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ABSTRACT
       Analysis of the cofunctional relationship between
common nouns and adjectives in English is examined in terms of the
principle of semantic copredication. It is proposed that a formalized
semantic metalanguage system can be constructed to demonstrate that
some English adjectives behave like common nouns. Numerous examples
are provided throughout the paper. (MSE)

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ADJECTIVES, NOUNS AND COPREDICATION IN ENGLISH

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Adjectives, Nouns and Co-predication in English

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I Introduction

1.1   The principal aim of this paper is to make explicit the cofunctional relationship between adjectives and common nouns in English in terms of <u>semantic copredication</u>. The notion is not new: Quirk, in the celebrated work <u>A Grammar of Contemporary English</u>, uses the term "co-reference" to refer to the relationship between the noun 'daughter' and adjective 'pretty' in the sentence: "Your daughter is <u>pretty</u>."[1] W.P. Lehmann (1962) uses the term "compound reference" to refer to the elements in the phrases "green roofs," "green dresses," etc.[2]

The idea could also be traced back through Strawson, Geach, Lyons,[3] Reichenbach,[4] and Leibniz back to Plato himself.[5] However, since it is not the main purpose of this paper to trace the developments of adjectives and nouns as word-classes, I shall simply refer the reader with further interest along this line to the references below and the bibliography at the end of this paper.

Although these scholars, and indeed many others, have briefly mentioned or suggested the line of argument, very little work - one that could be considered a substantial presentation - has been done in this field. Richard Montague mentions - perhaps with a suggestive overtone of completeness - in his "Universal Grammar" that "indications" of how to treat adjectives are given in his "On the Nature of Philosophical Entities," (1960,1967), while in reality he gave a more generous treatment in "English as a Formal Language" (1970).[6] But even in the latter, the treatment was indeed thinly veiled against the backdrop of other philosophical topics.

J.A.W. Kemp, in 1973,[7] gave a paper at the Cambridge Colloquium on <u>Formal Semantics of Natural Language</u> entitled "Two theories about adjectives." The paper, at first glance, purports to advance a theory on adjectives; but, so it seems, the author in the final analysis turns around and concentrates his attention on two issues: one is to repair some of Montague's formulas which have been generally recognised as inadequate in dealing with a certain group

of adjectives - namely, one that includes 'alleged', 'former', etc[8].; the other
to answer the group of philosophers who believe that positive adjectives stem
from comparative sources.

1.2   The underlying intention of this essay is to demonstrate in a simple
straight-forward manner that a formalized semantic metalanguage system could
be built up - one, perhaps, not as "ritualistically" complicated as that (or those)
proposed by most Montagueans - to show that English adjectives (though not all)
do behave like the common nouns, and that the justification for this procedure
will gradually unfold itself with the progress of the presentation. But first
clarification of some terms and concepts must be stated - even if only for
convenience.

    The terms predicate and predication themselves are usually prone to
confusion, perhaps because of their long history of usage. From a semantic
viewpoint, Lyons (1977) has this to say:

> ...a predicate is ...a term...used in combination with
> a name in order to give some information about the individual that
> the name refers to: i.e., in order to ascribe to him some property...[9]
> [italics mine]

Quine (1960) defines predicate - in a traditional sense, perhaps - as a "general
term," and what Lyons calls "name" a "singular term"; and that predication a
process of combining the two "to form a sentence that is true or false according
as the general term is true or false of the object, if any, to which the singular
term refers."[10] Hodges (1977) on the other hand defines "predicate" as "a
string of English words and individual variables, such that if the individual
variables are replaced by appropriate designators, the the whole becomes a
declarative sentence with these designators as constituents," [11] with an
added comment that "predicate" [in boldface] "is often used by grammarians and
philosophers in ways which are at variance with the definition we have given.
For example, some people use the word to mean property or quality."[12]

    Strangely enough, Hodges' view seems to coincide with Quirk's - compare
Quirk's diagram on page 35, (op.cit.), except that Quirk appears to have
given more prominence to the concept of predicate than predication, and that
his diagram should be construed from a syntactic viewpoint.

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All the alleged _variance_ in these definitions - at least as
proclaimed in Hodges' statement - can indeed be reconciled once the statements
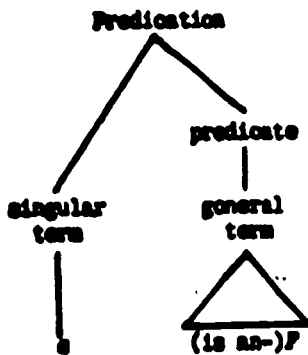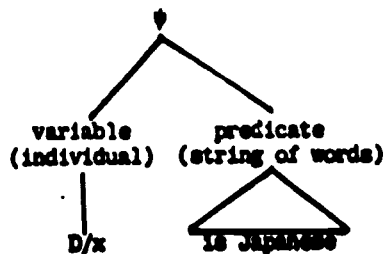are schematically represented in some form[13] compare the following tree-diagrams:

Diagram A (left):
Predication — singular term — s
Predication — predicate — general term — (is an-)F

Diagram B (right):
variable (individual) — D/x
predicate (string of words) — IS JAPANESE

where 'D' is an appropriate "designator",
and D = Mr. Hashimoto; and '/' indicates
a process of replacement.

· **Diag. A**   **Diag. B**

It is obvious that Diagram A represents Quine's concept of predication,
and that B Hodges'. Normally, Quine would represent the notion either as
"s is (an) F" or simply "Fs"; and in general so does Hodges, e.g., "Ja".[14]

For our purposes, then, we shall define _predicate_ - in the usual,
traditional sense - as a term that refers to a property (quality, or state)
which could be appellative of some individual name(s); and _compredication_ as
simply a process of combining two predicates, usually from two different sources -
e.g., an adjective and a noun, or a noun and a noun, etc., through a commonly
accepted well-formed procedure. For example, we could think of 'a tall man'
as "something is tall & something is a man," and that "something" is _one and
the same entity_. With the aid of symbolic notations, the phrase could be
formulated more simply:

     a1.1   (Tx & Mx)

using the obvious abbreviations 'T' and 'M' to stand for the predicates. This
is indeed a very simple example brought in to render added clarity to the defi-
nitions at hand. In reality, however, the process can be quite complicated -

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compare, for example, a 'house-boat' and a 'boat-house'.

Other concepts of opaque nature will be defined, or clarified, where and when necessary.

