On the Analysis of English Adjectives
In a Montague Grammar

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Declaration

I declare that this thesis has been composed by myself and that the research reported therein has been conducted by myself unless otherwise indicated.

Edinburgh, 3 October 1983

Kenneth R. Beesley
For S.
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I gratefully acknowledge the support of my supervisors Barry Richards and Keith Brown, who at various times encouraged me, corrected me and talked me out of giving up.

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Abstract

This thesis explores the analysis of English adjectives and adjectivals, in particular those which are properly translated as one-place predicates. The intent is both to review earlier analyses and to expand the fragment of English which is accounted for in a Montague grammar.

The presentation is in three parts. The first, comprising Chapters 1 to 4, explains and defends the analysis of some adjectives as predicates of individuals. Much of the discussion is devoted to measure adjectives like big and tall and evaluative adjectives like good and skillful. The second part, comprising Chapters 5 and 6, introduces adjectives and other categories at proposition level; these include modal adjectives like necessary and possible and parenthetical adjectives like odd and strange. Finally, Chapter 7 presents rules and definitions to account for predicative adjectives and other categories at property level; notably Tough adjectives and 'human propensity adjectives' like wise and stupid.

A number of other adjective classes and related phenomena are treated in the course of the discussion, including passive participles, present participles and adjectives taking various complements. A generalised theory and formalisation of non-restrictive modification is also provided.
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Chapter 0. Introduction

0.1 Goals

The overall goal of this thesis is to accommodate English adjectives within a Montague grammar and to examine the consequences of this analysis for the syntax, the semantics and the pragmatics of Montague grammar as a whole. It will be argued that the words traditionally identified as 'adjectives' comprise a very diverse class, both syntactically and semantically. Some adjectives, such as mere, former and possible, will be classed as basic ad-common nouns; that is, their basic function is to apply attributively to common nouns to form new common nouns as in (1).

(1) a. Lee is a mere boy.
   b. Mary is a former teacher.
   c. Nigel is a possible traitor.

Other adjectives, such as carnivorous, red, tall and good, will be characterised not as basic ad-common nouns but as predicative words which name one-place predicates. Such predicative words appear characteristically after copulas in 'predicate position'.

(2) a. Dogs are carnivorous.
   b. Richard is tall.
   c. This play is good.

In the case of vague adjectives such as tall and good, the analysis will appeal to contexts and hedges to specify comparison classes and criteria of application for predicates.

Yet other adjectives, including the Tough class and those taking various syntactic complements, will be taken to form complex 'adjectival' constructions which name one-place predicates.

(3) a. John is [hard to please].
   b. Bob is [scared of Roger].
Also included in this adjectival class are participial phrases, both present and passive.

(4) a. Richard is (singing (a hymn)).
   b. Mary is (loved (by John)).

As with basic predicative adjectives, derived adjectival constituents characteristically appear in predicate position.

Despite the diversity of phenomena, the analysis can be unified by 'bumping' rules which productively map predicative adjectives and other adjectival constructions into attributive modifiers of common nouns. The adjectivals from (2) to (4), when bumped into attributive modifiers, can be seen to modify common nouns as in (5). For clarity, the attributive modifiers are marked with italics in these examples.

(5) a. Dogs are carnivorous animals.
   b. Richard is a tall man.
   c. Last night we saw a good play.
   d. John is a hard man to please.
   e. The only person scared of Roger is Bob.
   f. The man singing a hymn is Richard.
   g. The woman loved by John is Mary.

It will be shown that in a Montague grammar it is possible to formulate bumping rules in place of traditional syntactic transformations like relative clause reduction.

The viability of the approach is shown by its successful formalisation within a coordinated Montague grammar. The grammar, in which bumping rules are an integral part, significantly extends the fragment of English so far accommodated within a Montague grammar.

0.2 Montague grammar

I have adopted a form of Montague grammar (MG) as the theoretical framework of this thesis, and I assume a familiarity with Montague 1973 (henceforth PTQ). Until Chapter 6, where contexts are
introduced, the analysis employs the traditional PTQ semantics and follows the slightly simplified conventions for notation and translation given in Bennett 1975 and in Dowty et al. 1981. English expressions will be translated into expressions of intensional logic (IL) and will be understood as interpreted according to the appropriate semantics.

The approach to syntax in MG continues to be a moot issue. In PTQ, the output of a syntactic combination rule is defined simply as a string. For example, a transitive verb (TV) is combined with a term (T) to form an intransitive verb (IV) string. The syntactic rule and an example are shown below.

(6) (PTQ S5). If $\delta \in P_{TV}$ and $\beta \in P_T$ then $F_5(\delta, \beta) \in P_{IV}$
where $F_5(\delta, \beta) = \delta \beta$ if $\beta$ does not have the form $he_n$
and $F_5(\delta, he_n) = \delta \text{him}_n$.

(7) love Mary IV
    loveTV MaryT

Similarly, a term is combined with an intransitive verb string to form a sentence (t) string.

(8) (PTQ S4). If $\alpha \in P_T$ and $\delta \in P_{IV}$ then $F_4(\alpha, \delta) \in P_t$
where $F_4(\alpha, \delta) = \alpha \delta'$ and $\delta'$ is the result of replacing the first verb in $\delta$ by its third person singular present.

(9) John walks t
    JohnT walkIV

It will be noted that the linear outputs of such combination rules, e.g. love Mary IV and John walks t, do not formally carry any information about the structure of the constituent expressions. That is, in the string love Mary IV there is no longer any specification that love is a transitive verb and Mary is a term; and in the string John walks t there is no longer any indication that the sentence is composed of a term and an intransitive verb. Such information is, of
course, crucial when the time comes for adding morphological markings for case and tense: for instance, the rule in (8) should combine John$^T$ with walk$_{IV}$ to form John walk$_{st}$, but it should combine John$^T$ with love Mary$_{IV}$ to form not John love Mary$_{st}$ but John loves Mary$_{t}$.

In an attempt to avoid these problems, Partee (1975:258-259; 1976b:63-64; see also Dowty et al. 1981:190) has argued that the syntax rules build not just simple strings but labelled and bracketed strings as in (10).

\[
\begin{array}{c}
\text{John}^T \quad \{\text{love}_{TV} \text{Mary}^T\}_IV \\
\text{love}_{TV} \quad \text{Mary}^T
\end{array}
\]

This approach preserves information about the internal structure of constituents. Also, it allows the grammar to construct unambiguous hierarchical tree structures instead of simple strings, which are often ambiguous. When interpreted in this way, the nodes of MG derivation trees become much like the linearly ordered phrase-structure trees of transformational grammar (TG).

The view that syntax rules build up unambiguous tree structures rather than simple strings is also a return to the principles laid out in Montague's *Universal Grammar* (UG) (1970a; see also PTQ:255). Of course, people do not write or speak trees in the real world. In UG, there is an 'ambiguating function' called R which maps unambiguous hierarchical structures into the potentially ambiguous strings actually observed in natural language. In UG, Montague leaves the specification and constraint of R rather open. Dowty (1979a:4-13) suggests that R can be interpreted freely to include traditional syntactic transformations. Partee (1979a, 1979b) has proposed that R be constrained to handling simple morphological marking and the erasing of brackets, category labels and numerical subscripts from labelled and bracketed strings.

The present analysis adopts the position that the outputs of syntactic combination rules are labelled and hierarchical but
UNORDERED trees. A typical grammar rule is shown in (11), which should be compared to (8).

(11) If $\alpha \in P_T$ and $\beta \in P_{IV}$ then $(\alpha, \beta) \in P_t$.

- Realisation: $(\alpha_T', \beta_{IV}) \Rightarrow \alpha' \cap \beta$
- Translation: $(\alpha_T', \beta_{IV}) \Rightarrow \alpha'('\beta')$

The first line of (11) states that the combination of a T constituent with an IV constituent is a set containing them both, and that set is a constituent of category t (a sentence). Thus the combination of $John_T'$ and $walk_{IV}$ is the set $(John_T', walk_{IV})_t'$, which is written equivalently as $(walk_{IV}, John_T)_t'$. The realisation clause of (11) states that any sentence constituent of the hierarchical form $(\alpha_T', \beta_{IV})_t'$ is to be realised (written or uttered) with the physical manifestation of the $\alpha$ constituent to the left of (or temporally before) the physical manifestation of the $\beta$ constituent. The realisation component of the grammar, which is the ambiguating relation R of 'UG, is generally responsible for morphological marking, where morphology is taken to include tense, aspect, and case markings, agreement, and the gross linear order of words in a phonological or orthographical string. The translation clause in (11) states that the translation of such a sentence constituent is calculated by applying the translation of $\alpha$, i.e. $\alpha'$, to the intension of the translation of $\beta$, i.e. $'\beta'$. Whenever possible, a rule like (11) will be abbreviated as in (12).

(12) If $\alpha \in P_T$ and $\beta \in P_{IV}$ then $(\alpha, \beta) \in P_t$.

- Realisation: $\alpha' \cap \beta$
- Translation: $\alpha'('\beta')$

In a complete grammar, the realisation rules would need to be much more explicit and complicated than shown above. For instance, the rule combining a TV with its T direct object can specify that the direct object is to be realised in its accusative form (Staal 1967:64-65, 66-67; Dahl 1977a:82; Partee 1979b:86-87).
If \( \alpha \in P_T^V \) and \( \beta \in P_T^T \) then \( (\alpha, \beta) \in P_{IV}^T \).

Realisation: \( \alpha \rightsquigarrow \lambda \text{Acc}(\beta) \)

Translation: \( \alpha'('\beta') \)

Tense, agreement, and pronouns (which are marked for case) are not central concerns in this thesis. Therefore, in the interest of simplicity, such features will often be ignored, and realisation rules will be largely confined to specifying linear order. As will be shown, even linearisation rules need to be fairly sophisticated to deal with cases where constituents are realised discontinuously.

It is important to note that the present approach to syntax makes a rigorous distinction between the abstract, and unambiguous, hierarchical structures, which are not linearly ordered, and the concrete, often ambiguous, linear strings which are realisations of the hierarchical structures. In a grammar using ordered phrase-structure rules, linear order and hierarchy are combined in a single representation. Another important point is that the present realisation rules (the ambiguating relation \( R \)) are limited to morphological operations which code output strings from hierarchical trees. If transformations are taken in their traditional sense to be syntactic operations which map trees into trees, then the present realisation rules are not transformational.

Such a programme for syntax is hardly new. Linguists who have proposed grammars with unordered hierarchical trees and realisation rules include Shaumyan (1965; 1971; 1977); Staal (1967); Fillmore (1968); Chafe (1970); L.B. Anderson (1971); Lytle (1971, 1974); Sanders (1972; 1975a; 1975b; 1979; 1980); Boas (1975); G. Hudson (1979); Schachter (1980) and Dik (1980). Most of these linguists have presented their grammars as direct challenges to traditional transformational grammar. Logicians and logico-linguists employing similar grammars include Curry (1961), Bartsch & Vennemann (1972), (see also Bartsch 1973, Vennemann 1973), J.M. Anderson (1976), S.R. Anderson (1976) and Dahl (1977a; 1977b). Schlesinger (1977) defends such a grammar with arguments from psychology. The present notation is most directly inspired by the MG-like systems of Dahl (1977a;
Beesley 1977b) and Keenan & Faltz (1978). Dowty 1980 also contains some specific proposals for adopting unordered constituency trees in a MG to better handle discontinuously realised constituents.³

In common with most of the approaches just cited, the grammar in this thesis does not appeal to anything analogous to a traditional TG deep structure. The surface unordered trees that provide the input to the realisation rules are built up directly by the syntactic combination rules. A direct, but not necessarily obvious, feature of such a grammar is that it avoids not only a TG-like deep structure but also a TG-like surface structure. That is, the linearisation rules produce simple strings; there is no stage in a derivation which is coded as a labelled and bracketed string. Also avoided in the grammar are rules which syntactically quantify—in terms to give them wide scope.⁴

The hierarchy-realisation approach will be shown to be a viable and insightful way to do MG syntax. In particular, the separation of hierarchical structures and linear realisations highlights the unity of attributive modifiers in this analysis. More generally, this approach makes the results of the investigation immediately available to the various linguists, logicians and psychologists who—often with very little intercommunication—have adopted remarkably similar formalisms to express their analyses of natural language.
Chapter 1. Preliminaries

1.0 Introduction

I shall argue that degree adjectives, such as big, tall and heavy and evaluative adjectives, such as good, bad, clever and skillful, are properly translated as one-place predicates in logical translation. This approach, which is basically the traditional logical treatment of 'absolute' adjectives, will be contrasted with the approach in Montague 1970b (henceforth EFL) and Parsons 1972 (also Cresswell 1973, 1976:265-266; Thomason 1976; Keenan & Faltz 1978; Aqvist 1981) wherein all adjectives are translated as two-place predicates, i.e. as semantic attributives. The move away from the Montague-Parsons analysis is not new: Bartsch (1972a, 1975), McConnell-Ginet (1973), Kamp (1975), Siegel (1976a, 1976b, 1979), Partee (1977:283-285) and Klein (1979a:39, 42; 1980a; 1980b) have similarly advocated one-place predicate status, at least for fairly straightforward qualities (e.g. red, carnivorous, stony) and even for degree adjectives. Evaluative adjectives, however, remain troublesome: Kamp concludes that their status is uncertain, and Siegel analyses them as two-place predicates after much argument. The present arguments are directed primarily against Siegel's analysis; I intend to show that there are syntactic tests, some suggested by Siegel herself, which argue persuasively that evaluative adjectives should be interpreted as one-place predicates.

1.1 Predicates in syntax and semantics

1.1.1 The traditional logical analysis of adjectives

To avoid confusion in a field which has become a terminological jungle, it is important to present a few definitions and clarify a few usages at this point. I shall write of 'syntactic predicates', 'syntactic predicate position', or just 'predicate position' when referring to the appearance of adjectives, without accompanying nouns, after copulas in strings such as The sky is blue. I shall write of 'syntactic attributives' or 'attributive position' when referring to adjectives appearing in strings together with the noun
they modify, as in blue sky, big flea and good plumber.

From the semantic point of view, a 'predicate' or, more precisely, a 'one-place predicate' will be taken to be a function whose domain is the set of entities in a model and whose range is the set (0,1). Let the predicate denoted by the noun barn be written \( \text{barn}' \). This predicate \( \text{barn}' \) takes one argument \( x \), written \( \text{barn}'(x) \), and returns 1 (true) if \( x \) is a barn and 0 (false) if it is not. Less formally, \( \text{barn}' \) can be thought of as denoting the set of all barns in a model, and \( \text{barn}'(x) \) will be true iff \( x \in \text{barn}' \). I shall write of 'two-place predicates' or 'semantic attributives' when referring to analyses of the Montague-Parsons type; examples will follow shortly. The distinction made here is important, but that does not mean that there are not significant correlations between syntactic and semantic predicativity and attributiveness. Indeed, by arguing that evaluative adjectives can and should be interpreted as one-place predicates, I am defending a closer link between their syntax and semantics than is generally accepted.

The following names of adjective classes will suffice to get the discussion going: 'Absolute' (sometimes called 'predicative' or 'intersecting') adjectives are taken to include, for the time being, red, white, blue, carnivorous, metallic and, in their literal sense, pregnant, magnetic, virgin, dead and alive. The 'degree' (sometimes called 'measure', 'measuring' or 'scalar') adjectives include big, small, tall, short, high, low, fat, thin, young, old, etc. 'Evaluative' (also called 'manner') adjectives include superb, excellent, skilful, beautiful, good, fair, poor, bad and awful.¹ The 'relative' adjectives are taken to be a motley bunch including mere, chief, alleged, ostensible, purported, fake and imitation. These groupings will be challenged, defended, subdivided and collapsed as the analysis progresses.

Some elementary logics have treated adjectives as one-place predicates, and this solution works nicely if one chooses one's examples carefully. Red, for example, has usually been considered an absolute adjective, and the corresponding one-place predicate is
written *red*. If we translate *x is a red barn* as in (1a), then (1b) and (1c) will follow logically.

(1) a. λy [red'(y) & barn'(y)] (x)
    b. barn'(x)
    c. red'(x)

That is, if we know that some entity is a red barn, we know intuitively that the entity is a barn and that the entity is red. Furthermore, a red barn is a red building and a red entity. It makes sense to speak of 'redness' or 'being red' pure and simple. Adjectives with this quality are called 'intersective', 'predicative' and 'absolute' by various authors.

Some other, more troublesome, adjectives seem to allow only the (b) entailment, and a few allow neither the (b) nor the (c) entailment. If we know that an entity is a big flea, for instance, we know that the entity is a flea, but we can object that the entity is not big. A big flea can be a small animal.

(2) a. x is a big flea
    b. flea'(x)
    c. big'(x)

If *big flea* were analysed using the simple conjunction analysis used for *red barn*, then (2c) would follow automatically, and to hold that 'a big flea is small' would seem to involve a contradiction, that something can be big and small at the same time. Similarly, if we know that someone is a good thief, then it appears to follow that he is a thief, but not that he is absolutely good. A good thief can be, and usually is, a bad man; someone can be a good mother and a bad wife simultaneously.

(3) a. x is a good thief
    b. thief'(x)
    c. good'(x)
The solution to this apparent failure of the conjunction analysis has generally been to treat degree adjectives like big and evaluative adjectives like good as relative rather than absolute adjectives. Size is always relative to something, a comparison class, and it makes no sense to ascribe bigness or smallness except relative to such a class. A flea can be 'big for a flea' but 'small for an animal'. Goodness and badness are also relative, but in a slightly different way. Evaluation is relative to some criterion or relevant function performed by the entity being evaluated. Thus, a woman can be 'good qua mother' but 'bad qua wife'.

It is here that the concept of a two-place predicate is sometimes used. Instead of saying simply that some entity is 'tall', one says that that entity is 'a tall N', where N is the comparison class. Instead of saying that some entity is 'good', one says that it is 'a good N' where N indicates the relevant role. In the logic, both tall' and good' apply first to this N, yielding a one-place predicate which can then be predicated of a subject just like the one-place predicates barn' and red'. Simplifying a great deal, we can characterise the traditional analyses of the syntactically attributive adjectives discussed so far. Examples consisting of a syntactic structure with its translation occur often in this thesis; by convention, the translation of example (n) will be shown in (n').

(4) John is a blue-eyed jockey. (absolute adjective)
(4') \( \lambda x [\text{blue-eyed}'(x) \& \text{jockey}'(x)](\text{John}) \)

The formula in (4') then reduces to blue-eyed'(John) & jockey'(John).

(5) John is a tall jockey. (degree adjective)
(5') \( \lambda x [(\text{tall}'(\text{jockey'}))(x)](\text{John}) \)

(5') then reduces to tall'(jockey')(John).

(6) John is a good jockey. (evaluative adjective)
(6') \( \lambda x [(\text{good}'(\text{jockey'}))(x)](\text{John}) \)
In this analysis, while blue-eyed, tall and good can all be syntactically attributive, only tall and good correspond to semantic attributives, that is, to two-place predicates. Blue-eyed’ turns out to be semantically predicative even when the surface adjective appears as a syntactic attributive. Conversely, these same adjectives can all appear in syntactic predicate position, but sentences like (8a) and (9a) must be taken as elliptical versions of the more complete sentences (8b) and (9b).

(7) John is blue-eyed.
(8) a. John is tall.
   b. John is a tall N. (where N is a noun)
(9) a. John is good.
   b. John is a good N. (where N is a noun)

1.1.2 The early Montague grammar analysis of adjectives

The early MG analysis of adjectives was motivated by classes of adjectives (the 'non-standard modifiers' of Parsons 1972:130) which are even more troublesome than good and tall. If we know that person x is a good thief, then we at least know that x is a thief. But if we know that x is an alleged thief, then we cannot even conclude that x is a thief, let alone that he is 'alleged'. And if x is a phony thief, then it seems that he is not a thief at all. Anxious to avoid any spurious logical consequences arising from a conjunction analysis for such adjectives, Montague (EFL:211-13) goes to the extreme of denying a conjunction analysis, and so one-place predicate status, to all adjectives. The result is an analysis where all adjectives correspond to semantic attributives much as in (5) and (6) above.

Montague rejects the idea of defining multiple syntactic classes of adjective, some of which, the 'intersectives', would translate to allow (b) and (c) logical consequences as in (1), others of which, the 'subsectives', would translate to allow the (b) logical consequences as in (2) and (3), and still others of which, like...
phony, reputed and alleged, would allow neither; he felt such a solution would detract from the 'conceptual simplicity' of his uniform treatment. As a result, all adjectives in EFL are treated as two-place predicates, ad-common nouns denoting functions from intensions of predicates to predicates. (10) and (11) show typical syntactic and semantic trees.

(10) \[ \text{big flea} \]
(10') \[ \text{big}'(\text{flea}') \]

(11) \[ \text{false friend} \]
(11') \[ \text{false}'(\text{friend}') \]

This blanket solution avoids invalid logical consequences; in fact it leaves Montague with no logical consequences at all. He cannot even show that a red barn is red and a red barn is a barn are valid sentences. To patch up this obvious deficiency, Montague introduces meaning postulates such as (12) and (13).

(12) \[ 'every \delta \zeta \text{ is a } \zeta' \]
where \( \delta \) is an intersective or subsective adjective
and \( \zeta \) is a common noun

(13) \[ 'every \delta \zeta \text{ is } \delta' \]
where \( \delta \) is an intersective adjective
and \( \zeta \) is a common noun

By way of example, red is an intersective adjective and tall is a subsective adjective in Montague's terminology. Meaning postulate (12) allows one to show that a red barn is a barn and a big flea is a flea are valid sentences. Similarly, (13) supports the validity of a red barn is red but not a big flea is big. These rules allow Montague to assign all adjectives the same syntactic category and logical translation while still getting out just the right consequences. However, this apparent simplicity has its hidden complexities.
Montague avoids adjective subclasses in the grammar, but the meaning postulates depend crucially on such subclasses in the end.

In spite of Montague's example, a number of writers in the general field of Montague grammar, e.g. Dowty (1976:209-210), continued to treat at least some adjectives as simple one-place predicates. Others like Kamp (1975), Bartsch (1973) and Klein (1980a) have argued that the Montague-Parsons analysis cannot be generalised to handle comparatives correctly; they claim that even degree adjectives should be translated as one-place predicates. Kamp ends his paper (1975:153-4) wondering just how many other types of adjective could be given predicate status; noting that alleged seemed a hopeless case, he continues:

The same can be said to be true, to an almost equal degree, of adjectives such as fake, skillful, or good. Where precisely we should draw the boundaries of the class of adjectives [which are one-place predicates] I do not know. For example, does skillful belong to this class? Surely we must always ask 'skillful what?' before we can answer the question whether a certain thing or person is indeed skillful; this suggests that the theory is not applicable to the word skillful. Yet there appears to be some plausibility in the view that having a good deal of skill does function as a predicate—be it a highly ambiguous one as there are so many skills.

Siegel (1976a, 1979) argues forcefully for treating degree adjectives as a subset of the class of absolute adjectives, but she draws the line firmly at the evaluative adjectives, which remain two-place predicates as in EFL.

I shall proceed by first examining the way in which degree adjectives have been elevated to absolute status. The challenge is to do this without causing undue problems for logical consequence. I shall then show that evaluative adjectives can be handled in much the same way. Some new tests involving adverbial modification of adjectives will lend support to my claims. In the end, it will be shown that extending one-place predicate status to evaluative adjectives results in more consistent syntax and semantics, with a closer mapping between the two.
Chapter 2. Degree and evaluative adjectives as one-place predicates

2.1 Degree adjectives

2.1.1 The traditional analysis of degree adjectives as two-place predicates

We may take Wheeler (1972) as a typical analysis of degree adjectives as semantic attributives. Wheeler translates (1) as (1').

(1) John is a tall man.
(1') Tall(John, \lambda x(x \text{ is a man}) \& \text{John } \in \lambda x(x \text{ is a man})

The translation in (1') contains two conjoined clauses. In the first, tall is shown to translate as a two-place predicate holding between an entity and a set of entities. The set of entities, in this case the set of men, is the comparison class by which John's tallness is to be judged. This first clause is meant to be read as 'John is tall compared to men' rather than as 'John is tall for a man'. The second paraphrase presupposes that John is a man, and Wheeler feels that it is important to preserve a notation for representing a comparison between an entity and a set of which it is not a member.\(^1\) The second clause in (1') supports the intuition that if John is a tall man is true, then John is a man is also true, by making the latter follow as a logical consequence. As we saw in Section 1.1.2, the less abstract Montague-Parsons analysis of tall man does not produce this logical consequence; meaning postulates must be invoked.

