponding descent is that by descending propositionally we attribute wider scope to 'an animal' over 'some man' in this proposition, in which, however, clearly the converse scope relation holds. So to set things right either we have to descend by a nominal conjunction under 'an animal', or we have to take 'some man' to refer to the same man in each propositional conjunct, i.e. read 'some man' referentially, as if we had already descended under it propositionally to some determinate man, following a 'priority rule of analysis'. Indeed, both of these remedies were considered in the literature. See Priest-Read, op.cit., Adams, loc. cit., King, op. cit. p.51., A. Broadie: *Introduction to Mediaeval Logic*, Oxford, 1987, p.24.

[27] You may even think of them as $x.x=x$ and $y.y=y$, respectively, I am using simple variables only to reduce the complexity of the schemata below.

[28] In this case special care needs to be taken of cases when these ranges either are infinite or contain only 0. For the technical details see "The Square of Opposition, Common personal Supposition and the Identity Theory of Predication within Quantification Theory" in my *Ars Artium: Essays in Philosophical Semantics, Mediaeval and Modern*, Budapest, 1988.

[29] Cf. P. Geach: "The Perils of Pauline", in: *Logic Matters*, Berkeley and Los Angeles, 1972.

[30] Cf. R. Montague: "The Proper Treatment of Quantification in Ordinary English", in: J. Hintikka-J. Moravcsik-P. Suppes: *Approaches to Natural Language*, Dordrecht, 1973; J.D. McCawley: *Everything that Linguists have Always Wanted to Know about Logic - but were ashamed to ask*, Oxford, 1981. pp.411-421.

[31] See Buridan: *Sophismata*, ed. T.K. Scott, Stuttgard-Bad Cannstatt, 1977, pp.83-90; Ockham: *Summa Logicae*, ed. Ph. Boehner, St. Bonaventure, N.Y., 1974, P.I.c.72., pp.219-221.

[32] Ockham: *Summa Logicae*, ed. cit., P.I.c.72., pp.219-221. cf. P.II.c.7. Cf. also Guillelmi de Ockham *Scriptum in librum primum Sententiarum Ordinatio*, St. Bonaventure N.Y., 1967-1979; d.2.q.4., pp.145-148. Cf. also the similar treatment of Albert of Saxony: *Perutilis Logica*, Hildesheim-New York, 1974, 14ra.

[33] See King, op. cit. pp. 17-25. A. Maierù: "Significatio et Connotatio chez Buridan", in: J. Pinborg (ed.): *The Logic of John Buridan*, Copenhagen, 1976.

[34] See Buridan: *Sophismata*, ed. cit., c.4.pp.59-90; *Tractatus de Suppositionibus*, ed. cit., pp.184-185, 333-335, 343-347.

[35] See "Understanding Matters from a Logical Angle" and "Socrates est species" in my *Ars Artium*. Presently I am working on a detailed and, at least according to my intentions, faithful formal reconstruction of Buridan's theory of signification and appellation as they are set to work in his analysis of 'Debeo tibi equum', in a paper under this title to be presented at the 9th European Symposium of Mediaeval Logic and Semantics, in St. Andrews, Scotland.

[36] For a similar analysis of Ockham's treatment see S.L. Read: "'I promise a penny that I do not promise': The Realist/Nominalist Debate over Intensional Propositions in Fourteenth-Century British Logic and its Contemporary Relevance", in: *The Rise of British Logic*, ed. P. Osmund Lewry, O.P., Papers in Mediaeval Studies 7 (Toronto: Pontifical Institute of Mediaeval Studies, 1985), pp.335-359.

[37] "... but in this kind of confusion it is not permissible to descend to the supposits either by a disjunctive sentence or by a categorical with a disjunct extreme, since such verbs make the terms following them appellate their *rationes*, namely those according to which they were imposed to signify." King's translation (ed. cit. p.145.) of Buridan's *Tractatus de Suppositionibus*, ed. cit. pp.333-334.

[38] See Buridanus: *Sophismata*, ed. cit. pp.83-90.

[39] See e.g. M. Davies: "Two examiners marked six scripts: Interpretations of Numerically Quantified Sentences", *Linguistics and Philosophy*, 12(1989) pp.293-323. Davies supplies also a number of further references.

[40] Cf. e.g.: "... this sign 'omnis' <meaning: 'all' in the plural, as opposed to its distributive meaning, translatable as 'every', which it has in the singular>, when it is taken in the plural, may be interpreted either collectively or divisively. If it is taken divisively, it denotes that the predicate truly applies to all those things of which the subject is truly predicated, like by this: 'All apostles of God are twelve' is meant that this predicate: 'twelve' is truly predicated of all those of which the subject 'apostles' is truly predicated; and so, since Peter and Paul are apostles, it follows that Peter and Paul are twelve. <And in this sense the proposition is false, of course.> But if it is taken collectively, it does not denote that the predicate applies to all those to which the subject applies, but that it applies to all those things taken together of which the subject is verified; so it means that these apostles, pointing at all the apostles, are twelve." Ockham: *Summa Logicae*, ed. cit., p.266. Cf. further: "Introductiones Montane Minores", in: L.M. de Rijk: *Logica Modernorum*, ed. cit., II-2., pp.29-30.; Buridan: *Tractatus de Suppositionibus*, ed. cit., pp.199-200.; William of Sherwood: *Syncategoremata*, *Mediaeval Studies*, 3(1941), pp.46-93 esp. pp.84-89; Walter Burleigh: *De Puritate Artis Logicae Tractatus Longior with a revised edition of the Tractatus Brevior*, St. Bonaventure, N.Y., 1955, pp.241-243, 252-253; Paul of Pergula: *Logica and Tractatus de Sensu Composito et Diviso*, St. Bonaventure, N.Y.-Louvain-Paderborn, 1961. pp.152-153.

[41] As a matter of fact, this paper is only a preparatory work for a joint project with Gabriel Sandu of the University of Helsinki in which we try to work out the technical details of this intuitive idea. Earlier drafts of this paper were presented at the Department of Linguistics and at the Department of Philosophy of the University of Helsinki during my stay in Helsinki as member of the project "Ockham and the via moderna" under the chairmanship of Simo Knuuttila, in the Fall Semester of 1989. I wish to express my gratitude to all the Finnish friends and colleagues for the inspiring discussions and all kinds of help they provided. My special thanks are due to Douglas Langston of the University of South Florida, member of the same project, for correcting the English of the paper.