1.3   Since, of necessity, there is a limit on the length of the essay, and since the subject as proposed here is, by nature, extensive in dimensions, the scope of the paper must accordingly be tailored. Consequently, only the major aspects will be dealt with, although some suggestions on related topics may be given in terms of a theoretical extension to be developed later, or else-where.

The nature of the subject-matter may dictate that the paper should deal at least with two aspects of predication: one from the common noun source, the other the adjective. The former generally does not present a great deal of problems, as the common nouns have almost always been a natural source from which scholars, ancient or modern, draw their predicates. It is the latter, however, that has raised questions and doubts as to the nature of its "true" category, and has indeed become a source of controversies even today. Reichen-bach, for example, prefers to group "adjectives" with "verbs": "The separation of nouns from the two others (adjectives and verbs) can be justified in so far as the noun can be interpreted to indicate the class for which the predicate holds...The division into adjectives and verbs, however, is of questionable significance."[15] In fact, he went on to say: "...it is better to put the adject-ive on a par with a tense of a verb."[16]

Quine (1952), on the other hand, wishes to have no distinction between nouns and adjectives at all;[17] and in his later work (1960) he adds "verbs" to the group and calls them all "general terms."[18] Other formalists would like to think of the adjective as part of an intransitive verb, once coupled with a copula, since it conveniently forms, in most cases, a one-place predicate.[19]

From this viewpoint, therefore, we will devote our attention mainly to the adjectives, and let the nouns conduct themselves within the accepted decorum.

In terms of copredication, however, the problem is not as grave as
it appears, once the formal system is set up. For, indeed, whether we want to
predicate an individual-name from an adjective source, e.g.:

     al.2   He is famous

or from a common noun source:

     al.3   He is a pianist

the symbolic representation would have the same underlying structure, i.e.,
'Fx', and 'Px' respectively; and these two predicates can easily be combined -
under the conditions that satisfy the rules of the system:

     al.4   (Fx & Px)

except that in this particular case, the combination happens to raise a
question - of a different kind, i.e., one of semantic ambiguity: "Is the
person in question a famous pianist, or is he famous and a pianist (as in the
case of Dudley Moore)?" We will glance at adjectives of this kind again later.

II   Nōmen Adiectīvum

2.1   From a syntactic viewpoint, adjectives have been elaborately
classified by various scholars. Quirk, again, classifies them in terms of
syntactic functions - although he points out some features overlapping with
other word-classes in terms of form. For him, the adjectives that can function
as both "attributive" and "predicative" are called central, and those only as
one or the other peripheral.[20] Such terms would be convenient for a system
that contains a cross-reference procedure between syntax and semantics - as
one that Montague proposes in "Universal Grammar" or PTQ.[21] Although we have
no intention to meddle with such procedures, we will adopt the terms for other
purposes - cf. infra.

Thomson and Martinet - henceforth referred to as simply <u>Thomson (1980)</u>, give the following classes as the "main kinds of adjectives":[22]

1   of quality: <u>square</u>, <u>good</u>, <u>golden</u>, <u>fat</u>, ...
2   demonstrative: <u>this</u>, <u>that</u>, <u>these</u>, <u>those</u>
3   distributive: <u>each</u>, <u>every</u>, <u>either</u>, <u>neither</u>
4   quantitative: <u>some</u>, <u>any</u>, <u>no</u>, <u>few</u>,...
5   interrogative: <u>which</u>, <u>what</u>, <u>whose</u>
6   possessive: <u>my</u>, <u>your</u>, <u>his</u>, ...

These classes, obviously, must be reclassified before they can be utilized in our system, since some items such as 'each', 'every', 'some', 'any', etc. must be considered <u>quantifiers</u>, while others, such as 'no', 'either (or)', 'neither (nor)' etc. are clearly <u>logical operators</u>, and so on. It appears that no existing syntactic classification would effectively serve our purpose, and that we should do well to reorganize the adjectives as a whole into the following schema:[23]
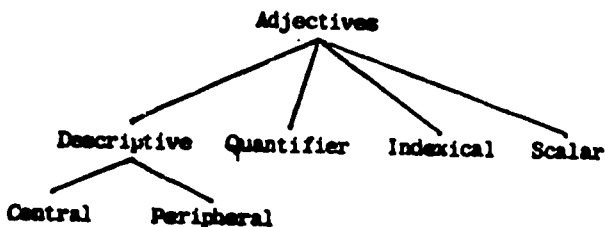

Fig.1

These categories are by no means intended to be watertight compartments as it were. Some doubtless will overlap - in the sense that some members of one category will also belong to another. But this we will examine later. At this point, let us look at what they all mean.

'Descriptive' may be accused of being so general a term, since most, / if not all, adjectives (henceforth '<u>A</u>', and used when appropriate)[24] are descriptive in one way or another; and it may, indeed, be argued that Lyon's term "ascriptive" (cf. supra - §1.2) is much more appropriate. For those who prefer the latter could do so without changing the intended meaning of the above.

Under this rubric, we deposit two large classes of English adjectives -
the central and the peripheral. As a time-saving device, the term "central"
is quite convenient, i.e., once the underlying principle as explained by
Quirk is understood, the reader will find no difficulty in identifying the
items in a dictionary, thus enables us to eliminate the necessity for a
special listing. The term "peripheral", however, is here adopted for different
reasons, since we do not have the same problems as Quirk does.

In formal semantics - at least from our point of view - it
matters not whether the adjective is used in an attributive or a predicative
position syntactically; the transformation into a symbolic notation - at least
for a one-place predicate - will always be in the same way, i.e., a Predicate-
name + an Argument-name. Besides, before the transformation can take place, the
expression usually undergoes a paraphrasing process - e.g., an expression such
as 'awake' or 'asleep' would be paraphrased as - or semantically approximated
to - "in-a-waking-state", or "in-a-sleeping-state", or something similar to
to it; and whether one uses 'A' (= awake) or 'W' (= in-a-waking-state) as the
predicate, i.e., 'Ax' or 'Wx', it is immaterial.