In Wheeler's analysis, the relativity of tall is captured in the variability of the comparison class. John is a tall dwarf receives the interpretation in (2), which indicates that John's height is now to be considered relative to the set of dwarves.

(2) Tall(John, \lambda x(x \text{ is a dwarf}) \& \text{John } \in \lambda x(x \text{ is a dwarf})

Any syntactically attributive construction AN, where A is a degree adjective and N is a noun, will be translated with N representing the
relevant comparison class. There are, however, two reasons why this translation is inadequate. First, I shall show that the translation is too rigid to account for the data, and second, I shall show that the relativity of degree adjectives can be better handled by appealing to vagueness and context.

2.1.2 Deriving the comparison class

2.1.2.1 Syntactic attributive constructions

The problem with the Wheeler analysis is that it is not so easy to derive the relevant comparison class mechanically from the syntax, especially with more complicated examples. Wheeler himself (1972:314) claims that (3) has two readings, one ascribing tallness to Jones relative to the set of old men and the other ascribing both tallness and age to him relative to the set of men.

(3) Jones is a tall old man.

These two readings, which involve, presumably, different bracketings of the noun phrase elements following tall, are representable in Wheeler's system as (4) and (5).

(4) Tall(John, \lambda x(\text{old}(x, \lambda y(y \text{ is a man})) \& x \in \lambda y(y \text{ is a man})))
\& John \in \lambda x(\text{old}(x, \lambda y(y \text{ is a man})) \& x \in \lambda y(y \text{ is a man}))

(5) Tall(John, \lambda x(x \text{ is a man})) \& John \in \lambda x(x \text{ is a man})
\& \text{old}(John, \lambda x(x \text{ is a man})) \& John \in \lambda x(x \text{ is a man})

The formalisms start getting unmanageable, and the intuitions start failing, however, as the noun phrases get more complicated. A sentence like 'John is a tall old fat man' has one reading, for Wheeler, where the tallness is relative to old fat men, and, 'given the present order of its attributives, the sentence can be understood in at least two other ways' (Wheeler 1972:321), which again appear to involve different surface bracketings. It is common practice to cite the simplest cases where 'it will generally be understood that the relevant class for grading is that specified by the noun'
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(McConnell-Ginet 1973:89; emphasis mine) and to avoid anything nastier. There is some uneasiness in the observations. If comparison classes are derived mechanically from syntactic structures, then it should always be possible to predict exactly how many readings are possible for any finite noun phrase construction involving degree adjectives.

Siegel (1976a:129-135; 1979:247-248) goes further than most in discussing the problems of interpretation of double degree adjectives in her examples (6) and (7).

(6) Billy is a heavy fast runner.

(7) Billy is a tall little red-headed basketball player.

Noting that (7) seems to allow a reading where tallness is measured in comparison to little basketball players, skipping over red-headed altogether, Siegel concludes, as did McConnell-Ginet, that context rather than syntax must pick out the comparison class.

Presumably, it is the context of utterance that allows us to understand how much is included in the comparison class.

It would appear that with prenominal measure [i.e. degree] adjectives, the comparison class may be taken as being either the set picked out by the basic common noun modified, or by another, more complex common noun to the right of the measure adjective.

Going a step beyond Siegel, I claim that the comparison class, even in the simplest AN constructions, may not be the set denoted by the noun at all. Consider the following conversation.

(8) Q: Which of the women over there is Barbara?

A: Barbara is the tall fashion-model.

Now there is a perfectly good, even preferable reading of *tall fashion-model* in (8) which involves women' rather than *fashion-model* as the comparison class for *tall*. That is, *tall fashion-model* can be paraphrased as '(*tall compared to women*) and (*a fashion-model*)'
rather than as '(tall compared to fashion-models) and (a fashion-model)'. It is therefore perfectly possible to hold that Barbara is a tall fashion-model but that she is not tall for a fashion-model or tall compared to fashion-models. Similarly, one can utter Quang is the short Vietnamese without meaning that Quang is short for a Vietnamese. In certain contexts, the sentence can be true if Quang is a Vietnamese and Quang is short (for a man). One can, conceivably, consistently assert both that Quang is a short Vietnamese and that Quang is tall for a Vietnamese. Once again, the comparison class can be different from the set denoted by the modified common noun, and only context seems able to pin it down. Wheeler's analysis, which mechanically derives the comparison class from the syntax, is incapable of capturing such usages.

2.1.2.2 Syntactic predicate constructions

Another problem for any Wheeler-like theory is to account for degree adjectives in syntactic predicate position.

(9) John is tall.

If such adjectives are taken to be semantically attributive, then the noun (or predicate or set) used for comparison must be slipped into the translation by some means. There are basically two ways of doing this, both of which amount to the same thing for the purposes of this discussion.

(10) a. An adjective like tall can be taken to apply to a noun as usual, yielding strings like John is a tall boy. Then a transformation can apply, deleting the noun (and deleting or suppressing the indefinite article) yielding John is tall. The predicate boy', or whatever, will remain in the semantic translation.

(10) b. Tall can be taken to apply to a dummy noun, call it $\Delta$, which never receives phonological form and so never has to be deleted. In the semantics, $\Delta$ is instantiated with a nominal predicate by the context.

For convenience, I shall call such a process 'dummy noun deletion' regardless of the actual mechanism involved. Neither of these
solutions is very attractive from a syntactic point of view, and semantically they fall prey to the objections already cited above. If the overt modified common nouns in *tall fashion-model* and *short Vietnamese* cannot be taken automatically to provide the relevant comparison class, then the deleted (or dummy) modified common noun in *tall boy* is no more helpful.

Any actual attempt to interpret a degree adjective in predicate position would seem to involve something like (10b), which ultimately relies on context. There have been claims, however, that the comparison class in such cases can be derived in an orderly way from semantic codings in the lexicon. Katz (1967) presents the examples in (11), where the comparison classes are claimed to be named by the nouns in square brackets.

\[
\text{(11)} \quad \begin{cases} \text{skyscraper} \\ \text{man} \\ \text{flea} \\ \text{United States} \\ \text{tarantula} \end{cases} \quad \begin{cases} \text{[buildings]} \\ \text{[humans]} \\ \text{[insects]} \\ \text{[countries]} \\ \text{[spiders]} \end{cases}
\]

In general, 'the class of entities with which something is compared is a category to which that thing belongs' (Katz 1967:186-187). Katz even claims that 'we cannot render "The skyscraper is big" as "The skyscraper is big for a physical object" or in a more extreme case, "The flea is big", as "The flea is big for an animal"'. The choice of comparison class is taken to be limited to the next highest concept in the great semantic chain of being. 3

Although Katz's claims include interesting observations about default comparison classes, they are ultimately untenable. Comparison classes cannot be taken automatically from semantic codings in the lexicon any more than they can be taken automatically from a modified common noun. For instance, it is clearly possible, Katz's claims to the contrary notwithstanding, to interpret 'The flea is big' as 'The flea is big for an animal', and such a reading can be
useful and natural in the context of science fiction.

The key point of these observations is that context must ultimately provide the relevant comparison class for degree adjectives. Context must also do more than simply provide suppressed or deleted common-noun arguments for adjectives appearing in predicate position; in fact, it seems unlikely that comparison classes can be incorporated in the theory as syntactic arguments at all. Klein (1979a:11-14; 1980a:14-16), for instance, has argued that treating contextually supplied variables (such as worlds, times, and comparison classes) as syntactic arguments leads to unreasonably abstract translations. The treatment of contexts within a MG requires significant modifications to the semantics, and the subject will be taken up in Section 6.2.4.

2.2 Evaluative adjectives as one-place predicates

2.2.0 Introduction

Given that degree and evaluative adjectives have traditionally been characterised together as relative adjectives (Geach 1956), a demonstration that one of these groups is really a subtype of absolute adjectives would tend to argue that the other is too. Nevertheless, there are differences between the classes, and I have already cited Kamp (Section 1.1.2) on the doubts over extending one-place predicate status to adjectives like good and skillful. I maintain that evaluative adjectives can indeed be analysed as one-place predicates. As Siegel addresses herself specifically to this question, concluding that evaluative adjectives could not be interpreted as one-place predicates, my remarks will be addressed mainly to her work.

2.2.1 Preliminaries

Before going on, it is important to explain some terminology used in previous analyses. The reader is warned that many of the following definitions and distinctions will prove unhelpful in a grammar that accommodates vagueness and contexts. In grammars where
all adjectives are treated as basic common-noun modifiers, both degree and evaluative adjectives have been traditionally labelled 'subsective' (also called 'restrictive' (Keenan & Faltz 1978:68, 16, 225) or 'affirmative' (Kamp 1975:125)). This means simply that the set denoted by the result of applying one of these adjectives to a common noun is always a subset of the set denoted by the common noun alone. That is, \( A(N) \subseteq N \).

\[(14) \quad [[\text{tall men}]] \subseteq [[\text{men}]] \]
\[(15) \quad [[\text{bad plumbers}]] \subseteq [[\text{plumbers}]] \]

Another way of expressing this quality is to say that subsective adjectives are compatible with the following Montaguvian meaning postulate (see Section 1.1.2).

'every \( b \zeta \) is a \( \zeta \)
where \( b \) is an intersective or subsective adjective
and \( \zeta \) is a common noun

'Absolute' or 'intersective' adjectives are also compatible with the stronger meaning postulate below. All absolute adjectives are subsective.

'every \( b \zeta \) is \( b \)
where \( b \) is an intersective adjective
and \( \zeta \) is a common noun

It has also been claimed that degree adjectives are 'extensional' modifiers, whereas evaluative adjectives are 'intensional' modifiers (Wheeler 1972:312; Kamp 1975:124-125; Bartsch 1975:176; Siegel 1976a:232-234; Keenan & Faltz 1978:162-163, 219, 249). Formally, extensional functions are those whose values depend solely on the extensions of their arguments. Informally, we may say that any extensional function, e.g. \textit{blue-eyed}, will pick out the same members of the set denoted by its argument, say \textit{basketball players}, no matter how that set is named. If the set of basketball players happens to be identical to the set of trombone players in a model \( M \), then it
will be the case that \([\text{blue-eyed basketball players}] = [\text{blue-eyed trombone players}]\) in \(M\). Evaluative adjectives are apparently not extensional: in the same model \(M\) it may well be the case that \([\text{good basketball players}] \neq [\text{good trombone players}]\).

Although degree adjectives are usually assumed to be extensional modifiers, the matter has been debated somewhat (Kamp 1975:126-127; Siegel 1976a:112-116, 231-232). Is it the case, for example, that in our world where all and only basketball players are trombone players that it will always be the case that \([\text{tall basketball players}] = [\text{tall trombone players}]\)? Such an assumption underlies any analysis where the modified common noun is taken automatically to denote the comparison class (see Section 2.1.1). Yet some people have the intuition that tallness for a basketball player might be assigned differently, probably more conservatively, than tallness for a trombone player, even if the two classes happen to be extensionally identical.

Also interesting to consider are the disaster scenarios of Zwicky (1969). Assume a world much like ours in which basketball players are an exceptionally tall group. If John is a basketball player who is 6'2" tall in this world, then he is tall for a man but not tall for a basketball player. Now if a sudden epidemic were to wipe out the entire population of basketball players over 6'2" tall and if no other basketball players are 6'2" tall, then John would be the tallest basketball player in the world. Some might still refuse, however, to say that he is tall for a basketball player.

The questions concerning the status of degree adjectives as 'extensional' modifiers are rendered inappropriate in the present context-dependent semantics. First, the new semantics depends on context to select comparison classes for degree adjectives from the universe of discourse. Thus the extension of basketball-player' may be irrelevant to the interpretation of tall in tall basketball player. Second, by translating degree adjectives as one-place predicates of individuals they cease to be, in their basic form, functions on common-noun arguments at all. It is therefore inappropriate to ask
if tall' is an intensional or extensional function on a head noun argument like basketball player. I shall argue that evaluative adjectives are basic predicates as well, and that their 'intensional' effects can and must be explained by suitable appeals to context.

2.2.2 History of analyses

The fact that evaluative adjectives modify 'intensionally' was recognised by Plato and Aristotle, who cited examples like good lyre player, and worried about the way that a good thief could be a bad man. Both concluded that good and bad modify relative to the functions of their arguments, and this kind of analysis continues little modified to the present day. Aristotle noted that if the function of a lyre player is to play the lyre, then the function of a good lyre player is to play the lyre well. The very same rule, sprinkled with varying degrees of sanctifying formalism, turns up in even the most modern discussions of adjectives and adverbs.5

W.D. Ross (1930:65-66) proposes that there are two very separate readings of good. The first is what he calls the 'attributive' type seen in the usual readings of good knife, good liar, good lyre player or anything else 'good of its kind'. The second is what he calls the 'predicative' (absolute) reading having the sense of 'moral excellence', as seen in one reading of good man and in constructions like courage is good. It soon becomes obvious that nouns indicating fairly obvious roles and functions (such as liar, baker and knife) will be most susceptible to Ross's 'attributive' good and that relatively 'empty' nouns like man will be most easily modified by the 'predicative' good. Researchers influenced by Ross's theory include Katz (1966:289-290, 311), Berman (1973a:198-199) and, as we shall see, Siegel.

Against this view, Geach (1956:33-34, 39) claims that good and bad are always 'attributive', even when they appear in predicate position. John is good, for instance, has to be interpreted as 'John is a good so-and-so', implicitly involving dummy noun deletion. While admitting that it is hard to explain the meaning of good man in terms of the meaning of man, he rejects the idea that a separate
kind of adjective is involved.

Hare (1957:107-108), criticising Geach, agrees that good and bad are 'attributives' but attacks the idea that the meaning of any AN construction, where A is an evaluative adjective, can be explained simply by knowing the meaning of N. Pointing out the distinction between 'functional words' like knife and 'non-functional' words like man, he writes:

'Good' often precedes words which are not functional. In such cases, in order to know what traits the thing in question would have to have in order to be called good, it is not sufficient to know the meaning of the word. We have also to know what standard is to be adopted for judging the goodness of this sort of thing; and this standard is not even partly (as in the case of functional words) revealed to us by the meaning of the word which follows 'good'.

It must be emphasised that this difference between the behaviour of 'good' when it precedes a functional word, and its behaviour when it precedes a non-functional word, is not due to any difference in the meaning of 'good' itself. We may say, roughly, that it means in both cases 'having the characteristic qualities (whatever they are) which are commendable in the kind of object in question'. The difference between the two cases is that the functional word does, and the non-functional word does not, give us clues as to what these qualities are.

Hare's comments are particularly astute, and we shall have occasion to refer back to his concept of 'standards' of evaluation. For now it is important to note how Hare challenged the notion that there is a self-evident standard for any common noun. For example, even if we know the meaning and function of a teacher, Hare claims quite correctly that there are still innumerable standards by which a good teacher might be judged. Even if we paraphrase good teacher as good qua teacher, we may still have to choose between standards of intelligence, clarity, elocution, legibility of handwriting on the blackboard, discipline, etc. (see also Berman 1973a:218). Context must be the final arbiter, and the standards suggested by the
function of the modified noun may be overridden altogether.

In Hare's account, the standard of 'moral excellence' or 'ethical goodness' is only one possible standard among many. There is no need (and no justification) for a separate 'predicative' good. When good modifies a word like man, there are fewer natural suggestions for a standard, but context could force a good man to be evaluated according to the standards appropriate for a soldier, a lover, a politician, a moral being, etc. Similar arguments are offered by Keene (1961:25-26).

The distinction between 'functional' and 'non-functional' words has been noted by a number of researchers. Vendler (1968:91-94) notes that his A3 class of adjectives, which corresponds to what are here called evaluative adjectives, have a special affinity for nouns denoting 'certain functions'. Katz (1966:292-293) argues that only function words can be meaningfully modified by evaluative adjectives. For each of Katz's function words, such as knife, there is an 'evaluation semantic marker' built right into the lexical coding. (16) shows the coding for knife.

(16) (Eval: (ease of dividing substances softer than its blade))

The function of good or bad, for Katz, is simply to set evaluation semantic markers such as (16) to plus (+) or minus (-). The claim that evaluation standards are automatically derivable from lexical codings parallels Katz's claims about the derivation of comparison classes (see Section 2.1.2.2), and it is open to all the same objections. Derived nouns, of course, have no lexical coding and so no evaluation semantic marker. Non-function nouns like man, which also lack such a marker, can also be evaluated in many contexts. And, above all, there is simply no way to defend the notion that there exists a simple, self-evident and invariable criterion by which anything, even the most functional noun, is evaluated. A knife which is to be given to a child, for instance, may be good only if the opposite of (16) applies (Sampson 1970; Berman 1973a:217-218). Katz's theory is perhaps the most explicit example of the kind of
theory shown to be unworkable by Hare (1957) and Keene (1961).

Berman (1973a:198-199) presents an analysis of good which is remarkably close to that of Ross (1930). That is, she takes good to be a doublet with semantically attributive and semantically predicative readings. The semantic attributive is called 'bound', indicating the claimed dependency of the meaning of good on the meaning of the noun it modifies, and the semantic predicate is called 'unbound', supposedly indicating its absoluteness.

The analysis of Siegel (1976a, 1979) differs in no important ways from Berman's, but it is formally elaborated and defended at length. Whereas Montague (EFL) analyses all adjectives as semantic attributives and Kamp (1975) argues for analysing as many adjectives as possible as one-place predicates, Siegel steers a middle course by adopting both solutions. For Siegel, 'absolute' adjectives, including degree adjectives, are interpreted as one-place predicates, and 'relative' adjectives, including evaluative adjectives, are interpreted as semantic attributives.

Siegel assigns relative adjectives to the category CN/CN. This simply indicates that they are syntactic functions which take a common noun and yield another common noun as the result. Relative adjectives are applied and ordered with rule (17).

(17) If $\alpha \in P_{CN/CN}$ and $\beta \in P_{CN}$ then
$$F_6(\alpha, \beta) \in P_{CN}$$
where $F_6(\alpha, \beta) = \alpha\beta$.

Semantically, relative adjectives correspond to functions from intensions of one-place predicates into one-place predicates. Their type is therefore $<<s,<e,t>>, <e,t>>$.

(17') If $\alpha \in P_{CN/CN}$ and $\beta \in P_{CN}$ and $\alpha$ and $\beta$ have translations $\alpha'$ and $\beta'$ respectively, then $F_6(\alpha, \beta)$ translates as $\alpha'(\beta')$.

(18) is a tree showing a typical Siegel analysis including mere, a relative adjective.
A one-place predicate within Montague grammar will be of type <e,t>. There are two such predicate classes in PTQ: syntactic predicates (IVs) and common nouns (CNs). To preserve the syntactic distinctions between them, syntactic predicates are assigned the category t/e and common nouns t//e. As Siegel proposes to treat some adjectives as one-place predicates, and as their syntactic behaviour is different from both syntactic predicates and common nouns, she assigns them the category t///e. Siegel uses a rule like (19) to form a syntactic predicate from an adjectival predicate by syncategorematically adding a copula be.

(19) If $\alpha \in P_{t///e}$ then $F_{20}(\alpha) \in P_{IV}$ where $F_{20}(\alpha) = \text{be } \alpha$.

For our purposes, the corresponding semantic interpretation rule may be taken to simply preserve the interpretation of $\alpha$.

As carnivorous and tall are both assigned to the category t///e, rule (19) will allow Siegel to generate strings such as (20) and (21), but (22) will not be generated by this rule because mere is not of category t///e.

(20) John is carnivorous.
(21) John is tall.
(22) *John is mere.

To generate absolute adjectives in syntactic attributive position, Siegel resorts to an awkward version of the old relative clause reduction transformation. The reduction rule is shown in (23) and an example using it in (24).
(23) If $\alpha \in P_{CN}$ and $\alpha$ is of the form "$\beta$ such that he be $\gamma$" where $\beta \in P_{CN}$ and $\gamma \in P_{t//e}$ then $F_{22}(\alpha) \in P_{CN}$ where $F_{22}(\alpha) = \gamma \beta$.

(24) The old barn collapsed_t
    the old barn_t collapsed IV
    old barn CN collapsed IV
    barn such that it is old CN
    barn he_0 is old_t
    he_0 be old IV
    old_t//e

As we have seen, Siegel includes degree adjectives in the t//e or absolute class. By using rules (19) and (23) she successfully generates the strings in (25) and (26) without any recourse to dummy noun deletion.

(25) The basketball player is tall.
(26) The tall basketball player sat down.

When taken to its full conclusion, this analysis makes some interesting predictions about possible readings for adjectives in attributive versus predicative position. If there are adjective forms which have both a CN/CN and a t//e reading, then only the t//e reading should be possible when the adjective appears in predicate position. Such an adjective in attributive position should be ambiguous: absolute if derived by way of relative clause reduction and relative if derived directly. Consider the case of moral in moral philosopher. A moral philosopher is either a practitioner of moral-philosophy (Siegel's 'relative' or CN/CN reading), or he is a philosopher who is moral (Siegel's 'absolute' or t//e reading). But moral has only the absolute reading when it appears in syntactic predicate position: The philosopher is moral.

So far the predictions are borne out. This test works for moral philosopher, plastic surgeon, abnormal psychologist, fuzzy logician, legal
secretary, deviant logician, Chinese restaurateur, mediaeval scholar and a number of similar examples discussed by Bolinger (1967). In fact, Siegel's absolute and relative classes correspond nicely with Bolinger's 'referent modifiers' and 'reference modifiers' or with the traditional distinction between 'inherent' and 'non-inherent' modifiers (Quirk et al. 1972:259ff).

Unfortunately for Siegel's analysis, evaluative adjectives refuse to act as her primary classification would predict. Good is taken to be a doublet, but unlike other doublets like moral, good in predicate position can still have what Siegel calls a relative reading.

(27) John is good.

Since Siegel's 'relative' readings come only from semantic attributives, any 'relative' reading of (27) must be derived from John is a good \( \Delta \), where \( \Delta \) is a common noun. This forces Siegel to retain dummy noun deletion.

2.2.3 On arguments against translating evaluative adjectives as one-place predicates

Siegel has two arguments, both of which I must counter, for analysing such 'relative' readings of evaluative adjectives as semantic attributives. The first argument is based on the distinction between intensional and extensional modifiers which was discussed in Section 2.2.1. Siegel claims that to evaluate an expression like good car, which involves a 'relative' adjective, one must have a grasp of the intension of car; one must know what it means to be a car. Conversely, she claims that to evaluate expressions like red car or fast car, which involve absolute adjectives, one does not have to have a grasp of the intension of car; one needs simply to be able to identify car things and red-things or car things and things which move as fast as a car. Similarly, to know what a bad library is, Siegel claims that one must have a grasp of the intension of library—a bad library could be poorly stocked, difficult to use, badly designed in general for
finding information, etc. But a tall library, by this argument, can be understood with no reference to the characteristic functioning of a library at all (1979:231-232; 1976a:109ff).

Siegel's analysis appeals to the form of the logical translation to explain the alleged relativity (semantic attributiveness) of her CN/CN adjectives and the alleged absoluteness of her t//e adjectives. When bad has its CN/CN reading, it is translated as in (28).

\[(28)\] \[x \text{ is a bad library}\]
\[(28')\] \[
(\text{bad}'(\text{'library'}))(x)
\]

That is, bad' applies to the intension of its argument library' to form a new predicate bad'(\text{'library'}), which is predicated of x. Such a logical form is taken to indicate, in itself, that badness is being predicated of x relative to the meaning (intension) of library'. Conversely, the translation of an absolute adjective like tall as a one-place predicate of individuals is taken to show how tall is applied independent of the 'meaning' of the common noun it precedes in the syntax. For Siegel, tall reaches prenominal position only by relative clause reduction, and a common noun like tall library receives a conjunction analysis.

\[(29)\] \[x \text{ is a tall library}\]
\[(29')\] \[
\lambda y[\text{tall}'(y) \& \text{library'}(y)](x)
\]

In reality, the logical form of (28') explains very little in itself. Without a semantics for bad', there is no set-theoretic account of how the extension of the new predicate bad'(\text{'library'}) is formed from its parts. The equation of intensions with pretheoretical notions of meaning has been strongly criticised by McConnell-Ginet (1979:141-142; 1982:162), who also emphasises that context, rather than the intension of library', must be allowed to specify the criteria of evaluation. Finally, a CN/CN could denote an extensional function, in the technical sense, even though it applied to the intension of its argument in the intensional logic; the intensionality or
extensionality of a function depends on its behaviour in the interpreting semantics, not on its logical form.