The term peripheral, for our purposes, is brought in merely to signal
a warning that the underlying structure of the adjective in question requires a
close examination. For instance, Quirk - again, to resort to his work - gives
a phrase

    a2.1   a really alive student

as an example of an a-A (adapting Quirk's notation here) that can be used as an
attributive adjective (abbreviated A-N, where necessary) to mean a "lively"
student. Compare the above phrase with the following:

    a2.2   She is still alive

Here both phrases 'still alive' and 'really alive' would produce the same
underlying structure, e.g.,

    a2.3   X + a-A

where 'X' is an appropriate modifier. (In fact, for our demonstration here,
the underlying form could be simply: 'X + A')

If Quirk's interpretation of a2.1 is correct - and I have no doubt
it is, then the copredication process of this particular instance would

go through a test case — projecting ourselves into the development of the
next section for a moment - i.e., we can say that

    a2.4   x is <u>lively</u> & x is <u>a-student</u>[26]

while

    a2.5   x is <u>still</u> & x is <u>alive</u>

would yeld a negative result; for one thing, the analysis unwittingly turns
'still' into an <u>A</u>, while in the original statement a modifier - in this case
an adverb (ADV). Yet, there is no way to leave it out — even though our
analysis here focuses <u>only</u> on adjectives - and to retain the complete meaning
of the statement. From this viewpoint, then, we will have to channel the
predicate 'alive' (of a2.5) to another category, namely, <u>indexical</u> for reasons
to be stated.

    At this point, one may raise a question: "Are we splitting the same
adjective into different lemmes at will to suit our convenience?" The answer
is "No!", since the categories proposed above are NOT <u>ontological</u> but <u>functional</u>
in nature.

2.2   Before we leave the <u>central</u> and <u>peripheral</u> categories, let us
examine very briefly the nature of the predicates that pose some problems, such
as 'famous' in 'a famous pianist'. An earlier analysis (s1.4) has shown that

    s1.4'   (Px & Px)

can generate at least two readings: one "a famous pianist"; the other "someone
is famous and he is a pianist," again, as in the case of Dudley Moore. Indeed,
most people know and remember Mr. Moore as a well-known actor and comedian, and
very few know that he is also an accomplished pianist - at least in US. In general
when the expression of this sort is used, the first reading is intended, which
indicates that the use of the adjective - in this particular case - depends
almost entirely on the use of the noun - i.e., if the person had not been a
pianist, he might not have become famous at all; in fact, the usage clearly
indicates that.

    Quirk mentions a class of "non-inherent" adjectives which at first
glance appear to be close to what we are talking about here. At a closer look,
however, one cannot say that someone's 'woodenness' or 'being wooden' -
from the example "a wooden actor" - was caused by the fact that he is an actor,
while it is so in the case of 'a famous ...' Quirk gave other examples of this
type, none parallel.[27]

The unfortunate word "cause" that we have been applying - for lack
of a better term - to this type of predicative relationship might sound object-
ionable to some   nders. We could, perhaps, think of this type of copredication
in terms of dependency relationship - not so much in the sense of the Dependency
Grammar, but in the general sense[28] - i.e., the semantic interpretation of one
predicate depends on the other, in this case that of the modifier depends on
the head. And if this is a more plausible explication, then we can dub the
adjectives of this type pensile /< L pensilis/;[29]   otherwise, they would take
the name central as explained earlier.

2.3   The notion of quantifiers is familiar to most people, so I will be
brief. Not all the quantifiers are expressed in the form of adjectives, as
we shall see. But first let us modify the quantifier node of the tree-diagram
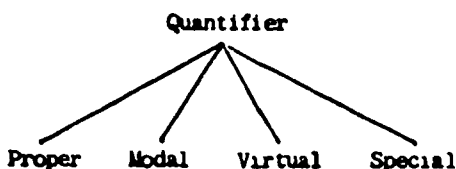in Fig. 1; the node was given there without its branches:

Fig. 2

The quantifiers referred to here are only those capable of assuming
a role as such in a semantic interpretation, or those that can be fitted into a
quantificational scheme in a formal system. There are terms or expressions that
may be considered "quantifiers" from a syntactic viewpoint (cf. Quirk's §4.25f,
Op.cit), which will not be dealt with here.

Let us look at the following list:

1   All, any, every, each, ...
2   Some, at least one, ...
3   It is possible that.../necessary that...
4   (All) those and only those...

It will be recognized that (1) fits into the schema of the universal
quantifiers; (2) the existential; (3) the modal, and (4) the virtual class or
abstraction quantifiers. There are many other expressions that would probably

fit into these quantificational schemata, but these are the typical, and
enough to bring back the memories of what we had learned in the dusty past
Some expressions, however, may appear like quantifiers, but semantically
they may function as something else, e g :

> s2 6   Everybody who is nobody goes to Roxy on the Strip
> to try to meet everybody who is somebody, who, hopefully,
> could help him get a break in showbiz.

The special (or occasional) type are any quantifiers that have not
been mentioned so far, they could be a combination of the types mentioned
earlier, e.g., as expressed in 'at least (two/...)', 'at most (twelve/...)',
etc.; or those not as commonly used as in the Theory of Possibility that
Rescher recently proposed, e.g.: '$[\phi]_A$' for "the x's whose actual property
is ϕ," which is in fact an abbreviation for ' $(x \cdot \phi x)$ '; or '$[\phi]_N$' for ' $(x:\phi!x)$ ' -
. e., "those x's that ϕ is an essential property of," etc.[30]

: 4   The term "indexical" has been proposed by Montague, but then again
is Thomason (obliquely perhaps) and other scholars - such as R.M. Martin, and
Hintikka[31] - have suggested that most of Montague's ideas are rarely original
with him, it was the novelty in the presentation that Montague aimed at.

Montague gave "former" as an example of   indexical adjectives;
but obviously many more - e.g., 'late' as in 'the late president', 'previous',
'last', ' esterday' as in 'yesterday afternoon' - can fit into this category.
They are indexical because they usually require some kind of markings indicative
of something - place, time, or degrees of something else. For example, 'a
former president' may be analyzed in a simplified fashion thus:[32]

> s2.7   x is a-President-at-Time-t_1,   & it is not the case that
> x is a-President-at-Time-t_2

> where t_1 is prior to t_2 (as well as to the time of utterance)

There are also interrelationships among predicates of this type, e.g.,
the predicative relation of the 'late president' would be subsumed[33] in that of
a 'former', etc Also, like other groups of predicates, the analysis can
come complex, e g , 'a former student' could be either a one-place or two-
ace predicate depending on its use. And, as usual, this group of adjectives
would also overlap those of the quantifiers, as in the cases of 'main argument',
principal achievement', or 'likely event', etc. In fact, the latter group of

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adjectives require both kinds of analysis - as I demonstrated in a preliminary version (the proposal) of this paper.