Siegel's argument that \textit{good} in \textit{good car} is interpreted relative to the intension of \textit{car} while \textit{fast} in \textit{fast car} is not is simply confused. She points out that a car can still be a car even if it does not run at all, and concludes from this that speed is not part of the intension of \textit{car}—i.e. it is not a necessary attribute of car-hood. A \textit{fast car}, therefore, can supposedly be characterised without recourse to the intension of \textit{car}. She claims that \textit{good car}, however, must be characterised relative to the intension of \textit{car}. This argument simply does not hold. I may call my car a 'good car' in the relative sense that it looks good. But certainly beauty is not a necessary property of cars any more than speed is. By Siegel's argument, beauty is therefore not part of the intension \textit{car}', and my usage of \textit{good} to describe the beauty of my car is not intensional. Yet my usage of \textit{good} is certainly 'relative', by Siegel's standards, and intensional modification is the only way that relative readings can arise in her system. When the relativity (vagueness) of adjectives like \textit{good} is properly ascribed to context rather than to intensional modification, such paradoxes do not arise.

Siegel's second argument for treating 'relative' readings of \textit{good} and \textit{bad} as semantic attributives is based on the possibilities of vague readings in sentences such as (30) and (31).

(30) That lutist is good.
(31) That man is a good lutist.

Siegel claims that \textit{good} in a sentence like (30) can be both ambiguous and vague. The claimed ambiguity is between being 'absolutely good' (derived from a t///e) and being 'good as a something' (derived from a CN/CN). In the case where (30) is derived from a CN/CN, the sentence is vague; the \textit{something} that the person is good as can be any noun in the lexicon. Thus (30) might turn out, in the right context, to mean that 'That lutist is good as a chess player'. On the other hand, the \textit{good} in (31) is claimed to be
ambiguous but not vague (1976a:55-56, 63-72). That is, the lutist might still be absolutely (i.e. morally) good or relatively good, but the relative goodness is limited to goodness as a lutist. It is impossible, claims Siegel, for (31) to be read as 'That man is a good as a chess player lutist'.

Siegell believes that her analysis of (30) and (31) as (30') and (31'), respectively, captures these observations about vagueness. (30'b) has a variable \( A \) ranging over common nouns. The same slot in (31'b) is filled by \textit{lutist}', blocking a similar kind of vagueness.

(30') a. \textit{good}'(\textit{that lutist})
   absolute reading
b. \textit{good}'(\^\textit{A}) (\textit{that lutist})
   vague relative reading
(31') a. \( \lambda y [\textit{good}'(y) \& \textit{lutist}'(y)] \) (\textit{that man})
   absolute reading
b. \textit{good}'(\^\textit{lutist}') (\textit{that man})
   non-vague relative reading

It is, however, possible, \textit{pace} Siegel, to read the \textit{good} in sentence (31) as 'good as a chess player'. Hare (1957), Sampson (1970) and Keene (1961) have shown the futility of trying to derive standards of evaluation mechanically from the meaning of modified nouns, and they have shown how context can override even the strongest hints of functional nouns. Consider the hypothetical case of a chess school which specialises in teaching musicians. When asked how lutists, as opposed to oboists, take to chess, an instructor might say, 'We get some good lutists and some bad lutists'. In this context, the goodness will be ascribed relative not to lute playing but to chess playing. Siegel's rejected reading 'good as a chess player lutist', is ungrammatical rather than incoherent or impossible. It happens that English adjectives with overt complements cannot be preposed attributive modifiers of common nouns. The reading becomes more clear and acceptable when the phrase
is postposed: That is a lutist good as a chess player.

Siegell also flaws her arguments by using only functional words in her examples showing the possibilities of vagueness. In practice, there is usually strong pragmatic pressure to evaluate goodness relative to lutist-like qualities in any construction like good lutist, just as there is strong pragmatic pressure to evaluate shortness relative to Vietnamese in a construction like short Vietnamese. It is easy to be led into thinking that the usual default readings for such constructions are the only readings available. It has, however, long been recognised that examples involving more general words like man, woman and person are much harder to explain (Bolinger 1967:26-30, 14, 20; Vendler 1968:21-22, 90-94; Hare 1957:107-109; Katz 1966:292-293; Berman 1973a:198-199).

(32) John is a good man.

It is much easier to get a range of vague readings for (32) than it is for Siegel's example in (31). The sentence might be uttered, for example, by John's sergeant, his drinking buddy, his wife, the president of his chess club or even his religious leader, and each utterance could imply goodness according to a different standard. Yet for Siegel, any reading other than that of absolute moral goodness must be derived from a semantic attributive. Her translation in (32'), with man' plugging up the vagueness slot, is completely inadequate.

(32') good'('man') (John)

That is, Siegel postulates that evaluative adjectives are vague because they can apply to many different property arguments. Resolving the ambiguity of an example like (30'b) is, for Seigel, a matter of finding out what predicate fills the A slot. But even when the A slot is filled, as with man in (32'), the sentence is still intuitively vague, and Siegel's system provides no way to
resolve, or even to represent, this ambiguity.

2.3 Syntactic tests

2.3.0 Introduction

Along with the semantic arguments, a number of syntactic tests have been proposed to defend the translation of certain adjectives as one-place predicates. Basically, it is assumed that certain straightforward adjectives like carnivorous, pregnant and red name one-place predicates and that certain unredeemably relative adjectives like alleged, mere and ostensible do not. Then if disputed adjectives can be shown to behave syntactically like pregnant and red, they are claimed, by analogy, to name one-place predicates as well.

Siegel uses such tests to defend her analysis of degree adjectives. She also claims that evaluative adjectives, on the whole, fail the tests, requiring that they be treated as relative adjectives. I shall argue that the tests, though not perfect, are generally valid, and that they show that both degree and evaluative adjectives behave syntactically like absolute adjectives.

2.3.1 The predicate position test

Siegel (1976a: 52-54; 1979: 228) argues that there is, in most languages, a strong correlation between predicate position and one-place predicate status for adjectives. Degree adjectives are like absolute adjectives, and unlike many of her relative adjectives, in their ability to appear grammatically in predicate position.

(33) Mary is pregnant. (absolute)
(34) Mary is tall. (degree)
(35) *Mary is mere/alleged/ostensible. (relative)

There are two advantages to classifying tall as an absolute adjective. First, it allows a less abstract analysis of (34) as tall'\(^\Delta\)(Mary) rather than as tall'\(^\Delta\)(Mary), where \(\Delta\) is a dummy noun. No dummy noun deletion transformation is necessary. Second, this
classification is consistent with the ungrammaticality of the strings 
in (35). If tall were a relative adjective and if Mary is tall were 
generated using dummy noun deletion, then there would be nothing to 
prevent the grammar from generating "Mary is mere and giving it the 
perfectly coherent translation mere"(^\text{\textepsilon})(\text{Mary}). The correct 
classification of tall allows (33) and (34) to be generated directly 
by a rule which forms IVs from absolute adjectives; the strings of 
(35) will not be generated by such a rule.

Unfortunately for Siegel, evaluative adjectives also appear 
freely in predicate position.

(36) Mary is good/bad/skilful/wonderful/awful.

By classifying evaluative adjectives as relative, Siegel is forced to 
derive the strings in (36) by using the otherwise unnecessary dummy 
noun deletion transformation (1976a:54; 1979:230). To avoid 
generating the strings in (35), Siegel is then forced to patch up the 
analysis by placing the ad-hoc feature [±dummy deletion] on every 
relative adjective (1976a:181). If evaluative adjectives are treated 
as absolute adjectives, the need for both the suspicious 
transformation and the ad-hoc feature disappears.

2.3.2 The very test

The use of very and other extent adverbs as a syntactic test for 
adjectives is problematic. Because "very alleged and "very mere are 
so grossly ungrammatical while very red and very tall are so natural, 
one is tempted to advance modification by very as a test for one-
place predicates. But some adjectives usually classified as absolute 
adjectives par excellence do not allow modification by very without 
taking on secondary meanings (Sapir 1944; Quirk et al. 1972:234, 
289; Kiefer 1978:144, 150; Levi 1978:20; Keenan & Faltz 1978:164, 
That is, pregnant, carnivorous, virgin and other such all-or-nothing 
adjectives must take on secondary readings in very pregnant, very 
carnivorous and very virgin. A woman either is pregnant or isn't 
pregnant, but very pregnant might convey something about a woman's
size, degree of morning sickness, craving for pickles, etc. Lees (1963:180-181) suggests that all 'bone-fide' adjectives can be modified by very, and Levi (1973:335, 340-341, 344; 1976:9-17; 1978:255) goes so far as to say that words like pregnant and virgin, by virtue of their resistance to very, are not adjectives at all but rather nouns.

It seems clear that if the present class of absolute adjectives is to be retained, then an internal distinction must be made between gradables and non-gradables. The gradables will allow modification by very, extremely, remarkably, quite and other such words (Ljung 1970:63; Quirk et al. 1972:265-266; Bolinger 1972). Semantically, the difference lies in the way an adjective divides up the universe of a model. A predicate like pregnant sharply divides all entities into the pregnant and the non-pregnant, with nothing left over. The boundaries of a vague predicate like tall, on the other hand, will be a bit fuzzy, and the boundaries can be manipulated by modification with extent adverbs. If we postulate that very can modify any suitably vague one-place predicate then we can show once again that degree adjectives act more like the absolute adjectives than like the relative adjectives.

(37) The very red woman finally left the beach.
(38) The very tall woman got the job.
(39) *They sent me a very mere boy.
(40) *The very alleged thief was freed.

Because evaluative adjectives occur freely with very and other extent adverbs, Siegel has to argue that very is not a reliable positive test for the status (1976a:146; 1979:256ff).

2.3.3 The non-restrictive modifier test

Yet another test proposed by Siegel (1976a:52, 123; see also Bennett 1975:44) is that only one-place predicates can function as non-restrictive modifiers of noun phrases.
(41) We all know naughty Nancy. (absolute)
(42) We all know big Bertha. (degree)
(43) *We all know mere Jonathan. (relative)
(44) *Ostensible Jonathan went home. (relative)
(45) *Say hello to alleged Bill. (relative)

Evaluative adjectives work well here too.

(46) The crowd cheered for Good King John.
(47) The king, skilful at warfare, suspected the abilities of his general.

2.3.4 The see-catch-find test

Siegel argues (1979:237-239; 1976a:76ff, 92) that the see-catch-find and there constructions in (48) and (49) select unerringly for one-place predicates, and she uses these tests as a key tool in motivating her classification. Her examples again show degree adjectives behaving like absolute adjectives.

(48) a. The warden saw the swimmers nude. (absolute)
b. I've often seen the grass tall around that house. (degree)
c. *The warden saw the swimmers veteran/mere/alleged. (relative)

(49) a. There is a bat asleep in the bathroom. (absolute)
b. There were two pigs clean in the whole pen. (degree)
c. *There are several crimes actual/ostensible/mere in the story. (relative)

In fact, Siegel misunderstands these tests, which select not for one-place predicates as a whole, but rather for one-place predicates which are 'temporary' in the carefully defined technical sense of Bolinger (1952:42-43; 1967:9-14), Bauer (1975:113, 119) and Dowty (1975:582-583). Dowty prefers to use 'temporary' and 'permanent' rather than Bolinger's terms 'accident' and 'essence' (Bolinger
1972:38-39, 47-48; 1973) because he thinks the latter terms to have inappropriate, misleading connotations from their other uses in philosophy. Ironically, Bolinger adopts the terms 'accident' and 'essence' because of a similar concern about the connotations of 'temporary' and 'permanent'. In Siegel's case, Bolinger's fears are justified; she misinterprets 'temporary' and 'permanent' in literal, everyday senses, and goes to great lengths to demonstrate that some adjectives appearing in see-catch-find sentences are not temporary at all. This misunderstanding seriously flaws Siegel's analysis, for English as well as for other languages she considers.

Because she analyses evaluative adjectives as relative, Siegel has to explain away her own example (50), wherein good appears in a 'see' sentence; she calls (50) an 'idiomatic' usage. In fact, the sentence is a counterexample to her theory and merely shows the absolute adjective good in one of its possible vague senses.

(50) I've seen the children good, but not very often.

Other similar examples with evaluative adjectives are easy to construct.

(51) Nureyev was bad last night; it's been a long time since we've seen him (so) bad.

The fact that many uses of evaluative adjectives fail the see-catch-find tests shows only that they are being used for 'permanent' rather than 'temporary' ascription. Even degree adjectives, interestingly, can fail the see-catch-find test; Siegel has simply chosen her examples well.

(48b) I've often seen the grass tall around that house.
(52) ?I've often seen Bill tall.

In our world, grass is a type of thing which is constantly changing in height—it gets cut short and grows right back again. The height
of grass, therefore, is a 'temporary' or 'accident' state. Humans, however, although they grow and change over time, have a characteristic 'permanent' or 'essence' height. We don't expect people to be 6' tall one day, 5'6'' tall the next, 6'2'' tall the next, etc. In a world like Wonderland, however, where Alice constantly grows and shrinks by eating and drinking magic cakes, mushrooms and liquids, the Mad Hatter could utter a perfectly acceptable sentence parallel to (52).

(53) I've often seen Alice tall.

In conclusion, the see-catch-find test supports the classification of evaluative adjectives together with degree and other absolute adjectives.

2.3.5 Nominalisation and verbalisation tests

Some people working on relative adjectives (e.g. Schmidt 1972:13, 112-113; Bartning 1976:10) have claimed that only those adjectives which are one-place predicates have meaningful nominalisations or corresponding nominal forms. Allowing some slightly abstract, stilted nouns, the results of this test seem to support the others.

(54) Adjective        Noun
red                redness     (absolute)
tall               tallness, height (degree)
big                bigness, size (degree)
intelligent       intelligence (evaluative)
good              goodness     (evaluative)
bad                badness      (evaluative)
skilful            skill        (evaluative)
mere               *mereness, *merity (relative)
alleged            *allegedness (relative)
ostensible        *ostensibility (relative)

The general intuition is this; being red or tall involves partaking
of the qualities of redness or height respectively. But there is no way to make sense of a property of *mereness or *allegedness in the same way. The nouns allegation and ostentation are, of course, related to alleged and ostensible, but these are obviously not related in the same way as are red and redness or big and size.

Similarly, transitive verbalisations, verbs with rough 'make Adjective' readings, and actual 'make Adjective' phrases appear to correspond only to one-place predicates and never to relative adjectives.

(55) Adjective Verb
red redden, make red, rubrify
tall make tall
old make old, age
big make big, increase, augment
small make small, decrease
dead kill, cause to become dead
pregnant impregnate, make pregnant
good make good, make better, improve, reform, ameliorate
bad make bad, ruin, harm, corrupt
mere *make mere, *merify
alleged *make alleged, *allegify

Allege, of course, is a verb related to alleged but this verb is not related to an adjective in the same way that impregnate and age are.

2.3.6 The all-or-part relativity test

Siegel argues that CN/CN modifiers have the quality of applying necessarily to the entire common noun following them, and that therefore such adjectives are always interpreted relative to the translation of that whole common noun. Degree adjectives, on the other hand, are not similarly relative, for their comparison classes are not necessarily the class denoted by the full CN following them (see Section 2.1.2.1). Siegel's key examples are (56) and (57)
(56) Bill is a tall little red-headed basketball player.

(57) Bill is a former little red-headed basketball player.

Quite rightly, Siegel points out that the comparison class for tallness in (56) may well be the set of little basketball players, with red-headed missed out altogether. Quite rightly again, Siegel points out that no such skipping is allowed in (57), which has the CN/CN former. However, she does not apply the same test to evaluative adjectives.

(58) Billy is a good little red-headed basketball player.

In (58) also, the goodness may very well be evaluated relative to some standard for little basketball players, with red-headed skipped over. In this and all other syntactic tests, evaluative adjectives behave like absolute adjectives and unlike relative adjectives. An additional syntactic test involving sentence adverbs which supports this conclusion will be presented in Section 6.3.3.

2.4 Rescuing the conjunction analysis

2.4.0 Introduction

In summary, I have shown some of the history of the analysis of degree and evaluative adjectives, which shows an increasing trend toward interpreting them as one-place predicates. I have shown how syntactic computation of comparison classes and criteria is inadequate, and how an appeal to context is both necessary and natural. I have also outlined a number of arguments designed to show that degree and evaluative adjectives behave syntactically like absolute adjectives, which lends support to a common translation.

A major problem remains for the semantics. As common nouns and absolute adjectives both name one-place predicates, the most natural way to translate attributive constructions like carnivorous beast is with the traditional conjunction analysis $\lambda x[\text{carnivorous}'(x) \& \text{beast}'(x)]$. The decision to treat degree and evaluative adjectives
as absolute adjectives therefore suggests that they too will receive a conjunction analysis when they appear in attributive position. Yet it was the apparent failure of these adjectives to support a conjunction analysis which originally led to their classification as semantic attributives. Let us look once again at the claims.

2.4.1 Degree adjectives and the conjunction analysis

2.4.1.1 Covert contexts

On the analysis of degree adjectives, Geach (1956:33) wrote

'Big' and 'Small' are attributive; 'x is a big flea' does not split up into 'x is a flea' and 'x is big', nor 'x is a small elephant' into 'x is an elephant' and 'x is small'; for if these analyses were legitimate, a simple argument would show that a big flea is a big animal and a small elephant a small animal.

In fact, a proper appreciation of context clears up this problem. Geach assumes that for a sentence like 'x is a big flea', the comparison class must necessarily be the set of fleas. This is the same assumption which was shown to be inadequate in Section 2.1.2.1. Even for simple AN constructions like tall fashion-model, short Vietnamese and big flea, context can force comparison classes different from N altogether. Also, Geach assumes that 'x is big', where x is a flea, will necessarily have the comparison class of animal'. This is an implicit statement of the Katz (1967) method for automatic computation of comparison classes from lexical codings, which is similarly inadequate (see Section 2.1.2.2).

If degree adjectives translate as one-place predicates, then a sentence like Nat is big will translate simply as big' (Nat). Context must then provide a comparison class before a truth value can be assigned. If Nat is a flea, then it is most likely the case that the speaker intends big' to be evaluated relative to the comparison class of fleas or perhaps insects. This is, however, a pragmatic consideration rather than an absolute constraint. In a science fiction movie entitled 'The Flea that Ate Edinburgh', Nat is big could mean 'big compared to houses' rather than just 'big compared to
fleas'. It is not the job of the syntax or intensional logic to reflect the fact that people usually compare fleas to other fleas, humans to other humans, and elephants to other elephants.

Attributive constructions like big flea can now be given a conjunction analysis without the difficulties cited by Geach.

(59) Nat is a big flea.
(59') \( \lambda x[\text{big}'(x) \& \text{flea}'(x)](\text{Nat}) \)

The comparison class for big' will again be set by context. Again, being that Nat is a flea, the most likely comparison class is the set of fleas. However, in the context of 'The Flea that Ate Edinburgh', an utterance of (59) could ascribe bigness of Nat relative to people, houses, trees, etc.

I therefore reject Geach's claim that "x is a big flea" does not split up into "x is a flea" and "x is big"; such a splitting up, as in a conjunction analysis, does indeed hold IF THE CONTEXT REMAINS CONSTANT and so supplies the same comparison class for big' in both cases. It is, of course, possible for 'x is a big flea' and 'x is big and x is a flea' to have different truth values, but this requires contextual equivocation. For that matter, even 'x is big' and a superficially identical utterance 'x is big' can have different truth values if they are evaluated at different contexts.

2.4.1.2 Hedges as overt specifiers of context

So far we have considered cases where covert context alone selects comparison classes. There are, however, a variety of ways in which comparison classes can be specified syntactically, as in the following examples.

(60) a. John is tall for a Pygmy.
    b. For a Pygmy, John is tall.
    c. John is tall for a Pygmy but short for a European.
(61) a. John is tall as Pygmies go/run.
    b. As Pygmies go, John is tall.

(62) John is tall 
    \begin{align*}
    \text{Compared with} & \{\text{Pygmies}\} \\
    \text{in comparison to} & \{\text{a Pygmy}\} \\
    \text{in relation to} & \{\text{a Pygmy}\}
    \end{align*}

(63) John is tall 
    \begin{align*}
    \text{when} & \text{considered as a Pygmy}\}
    \end{align*}

(64) John is tall by Pygmy standards.

(65) John is tall from a Pygmy point of view.

Adverbials such as for a Pygmy are a kind of hedge (Lakoff 1972), and they function to specify contexts much as time adverbials specify intervals. Hedges will be treated formally in Chapter 6.

2.4.2 The conjunction analysis and hedges for evaluative adjectives

As evaluative adjectives, like degree adjectives, are here translated as one-place predicates, Nat is good will receive the translation good' (Nat). Whereas tall', heavy' and other one-dimensionally vague predicates can be made more precise just by considering comparison classes, multi-dimensionally vague predicates like good' and bad' require something more. Before a truth value can be assigned to good' (Nat), a context must specify a standard of evaluation as well as a comparison class. Goodness can be ascribed by various standards including moral virtue, obedience to law, skill in activities like sewing, picking pockets, bowling, high-jumping, etc. Once the criterion of evaluation has been set, e.g. high-jumping, then a contextually supplied comparison class can indicate how good at high jumping one needs to be to qualify as 'good'.

Attributive constructions with evaluative adjectives, as with degree adjectives, are given a conjunction analysis.
As with degree adjectives, hedges can designate the criteria to use in applying the vague predicates.

(66') \( \lambda x [\text{good}'(x) \land \text{man}'(x)] \)

2.5 Conclusion

In conclusion, the treatment of evaluative and degree adjectives as semantic attributives fails both syntactically and semantically. Translating these adjectives as basic one-place predicates of individuals causes no insurmountable problems if context and syntactic hedges are properly considered. The formal analysis of hedges and context requires an important addition to the PTQ semantic model, which will be presented in Chapter 6. Until then, the discussion will avoid contextual complications while formalising the analysis presented so far.
Chapter 3. A basic grammar for individual-level adjectives

3.0 Introduction

The grammar to be presented in this chapter generates a fragment of English that includes the varieties of adjective discussed so far. 'Individual-level' adjectives are those which translate as predicates of individuals; i.e. they do not involve infinitives or nominalised sentences, which will be introduced in later chapters. This basic grammar will also serve to demonstrate the formalism and lay the foundation for further work. In subsequent chapters, many categories and rules will be added to the grammar, but existing rules will only rarely be modified. For convenience of reference, a full listing of the grammar rules in their final form is supplied in the Appendix. See Section 0.2 for an explanation of the rule formats.

3.1 Categories and types

The following table lists a number of syntactic categories with their abbreviations and, where appropriate, some sample basic expressions. As in PTQ, the basic categories of the grammar are e (entities) and t (sentences). Categories which are semantically alike but syntactically distinct will be differentiated by giving them different numbers of slashes. Thus where $\alpha$ and $\beta$ are categories, $\alpha/\beta$, $\alpha//\beta$, $\alpha///\beta$, etc. all also categories. For improved readability, multiple slashes will be shown with numerical superscripts: thus $\alpha///\beta$ will be written $\alpha/^{3}\beta$.

Let $B_n$ denote the set of basic expressions of a category $n$. Similarly, let $P_n$ denote the set containing both the basic and the derived expressions of category $n$. A number of categories have no basic expressions. For any category $n$, $B_n \subseteq P_n$.