2.5   Before a meaningful discussion of <u>scalar adjectives</u> could be made, a basic but necessary concept must be mentioned. In recent years, there has been a development in semantic interpretation of the formal system, probably in an attempt to resolve the differences between the underlying philosophy of the various schools of thought, e.g., the Classical, the Realist, the Formalist, the Intuitionist, etc. Out of all this comes the notion of <u>weak</u> and <u>strong</u> <u>reading</u>. The quickest and simplest way to demonstrate what the concept means is to look at the underlying notion of the logical <u>disjunction</u> (or alternation).

In general, when people think of a statement of the form 'A ∨ B', they think that only one of the components should be true for the whole statement to be true, and not both at the same time. For example, when a mother asks her child if (s)he wants an orange or a banana, she <u>expects</u> the answer to be a choice of one and not both at the same time (of course, the child may say "both" in any case). This usual expectation is commonly considered a <u>strong reading</u> of the statement. The logician, on the other hand, usually allows the following truth-value:

a2.8
$$\begin{array}{c|c|c} A & \vee & B \\ \hline T & T & T \end{array}$$

This is a <u>weak reading</u>.

2.6   A <u>scalar adjective</u> is one that can be made into a <u>comparative</u> form. At this point, one may protest: "But most adjectives are susceptible of comparative forms!" The comparative form referred to here is of a special kind. To see this clearly, let us consider the following situation: let us say that John at the age of 16 was nice and slim as he was a keen athlete; at 20 his friends began to feel that he was fat; at 26 he got fatter, at 30 he was even fatter, at 36 he was fatter still, and at 40 he was very, very fat, and so on.

Here we see that the <u>same adjective</u> applies to the <u>same person</u> (or entity) in a <u>climbing scale</u>. The following and many like them are capable of having like the example above, and hence considered scalar adjectives: <u>funny</u>,

happy, heavy, expensive, unpleasant, etc.

Not all adjectives are capable of this type of a scaling pattern -
e.g.: daily, monthly, quarterly (?), two-legged, four-wheeled, etc. Some
logicians would like to regulate the everyday speech in such a way that the
following words are not used as scalar predicates at all: square, perfect, smooth,
silent, straight - as in 'a straight line'. Perhaps, there is something to be
said for this wishful thinking after all; for example, if it can be asserted
that AB is a straight line - i.e., already a straight line, how is it possible
that it can be a straighter line under any circumstance?

What we have discussed so far could be considered a strong-reading
of the concept of the scalar adjective; a weak-reading would probably produce
an interpretation that includes all the adjectives which Quirk calls "gradable".

III   Predication and Copredication

3.1   Under the current pressure, i.e., space - and perhaps time as well,
the intended formalized metalanguage system as stated in §1.2 could not possibly
reach a fully-fledged stage. However, if a substantial amount of common
knowledge about the formal system can be assumed, then perhaps more could be
accomplished without much ado. And it is in this manner that I will introduce
a formalized system here.

3.2   Conceptually, many familiar theoretical points may be left unsaid, but
a notational system should at least be indicated; and for convenience, we shall
call our system SMI from a "Semantic Metalanguage based on (Objective)
Intensions" - objective in the sense that, semantically, we will adhere to the
general use of expressions and not follow any of the subjective use of language.[34]

The syntax of SMI will be referred to as 'S', whose language is 'L'.
L contains a number of well-formed sentences, or sentence schemata, whose
instances are sentences in object or natural languages - sometimes referred to
as '$L_{\theta_1}, \ldots, L_{v_n}$'.[35] L also contains a number of propositions, $p_1, \ldots, p_n$,
which may or may not be of the same number as that of the sentences.

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In specifying the syntactic elements of $\mathfrak{S}$, we will assume all
that is commonly used in a formal system based on the <u>classical two-valued</u>
<u>logic</u>, in particular in the <u>Peano-Russellean</u> tradition, and state very
briefly the following:[36]

    i)   'A, B, C,...' will represent <u>logical</u> formulas, or <u>sentential</u>
<u>schemata</u> in L;[37] 'x, y, z,...' and 'a, b, c,...' <u>individual</u> <u>variables</u>
and <u>constants</u> respectively.

    ii)   'P, Q, R,...' will be <u>predicate</u> <u>constants</u>, or <u>variables</u> - as
the case may be - of degrees t be specified in specific contexts.
In general, we will use the <u>obvious</u>, or <u>mnemonic</u>, upper-case letters
for <u>predicates</u>, e.g., 'M' for <u>man</u> (one-place), 'L' for <u>love(s)</u> (two-
place), or 'G' for <u>give(s)</u> (three-place), etc.

    iii)   The following <u>logical connectives</u> and <u>prefixes</u> will be
adopted <u>with all their conventions</u>: '$\neg$', '$\vee$', '$\&$', '$\rightarrow$', '$\leftrightarrow$', '$=$',
'ϵ', '$\forall$', '$\exists$' for <u>not</u>, <u>or</u> (inclusive), <u>and</u>, <u>if..then</u>, <u>if and only if</u>,
<u>is identical with</u>, <u>is a member of</u>, and the <u>universal and existential</u>
<u>quantifiers</u> respectively.

    Of these, '$\neg$', '$\vee$', '$\forall$' will be regarded as <u>primitives</u>, and
the remainder <u>definable</u> in the Peano-Russellean tradition, e.g.,
'$(A \rightarrow B)$' from '$(\neg A \vee B)$', and '$(\exists x)A$' from '$\neg(\forall x)\neg A$', etc.

    iv)   The usual <u>formational rules</u> will also be adopted, e.g.,
"If 'A' is a well-formed formula in L, then so is its negation
'$\neg A$', ..."

    v)   It appears that the only <u>transformational rule</u> we need,
if any, at this point is <u>Modus Ponens</u> (MP).

    vi)   Whatever else required will be introduced either formally or
intuitively, as occasion arises.

3.3   Let us now turn to a <u>Predication System</u>. There are at least two
ways of formulating a system: one by <u>specification</u> - i.e., specifying all the
required elements and the desired modus operandi; the other by <u>assumption</u> -
i.e., assuming that all that is required is there, provided that the data
pass a certain test (or a battery of tests), and I am going to do a little
of both in formulating a predication system here - perhaps more so of the
latter.