<table>
<thead>
<tr>
<th>Category</th>
<th>Abbreviation</th>
<th>Basic Expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t$</td>
<td></td>
<td>(none)</td>
</tr>
<tr>
<td>e</td>
<td></td>
<td>(none)</td>
</tr>
<tr>
<td>$t/e$</td>
<td>IV</td>
<td>run, walk, swim, escape, ...</td>
</tr>
<tr>
<td>$t/e$</td>
<td>CN</td>
<td>man, woman, dog, cat, barn,</td>
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</table>
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t/3e ADJ pregnant, carnivorous, big, tall,
good, bad, metallic...

t/4e PNOM (none)

t/5e PART (none)

t/6e REL (none)

PNOM is the category of predicate nominals, and PART is the category
of derived verbal participles. REL is the category of relative
clauses. Let PRED be a cover category including P_{t/3e} U P_{t/4e} U
P_{t/5e}. Let ADJVL be a cover category including P_{t/3e} U P_{t/5e} U
P_{t/6e}.

t/IV T John, Mary, Bill, Susan, ..., 
he_1, he_2, ..., he_n, ...
T/CN DET a(n), the, every
IV/T TV find, love, kill, date, ...
TV/ADJ make, render, turn, keep, paint,
colour, hammer, iron, press

IV/2T be
IV/PRED be^2

t/3IV PP-TO (none)

t/3IV PP-BY universally, widely, well

t/3IV PP-OF (none)

t/5IV PP-FOR (none)

PP-TO/T to
PP-BY/T by
PP-OF/T of
PP-FOR/T for

TV/PP-TO DTV give, send, read, ship, hand, throw

TV/T TTV allow, refuse, spare

ADJ/ADJ EXT very, rather, somewhat, extremely, ...

CN/CN mere, alleged, past, present, future, ...

CN/2CN (none)

(t/5e)/PP-BY (see text below)

ADJ/PP-BY (see text below)

ADJ/PP-FOR (see text below)
Let \( f \) be a function from syntactic categories to semantic types. Where \( \nearrow^n \) represents any natural number of slashes and \( \alpha \) and \( \beta \) are categories,

\[
\begin{align*}
  f(e) &= \langle e \rangle \\
  f(t) &= \langle t \rangle \\
  \text{If } \alpha \text{ is category } t \text{ and } \beta \text{ is category } e, \text{ then } \\
  f(\alpha/\nearrow^n\beta) &= \langle e, t \rangle \\
  \text{else } f(\alpha/\nearrow^n\beta) &= \langle s, f(\beta), f(\alpha) \rangle.
\end{align*}
\]

Variables of type \( \langle e \rangle \), which range over entities, are \( x, y \) and \( z \), supplemented by the subscripted variables \( x_n, y_n \) and \( z_n \), where \( n \) is a natural number. Whenever practical, unsubscripted variables will be used in examples because they are easier to tell apart. The variables \( P, Q, P_n \) and \( Q_n \) (where \( n \) is a natural number) are of type \( \langle s, \langle e, t \rangle \rangle \); they range over properties of individuals. \( P, Q, P_n \) and \( Q_n \) (where \( n \) is a natural number) are of type \( \langle s, \langle s, \langle e, t \rangle, t \rangle \rangle \); they range over properties of properties of individuals. \( G \), a two-place relation between individuals and individuals, is of type \( \langle e, \langle e, t \rangle \rangle \). \( H \), a three-place relation between individuals, individuals and individuals, is of type \( \langle e, \langle e, \langle e, t \rangle \rangle \rangle \).

The following first-order reduction rules follow traditional Montaguven conventions.

\[
\begin{align*}
\Lambda x \Lambda P V G O [(\delta(x, P) \rightarrow P(\lambda y[G(x, y)])] \\
\text{where } \delta \text{ translates any member of } P_{TV}.
\end{align*}
\]

\[
\begin{align*}
\Lambda x \Lambda P A Q V H O [(\delta(x, P, Q) \rightarrow Q(\lambda z[P(\lambda y[H(x, y, z)])])] \\
\text{where } \delta \text{ translates any member of } P_{DTV}.
\end{align*}
\]

By convention, if \( \delta \) is a two-place relation between individuals and
intentions of sets of properties of individuals, then $\delta_*$ is the name of the corresponding two-place relation between individuals and individuals. Thus, by first-order reduction, the formula $\text{love}'(j, \lambda m P(m))$ will reduce to $\text{love}_*(j, m)$. Similarly, if $\delta$ is a three-place relation between individuals, intensions of sets of properties of individuals, and intensions of sets of properties of individuals; then $\delta_*$ is the name of the corresponding three-place relation between individuals, individuals and individuals.

The following lexical items are explicitly given the complex translations shown. Suggestions for expanding this list of 'semantic primitives' or words having a 'standard interpretation' (Dowty 1979a:194-195) will be made in the text below.

$$
\begin{align*}
\text{be IV/PRED} & \quad \text{translates as} \quad \lambda P[\checkmark P] \\
\text{be IV/2T} & \quad \lambda P \lambda y P(\checkmark z[y=z]) \\
\text{to PP-TO/T} & \quad \lambda P[\checkmark P] \\
\text{by PP-BY/T} & \quad \lambda P[\checkmark P] \\
\text{of PP-OF/T} & \quad \lambda P[\checkmark P] \\
\text{for PP-FOR/T} & \quad \lambda P[\checkmark P] \\
\text{a(n) T/CN} & \quad \lambda P \lambda y \lambda z [\checkmark P(y) & Q(z)] \\
\text{the T/CN} & \quad \lambda P \lambda y \lambda z \lambda x [\checkmark P(z) \leftrightarrow y=z] & Q(y)] \\
\text{every T/CN} & \quad \lambda P \lambda y \lambda z [P(y) \rightarrow Q(y)]
\end{align*}
$$

3.2 Combination rules and examples

The basic grammar is designed to illustrate the most straightforward uses of adjectives in English. In the interests of simplicity, tense and aspect are ignored. The copula be of category IV/PRED is translated here as $\lambda P[\checkmark P]$, a function which merely preserves the original translation of its argument. Syntactically speaking, tenses and aspects could naturally be added at such a point, perhaps creating tensed intransitive verbs of category t/T which would map term subjects into sentences (see Thomason 1976:79; Keenan & Faltz 1978:23; Bach 1979a). Nothing in the present analysis would be substantially affected by such a variation; by avoiding these questions I stay closer to the familiar syntax of PTQ and save...
a few steps in semantic derivations. For the sake of readability, tense will be made to appear magically in realised strings. Explicit complex semantic translations for some basic CN/CN adjectives will be explored in later chapters. Proper names are translated as in PTQ, but with Bennett's simplification: e.g. $John \Rightarrow \lambda{PP(j)}$.

Wherever possible, syntactic combination rules will be presented shortly before they are first used in any examples. For ease of subsequent reference, a complete listing of the rules is given in the Appendix.

In categorial combination trees, derived constituents (complex nodes) will be labelled with the name of the rule justifying the combination. $R_1$, for instance, joins Ts and IVs to form sentences, as in the simple example below.

$R_1$. If $\alpha \in P_T$ and $\beta \in P_{IV}$ then $(\alpha, \beta) \in P_t$.

Realisation: $\alpha \circ \beta$

Translation: $\alpha'(\beta')$

(1) $(John_T, swim_{IV})_t$, $R_1$

Realisation: John swims.

Translation:

1. $John_T \Rightarrow \lambda{PP(j)}$ Proper noun
2. $swim_{IV} \Rightarrow swim'$ Basic
3. $(John, swim)_t \Rightarrow \lambda{PP(j)(swim')}$ From 1, 2 by $R_1$
4. $(swim')(j)$ Lambda conversion
5. $\forall^\prime swim'(j)$ Brace convention
6. $swim'(j)$ Down-up cancellation

The following rules generate more complex structures as in (2) and (3).

$R_2$. If $\alpha \in B_{IV/PRED}$ and $\beta \in P_{PRED}$ then $(\alpha, \beta) \in P_{IV}$.

Realisation: $\alpha \circ \beta$

Translation: $\alpha'(\beta')$
R3. If $\alpha \in P_{TV}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_{IV}$. 

Realisation: $\{(\gamma_{TTV}, \delta_{TV})_T, (\beta_T)_IV \Rightarrow \gamma \leftrightarrow \beta \leftrightarrow \delta \}
\{(\gamma_{DTV}, \delta_{PP-TO})_{TV}, (\beta_T)_IV \Rightarrow \gamma \leftrightarrow \beta \leftrightarrow \delta \}
\{(\gamma_{TV/ADJ}, \delta_{ADJ})_{TV}, (\beta_T)_IV \Rightarrow \gamma \leftrightarrow \beta \leftrightarrow \delta \}$

else $\alpha \leftrightarrow \beta$

Translation: $a'(\beta')$

R4. If $\alpha \in P_{DET}$ and $\beta \in P_{CN}$ then $(\alpha, \beta) \in P_T$.

Realisation: $\alpha \leftrightarrow \beta$

Translation: $a'(\beta')$

(2) (John$_T$, (be$_{IV/PRED}$, good$_{ADJ}$)$_IV$, R2)$_t$, R1

Realisation: John is good.

Translation:
1. be$_{IV/PRED} \Rightarrow \lambda P[\gamma P]$
2. good$_{ADJ} \Rightarrow \gamma P$
3. (be, good)$_IV \Rightarrow \lambda P[\gamma P](\gamma \text{good'})$
4. 'good'
5. good'
6. John$_T \Rightarrow \lambda P[j]$
7. (John, (be, good)]$_t \Rightarrow \lambda P[j](\gamma \text{good'})$
8. (\gamma \text{good'})(j)
9. 'good'(j)
10. good'(j)

(3) ((the$_{DET}$, man$_{CN}$)$_T$, R4', (love$_{TV}$, Mary$_T$)$_IV$, R3)$_t$, R1

Realisation: The man loves Mary.

Translation:
1. the$_{DET} \Rightarrow \lambda P \lambda Q V_y[\Delta z[P(z) \Leftrightarrow y=z] & Q(y)]$
2. man$_{CN} \Rightarrow \gamma P$
3. (the, man)$_T \Rightarrow \lambda P \lambda Q V_y[\Delta z[P(z) \Leftrightarrow y=z] & Q(y)](\gamma \text{man'})$
4. $\lambda Q V_y[\Delta z[\gamma \text{man'}(z) \Leftrightarrow y=z] & Q(y)]$
5. $\lambda Q V_y[\Delta z[\gamma \text{man'}(z) \Leftrightarrow y=z] & Q(y)]$
6. $\lambda Q V_y[\Delta z[\gamma \text{man'}(z) \Leftrightarrow y=z] & Q(y)]$

From 1, 2 by R4

Lambda conversion

Brace convention

Down-up cancellation
7. $\text{love}^{TV} \Rightarrow \text{love}'$

8. $\text{Mary}^{T} \Rightarrow \lambda \text{PP}(m)$

9. $(\text{love, Mary})^{IV} \Rightarrow \text{love}'(\lambda \text{PP}(m))$

10. $((\text{the, man}), (\text{love, Mary}))^{t} \Rightarrow$

$$\lambda Q \forall y[\forall z(\text{man}'(z) \iff y=z) \land Q(y)](\lambda \text{PP}(m))$$

From 7, 8 by R3

11. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \lambda \text{PP}(m)](y)$

Lambda conversion

12. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \forall \lambda \text{PP}(m)](y)$

Brace convention

13. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \text{love}'(\lambda \text{PP}(m))](y)$

Down-up cancellation

14. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \text{love}'(y, \lambda \text{PP}(m))]$

Relation notation

15. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \lambda \text{PP}(m)(\lambda x[\text{love}'(y, x)])]$

First-order reduction

16. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \forall \lambda \text{PP}(m)(\lambda x[\text{love}'(y, x)])]$

Brace convention

17. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \lambda \text{PP}(m)(\lambda x[\text{love}'(y, x)])]$

Down-up cancellation

18. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \lambda x[\text{love}'(y, x)](m)]$

Lambda conversion

19. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \forall \lambda x[\text{love}'(y, x)](m)]$

Brace conversion

20. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \lambda x[\text{love}'(y, x)](m)]$

Down-up cancellation

21. $\forall y[\forall z(\text{man}'(z) \iff y=z) \land \text{love}'(y, m)]$

Lambda conversion

Obviously, not all rules can be illustrated in such detail. In the interests of space, the brace convention and down-up cancellation will be assumed to work automatically with any instance of lambda conversion. Also, multiple instances of lambda conversion will usually be condensed into a single step. Some examples will list only the final translation instead of a complete worked-out
The basic fragment provides for predicate nominals, which, despite their apparent indefinite articles in surface form, are translated as simple predicates (see note 2). The copula $be_{IV/2T}$ which maps true terms into IVs, is illustrated in (5).

R5. If $\alpha \in B_{IV/2T}$ and $\beta \in P_T$ then $\{\alpha, \beta\} \in P_{IV}$.
Realisation: $\alpha \bowtie \beta$
Translation: $\alpha'(\beta')$

R6. If $\alpha \in P_{CN}$ then $\{a(\alpha), \alpha\} \in P_{PNOM}$.
Realisation: $a(\alpha) \bowtie \alpha$
Translation: $\alpha'$

(4) (Mary$^T$, $be_{IV/PRED}$ (a, woman$^\text{CN}$)$^\text{PNOM}$, R6$^\text{IV}$, R2$^\text{t}$, R1
Realisation: Mary is a woman.
Translation:
1. woman$^\text{CN}$ $\Rightarrow$ woman$'$ Basic
2. $\{a, \text{woman}\}^\text{PNOM}$ $\Rightarrow$ woman$'$ From 1 by R6
3. $be_{IV/PRED}$ $\Rightarrow$ $\lambda P\{^\text{P}\}$ Basic
4. $(be, \{a, \text{woman}\})_{IV}$ $\Rightarrow$ $\lambda P\{^\text{P}\}(\text{"woman"})$ From 2, 3 by R2
5. woman$'$
   Lambda conversion
6. Mary$^T$ $\Rightarrow$ $\lambda PP(m)$
   Proper name
7. (Mary, $\{be, \{a, \text{woman}\}\})_t$ $\Rightarrow$ $\lambda PP(m)\{\text{"woman"}\}$ From 5, 6 by R1
8. woman$'(m)$
   Lambda conversion

(5) (John$^T$, $be_{IV/2T}$ (the$^\text{DET}$ man$^\text{CN}$)$^\text{T}$, R4$^\text{IV}$, R5$^\text{t}$, R1
Realisation: John is the man.
Translation: $\forall y \exists x [\text{man'(x) } \leftrightarrow x=y] \& j=y$

Rules R7 to R10 should by now be self-explanatory. 8

R7. If $\alpha \in P_{DTV}$ and $\beta \in P_{PP-TO}$ then $\{\alpha, \beta\} \in P_{TV}$.
Realisation: $\alpha \bowtie \beta$
Translation: $\alpha'(\beta')$
R8. (lexical) If $\alpha \in P_{DTV}$ then $[\alpha] \in P_{TTV}$.
Realisation: $\alpha$
Translation: $\lambda P \lambda Q \lambda x [\alpha'(Q)(P)(x)]$

R9. If $\alpha \in P_{TTV}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_T$.
Realisation: $\alpha'^{\beta}$
Translation: $\alpha'(\beta')$

R10. If $\alpha \in P_{PP-TO/T}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_{PP-TO}$.
Realisation: $\alpha'^{\beta}$
Translation: $\alpha'(\beta')$

These rules are used in the generation and translation of 'Dative' sentences like (6) and (7). There is no transformational relationship between these sentences, but the lexical rule R8 ensures that they are assigned the same reading. Note that R3 provides for the discontinuous realisation of $[(\text{give}, (\text{to, Mary})), (\text{the, book})]$ in (6) as $\text{give the book to Mary}$ and $[((\text{give}), (\text{the, book})), \text{Mary}]$ in (7) as $\text{give Mary the book}$.10

(6) $\langle \text{John}_T, ((\text{give}_{DTV}, (\text{to}_{PP-TO/T}, \text{Mary}_T)_{PP-TO}, \text{R10})_{TV}, \text{R7}'$

$\langle \text{the}_{DET}, \text{book}_{CN} \text{T}, \text{R4}'_{IV}, \text{R3}' \text{t}, \text{R1} \text{t}, \text{R1} \text{t}$

Realisation: John gave the book to Mary.
Translation: $\text{V}y[\text{Ax}[\text{book'}(x) \leftrightarrow x \cdot y] \& \text{give'}(j, y, m)]$

(7) $\langle \text{John}_T, (((\text{give}_{DTV}^{TTV}, \text{R8}' (\text{the}_{DET}, \text{book}_{CN} \text{T}, \text{R4}'_{TV}, \text{R9'}$

$\text{Mary}_T)_{IV}, \text{R3}' \text{t}, \text{R1} \text{t}$

Realisation: John gave Mary the book.
Translation: $\text{V}y[\text{Ax}[\text{book'}(x) \leftrightarrow x \cdot y] \& \text{give'}(j, y, m)]$

Along with R2, the basic rules for manipulating adjectives are R11 to R13. R11 allows for extent modification of ADJs; it can, for example, combine very$_{EXT}$ and good$_{ADJ}$ to form very good. (The rule is also generalised to accommodate other adjective modifiers to be discussed later.) R12 is a rule which maps ADJs into attributive modifiers of common nouns (CN/2CNs). Adjectives which cannot appear in predicate position are basic CN/CNs rather than basic ADJs. For
the time being, any basic CN/CN \( \alpha \) will be translated simply as \( \alpha' \), a basic semantic attributive. Some will be given a more complex translation in Chapters 5 and 6.

R11. If \( \alpha \in P_{t/n_e}/(t/n_e) \) and \( \beta \in P_{t/n_e} \) then \( (\alpha, \beta) \in P_{t/n_e} \)

Realisation: \( \beta \supset \alpha \) if \( \alpha \) has a complement

else \( \alpha \supset \beta \)

Translation: \( \alpha'('\beta') \)

R12. If \( \alpha \in P_{ADJV} \) then \( (\alpha) \in P_{CN/2CN} \).

Realisation: \( \alpha \)

Translation: \( \lambda x \lambda y[P(y) \& \alpha'(y)] \)

R13. If \( \alpha \in P_{CN/n_CN} \) and \( \beta \in P_{CN} \) then \( (\alpha, \beta) \in P_{CN} \)

(where \( n \) ranges over the set \( \{1,2\} \)).

Realisation: \( \beta \supset \alpha \) if \( \alpha \) has a syntactic complement

else \( \alpha \supset \beta \)

Translation: \( \alpha'('\beta') \)

Derivations with basic CN/CN adjectives in syntactic attributive position are straightforward.

(7) \((\text{John}_T, (\text{be}_{\text{IV/PRED}}, (\alpha, (\text{mere}_{\text{CN/CN}}, \text{boy}_{\text{CN}}))))_{\text{PNOM}}, \text{R6}, \text{R2}, \text{R1}, \text{R13})_T, \text{R1} \)

Realisation: John is a mere boy.

Translation:

1. \text{mere}_{\text{CN/CN}} \Rightarrow \text{mere}' \quad \text{Basic}
2. \text{boy}_{\text{CN}} \Rightarrow \text{boy}' \quad \text{Basic}
3. \{\text{mere}, \text{boy}\}_{\text{CN}} \Rightarrow \text{mere}'('\text{boy}') \quad \text{From 1, 2 by R13}
4. \{\alpha, \{\text{mere}, \text{boy}\}\}_{\text{PNOM}} \Rightarrow \text{mere}'('\text{boy}') \quad \text{From 3 by R6}
5. \text{be}_{\text{IV/PRED}} \Rightarrow \lambda P['P] \quad \text{Basic}
6. \{\text{be}, \{\alpha, \{\text{mere}, \text{boy}\}\}\}_{\text{IV}} \Rightarrow \lambda P['P]('\text{mere}'('\text{boy}')) \quad \text{From 4, 5 by R2}
7. \text{mere}'('\text{boy}') \quad \text{Lambda conversion}
8. \text{John}_T \Rightarrow \lambda P[jj] \quad \text{Proper name}
R12 allows us to generate absolute adjectives in attributive position with no recourse to a relative clause reduction transformation. The proper conjunction analysis falls out in the semantics.

\[(\text{John}, \{\text{be}, \{\text{a}, \{\text{mere}, \text{boy}\}\}\}\})_t \Rightarrow \lambda P(j)(\text{mere}'('\text{boy}')\})\]
From 7, 8 by R1

\[\text{mere}'('\text{boy}')\}(j)\]
Lambda conversion

\(\lambda P(x)(\text{be}(x), \lambda P(y)(\text{a}(y), \text{mere}'(\text{boy})))\)

Note that the rules defined above provide no way to generate the ungrammatical strings of (9).

\[(\text{John}_T, \{\text{be}_{IV/PRED}, \{\text{a}, \{\text{bad}_\text{ADJ}\}_{CN}^2, \text{CN}_\text{thief}, \text{CN}, \text{R1_3/PNOM}, \text{R6}_{IV}, \text{R2}_t, \text{R1}\}\})_t, \text{R1}\]
Realisation: John is a bad thief.

Translation:
1. \(\text{bad}_\text{ADJ} \Rightarrow \text{bad}'\) Basic
2. \(\text{bad}_\text{CN}^2 \Rightarrow \lambda P(y)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) From 1 by R12
3. \(\text{thief}_\text{CN} \Rightarrow \text{thief}'\) Basic
4. \(\lambda P(y)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) From 2, 3 by R13
5. \(\lambda P(y)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) Lambda conversion
6. \(\lambda P(y)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) From 5 by R6
7. \(\text{be}_{IV/PRED} \Rightarrow \lambda P(x)\) Basic
8. \(\text{be}_{IV/PRED}, \{\text{a}, \{\text{bad}, \text{thief}\}\}_T \Rightarrow \lambda P(x)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) From 6, 7 by R2
9. \(\lambda P(x)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) Lambda conversion
10. \(\text{John}_T \Rightarrow \lambda P(j)\) Proper name
11. \(\text{John}_T, \{\text{be}, \{\text{a}, \{\text{bad}, \text{thief}\}\}\}_t \Rightarrow \lambda P(j)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) From 9, 10 by R1
12. \(\lambda P(j)(\text{be}(x), \text{a}(y), \text{bad}'(y))\) Lambda conversion

As the grammar implicitly predicts, an ADJ modified by an extent...
adverb can appear in predicate position or attributive position.

(10) \( \{ \text{Mary}_T, (\text{beIV/PRED'}) \{ \text{extremely}^{\text{EXT}}, \text{clever}^{\text{ADJ}} \}, \text{R}_1\}, \text{IV}, \text{R}_2\}\), R\_1

Realisation: Mary is extremely clever.
Translation: extremely'(\text{'clever'})(m)

A rule similar to R12 which maps or 'bumps' ADJVLs into ad-

common nouns appears in Bartsch 1975:179. In English, a rule R12X

could combine an ADJVL and a CN more directly (see e.g. Chierchia


(12) R12X. If \( \alpha \in \text{P}_{\text{ADJVL}} \) and \( \beta \in \text{P}_{\text{CN}} \) then \( \{ \alpha, \beta \} \in \text{P}_{\text{CN}} \).

Realisation: \( \beta \sim \alpha \) if \( \alpha \) has a complement
else \( \alpha \sim \beta \)
Translation: \( \lambda y[\alpha'(y) \& \beta'(y)] \)

In English the choice of analysis does not seem to be particularly

significant.

However, there is compelling morphological evidence that a rule

promoting ADJVL constituents into \( \text{CN}^2 \text{CNs} \) operates in Russian.

Working in a TG framework, Sussex (1972: Chapter 3) and Babby

(1973:359; 1975:9-10, 168-170, 200-209) are in essential agreement

that deep structure adjectives (or 'verbs' with a \([+\text{ADJ}] \) feature)

underly both short form (SF) and long form (LF) Russian adjectivals.

The SF, which appears only in predicate position, is held to be

identical to or closer to the deep adjective. Only the LF, which is

indeed a longer, case-marked adjective, can appear in attributive

position. (The LF can also appear alone in predicate position, but

both Sussex and Babby show that such adjectives behave, and must be
analysed, like predicate nominals with a suppressed head noun.) The key difference between LF and SF is that a LF adjecitival is always dominated by a noun phrase whereas a SF adjecitival never is (barring a listable class of exceptions).

This pattern is easily accounted for in the present analysis. The only adjectives which are dominated by a noun phrase (term) are those which apply directly to common nouns; a LF adjective is therefore the realisation of a CN/2CN or a CN/CN. A SF adjective is simply the realisation of an ADJVL which has not been promoted to a CN/2CN. A rule R12X for Russian therefore has a morphological as well as a syntactic change. 13

(13) R12X (Russian). If $\alpha \in P_{ADJVL}$ then $(\alpha) \in P_{CN/2CN}$.

Realisation: $\alpha''$, where $\alpha''$ is the LF of $\alpha$

Translation: $\lambda P \lambda y [P(y) \ & \alpha'(y)]$

Alternatively, we might propose a LF morpheme, call it LFSUF, which maps the SF into the LF. Let LFSUF be of category $(CN/2CN)/ADJVL$ with translation $\lambda Q \lambda P \lambda y [P(y) \ & \ Q(y)]$.