    For our test cases, a simple device of the form 'x is a-P',[38]
or simply:

    s3.1   x is P

for a test of _predication_, and of the form

      s3.2   (x is P & x is Q)

for _copredication_ should suffice. Let us take the following examples to illustrate the point: i) 'red apple', ii) 'main argument'. The first should appear somewhat thus

      s3.3   (x is Red & x is an-Apple)

or simply

      s3.3'   (Rx & Ax)

while the second.

      s3.4   (x is Main & x is an-Argument)

which can hardly be said to satisfy the well-formedness of a semantic interpretation, and which must, therefore, direct our attention to the necessity of another test procedure - to which we shall return later (cf. also §2.1 - _peripheral_ A) For the moment, let us return to s3.3' '(Rx & Ax)'; how exactly, here one may ask, does the predication or co-predication take place - i.e., in the domain of objects in a certain universe of discourse, how does a certain property coalesce with a certain individual? And this is where the concept of virtual class comes into play.

5.4   Although the notion of _virtual classes_ (or the _abstraction theory_) has, wittingly or unwittingly, been placed on the center stage recently by the Montague grammarians, it can be traced back to Peano, Frege, and Russell. It was Quine, however, who propounded the theory at length,[39] and other scholars such as Carnap, Church and, especially, R.M. Martin have in recent years made frequent use of the theory. And while Quine, Carnap and Martin are quite consistent in their presentation - and on the whole their interpreta-tions of the idea coincide, the Montagueans - namely, Dowty and McCawley - seem to have brought in something extraneous to the original theory. But this is not the thesis of this study, and we shall ignore the differences for now. It suffices to say that our theory corresponds to the original.

      The quintessence of the virtual class concept can be seen clearly in the following situation: suppose we know that Mrs. Jones is a secretary. How does she become a secretary? Obviously, she did something to qualify lf for the position, e.g., she learned to take shorthand, to type up to tain speed, to do the filing, etc. _To be a secretary_ is in fact to be

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counted as one among secretaries; in other words, *to be admitted into the
class of secretaries*. Indeed, Mrs. Jones is a secretary only by *virtue of
the fact* that she has fulfilled certain conditions required of her. In short,
<u>x</u> is <u>admitted</u> into a class <u>by virtue of the fact</u> that <u>x</u> has <u>fulfilled</u> the
<u>requirements</u> stipulated, formally or informally, <u>for its membership</u>.

It is from this viewpoin' that we consider this type of <u>classial
entity</u> a <u>virtual class</u>. It is wor... noting that Mrs. Jones does not have to
born to be a secretary[40] simply because she wants to be one; nor is she
obligated to remain one for the rest of her life. She could, for example,
go through another professional training, say "nursing", and become a nurse
at the end of the training, provided she fulfils the requirements for the
profession; in which case she would be, logically speaking, admitted into
another virtual class.

It is also worth noting that this type of classial entity is <u>not</u>
committed to its membership. Suppose, for example, we have a Japanese
professor in the Linguistics Department who wants to offer a Japanese
Typology course, say, in the autumn of 1982. The course is announced, and
the classroom space allocated. But when the term begins, the Board of
Graduate Studies discovers that no student has signed up for it. The class
is then cancelled. However, in all the inquiries and replies thereto, that
particular class would still be referred to as <u>a class</u> whether it materializes
or not. The underlying notion here is not far from what some Montagu-
grammarians talk about in

a3.5   Jane came in to look for friends

in the sense that there is no indication whether the class of Jane's friends
has any member - as opposed to "John seeks a unicorn."[41]

For our purposes, we will utilize the notion of the virtual class
in this fashion, i.e., "non-committal" - to borrow Quine's term; and it
"carries no general presumption of existence of the class."[42]

3.5   Schematically, the virtual class has been variously represented:
Frege, for example, uses a Greek letter with a smooth breathing: '$\acute{\epsilon}(t...)$';[13]
while Quine: '$(x:Fx)$';[44]   and R.M. Martin, following Peano, the inverted
epsilon thus: '$x\exists(-x-)$'.[45] Russell, on the other hand, places a circumflex

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over the variable. '$\Omega(\phi x)$', which gives the advantage of being able to turn it into a propositional function '$\phi\Omega$' or more specifically '$\phi!\Omega$'.[46] In this presentation, we shall use the notation currently in vogue, i.e.,

s3.6 $\lambda x(..x..)$

for a _virtual class_ or a _one-place abstract_, with appropriate restrictions to be stated below. So, for a predicate 'man', for example, we shall write

s3.7 $\lambda x(Mx)$

which reads: "all the entities $\underline{x}$ such that $\underline{x}$ bears the _property_ of being a man." And to say that "some individual $\underline{y}$ is a man," we will indicate

s3.8 $y \in \lambda x(Mx)$

i.e., if we take s3.7 as a _virtual class_; but if we want to regard s3.7 as a form of a _predicate_ - in this case, a complex one - we shall rewrite s3.8 as follows:

s3.9 $(\lambda x(Mx))y$

with a provision that the parentheses will be thinned down where there is no danger of confusion, e.g., '$\lambda x(Mx)y$', etc. We could also utilize our _sentential variables_ of L, e.g., '$\lambda x(A)y$' when we wish to make a general statement or as a shorthand procedure, where desired.

The above statements, s3.8 and s3.9, clearly show that the schematic expression in s3.6 can function either as a _class_ or _predicate_ symbol _mutatis mutandis_, of course.

Although it is quite clear at this point that we will not be able to utilize the virtual class theory to the fullest extent in this particular study, it is still necessary to state the restrictions that accompany the use of these schematic expressions - lest it become a source of misconception; hence, the following will be our rules and definitions for _Abstraction_ - one each should suffice here:

D-Abst 1   '$\lambda x(Px)y$' as an abbreviation for

'$(\exists z)(z = y \ \& \ (\exists x)(x = z \ \& \ Px))$'[47]

,'z' must not be free in the sentence represent by 'Px'; but that much dard convention.

R-Abst 1

$\vdash \lambda x(B)y \quad \leftrightarrow \quad$ A, where A and B are any
formulas and $\underline{x}$ is an individual variable $\underline{not}$ free in A,
and B differs from A $\underline{only}$ in containing free occurrences
of $\underline{x}$ where and only where there are free occurrences of $\underline{y}$
in A.[48]

We should want, perhaps in future use, our rules and definitions to
extend o v e r the cases of $\underline{two-}$ or $\underline{more-place}$ abstracts, natura'ly, with
appropriate changes.

3.6   There are obvious advantages[49] in formulating a $\underline{theory\ of\ predication}$
(or copredication) in terms of the Virtual Class or Abstraction theory: $\underline{first}$,
as we have tacitly shown, it allows us to conflate the notion of class with that
of property; $\underline{second}$, it allows us to talk about a class as an entity without a
commitment to its existence; $\underline{third}$, it allows an easy access to complex predicates
e.g., consider again the predicate 'man': if we choose to define $\underline{man}$ as a
"rational animal", then instead of stating '$\lambda x(M)$', we can write:

a3.10 $\lambda x(Rx \ \& \ Ax)$

In fact, we might say that a3.10 is the kind of image we want to   present
in terms of copredication in our analysis, i.e., one individual object - fictive
or instantiated - shares a plurality of properties. In English, this plurality
basically does not exceed two in number; when it does, of course, it will
require a more sophisticated analytic procedure - one that must be presented
on another occasion.

Many more advantages from this type of theoretical conceptualization
will emerge, if the scope of the paper permits a fuller development. As it
stands, we must be content with what possibilities the above enumeration might
bring.

IV   The Unsaid

4.1   It would be a miracle of miracles for a topic of this nature to be
presented, within the limit of the scope as prescribed, without any   short-
comings. There are at least two possible sources of these: one from the
involved nature of the subject-matter. The classification and reclassification
of the English adjectives, for a semantic analysis as proposed, in itself is
a formidable task - i.e., if one wishes to do justice to the subject - let alone
its combination and involvement with the nouns. But it would be impossible to
talk about a system in which adjectives and nouns are cofunctional with only
one or the other element present. And with the prescribed limit on the scope
impending on the presentation, the additional task at hand is the selection
with a sense of relevancy. Unfortunately, however, the question of "relevancy"
is so subjective that the task may fall short of "satisfactory" because of
diverging viewpoints.

        The other source stems from the formal system itself: to create a
formalized metalanguage system with a logical progression, one cannot quicken
the pace faster than that of the logical progression itself. And, again, under
the same circumstances, one - in a desparate attempt - may resort to the
temptation of abbreviatory devices, or the seemingly possible curtailment of
logical steps - all of which may, from the reader's standpoint, form a
source of perplexity. I certainly hope that this is not the case here.

        To be brief, the following list will show what should have been
included but for reasons of space and time:

        i)   Identity Theory

        ii)   Time Theory and other indexical devices

        iii) Boolean classes

4.2   As to the Theory of Identity: one might have noticed that the notion
of identity was intuitively utilized in the definition of Abstraction (D-Abst 1).
This is because the concept itself is so self-evident - as most sch. vs claim[50] -
that we can borrow and use it without having to define it beforehand - at this
stage, at any rate, yet, as Quine puts it, "despite its simplicity, identity
in   nfusion."[51] Consequently, most scholars are forced to define it in

some form, at some point, or another in their theory, especially when it is
to be applied to entities other than individual constants, or variables. To
derive a full (or fuller) benefit from the Abstraction theory, we should at
least introduce some interrelationships of Identity. For example, we may
at some stage be forced to make a statement about the identity of two
virtual classes, such as

4.1 $\qquad \lambda x(A) = \lambda y(B)$

e.g., the class of "the passengers of the first voyage of the Mayflower" is
identical to the class of "the founders of Plymouth (Massachusetts)." And it
would be difficult to do so without any preliminary statements about the nature
of identity. In fact, from a theoretical viewpoint, the proofs of many virtual
class theorems depend on the Theory of Identity.

.. 4.3 $\qquad$ A _time theory_ and other _indexical procedures_: our theory, as has
been shown briefly, requires a device by which a variety of indices - temporal
or otherwise - could be applied. For temporal indices, the simplest way is
to formulate the time theory in terms of a _discrete_, _relative time-flow system_,
.as proposed by Woodger and Martin,[52] in which the time-flow is - perhaps only
heuristically - reduced to "stretches", "segments" and "discrete moments" of
time relative to each other. For example, time t_1 can be said to be _prior to_
(or _wholly before_) t_2; and t_3 an _overlapping period of_ t_1 and t_2, etc.
Once all the interrelations among these segments are worked out, it is not
difficult to approximate them to the English tenses.

$\qquad$ A time system of this kind is much easier to handle than one that
divides the whole universe into different temporal worlds, e.g., the world of
the _past_, _present_, and the _future_, etc., as Prior, Cocchiarella, and others
have proposed.[53] For one thing, if _time_ becomes an insignificant feature in
a particular statement, then in the above system the indices could be dropped,
and the notion of time "ignored" or "left out ar being understood" in much /
the same way as the notion of time operates in natural languages. While in the
other system, once time becomes a fixed entity, it must be accounted for at
all times.

$\qquad$ If the proposed time marking sytem is adopted, then, together with
a _two-place_ predicate which we will quickly introduce intuitively here, we can
demonstrate - in a glimpse, perhaps - the structural differences between the

gradable and the scalar adjectives.

'$\mathbb{C}$' will indicate a comparative relation of the type "(more-$\underline{A}$) than"[54]. So, to say that "John is fatter than Mary" - which is a gradable adjective here - is in fact to say that - to put it in a general form:

s4.2   x is more-$\underline{A}$ than y is $\underline{A}$

With the newly introduced predicate, we could restate s4.2 - using a predicate 'P' for $\underline{A}$ - more simply and accurately thus:

s4.3 $\mathbb{C}<Px, Py>_{t_i}$

where $\underline{t_i}$ = the time of utterance.

With this kind of a two-place predicate, we can see a necessity for an ordered-pair (or n-tuple) form of statement. In demonstrating the structure of the scalar adjectives, we will, for convenience, transfer the temporal indices from the $\underline{t}$'s to the predicates themselves - also, for added clarity, we will enclose the individual variables in parentheses:

s4.4 $\mathbb{C}<P_i^A(x), P_j^A(x)>$

where 'i' and 'j' are time parameters, and 'i' is prior to 'j' as well as to the time of utterance, and the superscript 'A' indicates that the predicate is of an adjective source - cf. infra.

Here, the two underlying structures are clearly indicated, recalling that the scalar adjectives are also reflexive.

The indexical system can get quite elaborate, if we allow it to run its course; for example, we all know that other word-classes can also take the comparative form. But even if we confine ourselves within the area of our interest here, we get statements such as "He is more of a brother to me than a friend." Here, not only do we get the change in the type of predicate - i.e., from 'P_D^A' to 'P_D^N' (cf. supra), but in the predicate itself. The situation is worse in the following statement: "He used to be more of a father to me than a husband..." Here we get the time indices added on to as well. Of course, the comparative degree can run up and down the scale as it pleases, e.g., "He used to be less of a husband to me than he is now," etc.