(14) R12XX (Russian). If $\alpha \in P_{LFSUF}$ and $\beta \in P_{ADJVL}$ then $(\alpha, \beta) \in P_{CN/2CN}$.

Realisation: $\beta-\alpha$

Translation: $\alpha'(\beta')$

The following outline examples use R12X and data from Babby 1973. The categories and syntactic combination rules implied are only conjectures. Umna is the SF of 'smart', and umnaja is the LF.

(15) umnaja devuska CN

\[ \text{'smart girl'} \]

\[ \text{umnaja} \ ]_{CN/2CN} \text{devuska} \ ]_{CN}

\[ \text{umnja} \ ]_{ADJ}

(15') $\lambda y [\text{devuska}'(y) \ & \ umnja'(y)]$
3.3 Issues in adjective ordering

Smith (1961:343) and Green (1970:273) note that certain 'indefinite' nouns always have postposed modifiers: someone special, something different, somewhere new. Romance languages, where postposed adjectives are the rule, tend to have small groups of adjectives which prepose, as in the French pauvre, ancien, grand, brave, and petit (Gougenheim 1973; Bartning 1976:11, 157). As these exceptions involve a very finite number of words, they can be reflected with specific ordering exception rules. For English we could add rules as in (17).

(17) a. \(a_{CN/2CN} \rightsquigarrow \text{someone} \rightarrow \text{someone} \rightarrow a\)

b. \(a_{CN/2CN} \rightsquigarrow \text{somewhere} \rightarrow \text{somewhere} \rightarrow a\)

If a useful syntactic feature is common to all and only the members of this set of 'indefinite' nouns, then a more parsimonious rule schema referring to that feature could be defined. For French, where the preposed ancien has the reading 'former', we could define similar rules (Sanders 1975b:422-423).

(18) \(\text{ancien}_{CN/CN} \rightarrow \text{ancien} \rightarrow \beta\)

Rule R13 indicates that attributive adjectives 'with a syntactic complement' are to be ordered after the common noun they modify. 'Having a complement', in this context, means that, when linearised, the adjective constituent does not end in the main adjectival word of the constituent. The adjective ordering rule defined in EFL, which
postposes all multi-word adjectivals, is totally inadequate; it would even postpose very good (see also Hamblin 1976:249; Thomason 1976:81-82). Bartsch's (1973:57) slightly better rule, which preposes those adjectivals which end in an adjective, will still incorrectly order examples such as *the+eager to help you become famous+man. The present solution, based on 'having a complement' or ending in the main adjectival word of the constituent, is hinted at by Montague himself (EFL:220).

Perhaps most troublesome are adjectives whose 'accident' (sometimes termed 'temporary') readings make them awkward or ungrammatical in preposed attributive position. Accident properties are roughly those which cannot be used to characterise an individual. One class of adjectives which are usually confined to accident readings begin with the letter 'a'; the class includes awake, agog, abroad, aboard, alight, awry and several others. Other typical accident adjectives include ready, handy, faint and dizzy (Bolinger 1967; Quirk et al. 1972:232, 236, 248). Such ADJs appear normally in predicate position, but as attributive common-noun modifiers they must be postposed.

(19) a. The man is asleep.
   b. *the asleep man
   c. The man asleep is John.

(20) a. The house was ablaze.
   b. *the ablaze house
   c. The house ablaze at that moment exploded.

(21) a. The woman is ready.
   b. *the ready woman
   c. The woman ready to go is Jane.

In some cases, 'a'-marked adjectives are 'sneaking' into preposed attributive position.

(22) The alert sailor spotted the submarine.
The opposite of an accident property is an 'essence' property, which is generally more permanent and is useful for characterising an individual. Sometimes what appears to be a single adjective can appear prenominally or postnominally with the 'essence' and 'accident' readings respectively. These data are adapted from Bolinger 1967: 3.

(23) The only navigable river is the Zambongo.

(24) The only river navigable is the Zambongo.

Example (23) invites an essence reading of navigable; i.e. the Zambongo is being called characteristically (or essentially) navigable. The classification of a river as navigable is not affected, for example, by temporary un-navigability caused by transitory floods or a freak-drought. Example (24), however, invites an accident reading wherein the Zambongo is asserted to be navigable AT THE MOMENT, and nothing is conveyed about whether it is navigable as a rule. It is hard enough to capture the syntax of accident adjectives—the class of adjectives in question which begin with 'a' are historically descended from prepositional phrases, and their preferred postnominal position may still reflect that history. Semantically, essence and accident are closely connected with aspect, disposition, psychological characterisation, or perhaps even the 'realisations' of Carlson (1982). For further discussion of essence/accident phenomena and adjectives see Section 2.3.4.

3.4 Two-place adjectives and adjectivals

So far we have considered adjectives which are translated as one-place predicates. In the remainder of the chapter, we shall consider mainly two-place or transitive adjectivals which name relations between two individuals. These are not to be confused with the two-place semantic attributives of Montague and Parsons which allegedly name relations between an individual and a property (see
Adjectivals will be taken to include adjective-like words which, for various reasons, cannot conveniently be labelled simply as ADJ; they are formally grouped under the cover class ADJVL. The key ADJVL qualities are the ability to appear after be in predicate position and the ability to modify a common noun attributively. I shall first look at passive participles, adopting a variation of the non-transformational analysis of Thomason 1976. I shall then apply similar principles to adjectivals in -able and -ing and other forms based on TVs. Finally I shall look at true present participles which are used adjectivally.

3.4.1 Passive participles of TVs

Although there have been attempts to impose a Chomsky-style passive transformation in MG (Partee 1975:254-255, 261; 1976b:66; also, for doubts, 1979b:91), the direct generation of passive constructions proposed in Thomason 1976 has been most influential. The key features of Thomason's approach are these: First, no structural transformations are used; second, the 'sameness' of active and passive sentences is shown in the semantics rather than in the syntax; third, the passive rule applies to transitive verbs; and, fourth, provision is made for both agentive and agentless passive constructions. The treatment of passive shown here is much like that in Bach 1980, the difference being that here the syntactic integrity of PP-BY phrases is respected.

R14. If $a \in P_{TV}$ then $(a, \text{PASS}) \in P_{(t^5e)/PP-BY}$.
Realisation: $a''$, where $a''$ is $a$ with the main verb in the past participle form.
Translation: $\lambda P \lambda x P(\lambda y [a' (\lambda PP(x))(y)])$

R15. If $a \in P_{(t^5e)/PP-BY}$ then $(a) \in P_{t^5e}$.
Realisation: $a$
Translation: $a'(\lambda P Vz[P(z)])$
R16. If \( \alpha \in \mathcal{B}_{PP-BY/T} \) and \( \beta \in \mathcal{P}_T \) then \( \{\alpha, \beta\} \in \mathcal{P}_{PP-BY} \).

Realisation: \( \alpha \overset{\sim}{\sim} \beta \)

Translation: \( \alpha'(\overset{\sim}{\beta'}) \)

R17. If \( \alpha \in \mathcal{P}(t/\mathcal{N})_{PP-BY} \) and \( \beta \in \mathcal{P}_{PP-BY} \) then 
\( \{\alpha, \beta\} \in \mathcal{P}(t/\mathcal{N})_{PP-BY} \) (where \( n \) ranges over the set \( \{3,5\} \)).

Realisation: \( \beta \overset{\sim}{\sim} \alpha \) if \( \alpha \) has a syntactic complement
else \( \alpha \overset{\sim}{\sim} \beta \)

Translation: \( \alpha'(\overset{\sim}{\beta'}) \)

(25) \( \{\text{John}_T, (\text{be}_{IV/PRED'}, ((\text{love}_T, \text{PASS})_{t/5e})_{PP-BY}, \text{R14'} \}
\)
\( \{\text{by}_{PP-BY/T}, \text{Mary}_T\}_{PP-BY}, \text{R16}, t/5e, \text{R17}IV, \text{R2}t, \text{R1} \)

Realisation: John is loved by Mary.

Translation:
1. \( \text{by}_{PP-BY/T} \Rightarrow \lambda \mathcal{P}[\overset{\sim}{\mathcal{P}}] \) Basic
2. \( \text{Mary}_T \Rightarrow \lambda \mathcal{P}(m) \) Proper name
3. \( (\text{by}, \text{Mary})_{PP-BY} \Rightarrow \lambda \mathcal{P}[\overset{\sim}{\mathcal{P}}](\lambda \mathcal{P}(m)) \) From 1, 2 by R16
4. \( \lambda \mathcal{P}(m) \) Lambda conversion
5. \( \text{love}_T \Rightarrow \text{love'} \) Basic
6. \( (\text{love}, \text{PASS})_{t/5e}\mathcal{P}_{PP-BY} \Rightarrow \lambda \mathcal{P}\lambda x \mathcal{P}(\overset{\sim}{\lambda}y[\text{love'}(\overset{\sim}{\lambda}x)(x)](y)) \) From 5 by R14
7. \( ((\text{love}, \text{PASS}), (\text{by}, \text{Mary}))(t/5e) \Rightarrow \lambda \mathcal{P}\lambda x \mathcal{P}(\overset{\sim}{\lambda}y[\text{love'}(\overset{\sim}{\lambda}x)(x)](y))(\overset{\sim}{\lambda}x)(m) \) From 4, 6 by R17
8. \( \lambda x[\lambda \mathcal{P}(m)(\overset{\sim}{\lambda}y[\text{love'}(\overset{\sim}{\lambda}x)(x)](y))] \) Lambda conversion
9. \( \lambda x[\lambda y[\text{love'}(\overset{\sim}{\lambda}x)(x)](y)](m) \) Lambda conversion
10. \( \lambda x[\text{love'}(\overset{\sim}{\lambda}x)(x)](m) \) Lambda conversion
11. \( \text{be}_{IV/PRED} \Rightarrow \lambda \mathcal{P}[\overset{\sim}{\mathcal{P}}] \) Basic
12. \( (\text{be}, ((\text{love}, \text{PASS}), (\text{by}, \text{Mary})))_{IV} \Rightarrow \lambda \mathcal{P}[\overset{\sim}{\mathcal{P}}](\overset{\sim}{\lambda}x[\text{love'}(\overset{\sim}{\lambda}x)(x)](m)) \) From 10, 11 by R2
13. \( \lambda x[\text{love'}(\overset{\sim}{\lambda}x)(x)](m) \) Lambda conversion
14. \( \text{John}_T \Rightarrow \lambda \mathcal{P}(j) \) Proper name
15. \( (\text{John}, (\text{be}, ((\text{love}, \text{PASS}), (\text{by}, \text{Mary}))))_{t} \Rightarrow \lambda \mathcal{P}(j)(\overset{\sim}{\lambda}x[\text{love'}(\overset{\sim}{\lambda}x)(x)](m)) \) From 13, 14 by R1
16. love'(^xQQ(j))(m) \hspace{1cm} \text{Lambda conversion}
17. love'*(m,j) \hspace{1cm} \text{First-order reduction}

The derivation for the agentless passive is quite similar; the slot of the missing argument is filled with an existentially-quantified variable. R15 acts as a relation-reducing rule.

(26) \[(\text{John}_T, \text{be}_IV/PRED' \{(\text{murder}_TV'}\hspace{1cm}
\text{PASS})_t/e/PP-BY, R14'_t/e, R15'Iv, R2_t, R1\]
Realisation: John was murdered.
Translation: Vx[murder'*(x,j)]

Passive participles (t/5 es) are in the cover category ADJVL, allowing R12 to bump them into attributive modifiers of common nouns. On the ordering of attributive past participles see Lakoff 1970a:46; Barkai 1972 and Quirk et al. 1972:904-911.

(27) \[(\text{the}_DET' \{(\text{woman}_CN}_T, \{(\text{love}_TV, \text{PASS})_t/e/PP-BY, R14'_{by}/PP-BY/T' \text{John}_T/PP-BY, R16'_t/e, R17'_CN/2CN, R12'_CN, R13'_T, R4'_{be}_IV/2_T' \text{Mary}_T/IV, R5'_t, R1\]
Realisation: The woman loved by John is Mary.
Translation: Vx[y[Ax[(woman*(x) & love*(j, x)) \leftrightarrow x-y] & y=m]]

(28) \[(\text{the}_DET' \{(\text{man}_CN}_T, \{(\text{murder}_TV, \text{PASS})_t/e/PP-BY, R14'_t/e, R15'_CN/2CN, R12'_CN, R13'_T, R4'_{collap}se_IV'_t, R1\]
Realisation: The murdered man collapsed.
Translation: Vx[Ax[(man(x) & Vz[murder*(z, x))] \leftrightarrow x-y] & collapse*(y)]

All the passives described so far are syntactically derived. No attempt will be made here to account for lexical passives.\textsuperscript{14}

Finally, the present grammar recognises widely, universally and well as basic expressions of category PP-BY. Assuming that there exists a quantifier Many, the PP-BY readings of these adverbs can be given the explicit readings in (29).
Treating these adverbs as basic agentive 'prepositional phrases' was suggested by McConnell-Ginet (1982:179; see also Postal 1972a:72). Example (30) is typical.

\[(30) \text{ (Nigel}_t, \text{ (be}_{IV/PRED}, \text{ (universally}_{PP-BY},
\text{ (admire}_{TV} \text{ PASS)}(t/5e)/PP-BY, R1^4t/5e, R1^7t/IV, R2^7t, R1}
\text{ Realisation: Nigel is universally admired.}
\text{ Translation: } Az[\text{admire}_{z}(z,n)]
\]

### 3.4.2 Adjectivals in -able

It is generally conceded that adjectives in -able must be produced by lexical rule (Dowty 1978:408-411; Wasow 1977:333-336). Most examples seem to be fairly transparently derived from basic TVs, e.g. breakable, workable and lockable; but many basic TVs seem to take -able only with difficulty, the resulting adjective having the taste of a neologism: climbable, killable, stranglable, buildable, hitable. Derived TVs take -able even less happily, though it is difficult to call the resulting adjectives ungrammatical: ?glivable to Mary, ?persuadable to go, ?painlatable red. Also, although breakable is paraphrased as 'capable of being broken', a word like changeable can often mean 'capable of changing' rather than 'capable of being changed'.

Despite these caveats, the -able adjectival formation rule is highly productive, given suitable contexts, and real discourse can exhibit some surprising virtuoso formations. The following rules follow Dowty (1978) in translating a word like breakable in terms of break' and the possibility operator $\Diamond$.}


R18. If $\alpha \in B^*_{TV}$ then $(\alpha, ABLE) \in P_{ADJ/PP-BY}$.
   Realisation: $\alpha''$ where $\alpha''$ is $\alpha$ with the main verb in the -able form.
   Translation: $\lambda P \lambda x \circ [P(\lambda y [\alpha'(\lambda \text{PP}(x))(y)])].$

R19. If $\alpha \in P_{ADJ/PP-BY}$ then $(\alpha) \in P_{ADJ}$.
   Realisation: $\alpha$
   Translation: $\alpha'(\lambda \text{PV}\circ[P(z)])$

As expected of all adjectivals, derived -able adjectives can modify a noun attributively.

(32) The breakable antique was carefully packed away.

3.4.3 Adjectivals in -ing

Yet another class of adjectivals lexically related to TVs are adjectives with -ing suffixes.

(33) John is interesting.
(34) The book is disgusting.
(35) The boring lecturer screamed.

The arguments that these are adjectives and not present participles are well known and will not be repeated here (Quirk 1972:242-246; Bolinger 1972:24; Chomsky 1957:73; 1965:151). The class of TVs which commonly have corresponding -ing adjectives are those which indicate that an agent produces a certain psychological or physiological state in a patient: interest, bore, annoy, disgust, amuse, sicken, madden, soothe, calm, disappoint, relax, hearten, stimulate, enervate, depress, terrify, horrify, excite, thrill etc. Other examples like sobering, revolting, cheering and trying, are perhaps more commonly found now than the TVs.
Adjectives

to which they are related.

About the closest that MG can approach to giving a reading, for John is interesting is 'John interests someone', or 'there is someone such that John interests him'. The translation of (33) in intensional logic would therefore be (33').

(33') $Vx[\text{interest}_x(j,x)]$

Translation (33') is much like that for agentless passives, except in this case it is the PATIENT slot which is filled by an existentially quantified variable. Let us call bare constructions like (33) to (35) 'patientless' -ing adjectives. Just as agents are optionally supplied for passives in PP-BY phrases, so patients are optionally supplied for 'patientive' -ing adjectives in PP-TO or PP-FOR phrases.

(36) John is interesting to Mary.
    (≠ John interests Mary.)
(37) This book is stimulating to John.
    (≠ This book stimulates John.)
(38) The city disappointing to/for Susan was Paris.
    (≠ The city such that it disappointed Susan was Paris.)
(39) John is boring for Mary.
    (≠ John bores Mary.)
(40) This news is depressing for John.
    (≠ This news depresses John.)

The choice of PP complement appears to be lexically governed, suggesting that -ing adverbials might well be just listed in the lexicon to begin with. R20 and R21 are included in the fragment as lexical rules to reflect the reasonable productiveness of the class. The translations provided, though not completely satisfactory, do semantically relate interesting to interest by translating them both in terms of the same semantic relation interest'.
R20. (lexical). If $a \in B_{TV}$ then

$(a, \text{ING}) \in P_{\text{ADJ}/(t/\text{nIV})}$ (where $n$ ranges over the set $\{2,5\}$; $t/\text{IV}$ is PP-TO and $t/5\text{IV}$ is PP-FOR).

Realisation: $\alpha'$ where $\alpha'$ is $\alpha$ with the main verb in the present participle (-ing) form

Translation: $\lambda P \lambda x P(\lambda y [\alpha'(\lambda PP(y))(x)])$.

R21. If $a \in P_{\text{ADJ}/(t/\text{nIV})}$ then

$(a) \in P_{\text{ADJ}}$ (where $n$ ranges over the set $\{2,5\}$).

Realisation: $a$

Translation: $a'(\lambda PVz[P(z)])$

R22. If $a \in P_{\text{ADJ}/PP-TO}$ and $\beta \in P_{PP-TO}$ then $(a, \beta) \in P_{\text{ADJ}}$.

Realisation: $a' \beta$

Translation: $a'(\beta')$

R23. If $a \in P_{PP-FOR/T}$ and $\beta \in P_T$ then $(a, \beta) \in P_{PP-FOR}$.

Realisation: $a' \beta$

Translation: $a'(\beta')$

R24. If $a \in P_{ADJ/PP-FOR}$ and $\beta \in P_{PP-FOR}$ then $(a, \beta) \in P_{ADJ}$.

Realisation: $a' \beta$

Translation: $a'(\beta')$

(41) $(\text{Mary}_T, (\text{be}_{IV}/\text{PRED'}, \{\text{interest}_{TV}, \text{ING}\}_{\text{ADJ}/PP-TO}, R_{20'})_{\text{ADJ}},$

$R_{21'}_{IV}, R_{2'}_t, Ri$

Realisation: Mary is interesting.

Translation: $\text{Vy}[\text{interest}_s'(m,y)]$.

The patientive form of *interesting* has a similar derivation.

(42) $(\text{Mary}_T, (\text{be}_{IV}/\text{PRED'}, \{\text{interest}_{TV}, \text{ING}\}_{\text{ADJ}/PP-TO}, R_{20'}$

$(\text{to}_{PP-TO/T'}, \text{John}_T)_{PP-TO}, R_{10'}_{ADJ}, R_{22'}_{IV}, R_{2'}_t, Ri$

Realisation: Mary is interesting to John.

Translation: $\text{interest}_s'(m,j)$.
3.4.4 Other transitive adjectivals

Jackendoff (1977: 77) lists a number of adjectives which are related to TVs and which take PP-OF complements; these include fearful, considerate, desirous and solicitous. The PP-OF phrase introduces the patient of the underlying TV. The following adjective examples are paired with examples illustrating a parallel transitive verb. The relationship between adjective and verb is often highly idiosyncratic.

(43) a. John is fearful/afraid/frightened/scared of Mary
    b. Mary frightens/scares John.

(44) a. John is considerate/inconsiderate of Mary.
    b. John (does not) consider/take-account-of Mary.

(45) a. Keith is desirous of a woman.
    b. Keith desires/wants a woman.

(46) a. Roger is solicitous of Mary.
    b. ?Roger solicits Mary.

Note that scared and frightened can also appear with PP-BY complements. This and the historical link between pairs like afraid and the now obscure verb affray ('to frighten') suggest that these are relics of an older passive rule. One way to handle these adjectivals is to give them explicit readings such as the following. However, considering the idiosyncrasies of these examples, such a 'generative semantics-like' approach is hard to defend.

\[
\lambda xVy[fear^\star(x,y)] \\
\lambda P\lambda xP(\neg \lambda y[fear^\star(x,y)]) \\
\lambda P\lambda xP(\neg \lambda y[frighten^\star(y,x)]) \\
\lambda P\lambda xP(\neg \lambda y[scare^\star(y,x)]) \\
\lambda xVy[treat-well^\star(x,y)] \\
\lambda P\lambda xP(\neg \lambda y[treat-well^\star(x,y)])
\]

If afraid is overtly translated in terms of fear, then (48a) will
translate as (48c). If afraid is translated simply as afraid', the result will be (48b); a meaning postulate could then ensure that $A_xA_y[A_fraid(x,y) \Rightarrow fear'(x,y)]$.

R25. If $a \in B_{PP-OF/T}$ and $\beta \in P_T$ then $(a, \beta) \in PP-OF'$
Realisation: $a \leftarrow \beta$
Translation: $a'(\beta')$

R26. If $a \in B_{ADJ/PP-OF}$ and $\beta \in P_{PP-OF}$ then $(a, \beta) \in P_{ADJ}$
Realisation: $a \leftarrow \beta$
Translation: $a'(\beta')$

(48) a. John is afraid of Mary.
   b. afraid'(j,m)
   c. fear'(j,m)

It is not vital here to choose between these competing approaches. Meaning postulates are no doubt the safer method for these examples. For a general discussion on the choice between using meaning postulates or complex translations of lexical items see Dowty 1979a:35-36, 194-199. Other adjectives with PP-OF complements include aware (of), ashamed (of), proud (of), beloved (of) and tired (of).

Wasow (1977:349) lists a number of other lexical passive participles (i.e. adjectives) which can take prepositions other than by or of.

| Annoyed (at) | Known (to) |
| Bored (with) | Overjoyed (at) |
| Contained (in) | Pissed off (at) |
| Disappointed (with) | Pleased (with) |
| Elated (at) | Relieved (at) |
| Frightened (at) | Surprised (at) |
| Horrified (at) | Upset (with) |
| Interested (in) | |

Again, many of these can take PP-BY phrases as well, and their syntax
can be accommodated with rules parallel to R25 and R26. Semantically, either generative semantics-like translations or meaning postulates could be used to capture intuitions about entailments and lexical relations. An added complication is the tendency of these lexical adjectives to take PPs with abstract or higher-type term constituents.

3.4.5 Adjectival present participles

True present participles derived from IVs are to be distinguished from -ing adjectives, which they superficially resemble (see Section 3.4.3). Present participles, for instance, resist modification by very, cannot appear after seem, act or appear, and cannot take an un- prefix.

(49) John is \{ (very) (un-) amusing. (Adjective) \\
                    (*very) (*un-) amusing Mary. (Present participle) \\
\}

(50) John seems \{ disgusting. (Adjective) \\
                    (*disgusting her. (Present participle) \\
\}

On the other hand, present participle phrases are predicative, in the sense that they name one-place predicates and appear syntactically after a copula be. A rough translation for (51), ignoring tense and aspect as usual, is (51').

(51) John is singing.
(51') sing'(j) 

Finally, present participles are adjectival in the sense that they can modify a common noun attributively.

(52) The boy amusing Mary is John

These features justify the assignment of present participles to \( t/5 \). By definition any member of \( t/5 \) is also a member of the cover
categories ADJVL and PRED.

Syntactically, a present participle appears to be quite simply
an IV, or at least an untensed IV with no complicating auxiliary
verbs, with its main verb in the present participle (or -ing) form.
The original arguments, complements and adverbs of the IV remain
intact.

(53) a. sing badly => singing badly
    b. beat him/the dog => beating him/the dog
    c. give the book to Mary => giving the book to Mary
    d. give Mary the book => giving Mary the book
    e. paint the fence red => painting the fence red

The rule for present participle formation, ignoring tense and aspect,
is therefore a straightforward mapping from IVs to t^5'es. On the
ordering of attributive present participles relative to head nouns
see Lees 1963:33, 97; Bolinger 1967:6-9; Dowty 1979b:206.

R27. If α ∈ P IV then (α, ING) ∈ P t^5 e.
Realisation: α'', where α'' is α with the main verb in
the present participle form
Translation: α' [ignoring aspect and tense]

(54) (John T, (be IV/PRED' (sing IV' ING)t^5 e, R27)IV, R2)T, R1
Realisation: John is singing.
Translation: sing'(j)

Attributive usages fall out naturally with the existing rules.

(55) ((the DET' (man CN, {{kiss TV' Mary T}IV, R3'}
ing)t^5 e, R27')CN/2 CN, R12')CN, R13)T, R4'
(love TV, Susan T)IV, R3)T, R1
Realisation: The man kissing Mary loves Susan.
Translation: Vy[∀x[(man'(x) & kiss'_x'(x,m)) ↔ x=y] & love'_y(y,s)]
3.4.6 Make-ADJ and related constructions

Arguments that make John angry is formed by combining a TV make angry with a direct object John are of long standing (see e.g. Dowty 1976). Such an analysis is very easy to capture, without transformations, in the present formalism. Related constructions with a similar analysis are shown in (56).

(56) a. render him unconscious/harmless/helpless
    b. paint the barn red/white/blue
    c. hammer the bar flat/round/square
    d. iron the shirt smooth/all wrinkly

The tentative rule to accommodate all such constructions is R27X, and (57) is a typical example.

R27X. If $\alpha \in B_{TV/ADJ}$ and $\beta \in P_{ADJ}$ then $(\alpha, \beta) \in P_{TV}$.

Realisation: $\alpha \rightarrow \beta$

Translation: $\alpha'(\beta')$

(57) (NigelT, ((makeTV/ADJ, angryADJ)TV,
         R27X JohnT IV, R3\text{t}, R1
Realisation: Nigel makes John angry.
Translation: make'(angry')(\PP(j))(n)

The realisation component of R3, which joins TVs and their T objects, specifies that $((\gamma_{TV/ADJ}, \delta_{ADJ}), \beta_{TV}) \rightarrow \gamma \rightarrow \beta \rightarrow \delta$, which means that $((\text{make, angry}), \text{John})$ is realised as the string make John angry.

In the spirit of Dowty 1976 and 1979a:223, where 'lexical decomposition' is pursued, make (also turn and render) could be translated overtly as $\lambda Q \lambda y VP(\text{CAUSE}(P(y), \ P(Q)))$. The translation of (57) would then be $VP(\text{CAUSE}(P(n), \ \text{angry}'(j)))$, which indicates roughly that something that Nigel does causes John to be angry. Alternatively, a meaning postulate like the following could be invoked.
The examples in (56) need similar treatment.

Examples with see, catch and find have a similar syntax but present more challenges in the semantic interpretation. If these words are assigned to category TV/ADJ and translated simply as see', catch' and find', R27X will generate examples such as (59).

(59) Mary saw John nude.
(59') see'(nude')(XPP(j))(m)

A full examination of adjective complement ('object complement') constructions and 'pseudo-appositive adjectives' (Green 1970; 1973; Dowty 1972; Quirk et al. 1972:240-257; Live 1977) would require a full thesis in itself. One way of handling translations like (59'), which are based on three-place relations like see', is to define a meaning postulate to relate them to formulas based on more common two-place relations. Let see2' be the two-place relation which translates the TV see as in John saw Mary.

\[ \Lambda \alpha [\text{see}'(P)(P)(x) \to (\text{see2}'(P)(x) \land P(P))] \]

As such examples involve accident readings (see Section 2.3.4), a semantic characterisation of the essence/accident distinction will be needed before a completely satisfactory explanation can be given.

Think and consider also appear to have TV/ADJ (or perhaps TV/PRED) readings, so R27X can also generate sentences like (60) to (62) (see Bach 1980:337).

(60) John thought Mary gorgeous.
(61) Mary considered John sweet.
(62) Bill considers Joe a pest.

If think, TV/ADJ translates directly as the three-place relation think3', then (60) will translate as (60').
We can then appeal to a meaning postulate like (63) to relate such constructions to others based on think\(^t\), a two-place relation between individuals and propositions.

\[(63) \Delta P \Delta P \Delta x (\text{think}^t(P)(P)(x) \rightarrow P(\lambda z [\text{think}^t(x, ^z[P(z)])]))\]

Alternatively, think\(^{TV/ADJ}\) could be translated directly as \(\lambda P \lambda P \lambda y P(\lambda z [\text{think}^t(y, ^z[P(z)])])\). These constructions are closely related to similar sentences with to be infinitives, which will be treated in Chapter 7.

\[(64)\]
\[
a. \text{John thinks Bill silly.} \\
b. \text{John thinks Bill to be silly.}
\]

Other words in this class include judge, decree, believe, deem, suppose, prove, one reading of find, and perhaps want, wish, prefer and like.

Derived TV constituents such as (make, angry), (think, silly), (paint, blue) and (see, nude) can be passivised in the usual way to produce strings like (65).

\[(65)\]
\[
a. \text{John was made angry (by Bill).} \\
b. \text{The barn painted blue looked ridiculous.} \\
c. \text{John was seen nude by Mary.} \\
d. \text{Bill was thought silly (by Roger).}
\]

### 3.5 Conclusion

In this chapter I have shown how various adjectives and adjectivals can be handled in a non-transformational MG. Basic adjectives, passive participles, present participles, and various lexical classes turn out to display remarkably similar syntactic behaviour, and this behaviour is more easily appreciated when the categorial analysis abstracts away from linear representations. The account is far from complete; the intent is to let the basic fragment
serve as a blueprint for further analysis. This will be the plan for the remainder of the thesis.
Chapter 4. Non-restrictive modification of terms

4.0 Introduction

The aim in this chapter is to present and defend a new approach to the analysis of non-restrictive modification in MG. The key innovation is the adoption of a 'subroutine' mechanism to reflect the intuition that non-restrictive modifiers are assertions which are 'smuggled' into the stream of a superordinate speech act. The analysis in this chapter will later serve as a blueprint for non-restrictive modification at the proposition and property levels, and will suggest similar analyses for appositives and referring expressions.

4.1 An overview of the problem

I shall argue that non-restrictive modifiers are akin to digressions and interpolations, as in the following pairs.

(1) a. John, who is handsome, loves Mary.
   b. John—he is handsome—loves Mary.

(2) a. My brother, whom you met yesterday, is a lion-tamer.
   b. My brother—you met him yesterday—is a lion-tamer.

(3) a. Your charming wife throws delightful parties.
   b. Your wife—she is charming—throws delightful parties.

Appealing to the vocabulary of computer science, a non-restrictive modifier is much like a subroutine which is called from a superordinate program, performs its task and then passes control back to the calling program. Loosely speaking, a speaker uttering a sentence containing a non-restrictive modifier can be thought of as performing two speech acts in parallel, or, more accurately, in 'pseudo-parallel'.

Traditionally, non-restrictive modifiers have been analysed not as subroutines but as conjoined utterances, thus (1a) would be transformed from or translated into something of the rough form 'John loves Mary AND John is handsome'. The distinction between the
subroutine view and the conjunction view is relatively trivial for most textbook examples. However, I intend to show that the conjunction analysis fails in opaque contexts and is inappropriate for analysing non-restrictive modifiers appearing within question and commands.

The chapter will proceed with an introduction to relative clauses and then a detailed examination of non-restrictive phenomena and the conjunction analysis as it has been proposed in Montague grammars. The subroutine analysis will then be proposed and tested with non-restrictive adjectives, relative clauses and appositives.

4.1.1 Relative clauses

It has long been appreciated that relative clauses can be either restrictive or non-restrictive in their manner of modification. The classic examples are on the pattern of (4) and (5).

(4) The man, who was tired, left.
(5) The man who was tired left.

In a non-restrictive example like (4), who is tired provides an incidental characterisation of the man, whom the speaker assumes to be already specified or distinguished sufficiently for the purposes of the utterance. If the non-restrictive relative clause in (4) is removed, the main thrust of the sentence is not affected. On the other hand, the restrictive relative clause in (5) functions centrally to help specify or determine just which man is intended; who is tired 'restricts' the class of possible referents. Removing a restrictive modifier can have grave effects on the success of communication. Logically speaking, (4) and (5) have different truth conditions (Montague EFL: 213-214); for instance, while (4) conveys the assertion that there is one and only one man (and that he was tired and left), (5) conveys the assertion that there is one and only one tired man (and that he left).

While restrictive and non-restrictive relative clauses share many syntactic qualities, a number of differences are commonly cited.
For instance, non-restrictive relative clauses are typically said to be set off by pauses and a distinct pitch contour (Lees 1963:85ff); it is also claimed that relative WH words appear in both restrictive and non-restrictive relative clauses, but that that relative clauses are limited to the restrictive reading (Jespersen 1924:112; Vendler 1968:13; Rodman 1972:91; Quirk et al. 1972:871). Such claims do not always hold up, especially in Scots dialect. Therefore, I shall proceed under the assumption that the traditional semantic distinctions, if not the syntactic ones, are genuine.

4.1.2 PREDs and ADJVLs

While relative clauses provide the clearest examples, attributive ADJVLs and PREDs can also modify restrictively or non-restrictively. Jespersen (1924:108ff) cites examples like (6), pointing out their ambiguity.

(6) The industrious Japanese succeed.

(6) may refer to an industrious subset of the Japanese (the Japanese who are industrious) or it may refer to all Japanese, with a non-restrictive characterisation of them as being industrious (the Japanese, who are industrious). Such 'ornamental' or 'parenthetical' adjectives are sometimes used with proper names, as in titles, gushy addresses and Homeric epithets (Jespersen 1924:111-112; Vendler 1968:87; Chomsky 1965:217).

(7) My dear little Ann

(8) Brave Ulysses

(9) The honourable John Smith

Care must be taken with preposed adjective examples because most are ambiguous between restrictive and non-restrictive readings. The adjective in (10), for instance, may be used to pick out one of a set of brothers, the stupid one, from the rest of the brothers, who are, presumably, not stupid. But in a context where only one brother is involved, stupid may be added non-restrictively as the speaker's assessment of the brother in question. Care must also be taken with
examples like (11), which may appear to exclude a restrictive reading for beautiful.

(10) Your stupid brother
(11) My beautiful wife

Such a restrictive reading is, however, quite possible, and would be useful in a polygamous society.

The syntactic ambiguity of (10), at least in the written form, is an accident of the relatively inflexible syntactic order of English. Languages like Spanish and Portuguese, which allow more freedom in the placement of adjectives, often put non-restrictive adjectives before nouns, while the usual position for restrictive adjectives is after nouns.4

Postposition of non-restrictive adjectivals in English is necessary when they have syntactic complements.5 Non-restrictive PNOMs must also be postposed.

(12) /e--past participle
   The foreign minister, rebuked by the prime minister, resigned.
(13) /e--adjectival present participle
   John, being the supervisor, was blamed.
(14) PNOM
   Lee, a postgraduate student, drank only Dutch gin.

Thus any member of PRED or ADJVL, the cover classes of /e constituents which appear in predicate and attributive position, can also be a non-restrictive modifier.

True terms which appear to be non-restrictive modifiers, as in (15), require a slightly different analysis, and will be discussed in Section 4.6.

(15) John, the man you met yesterday, sells vacuum cleaners.
4.2 Formal observations on non-restrictive modifiers

4.2.1 One-place predicates

It is generally agreed that only constituents naming one-place predicates can be used as non-restrictive modifiers (Siegel 1976a:52; Bennett 1975:44). Indeed the ability to act as a non-restrictive modifier was cited as a test of one-place predicate-hood in Section 2.3.3. Examples with non-restrictive readings thus include absolute adjectives like red, degree adjectives like tall and evaluative adjectives like worthless.

(16) The officer's red face betrayed his embarrassment.
(17) The tall movie star signed autographs.
(18) Your worthless secretary should have this finished in a couple of hours.

Non-predicative adjectives like mere, former and sheer cannot have non-restrictive readings.

Relative clauses intuitively translate as sentences with an argument slot abstracted out; they too are one-place predicates and so can be expected to modify non-restrictively.

(19) a. which is red \( \lambda x[\text{red}'(x)] \)
b. who is tall \( \lambda x[\text{tall}'(x)] \)
c. who is worthless \( \lambda x[\text{worthless}'(x)] \)
d. who loves Bob \( \lambda x[\text{love}'(\lambda \text{PP}(b))(x)] \)
e. whom Bob loves \( \lambda x[\text{love}'(\lambda \text{PP}(x))(b)] \)

4.2.2 Terms modified by non-restrictive modifiers

Smith (1964:38) notes that bare proper names in English can be modified only by non-restrictive relative clauses (see also Arnauld & Nicole 1662:60; Chomsky 1965:217; Vendler 1968:14, 86-87).
(20) Nigel, whom I know well, would never pick up a check.

(21) *Nigel that I know well would never pick up a check.

Homeric epithets as in Brave Ulysses are similarly non-restrictive. By treating Nigel overtly as a common noun and adding a definite article, restrictive modifiers become perfectly acceptable.

(22) The Nigel that I know would never pick up a check.

The analysis of proper names as predicates will be taken up in Section 4.6.1.2.

While definite noun phrases can be modified either restrictively or non-restrictively, the possibilities for modifying indefinite terms are more controversial. It has even been claimed that non-restrictive modifiers on indefinite terms are ungrammatical (Rohrer 1973:412) or at least different from other non-restrictives (Thompson 1971:82; Fairclough 1973:530). Though I disagree with many of her specific examples, Smith (1964:47-48) is right in claiming that 'vacuous' indefinite terms cannot take non-restrictive modifiers (see also Rohrer 1973:411-412). One kind of vacuous indefinite term is one for which the corresponding 'referent's' existence is being denied. Another purportedly vacuous example is the English-predicate nominal; these are properly translated as simple predicates and so are not really terms at all (see Section 3.2 example (4)). The following examples from Smith 1964 are ungrammatical or incoherent where the indefinite terms are vacuous and the relative clauses are non-restrictive.

(23) *He never wrote [a novel, which was published by McGraw-Hill].

(24) *He is [an anthropologist, who studies Indian tribes].

For indefinite terms which are, in some sense, referring expressions, non-restrictive modifiers are perfectly acceptable.

(25) An anthropologist, who studies Indian tribes, gave an excellent talk.
(26) They finally gave some food to a dog, which had been following them around for hours.

(27) A beggar, who had been begging here for 30 years, turned out to be rich.

In all these cases, the non-vacuous indefinite terms can be fortified with particular, certain or specific (e.g., a certain anthropologist); each could be replaced, given the right context and shared knowledge, with more definite naming expressions such as Dr Bloggs or the anthropologist for an anthropologist, Fido or the hungry dog for a dog, and Lazarus or the town beggar for a beggar.

Other determiners yielding vacuous terms include 'generic' indefinite articles and no, any, few and every. True non-restrictive readings for the relative clauses in the following sentences are therefore anomalous.

(28) *A child, who is polite, should be seen and not heard.
(29) *Any book, which is amusing, will do.
(30) *No antique dealer, who has any sense, would buy that.
(31) *Every dealer, who sells at that price, goes broke.

These restrictions have been noted by a number of researchers (Smith 1964:38, 48; Thorne 1972:553; Aissen 1972:188; Cooper 1975:229; 1979:73; Rodman 1972:175; Bartsch 1979:37-40). In actual discourse, therefore, the presence of a true non-restrictive modifier is a clue to the hearer to interpret the modified term as specific or referring, in some sense, to a potentially identifiable individual.

Because of this there is a certain amount of pressure to interpret a sentence like (23) as (32), a possible but somewhat improbable reading.

(32) He didn't write [a (particular) novel, which was published by McGraw-Hill].
Note that if we adopt an explicit existential quantifier on the lines of Bennett's (1975:106-107) \( \text{at least } n \) quantifier, the indefinite terms taking non-restrictive modifiers cannot be paraphrased as 'at least one CN'.

(33) *At least one anthropologist, who studies Indian tribes, gave an excellent talk.

Also the expressions any old or an arbitrary, which characterise non-specific indefinite terms, preclude non-restrictive modification (see note 7).

(34) *They finally gave some food to any old dog, who had been following them around for hours.

(35) *An arbitrary beggar, who had been begging here for 30 years, turned out to be rich.

These facts tend to argue against translating 'specific' indefinite terms with existential quantifiers.\(^8\) We shall return to the referring status of indefinite terms in the discussion of Bartsch's analysis of non-restrictive modifiers in Section 4.4.2.

4.2.3 Non-restrictive modifiers as independent speech acts

4.2.3.1 Performative adverbs and tags

There is considerable evidence to support the conclusion that non-restrictive modifiers are speech acts separate from the superordinate speech acts in which they appear. Thorne (1972; see also McCawley 1978:163) has shown that non-restrictive relative clauses may have their own separate 'performative' adverbs like frankly and honestly; and Seuren (1969:190-191) has shown that they can have their own tags.

(36) John, who frankly is a bore, talked all night.

(37) John, who is a bore, isn't he?, talked all night.

As both tags and performative adverbs are usually associated with
Keith Brown has also pointed out to me that non-restrictive modifiers can be interjected not only by the speaker himself but by his interlocutors. Thus in example (36), speaker A could say John, and then speaker B could burst in with who frankly is a bore before A had a chance to finish the sentence with talked all night. In such a case, two speech acts are clearly involved, and each assertion would be ascribed to its respective speaker.

It is also possible, even in written text, to find non-restrictive modifiers isolated off in separate sentences.

Unlike James, [Mary of Guise] had one small son, Francis, the new duke of Longueville, and gave birth to another son shortly after her husband's death. Who died. (Fraser, A., Mary Queen of Scots, 1970, London: Panther.)

Who died in this extract appears to contain an anaphoric reference back to Mary of Guise's second son, who is introduced in the preceding sentence. Such separability, though it might be explained as only a strong pause, is consistent with the view that non-restrictive modifiers convey a separate speech act.

4.2.3.2 Questions and commands

Although most examples of non-restrictive modifiers in the literature show them appearing inside assertions, non-restrictive relative clauses appear to attach to any suitable (i.e. 'referring' or 'specific') terms in any kind of sentence.

(38) Tell your father, who is outside, that dinner is ready.
(39) Who told John, who shouldn't know about it, that Mary left?
(40) I wish that Bruno, who is very strong, were here now.
(41) May your business, which has hitherto been a disaster, turn into a great success!
(42) I name this ship, which is the biggest ever made, the Titanic.

In each case, no matter what kind of superordinate speech act is
involved, the non-restrictive clause expresses an assertion. This assertion is somehow subordinate, parenthetical or incidental, having the status of an interpolation, an afterthought or an aside (Arnauld & Nicole 1662:115, 122).

4.2.3.3 Conjunction paraphrases

Almost everyone studying non-restrictive modifiers proposes that they derive from or translate into assertions which are conjoined to the main sentence at the highest level.\textsuperscript{10} The top-level conjunction analysis is only roughly compatible with the observations above, which indicate that non-restrictive assertions are independent speech acts.

The problem is that such an analysis requires the extremely suspicious conjunction of questions and assertions and also commands (or optative sentences) with assertions. Ross (1967:434–437) therefore resorts to transformationally deriving sentences with non-restrictive modifiers not from conjunctions of sentences but from SEQUENCES of sentences in a discourse, a solution which may be what the Port-Royal grammarians and logicians had in mind.\textsuperscript{11} Ross's solution, divorced from the old Chomskyan assumptions of linear sequence and transformational derivation, is in line with the speech-act observations and will form the basis of the present analysis. That is, a sentence with a non-restrictive modifier will not be translated as a conjunction, but as two separate sentences in the discourse. To do this, non-restrictive modifiers will be translated as independent assertions which are smuggled into the stream of a superordinate sentence. Non-restrictive modification is a way to perform two or more separate speech acts, not conjoined or in sequence, but rather in (pseudo-)parallel fashion.

4.3 Relative clauses

4.3.1 Restrictive relative clauses

Although relative clause analysis has long been a contentious issue in linguistics, there is now wide agreement that
restrictive relative clauses and adjectives attach in some way to CNs (the so-called Nom-S analysis) while non-restrictives attach to terms (the NP-S analysis). Restrictive relative clauses therefore function in a way quite parallel to attributive adjectives, and some researchers have gone so far as to include them under the adjective label (Quine 1960:110; Cresswell 1973:158; Thomason 1976:79; Keenan & Faltz 1978:51, 165). The full analysis of relative clauses is complicated by problems of allowable complementisers and scope restrictions (see Rodman 1976, Thomason 1976), which are not at issue here and which lead far astray from adjectives. The following categorisation and rule will suffice for the simple examples used herein.

<table>
<thead>
<tr>
<th>Category</th>
<th>Abbreviation</th>
<th>Basic expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>t/e REL</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

R28. If $\alpha \in P_t$ and $\alpha$ is of the form $\ldots \text{he}_n \ldots$, then $\{\alpha\} \in P_{REL}$ (where $n$ is a natural number).

Realisation: $\text{THAT} \uparrow \{\ldots \text{he}_n \ldots \}_t$

Translation: $\lambda x_n[^{\alpha'}]$

The rule states simply that a sentence with an indexed pronoun can be turned into a REL by abstracting out the indexed pronoun. Relativised sentences herein will be restricted to examples containing a single indexed variable for the sake of simple rules and easy exposition. The notation $\text{THAT} \uparrow \{\ldots \text{he}_n \ldots \}$ indicates that the REL is realised as a THAT followed by the normal realisation of the sentence, minus the indexed variable, which has a null realisation. Alternatively, THAT can itself be considered the realisation of the indexed variable. THAT is an abbreviation for words like that, who, whom and which; these words are selected by non-trivial morphological rules sensitive to grammatical relations and features such as [+human]. Such morphological rules will be assumed to operate, though no formalisation will be provided here.

We can now show, ignoring tense and aspect, that the barn that is red has the same translation as the restrictive reading of the red
barn.