Other indexical devices, such as the method of "predicate description" in the manner of Frege's *Art des Gegebenseins*[55] as frequently utilized by

Martin and Davidson (as demonstrated in my preliminary version), could also be introduced for various purposes.

4 4   The need for the above two items may ⊢ ꞏꞏtransparen⸳ enough, but the need for the <u>Boolean classes</u> may be obviated ꞏy the feeling that these are items of theoretical extravaganza. Consider the following statements, however,:

> s4.5   Teachers are educationists
>
> s4.6   Mammals are mortal
>
> s4.7   Patience is a virtue
>
> s4.8   Man is a species

From an extensional viewpoint, and with the limited tool we have, we could interpret s4.5 as an identity statement, e.g.,

> s4.5' $\lambda x A = \lambda y B$

i.e., the class of "teachers" is identical to that of "educationists." But this would be inaccurate, since it implies that "all educationists are teachers." The same applies to s4.6. Schematically, however, s4.7 could probably be represented thus:

> s4.7' $(\forall z)(\lambda x(Px)z \rightarrow \lambda x(Vx)z)$

and the back-translation may appear: "If anything is patient, then it is virtuous."

The obliqueness, or periphrasis, in translation, however, does not affect the sense of the sentence as much as it would in s4.8, e.g.,

> s4.8' $(\forall x)(\lambda y(My)x \leftrightarrow \lambda z(Sz)x)$

i.e., "If anything is a man, then it is a species, and conversely," which is not the case at all; nor is this sense intended in the original.

If we, indeed, had access to the Boolean algebra, we could formulate s4.5 schematically thus:

> s4.5" $\alpha \subset \beta$

i.e., the class of "teachers" is included in the class of "educationists."[56] A precise underlying structure of s4.8 is a little more subtle and may be given as follows:

> s4.8" $\alpha \subseteq \alpha\beta$

'hat is, "the class of man is included in an intersection of itself with a
class of those that form a species." There are many living objects that can
form species; but this intersection contains only those that belong to the
class of man.

Indeed, the Boolean classes (or functions) would have added clarity
and precision to our system, even as small as it has been intended. The
transition between the two concepts of classes - i.e., the definitions which
link the Boolean with the virtual class - alone would have served the reader
with a greater insight into the interrelationships between class and predicate.

4.5   One could, of course, go on suggesting other formal concepts which
would render clarity to semantic notions and relations; but semantic problems
are, unlike the Rubic-cube tricks, genuinely complex in nature and extensive
in scope - so much so, that one can keep on adding to the list *ad infinitum*
and still leave the problems staring at one in the face.

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NOTES

1   Quirk, et al (1972), p. 247; it will generally be referred to as "Quirk".

2   Historical Linguistics, New York, Holt, 1962; p. 196.

3   (1977), p. 147ff.

4   (1947), p. 251f.; Reichenbach feels that adjectives should be put "on a par with a tense of a verb."

5   For the history of adjectives as a word-class, _x_ Lyons (1969), p. 6ff; Robins (1979), Chs II, III, et passim.

6   Montague (1974), p. 243, et passim.

7   _x_ Keenan (1975) p. 123ff. It is difficult to know how much influence Montague had on Kamp's work, since he was one of Montague's studer's; at the same time Montague acknowledged Kamp's criticism on his works even before Kamp's paper was published.

8   _x_ Thomason's remarks in his introduction to Montague (1974).

9   P. 147

10   P. 95f.

11   P. 154f; italics mine.

12   Loc.cit; italics mine

13   This is one of the reasons we feel that a formalized metalinguistic system would present ideas more clearly.

14   For Quine, op.cit., p. 96f; Hodges, op.cit., p. 57, and 210ff.

15   Op.cit., p. 251; italics mine.

16   Loc.cit.

17   P. 79.

18   P. 96.

19   Any standard text in symbolic logic would reflect this attitude; Quine (1970) concurs - _x_ p. 22f.

20   Op.cit., p. 234.

21   Op.cit., see articles concerned.

22   P. 15.

It is not the intention of this study to give a listing of all the adjectives; each classification within the schema will give some examples

24 This symbol, which would always be underlined, is not to be confused with 'A, B, C, ...' to be introduced later as sentential variables in our formal system.

25 (Deleted)

26 There is still a hitch here; the problem is similar to the case of 'a famous pianist' - cf. infra.

27 Except in the case of "lively student"; but I am not sure _ he means the same as what I mean. For data, x p. 266, op.cit.

28 The notion of "dependency" - however one interprets it - is not very far from that used in the Dependency Grammar; but I have no wi. / to get tangled up in the web of technicalities, if any, at this point. The idea as proposed here is not far from what P.H. Matthews (1981) describes, including the terms "head" and "modifier" - p. 78ff.

29 From a semantic viewpoint, the notion could be presented in terms of semantic focus; but the scope of this paper precludes it.

30 (1975), Chs. I, II; it is not very likely that we will have a great deal to do with work of this kind, although it would be interesting to compare his formulation of '$(x:\phi x)$' with Quine's '$(x:Fx)$' - x (1969), p. 15ff.

31 For Thomason, x Montague (1974),"Introduction"; Martin (1979), p. 160ff; Hintikka - x Kosner (1976), p. 208ff.

32 Some formalists prefer a notation such as '$t_i < t_j$' - where 'i' is smaller than, or prior to, 'j'.

33 In an extended version, the logical relations of predicative subsumption and comprehension, and the related notions should be stated.

34 R.M. Martin (1963) has done some work on "subjective quasi-intensions" - p. 79ff.

35 We will concern ourselves here with English only.

36 In all likelihood, we are overspecifying in the present study.

37 These sentential variables, or schematic symbols, should always be thought of as having the following underlying structure:
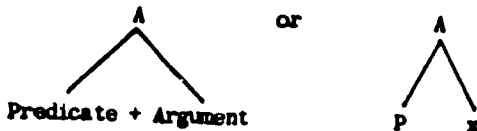
38 Kamp (cf. supra) claims that this procedure is no longer in use; however, cf. Montague (1974), p. 213 - when he wrote

'v_0 is a horse'

where 'v_0' is a variable.

s type of structure also appears elsewhere in Montague's works; xx

he (1960) and his other works - passim.

39 In his System of Logistic (Cambridge, Mass., 1931), p. 48ff; in his Brazilian lectures, O Sentido da Nova Lógica (1942), published by Martins in São Paulo, 1944, he elaborated the idea, and in his (1969) he departed somewhat from his original formulation.

40 At one point, scholars divided classes into "real-" and "pseudo-classes"; and a typical example of the real class is a class of "mothers", "fathers", of "ancestries", etc. Indeed, one cannot become a mother just in the same way as one can a secretary; it involves a physical transformation, etc. But this is a highly explosive material, and we should stay clear from it as far as possible.

41 Regardless of Bennett's claim - i.e., there are two readings of this statement - we all know that there are no unicorns; x Partee (1976), p.142.

42 Quine (1969), p. 35.

43 During Frege's time, it was ambiguously called the "graph of function..." - x Geach et al (1952), Ch ! xx Kneale and Kneale, The Development of Logic, Oxford, Oxford UP, 1962, p 50.11.

44 (1963,1969), p. 16; Quine's notation is pretty close to the form used in set theory, and is now widespread among mathematicians. P.H. Matthews

in his Inflectional Morphology (Cambridge, 1972), incidentally, uses:

$$\{z|(z\ R\ w).(w\ B\ l).(l \in VERS)\}$$

for "the set of word-form z ..." (x Ch 9); the underlying idea is not far from what Quine and other scholars are talking about except that this particular use is intended to be that of a "set".

45 (1958), p. 49ff, and subsequent works. Martin has been known to use other forms, e.g., '&(..x..)'; and - perhaps, only once - 'λx(..x..)' in his (1978).

46 In Principia Mathematica, commonly known as PM, p23ff, and *20.

47 In §3.2, we stated that all the conventions for the classical two-valued logic would be adopted for this study; that in effect would include the stratificational procedure, and would insure our system against any intrusion of antinomies. The three—variable convention, following Quine, is introduced here, however, only as a double precaution; xx Quine (1969), p. 17ff.

48 The simplest way to read this rule is to translate it back into the predicate form, e.g.:

$$\vdash\ \lambda x(Px)y\ \leftrightarrow\ Py,\ ...$$

We should, of course, allow this rule to apply to individual constants as well; xx Martin (1963), p. 10f, or (1958), p. 59ff.

49 (Deleted)

50 x Copi (1979), p. 140ff, Quine (1974), p 221.

51 loc.cit.; compare also the following statement: "Joan and Veronica are wearing identical dresses," or "My dear Mary! This is the exact identical dress that Miss America was wearing last night."

52 Woodger (1939), p. 32ff; Martin (1963), p. 40ff.

53 x Bibliography

54 Strictly speaking, it should be "(more-A-than-A) than", since in terms of a numerical analysis, the comparative degree would be approximated to the '(n + n)-type', e.g., "fatter" would be (fat + fat), hence the statement should read:

$$\text{"x is more-}\underline{A}\text{-than-}\underline{A}\text{ than y is }\underline{A}\text{"}$$

but such pedantry may taint probity.

55 Geach and Black translates this as "mode of presentation" – Geach (1980), p. ix; while Martin as "mode of linguistic description" – Martin (1981), p. 8.

56 The virtual-class inclusion is usually defined in terms of a predicate inclusion, which we did not have time for.

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SELECTED BIBLIOGRAPHY

Carnap, R. (1956)
      Meaning and necessity. University of Chicago Press.

Cocchiarella, N.B. (1965)
      Tense and modal logic. [UCLA PhD Diss.]

Copi, I.M. (1979)
      Symbolic logic. New York, Macmillan.

Davidson, D. & Harman, G (eds) (1972)
      Semantics of natural language. Reidel.

Dowty, D. et al (1981)
      Introduction to Montague semantics. Reidel.

Geach, P. et al (1980, 1952)
      Translations from the philosophical writings of Gottlob Frege. Blackwell.

Gupta, Anil (1980)
      The logic of common nouns. Yale University Press.

Hintikka, J (1973)
      Logic, language-games and information. University of Oxford Press.
      ———— . (1976)
      "Quantifiers in logic and quantifiers in natural languages," see
   Koener (1976)

Hodges, W. (1977)
      Logic. Penguin Books.

Keenan, E.L. (ed) (1975)
      Formal semantics of natural language. Cambridge University Press.

Koener, S. (ed) (1976)
      Philosophy of logic. Blackwell.

Lyons, J. (1969)
      Introduction to theoretical linguistics. Cambridge University Press.
      ———— . (1977)
      Semantics, Vol. I, II. Cambridge University Press.

Martin, R.M. (1958)
      Truth and denotation. University of Chicago Press.
      ———— . (1963)
      Intension and decision. Prentice Hall.
      ———— . (1978)
      Semiotics and linguistic structure. The State University of New York
   Press.
      ———— . (1979)
      Pragmatics, truth and language. Reidel.
      ———— . (1981)
      Logico-linguistic papers. Foris.

———; P.H. (1981)

Montague, R. (1974)
      Formal philosophy. Edited by R. Thomason (posthumously). Yale University
  Press.

Partee, B.H. (ed) (1976)
      Montague grammar. Academic Press.

Platts, M. (1979)
      Ways of meaning. Routledge.

Prior, A.N. (1967)
      Past, present and future. Oxford University Press.
—————— . (1968)
      Papers on time and tense. Oxford U.P.

Quine, W.V.O. (1960)
      Word and object. The M.I.T. Press.
—————— . (1969, 1963)
      Set theory and its logic. rev. ed. Harvard U.P.
—————— . (1970)
      Philosophy of logic. Prentice Hall.
—————— . (1974, 1952)
      Methods of logic. 3rd.ed. Routledge
—————— . (1981, 1940)
      Mathematical logic. rev. ed Harvard U.P.

Quirk, R. et.al (1972)
      A Grammar of contemporary English. (corrected printing, 1973) Longman.

Reichenbach, H. (1947)
      Elements of symbolic logic. Dover Publications.

Rescher, N. (1975)
      A Theory of possibility. Blackwell.

Robins, R.H. (1979)
      A Short history of linguistics. 2nd ed. Longman

Russell, B. (1927)
      See Whitehead.

Strawson, P.F. (1971)
      Logico-linguistic papers. Methuen.

Thomson, A.J., & Martinet, A.V. (1980)
      A Practical English grammar. Oxford U.P.

Whitehead, A.N., & Russell, B. (1927)
      Principia mathematica. 2nd ed. (Abridged ed. To *56) Cambridge U.P.

Woodger, J.H. (1937)
      The Axiomatic Method in Biology. Cambridge U.P.
—————— . (1939)
      The Technique of theory construction. University of Chicago Press.