(43) \(\text{the}_{\text{DET}} (\{\text{red}_{\text{ADJ}}\}_{\text{CN/2}} \text{CN}, \text{R12}', \text{barn}_{\text{CN}} \text{CN}, \text{R13}'_T, \text{R4})\)

Realisation: the red barn

Translation:
1. \(\text{red}_{\text{ADJ}} \rightarrow \text{red}'\) Basic
2. \(\{\text{red}\}_{\text{CN/2}} \text{CN} \rightarrow \lambda \text{P}(\text{y}) \& \text{red}'(\text{y})\) From 1 by R12
3. \(\text{barn}_{\text{CN}} \rightarrow \text{barn}'\) Basic
4. \(\{\{\text{red}\}, \text{barn}\}_{\text{CN}} \rightarrow \lambda \text{P}(\text{y}) \& \text{red}'(\text{y})\) (\(\text{barn}'\)) From 2, 3 by R13
5. \(\lambda \text{y}[\text{barn}'(\text{y}) \& \text{red}'(\text{y})]\) Lambda conversion
6. \(\text{the}_{\text{DET}} \rightarrow \lambda \text{P}\lambda \text{Q} \text{Vz}(\text{Ax}[\text{P}(\text{x}) \leftrightarrow \text{x} \& \text{Q}(\text{z})])\) Basic
7. \(\{\text{the}, \{\{\text{red}, \text{barn}\}\}_{\text{CN}}\}_T \rightarrow \lambda \text{P}\lambda \text{Q} \text{Vz}(\text{Ax}[\text{P}(\text{x}) \leftrightarrow \text{x} \& \text{Q}(\text{z})])\)

(44) \(\{\text{the}_{\text{DET}}, \{\text{barn}_{\text{CN}}\}' (\{\text{he}_{1}' \{\text{be}_{\text{IV/PRED}}, \text{red}_{\text{ADJ}}\}_{\text{IV}}, \text{R2}'_T, \text{R1}'_\text{REL}, \text{R28}'_{\text{CN/2}} \text{CN}, \text{R12}'_{\text{CN}}, \text{R13}'_T, \text{R4})\)

Realisation: the barn that is red

Translation:
1. \(\{\text{he}_{1}' \{\text{be}, \text{red}\}\}_T \rightarrow \text{red}'(\text{x}_1)\) See previous examples
2. \(\{\{\text{he}_{1}', \{\text{be}, \text{red}\}\}\}_\text{REL} \rightarrow \lambda \text{x}_1'[\text{red}'(\text{x}_1)]\) From 1 by R28
3. \(\{\{\text{he}_{1}', \{\text{be}, \text{red}\}\}\}_\text{CN/2} \text{CN} \rightarrow \lambda \text{P}\lambda \text{y}[\text{P}(\text{y}) \& \lambda \text{x}_1'[\text{red}'(\text{x}_1)](\text{y})]\) From 2 by R12
4. \(\lambda \text{P}\lambda \text{y}[\text{P}(\text{y}) \& \text{red}'(\text{y})]\) Lambda conversion
5. \(\text{barn}_{\text{CN}} \rightarrow \text{barn}'\) Basic
6. \(\{\text{barn}, \{\{\text{he}_{1}', \{\text{be}, \text{red}\}\}\}\}_\text{CN} \rightarrow \lambda \text{P}\lambda \text{y}[\text{P}(\text{y}) \& \text{red}'(\text{y})]\) (\(\text{barn}'\)) From 4, 5 by R13
7. \(\lambda \text{y}[\text{barn}'(\text{y}) \& \text{red}'(\text{y})]\) Lambda conversion
8. \(\text{the}_{\text{DET}} \rightarrow \lambda \text{P}\lambda \text{Q} \text{Vz}(\text{Ax}[\text{P}(\text{x}) \leftrightarrow \text{x} \& \text{Q}(\text{z})])\) Basic
9. \( \{\text{the, \{barn, \{\text{he, be, red}\}\}}\} \Rightarrow \lambda P \lambda Q V z [\lambda x [P(x) \iff x = z] \land Q(z)](\lambda y [\text{barn'}(y) \land \text{red'}(y)]) \)

From 7, 8 by R4

10. \( \lambda Q V z [\lambda x [(\text{barn}(x) \land \text{red'}(x)) \iff x = z] \land Q(z)] \)

Lambda conversion

4.3.2 Non-restrictive relative clauses

While restrictive relative clauses function almost identically to intersective attributive adjectives, non-restrictive relative clauses require a completely different translation. If Quine and the others cited in note 10 are correct in claiming that sentences with non-restrictive modifiers are merely stylistic variations of conjoined sentences, then the goal is to analyse examples like (45) and (46) as (45') and (46') respectively.

(45) John, who is handsome, walked away.
(45') [John walked away] and [John is handsome]
(46) John loves Mary, who is pretty.
(46') [John loves Mary] and [Mary is pretty]

The challenge for a surfacy MG would be to provide a syntax which directly generates complex terms like John, who is handsome, with a semantics which allows the translation of the non-restrictive modifier to appear at the top of the derivation as a conjoined sentence.

Rodman (1972:174-175) presents an analysis designed to do just that. Translated into the present notation (and adding Bennett's simplification), Rodman's Rule, abbreviated RR, is shown below.

Rodman's Rule: If \( \alpha \in P_{\text{ADJVL}} \) then \( \{\alpha\} \in P_{T/T} \).

Realisation: \( \alpha \)

Translation: \( \lambda P \lambda Q [P(\lambda y [\alpha'(y) \land Q(y)])] \)

We shall also need R29 for joining a non-restrictive modifier to a term.
R29. If $\alpha \in P_T/T$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_T$.

Realisation: $\beta \supset \alpha$, if $\alpha$ has a complement

$\alpha \supset \beta$ if $\alpha$ is a simple adjective and $\beta$ is a proper name

else $((\gamma_{DET}, \delta_{CN})_{T/T}, \alpha_{T/T}) \Rightarrow \gamma \supset \alpha \supset \delta$

Translation: $\alpha(' \beta')$

The following example shows how Rodman's Rule produces a 'conjunction' analysis for a non-restrictive modifier. The example is for comparison only; it does not represent the present 'subroutine' analysis.

(47) $((\text{John}_T, (((\text{he}_1T', \text{be}IV/PRED, \text{handsome}_ADJ)_IV,}
R2)_T, R1)_REL, R28)_T/T, R1)_REL, R29)_T/T, R29')_REL, R1)

Realisation: John, who is handsome, swims.

Translation:
1. $((\text{he}_1', \{\text{be}, \text{handsome}\}))_REL \Rightarrow \lambda x_1[\text{handsome}'(x_1)]$

See previous examples

2. $((\text{he}_1', \{\text{be}, \text{handsome}\}))_{T/T} \Rightarrow 
\lambda \rho \lambda \xi \eta [\rho(\lambda y[\lambda x_1 [\text{handsome}'(x_1)] (y) \& \xi])(\eta)]]$

From 1 by Rodman's Rule

3. $\lambda \rho \lambda \xi \eta [\rho(\lambda y[\text{handsome}'(y) \& \xi])(\eta)]]$

Lambda conversion

4. $\text{John}_T \Rightarrow \lambda P P[j]$

Proper name

5. $((\text{John}, (((\text{he}_1', \{\text{be}, \text{handsome}\}))_T \Rightarrow$

$\lambda \rho \lambda \xi \eta [\rho(\lambda y[\text{handsome}'(y) \& \xi])(\eta)]] (\lambda \rho P[j])$

From 3, 4 by R29

6. $\lambda \rho [\lambda \rho P[j](\lambda y[\text{handsome}'(y) \& \xi])(\eta)]$

Lambda conversion

7. $\lambda \rho [\text{handsome}'(j) \& \xi](\eta)]$

Lambda conversion

8. $\text{swim}'_IV \Rightarrow \text{swim}'$

Basic

9. $((\text{John}, (((\text{he}_1', \{\text{be}, \text{handsome}\})))_T, \text{swim})_T \Rightarrow$

$\lambda \rho [\text{handsome}'(j) \& \xi](\eta)] (\lambda \rho \text{swim}')$

From 7, 8 by R1

10. $\text{handsome}'(j) \& \text{swim}'(j)$

Lambda conversion

As shown in step 10, the non-restrictive modifier who is handsome translates as a conjunct of the main sentence. We can now contrast restrictive and non-restrictive readings involving relative clauses.
(48) Restrictive

\[ ([\text{the}_{\text{DET}} \text{barn}_{\text{CN}} \text{the}_{\text{DET}} \text{be}_{\text{IV/PRED}} \text{red}_{\text{ADJ}} \text{IV}, \text{R2}\text{t}, \text{R1}\text{REL}, \text{R28}\text{CN}/2\text{CN}, \text{R12}\text{CN}, \text{R13}\text{T}, \text{R4}\text{collapse}_{\text{IV}}\text{t}, \text{R1} \text{Realisation: The barn which is red collapsed.} \text{Translation: } \forall x[\exists y((\text{barn}(x) \& \text{red}(y)) \Leftrightarrow x=y] \& \text{collapse}(y)]\]

(49) Non-restrictive (with Rodman's Rule)

\[ ([\text{the}_{\text{DET}} \text{barn}_{\text{CN}} \text{the}_{\text{DET}} \text{be}_{\text{IV/PRED}} \text{red}_{\text{ADJ}} \text{IV}, \text{R2}\text{t}, \text{R1}\text{REL}, \text{R28}\text{T/T}, \text{R4}\text{T}, \text{R29}\text{-collapse}_{\text{IV}}\text{t}, \text{R1} \text{Realisation: The barn, which is red, collapsed.} \text{Translation: } \forall x[\exists y((\text{barn}(x) \leftrightarrow x=y] \& \text{red}(y) \& \text{collapse}(y)]\]

As has already been pointed out, these two sentences have different truth conditions.

4.4 Non-restrictive PREDs and ADJVLs

4.4.1 A Rodman-like analysis

All attributive modifiers in previous chapters have been restrictive. The semantics of non-restrictive attributive PREDs and ADJVLs in general should be identical to that for non-restrictive relative clauses. Syntactically, however, simple adjectives in English typically come before nouns and after any articles. This causes little trouble with epithets on proper names, but simple non-restrictive adjectives which modify definite terms require discontinuous realisation to get them into their prenominal slot (see Chapter 3 note 10). For instance, if white non-restrictively modifies the term the snow, then the constituent \((\text{the, snow})_{\text{T}}, (\text{white})_{\text{T/T}}\) will be realised as the string the white snow. These complications are dealt with in the realisation component of R29.

The solution for Homeric epithets and postposed non-restrictive PREDs and ADJVLs is fairly straightforward, both syntactically and semantically. Again, the Rodman analysis is being used in the following examples.
Beesley

Adjectives

(50) \(((\text{brave}_\text{ADJ})_{T/T}, \text{Ulysses}_T, \text{R29}, \text{escape}_\text{IV}t, \text{R1})\)
Realisation: Brave Ulysses escaped.
Translation:
1. brave\_\text{ADJ} \Rightarrow \text{brave}'  
2. (brave)_{T/T} \Rightarrow \lambda P\lambda Q[\lambda y(\text{brave}'(y) & Q(y))]  
   From 1 by Rodman's Rule
3. Ulysses\_T \Rightarrow \lambda P\lambda u  
4. ((\text{brave}), \text{Ulysses})_T \Rightarrow \lambda P\lambda Q[\lambda y(\text{brave}'(y) & Q(y))] (\lambda P\lambda u)  
   From 2, 3 by R29
5. \lambda Q[\text{brave}'(u) & Q(u)]  
6. escape\_\text{IV} \Rightarrow \text{escape}'  
7. ((\text{brave}), \text{Ulysses}, \text{escape})_T \Rightarrow \lambda Q[\text{brave}'(u) & Q(u)] (\text{escape}')  
   From 5, 6 by R1
8. brave'(u) & escape'(u)  

(51) \(((\text{John}_T, (\text{reject}_T, \text{PASS})_{T/T, \text{by}\_\text{PP-BY}/T, \text{Mary}_T, \text{R14'}, \text{R16'}, \text{R17}'), \text{R29}, \text{despair}_\text{IV}t, \text{R1})\)
Realisation: John, rejected by Mary, despaired.
Translation:
1. ((\text{reject}, \text{PASS}), (\text{by}, \text{Mary}))_{T/5e} \Rightarrow \lambda x(\text{reject}'(m, x))  
   See previous examples
2. ((\text{reject}, \text{PASS}), (\text{by}, \text{Mary}))_{T/T} \Rightarrow \lambda P\lambda Q[\lambda y(\lambda x(\text{reject}'(m, x))(y) & Q(y))]  
   From 1 by Rodman's rule
3. \lambda P\lambda Q[\lambda y(\lambda x(\text{reject}'(m, y) & Q(y)))]  
4. \text{John}_T \Rightarrow \lambda P\lambda j  
5. (\text{John}, (\text{reject}, \text{PASS}), (\text{by}, \text{Mary}))_T \Rightarrow \lambda P\lambda Q[\lambda y(\lambda x(\text{reject}'(m, y) & Q(y)))] (\lambda P\lambda j)  
   From 3, 4 by R29
6. \lambda Q[\lambda x(\lambda x(\text{reject}'(m, j) & Q(j))]  
7. despair\_\text{IV} \Rightarrow \text{despair}'  
   Basic
8. \[\text{(((John, (((reject, PASS), (by, Mary))))), despair)} \mapsto \lambda Q[j] (\text{reject'}(m, j) \land Q[j]) \text{ (despair') from 6, 7 by R1}\]

9. \[\text{reject'}(m, j) \land \text{despair'}(j) \text{ lambda conversion}\]

The two readings of *The stupid president resigned* are shown in (52) and (53).

**52) Restrictive**

\[
\text{realisation: The stupid president resigned.}
\text{Translation: } V[y[\Delta x[(\text{president'}(x) \land \text{stupid'}(x)) \leftrightarrow x \cdot y] \land \text{resign'}(y)]}
\]

**53) Non-restrictive (Rodman's analysis)**

\[
\text{realisation: The stupid president resigned.}
\text{Translation: } V[y[\Delta x[\text{president'}(x) \leftrightarrow x \cdot y] \land \text{stupid'}(y) \land \text{resign'}(y)]}
\]

In the restrictive reading, *stupid'* functions as a restricting quality; the intended referent is that president such that he is also stupid. In the non-restrictive reading, *the president* functions as the referring expression, and *stupid'* is predicated incidentally of the entity who is the unique president. Note that the non-restrictive assertion *stupid'(y)* in (53) is tied to the main assertion *resign'(y)* by the sharing of a common bound variable. In the non-restrictive reading, the adjective must be syntactically wedged between the determiner and the common noun of the modified term. This step is illustrated in (54).

**54) ((stupid_{ADJ}^{T/T}, (the_{DET}^{CN}, president_{CN}^{T})^T \Rightarrow
the_{DET}^{CN} \text{stupid}_{ADJ}^{T/T} \text{president} \quad \text{by R29}}

\[
\text{realisation: The stupid president resigned.}
\text{Translation: } V[y[\Delta x[\text{president'}(x) \leftrightarrow x \cdot y] \land \text{stupid'}(y) \land \text{resign'}(y)]}
\]
So far we have only looked at non-restrictive modifiers on subjects. Example (55), still using Rodman's rule, shows one modifying a direct object.

(55) \((\text{John}_T, (\text{like}_T\text{}'\left(\text{the}_\text{}\text{C}_{\text{N}},_T, \text{R}_4\right)), (\text{he}_\text{}\text{I}_T, (\text{be}_\text{}\text{IV}_\text{}\text{P},_\text{}\text{P},_\text{}\text{P}_\text{}\text{A}_\text{}\text{D}_\text{}\text{J}_\text{}\text{I}_V), (\text{the}_\text{}\text{I}_T, (\text{dancer}_\text{}\text{CN}_T, R_4))^{\text{REL}}, R_2^{\text{T}}, R_1^{\text{T}}, R_29^{\text{T}}, R, R_9^{\text{T}}, R_3^{\text{T}}, R_1)\)

Realisation: John likes the dancer, who is pretty.

Translation:
1. \(\left(\text{he}_1, (\text{be}, \text{pretty})\right)\) \(\Rightarrow\) \(\lambda P\lambda \lambda P\left(\lambda y[\text{pretty}\left(y\right) \& P\left(y\right)]\right)\)
   See previous examples
2. \((\text{the}, \text{dancer})\) \(\Rightarrow\) \(\lambda Qvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& Q\left(z\right)]\)
   See previous examples
3. \((\text{the}, \text{dancer}), \left(\text{he}_1, (\text{be}, \text{pretty})\right)\) \(\Rightarrow\) \(\lambda P[\lambda Qvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& Q\left(z\right)]\]
   Lambda conversion
4. \(\lambda P[\lambda Qvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& Q\left(z\right)]\]
   Lambda conversion
5. \(\lambda Pvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& \text{pretty}\left(z\right) \& P\left(z\right)]\)
6. \(\text{like}_T\text{}'\) Basic
7. \((\text{like}, (\text{the}, \text{dancer}), \left(\text{he}_1, (\text{be}, \text{pretty})\right))\) \(\Rightarrow\) \(\text{like}'\left(\lambda Pvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& \text{pretty}\left(z\right) \& P\left(z\right)]\right)\)
   From 5, 6 by R3
8. \(\text{John}_T\) \(\Rightarrow\) \(\lambda Q\left(j\right)\) Basic
9. \((\text{John}, \text{like}, (\text{the}, \text{dancer}), \left(\text{he}_1, (\text{be}, \text{pretty})\right))\) \(\Rightarrow\) \(\lambda Q\left(j\right)\) \(\left(\text{like}'\left(\lambda Pvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& \text{pretty}\left(z\right) \& P\left(z\right)]\right)\right)\)
   From 7, 8 by R1
10. \(\lambda Pvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& \text{pretty}\left(z\right) \& \text{like}'\left(j, y\right)]\)
    Lambda conversion
11. \(\lambda Pvz[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& \text{pretty}\left(z\right) \& P\left(z\right)]\)
    First-order reduction
12. \(\text{Vz}[\lambda x[\text{dancer}\left(x\right) \leftrightarrow x=z] \& \text{pretty}\left(z\right) \& \text{like}'\left(j, z\right)]\)
    Lambda conversion
The Rodman analysis appears satisfactory in a number of respects. Non-restrictive modifiers combine straightforwardly with terms in the syntax, and the conjunction which is so often appealed to in explaining non-restrictive modification is built into the semantics. There are, however, some problems. First, as examples (50) and (51) show, the clause representing the non-restrictive assertion, which is intuitively subordinate or parenthetical, is fully as prominent as the main assertion of the sentence. In a truth-conditional semantics, this objection is not terribly worrying. Second, although the analysis has the virtue of applying equally well to proper names and appropriate terms of the form the CN and a CN, it also applies inappropriately to terms like every CN, no CN, any CN and the so-called 'vacuous' indefinite terms, none of which can take non-restrictive modifiers. Third, Rodman's rule translates non-restrictive assertions as conjuncts to the main clause, but these conjuncts are, in the case of definite and indefinite terms, tied together by an existential quantifier.

(56) 

\[ ((a_{DET}\, \text{man}_{CN})_T, R^4, ((\text{he}_{IT}, \text{be}_{IV/PRED}, \text{ill}_{ADJ}, \text{fall}_{IV}, \text{R}_2, \text{R}_1)_T, \text{R}_28, \text{R}_29, \text{R}_1, \text{R}_T)_{T, \text{R}_1}) \]

Realisation: A man, who was ill, fell.

Translation: \( Vx[\text{man}'(x) \& \text{ill}'(x) \& \text{fall}'(x)] \)

This clashes with the evidence that non-restrictive assertions, which can take their own performative adverbs and tags, are separate speech acts. The mechanism of linking variables across clauses with quantifiers has recently faced some general criticism (Cooper 1979:72); and even if such translations were allowed for sentences like (56), where the non-restrictive relative clause translates as an assertion within an assertion, it is much harder to justify in those cases where non-restrictive modifiers appear within questions and commands. That is, a Rodman-like analysis would have to analyse sentences like (38) and (39), reprinted here, roughly as (38') and (39') respectively.
(38) Tell your father, who is outside, that dinner is ready.
(38') (tell your father that dinner is ready) &
(your father is outside)

(39) Who told John, who shouldn't know about it, that Mary left?
(39') (who told John that Mary left?) &
(John shouldn't know about it)

Conjoining questions with assertions is already decidedly odd even in syntax, and Ross (1967:434-437) abandoned the conjunction analysis for just this reason. Even worse, the Rodman analysis requires that variables be bound across such conjunctions, for that is the only way that the coreference between the two clauses is enforced. As a question or a command does not have a truth value in the usual sense, the logical conjunction of a question or command with an assertion is not even well-formed.

Another source of worry or comfort, depending on one's point of view, is the fact that the translation in (56) is identical to that for the sentence A man who was ill fell where who was ill is translated as a restrictive modifier of man. If Rodman's analysis is correct, we must conclude that what appear to be restrictive and non-restrictive modes of modification on indefinite terms do not differ in truth value. If a difference must be captured, as I believe, then something is wrong with the analysis of indefinite terms or with Rodman's analysis of non-restrictive modifiers.

A further cause for concern is the increasing complexity of the semantic derivations as non-restrictive modifiers apply to terms in deeper and deeper parts of trees. Example (51) shows a non-restrictive modifier applying to the subject term of the sentence. The fact that the conjoined clause pops up so easily in such cases is a direct reflection of the MG analysis, where subject terms map IVs into sentences. When the non-restrictive applies to the direct object of a sentence, as in (55), several extra derivation steps involving first-order reduction are necessary to make the conjunct pop up. Writing out the derivations becomes very tedious indeed when the non-restrictives are further embedded, and one must eventually go
beyond syntactic simplifications to get the conjuncts to appear at
the highest level. Consider sentence (57), where the non-restrictive
relative clause who is pretty is read as applying to Mary.

\[(57) \text{((the}_1 \text{DET} \text{, (man}_2 \text{CN, \{(he}_3 \text{heTV,}
(Mary}_4 \text{, \{(he}_5 \text{beIV/PRED,}
\text{pretty}_6 \text{adjIV, R2}_7 \text{t, R1}_8 \text{REL, R28}_9 \text{T/T,}
\text{RR}_1 \text{T, R29}_2 \text{IV, R3}_3 \text{t, R1}_4 \text{REL,}
\text{R28}_5 \text{CN/2CN, R12}_6 \text{CN, R13}_7 \text{T, R4}_8 \text{, resign}_9 \text{IV}_1 \text{T, R1}_1 \text{)}}\text{Realisation: The man who loves Mary, who is pretty, resigned.}

\text{Translations:}
1. ((\text{Mary, \{(he}_2 \text{be, pretty))))} \text{T} \Rightarrow
\lambda Q[\text{pretty}'(m) & Q(m)] \quad \text{See previous examples}
2. love_TV \Rightarrow love' \quad \text{Basic}
3. ((\text{love, (Mary, \{(he}_2 \text{be, pretty))))} \text{IV} \Rightarrow
love'('\lambda Q[\text{pretty}'(m) & Q(m)]) \quad \text{From 1, 2 by R3}
4. he_1 \Rightarrow \lambda PP(x_1) \quad \text{Pronoun}
5. ((\text{he}_1 \text{love, (Mary, \{(he}_2 \text{be, pretty))))} \text{T} \Rightarrow
\lambda PP(x_1) ('\text{love'('\lambda Q[\text{pretty}'(m) & Q(m)])})
\text{From 3, 4 by R1}
6. love'('\lambda Q[\text{pretty}'(m) & Q(m)](x_1) \quad \text{Lambda conversion}
7. '\lambda Q[\text{pretty}'(m) & Q(m)] ('\lambda y[\text{love'x_1(y, y)]) \quad \text{First-order reduction}
8. ((\text{pretty'}(m) & \lambda y[\text{love'x_1(y, y)]}(m)) \quad \text{Lambda conversion}
9. ((\text{pretty'}(m) & \text{love'x_1(y, m)) \quad \text{Lambda conversion}
10. ((\text{he}_1 \text{love, (Mary, \{(he}_2 \text{be, pretty))))} \text{REL} \Rightarrow
\lambda x_1[\text{pretty'}(m) & \text{love'x_1(y, m)]} \quad \text{From 9 by R28}
11. ((\text{he}_1 \text{love, (Mary, \{(he}_2 \text{be, pretty))))} \text{CN/2CN} \Rightarrow
\lambda P\lambda y[P(y) \& \lambda x_1[\text{pretty'}(m) & \text{love'x_1(y, m)](y)] \quad \text{From 10 by R12}
12. \lambda P\lambda y[P(y) \& \text{pretty'}(m) \& \text{love'x_1(y, m)] \quad \text{Lambda conversion}
13. man_CN \Rightarrow man' \quad \text{Basic}
Rodman's conjunction approach leads to more and more complicated derivations for carrying along non-restrictive assertions from deeper and deeper in the tree. This results in a lot of tedium but is not in itself a serious criticism. However, note in line 22 that the non-restrictive assertion pretty'(m) does not emerge as a conjunct of the main sentence as a whole but rather is locked deep down in the formula among the limiting clauses of the definite description.

4.4.2 The Bartsch analysis

Bartsch (1979) provides an analysis of non-restrictive modifiers which solves some of these problems. The solution must be understood in the context of her theory of pronominal coreference. Bartsch
translates proper names as in PTQ, so John translates as the set of all properties of the intension of some individual constant: \( \lambda \text{PP}(j) \). From here on I shall adapt Bartsch's translations to conform to Bennett's simplification, though the issue is not crucial to the discussion. Thus John will translate as \( \lambda \text{PP}(j) \). Unlike PTQ, Bartsch's theory allows individual constants to be introduced into translations not only by proper names but by any term having a 'specific' reading. In the specific reading, for instance, the indefinite article translates as \( \lambda \text{Q} \lambda \text{P}[\text{Q}(v) \& \text{P}(v)] \), where \( v \) is a newly introduced constant; that is, \( v \) is of the same type and nature as the constant \( j \) in the translation of John. Such a translation is used when the indefinite term names or refers, in some sense, to a specific entity in the mind of the speaker. Example (58) uses Bartsch's analysis of the specific indefinite article (with Bennett's simplification added). Let \( v_1 \) be the constant corresponding to the car John bought, and, in general, let \( v_n \), where \( n \) in a natural number, be a set of individual constants.

(58) \((\text{John}_T, (\text{buy}_T, (a_{\text{DET}}, \text{car}_C)_T), R^4)_T, R^3)_T, R^1\)

Realisation: John bought a car.

Translation:

1. \( a_{\text{DET}} \Rightarrow \lambda \text{P} \lambda \text{O}[\text{P}(v_1) \& \text{Q}(v_1)] \)
   Bartsch's translation of a specific indefinite article

2. \( \text{car}_C \Rightarrow \text{car}' \)
   Basic

3. \( (a, \text{car})_T \Rightarrow \lambda \text{P} \lambda \text{O}[\text{P}(v_1) \& \text{Q}(v_1)] (\text{car}') \)
   From 1, 2 by R4

4. \( \lambda \text{Q}[	ext{car}'(v_1) \& \text{Q}(v_1)] \)
   Lambda conversion

5. \( \text{buy}_T \Rightarrow \text{buy}' \)
   Basic

6. \((\text{buy}, (a, \text{car}))_T \Rightarrow \text{buy}'(\lambda \text{Q}[	ext{car}'(v_1) \& \text{Q}(v_1)]) \)
   From 4, 5 by R3

7. \( \text{John}_T \Rightarrow \lambda \text{PP}(j) \)
   Proper name

8. \( (\text{John}, (\text{buy}, (a, \text{car})))_T \Rightarrow \lambda \text{PP}(j) \ (\text{buy}'(\lambda \text{Q}[	ext{car}'(v_1) \& \text{Q}(v_1)])) \)
   From 6, 7 by R1

9. \( \text{buy}'(\lambda \text{Q}[	ext{car}'(v_1) \& \text{Q}(v_1)])(j) \)
   Lambda conversion
If the sentence *John bought a car* were followed by the sentence *It is red*, Bartsch's rules of anaphoric resolution would search the context for the constant referred to by *it*. Assuming that this is the car bought by John, it would be translated as $\lambda P(v_1)$, and *It is red* would translate as $\lambda P' (v_1)$.

Definite terms in Bartsch's system are also specific and have the same kind of translation as specific indefinite terms. In contrast, the translation of *every, no, any* and non-specific *a* or *an* does not cause the introduction of entity constants but rather of 'blocked variables', which are eventually bound by quantifiers.

The following are Bartsch's rules, adapted to the present formalism, for handling non-restrictive modifiers.

**Bartsch's Rule 1:** If $\alpha \in P_{ADJVL}$ then $(\alpha) \in P_{T/T'}$.

- **Realisation:** $\alpha$
- **Translation:** $\text{RELT}(\alpha')$

**Bartsch's Rule 2:** If $\alpha \in P_{T/T}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_T$.

- **Realisation:** $\beta \rightarrow \alpha$
- **Translation:** where $\beta'$ is of the form $\lambda P(...P(v)...)$ and $\alpha'$ is of the form $\text{RELT}(\lambda x[y'(x)])$, then $(\alpha, \beta)$ translates as $\lambda P(...y'(v) & P(v)...)$

Janssen (1978:221-223) has shown that Bartsch's reference to the internal logical forms of constituents is awkward at the least. His alternative is to let $\text{RELT}(\alpha')$ translate as $\lambda P \lambda Q P(\lambda y [Q(y) & \alpha'(y)])$ and let it apply to the translation of the term it modifies. This, of course, is entirely equivalent to Rodman's account, and Janssen concludes that their semantic approaches are the same. There is, nonetheless, a subtle but important difference in Bartsch's rule. By specifying that the translation of the non-restrictively modified term be of the form $\lambda P(...P(v)...)$, Bartsch is specifying that the
term must translate as the set of properties of an individual constant; Bartsch uses $v$ as an individual constant, just like $j$, $m$, $b$ and $s$ (for John, Mary, Bill and Sue), as opposed to bindable variables such as $x$, $y$ and $z$. Within her theory, this explains why terms with the articles every, any, no and vacuous $a$ can never have non-restrictive modifiers—they are always translated with variables and will never satisfy the semantic constraints of Bartsch's Rule 2. In addition, terms which translate as property sets of constants are the only ones which can be linked to anaphoric pronouns like he, she and it in subsequent sentences. The theory therefore predicts a strong correspondence between discourse anaphora and non-restrictive modification: all and only those terms which can be non-restrictively modified can support subsequent anaphoric pronouns. This prediction appears to hold (see note 8). Consider the pairs in (59) and (60), where the (a) sentences involve a specific indefinite term and the (b) sentences involve a non-specific indefinite term.

(59) a. John wants to marry a (specific) Norwegian $i$ (who $i$ is very pretty). She $i$ is a blonde.

b. John wants to marry a (any old) Norwegian $i$ (who $i$ is very pretty). *She $i$ is a blonde.

(60) a. A (specific) businessman $j$ (whom $j$ I met on the plane,) was very aggressive. He $j$ offered me a job.

b. A (any old) businessman $j$ (whom $j$ I met on the plane,) should create new jobs. *He $j$ offered me a job.

Despite these advantages, a few reservations about Rodman's solution carry over to Bartsch's. Though Bartsch does not link main clauses and parenthetical clauses with quantified variables (her specific terms are not translated with quantifiers at all), the two clauses still appear as logical conjuncts in translation. The parenthetical nature of non-restrictive modification is not reflected. In complex embedded constructions, non-restrictive assertions still tend to get buried in layers of semantic embedding instead of popping up to the
highest level as conjuncts.

4.4.3 Opaque contexts

Belief contexts provide examples where both Rodman's and Bartsch's analyses fail dramatically. Let us temporarily adopt the belief analysis of PTQ, where believe-that is a verb of category IV/t. A revised analysis will be shown in Chapters 5 and 6. Belief translates as a relation between an individual and a proposition, as in the following simplified example.

\[
\begin{align*}
(61) & \quad \text{John believes that Mary runs} \\
\text{John} & \quad \text{believe} \rightarrow \text{Mary runs} \\
\text{believe-that} & \rightarrow \text{IV/t} \\
\text{Mary runs} & \rightarrow \text{IV} \\
\text{run IV} & \rightarrow \\
\end{align*}
\]

\[
(61') \quad \begin{align*}
1. & \quad \text{Mary} \rightarrow \lambda \text{PP(m)} \\
2. & \quad \text{run IV} \rightarrow \text{run'} \\
3. & \quad \text{Mary runs} \rightarrow \lambda \text{PP(m)}(\text{run'}) \\
4. & \quad \text{run'}(m) \\
5. & \quad \text{believe-that IV/t} \rightarrow \text{believe-that'} \\
6. & \quad \text{believe that Mary runs} \rightarrow \text{believe-that'}(\text{run'(m)}) \\
7. & \quad \text{John} \rightarrow \lambda \text{PP(j)} \\
8. & \quad \text{John believes that Mary runs} \rightarrow \lambda \text{PP(j)}(\text{believe-that'}(\text{run'(m)})) \\
9. & \quad \text{believe-that'}(\text{run'(m)})(j) \\
10. & \quad \text{believe-that'}(j, \text{run'(m)})
\end{align*}
\]

When non-restrictive modifiers occur within the belief context, the analyses considered so far give the wrong readings. Consider the following example, where who is pretty non-restrictively characterises Mary.
(62) John believes that Mary, who is pretty, loves Bill

1. love Bill_{IV} \rightarrow love'(\lambda PP(b))
2. Mary, who is pretty_{T} \rightarrow \lambda Q[Q(m) & pretty'(m)]

By Rodman's Rule or Bartsch's Rule

3. Mary, who is pretty, loves Bill_{T} \rightarrow 
   \lambda Q[Q(m) & pretty'(m)] (\lambda [love'(\lambda PP(b))])
4. love'(\lambda PP(b))(m) & pretty'(m)
5. love'(m, b) & pretty'(m)
6. believe-that_{IV/t} \rightarrow believe-that'
7. believe that Mary, who is pretty, loves Bill_{IV} \rightarrow 
   believe-that'(\lambda [love'(m, b) & pretty'(m)])
8. John_{T} \rightarrow \lambda PP(j)
9. John believes that Mary, who is pretty, loves Bill_{T} \rightarrow 
   \lambda PP(j)(\lambda [believe-that'(\lambda [love'(m, b) & pretty'(m)])])
10. believe-that'(j, \lambda [love'(m, b) & pretty'(m)])

The resulting reading is equivalent to that for John believes that Mary is pretty, and that Mary loves Bill. Unfortunately, this is not a possible reading of (62); pretty'(m) is properly analysed as an assertion of the speaker rather than as a belief of John. Of course, John may indeed believe that Mary is pretty, but that is not what the sentence conveys.

One's first reaction is to try a fancier analysis of belief sentences, employing the mechanism of quantifying-in to allow non-restrictively modified terms to be evaluated with wide scope. Something like the following will be necessary.

(63) John believes that Mary, who is pretty, loves Bill

Mary, who is pretty_{T} John believes that he_{T} loves Bill_{T}
1. John believes that he loves Bill \( \Rightarrow \)
   \[ \text{believe-that}'(j, \text{[love}'_1(x_1, b)]) \]
2. Mary, who is pretty \( \Rightarrow \lambda Q[\text{pretty}'(m) \& Q(m)] \)
   By Rodman's Rule or Bartsch's Rule
3. John believes that Mary, who is pretty, loves Bill \( \Rightarrow \)
   \[ \lambda Q[\text{pretty}'(m) \& Q(m)] \]
   \( (\lambda x_1[\text{believe-that}'(j, \text{[love}'_1(x_1, b)])]) \)
4. pretty'(m) \& \lambda x_1[\text{believe-that}'(j, \text{[love}'_1(x_1, b)])](m)

We might paraphrase this reading as 'Mary is pretty and John believes that she loves Bill'.

While this might appear to solve the problem, there are at least three reasons for not resorting to quantifying-in. First, the mechanism of quantifying-in is itself highly controversial. Second, wide scope de re readings should normally be contrasted with narrow scope de dicto readings, but no such reading is valid in (62). Third, this analysis forces a de re reading of some terms which are demonstrably de dicto.

On the first point, work by Heny (1973:232-234), Kasher & Gabbay (1976) and Shadbolt (1983) has seriously put in question the use of logical scope to account for ambiguities and the failure of substitution in opaque contexts. They claim that the notion of scope has been much over-loaded in logical notation, made to distinguish all kinds of readings that are really not connected with scope at all. When scope is called upon to explain opacity, specific/non-specific, de re/de dicto, and similar distinctions, the analyses lead to clashes and paradoxes. From another point of view, the syntactic mechanism of quantifying-in is a very powerful transformation, and some may want to avoid using it for that reason alone. Cooper (1975:145-160) has argued persuasively that there is no syntactic evidence justifying so violent an operation as quantifying-in, and both he and Bartsch (1979:26) have offered ways to do away with it.
(see Chapter 0 note 4).

On the second point, it is enough to note that there is no attractive way to exclude the analysis in (62) as ungrammatical. The reading represented in (62') is neither ill-formed nor incoherent—it is simply not a possible reading of the sentence it parallels. Appealing to quantifying-in is therefore a simple act of desperation.

Finally, I claim that one can non-restrictively modify terms which in PTQ would have to have narrow scope. This should be impossible if non-restrictively modified terms must be quantified-in. Consider the following sentence.

(64) Bill believes that a unicorn lives in his garden.

When a unicorn in (64) is given a de dicto (narrow scope) reading in PTQ, the speaker is not committed to the real-world existence of the unicorn—it is rather part of the belief of Bill that the unicorn exists. Roughly,

(65) \(\text{believe-that}'(b, \sim[Vx[\text{unicorn'}(x) \land \text{live-in-Bill's-garden'}(x)]]\)

On the de re reading, however, the speaker is committed to the real-world existence of the unicorn.

(66) \(Vx[\text{unicorn'}(x) \land \text{believe-that}'(b, \sim[\text{live-in-Bill's-garden'}(x)]]\)

If non-restrictive relative clauses force de re readings, then the following sentence, on its most natural reading, produces contradictions.

(67) Bill believes that a unicorn, which doesn't exist, lives in his garden.

If a unicorn, which doesn't exist is given wide scope by quantifying-in, then the speaker of the sentence is committed to the contradiction that a unicorn both does and does not exist. If the
term is given narrow scope, then Bill is committed to the same contradiction. The sentence, however, has as its most natural reading a perfectly coherent proposition: that Bill believes that a particular unicorn exists and the speaker of the sentence does not believe that the unicorn exists.

The PTQ use of wide scope for de re readings versus narrow scope for de dicto readings has been challenged by Bennett (1975:49–69). In short, Bennett argues that a broad sense of existence must include things like unicorns and Greek gods; a wide scope existential quantifier must indicate this broader existence rather than real-world existence. In other words, quantifiers quantify over possible objects. This leaves the predicate exist to indicate real-world existence. Such a programme is actually laid out by Montague himself in his paper *Pragmatics and Intensional logic* (1970c:120–124). Under these interpretations, the wide scope reading in (68) is both coherent and intuitively reasonable.

(68) \( \forall x [\text{unicorn}(x) \& \neg \exists x \text{exist}(x) \& \text{believe-that}(b, \exists x [\text{lives-in Bill's-garden}(x)])] \)

We might read (68) as 'there is a (possible) entity such that it is a unicorn and it does not "exist" (i.e. it does not have a counterpart in the present world) and Bill believes that it lives in his (Bill's) garden'. Unfortunately, this turns out to be another case of quantifying-in out of desperation. There is no satisfying way to rule out a narrow scope derivation, which yields the impossible reading in (69).

(69) \( \text{believe-that}(b, \exists x [\text{unicorn}(x) \& \exists x \text{exist}(x) \& \text{lives-in-Bill's-garden}(x)]) \)

The formula in (69) is, of course, logically coherent but it is not a possible reading of (67). We must conclude, even under Bennett's interpretation, that a term can be non-restrictively modified only if it is about to be quantified-in. To enforce this constraint, it would be necessary to invoke a global rule or to formally distinguish
non-restrictively modified terms from unmodified ones, say with a feature. Neither of these options is at all compelling.

It may be objected that exist' is a troublesome predicate and may invalidate the argument used above. The same observations, however, hold for (70).

(70) Bill believes that a unicorn, which he calls Fred, lives in his garden.

One natural reading for (70) is the one where Bill believes that there is a unicorn which lives in his garden but which says nothing about the speaker having any such beliefs in unicorns. In a PTQ analysis, this requires narrow scope for a unicorn, which he calls Fred relative to believe. At the same time, the non-restrictive modifier which he calls Fred is an assertion by the speaker of the sentence; this requires that the term have wide scope. Thus the most natural reading of the sentence requires that the term a unicorn, which he calls Fred have both wide and narrow scope at the same time.

Another possible problem with quantifying-in concerns example (57), repeated here, where a non-restrictive modifier applies to a term inside a relative clause.

(57) The man who loves Mary, who is pretty, resigned.

If Mary, who is pretty is given wide scope, as would appear necessary to get a valid interpretation of the sentence, then we would be quantifying into a relative clause, a practice argued against by Rodman (1972).\(^{15}\)

In summary, the Bartsch-Rodman analysis of non-restrictive modifiers is inadequate on a number of points. First, non-restrictive assertions are suspiciously translated as logical conjuncts of the main clause, even when that clause is a command or a question. Second, the parenthetical flavour of non-restrictive assertions is not reflected in any way. And third, the analysis appears to force the use of quantifying-in, already suspicious, in
ways that are arbitrary and perhaps independently ruled out. I believe the problem lies in the analysis of non-restrictive modification itself.

4.5 A new approach to non-restrictive modification

What follows is a defence of the 'subroutine' analysis of non-restrictive modification. Let us intuitively examine what happens during non-restrictive modification. While a sentence is being uttered, certain terms are introduced and evaluated immediately. 'Evaluation', in Bartsch 1979, would mean the assignment of an entity constant. In any case, the terms involved will be those which can be tied to anaphoric pronouns in later sentences. Once a term, say John, is evaluated, a speaker can pause in the stream of the main sentence, take a psychological step down to a new level, assert something parenthetical about the referent of the term, and then return to top level to continue the main sentence. This is represented diagrammatically in (71) to (73).

(71) Top level: John, , loves Mary.
     Parenthetical: who is handsome

(72) Top level: John loves Mary,
     Parenthetical: who is pretty.

(73) Top level: The boy who hates Mary, , walks.
     Parenthetical: who is ill

The whos in (71) and (72) are coreferential with John and Mary respectively, but the who in (73) is potentially ambiguous between being coreferential with Mary or with the boy who hates Mary. It is even possible to have two or more parenthetical levels.

(74) John,
     who took Mary, , to the dance
     who hates him

The successive parenthetical levels point out the relation of non-restrictive modification to digressions and recursive processes. It
is as if a speaker were putting the superordinate sentence on hold and calling a computer subroutine as he steps down to a parenthetical level. Subroutines may themselves call subroutines, subject to limitations of memory and attention. When the subroutines are finished, they pass control back up through successive levels to the top. Non-restrictive modification is therefore akin to more obvious interruptions as in (75) and (76). In these examples, it is even more plain that the superordinate sentence is put on temporary hold while the subroutine outputs a separate sentence.

(75) John—he's very handsome—said that he would rather die than move to Slobovia.

(76) Then I told Bill—he was the tallest one in the room—to put the box on the top shelf.

The difference is that the digressions coded as non-restrictive modifiers are syntactically blended into the host sentence by way of relative pronouns.

Two key semantic features of computer subroutines are (1) that they are finished as soon as control is passed back to the calling level, and (2) that they may have their own independent 'outputs'. Within natural language, a subroutine view of non-restrictive modifiers would allow incidental assertions to be made in the course of uttering a superordinate sentence; these assertions would then be added immediately on completion to the discourse pool. Control would then pass back up to the superordinate sentence (be it a question, command, hope, performative naming act or assertion), whose semantic structure would continue to be built up as if the non-restrictive interruption had never occurred. This results in the translation of the superordinate sentence being uncluttered, freed from trying to carry non-restrictive assertions to the top as conjuncts. It also avoids any logical conjunction of assertions with other kinds of speech act. The following framework can accommodate these
Let us define the discourse pool to be the set of speech acts performed by speakers during a conversation. We shall be concerned only with assertions here. Assertions are normally added one by one to the discourse pool during the course of the conversation. Let us assume that a pragmatic mechanism (i.e. one not explicit in linguistic or logical form) marks speech acts for speaker, time, place, etc. Only the speaker marking will be of interest in what follows. If John asserts $\Phi$, then we shall represent this entry to the discourse pool as the pair $\langle \text{John}, \Phi \rangle$.

Let $\lambda P(x_a)$ be the translation of anaphoric he, she or it. An individual constant is assigned to $x_a$ from the context; in non-restrictive modification, the assigned individual will be that one referred to by the modified term. The new subroutine rule for non-restrictive term modifiers is shown as R30.

R30: If $\alpha \in P(\text{PRED U ADJVL})$ then $\{\alpha\} \in P_T/T$.

Realisation: $\alpha$

Translation: $\lambda P(\cdot P)$; subroutine($\lambda P(x_a)(\wedge a')$)

The translation in R30 would be read in the following way. First, $\lambda P(\cdot P)$ is the translation of the non-restrictive modifier in the 'calling' or superordinate sentence. Second, the clause subroutine($\lambda P(x_a)(\wedge a'$)) indicates that a subroutine call is made to evaluate the formula $\lambda P(x_a)(\wedge a')$. The semicolon, inspired by similar syntax in computer programming languages, merely serves as a separator. The presence of the translation of an anaphoric pronoun $\lambda P(x_a)$ in R30 reflects the close link between non-restrictive modification and discourse anaphora (and sentences like (75) and (76)). Within the calling program, the translation $\lambda P(\cdot P)$ ensures that the effect of the non-restrictive modification is nil; the original translation of the modified term is preserved. Compare the effect of the new analysis in (77) with the old one in (47).
(77) \((\text{[John}_T, \{\{\text{he}_1T, \{\text{be}, \text{handsome}\}\}_\text{IV/PRED} \text{ handsome}_\text{ADJ}\}_\text{IV}, \text{ R}_2t, \text{ R}_1\text{REL}, \text{ R}_2\text{8}_T/T, \text{ R}_3\text{0}_T, \text{ R}_2\text{9}_\text{swim}_\text{IV}t, \text{ R}_1)\)

Realisation: John, who is handsome, swims.

Translation:
1. \(\text{John}_T \Rightarrow \lambda \text{PP}(j)\) Proper name
2. \(\{\{\text{he}_1, \{\text{be}, \text{handsome}\}\}\}_\text{REL} \Rightarrow \lambda x_1[\text{handsome}'(x_1)]\) See previous examples
3. \(\{\{\text{he}_1, \{\text{be}, \text{handsome}\}\}\}_T/T \Rightarrow \lambda P'(P); \text{ subroutine}(\lambda \text{PP}(x_a)(\lambda x_1[\text{handsome}'(x_1)]))\) From 2 by R30

S1. \(\lambda \text{PP}(x_a)(\lambda x_1[\text{handsome}'(x_1)])\) Lambda conversion
S2. \(\text{handsome}'(x_a)\) Anaphoric resolution
S3. \(\text{handsome}'(j)\)
S4. Return
4. \(\{\text{John},\{\{\text{he}_1, \{\text{be}, \text{handsome}\}\}\}\}_T \Rightarrow \lambda P'(P)(\lambda \text{PP}(j))\) From 1, 3 by R29
5. \(\lambda \text{PP}(j)\) Lambda conversion
6. \(\text{swim}_\text{IV} \Rightarrow \text{swim}'\) Basic
7. \(\{\text{John},\{\{\text{he}_1, \{\text{be}, \text{handsome}\}\}\}\},\text{swim} \Rightarrow \lambda \text{PP}(j)(\text{swim}')\) From 5, 6 by R1
8. \(\text{swim}'(j)\) Lambda conversion

In (77), step 3 illustrates the new translation for non-restrictive modifiers. This translation interrupts the main sentence with a subroutine call, which is shown in steps S1 to S4. The subroutine then returns control to the calling sentence, which continues as if the subroutine interruption had never occurred. Step S3 shows the resolution of the anaphoric pronoun linking the non-restrictive clause to the main clause. The assertion \(\text{handsome}'(j)\) is added to the discourse pool immediately on completion, just like \(\text{swim}'(j)\). If sentence (77) were uttered by Bill, then the state of the discourse pool would be as in (78).

(78) Discourse pool: \(<\text{Bill, handsome}'(j)>\>
\(<\text{Bill, swim}'(j)>\>

In short, the effect of uttering (77) is to add two assertions to the
This way of doing things has two immediate advantages. First, it better captures the parenthetical nature of non-restrictive assertions. Sentences like that in (33) could, if necessary, be marked somehow as less prominent than sentences entering the discourse pool in the normal way. Second, the assertion expressed by the non-restrictive modifier does not encumber the translation of the rest of the sentence. This not only makes the listing of derivations much easier, but it reflects the intuition that any appropriate term, no matter how deeply embedded in structure, can be non-restrictively modified without difficulty. The speaker can, at almost any point, step temporarily into another dimension (i.e. pass control to a subroutine), deliver a pithy assertion, and return with no damage done. Of course, multiply embedded and long digressions will tax the human memory severely.

Note that non-restrictive assertions are no longer translated as logical conjuncts of the main clause—they are separate speech acts smuggled into the stream of a host sentence, and their translations are added to the discourse pool separately. The formulation of non-restrictive coreference in terms of discourse anaphora reflects the separateness of the speech acts involved and is consistent with the fact that all and only those terms which can be antecedents of anaphoric pronouns in discourse can be non-restrictively modified. A sentence like (77) is, therefore, not a stylistic variation of a conjunction but rather a way of performing two separate speech acts at the same time, one slipped in as a subroutine of the other. The two resulting assertions are only conjoined in the weak sense that any two consecutive (and compatible) assertions in a person's discourse might be said to be conjoined. This avoids the problem of translating non-restrictive modifiers within questions and commands: as the calling question or command enters the discourse pool separately from any non-restrictive assertions, there is no problem of trying to logically conjoin questions (or commands) with assertions. There is certainly no question of quantifying over such
conjunctsions, as in the Rodman analysis, for here the coreference is represented anaphorically.

It is interesting to note that a number of previous observers have resorted to pronouns when paraphrasing sentences containing non-restrictive modifiers. For instance, Cresswell (1973:158-159) suggests that who in a non-restrictive relative clause is derived from and he. We shall see in later chapters that anaphoric pronouns have been similarly employed in handling non-restrictive modifiers at higher levels.

The new solution avoids the old conjunction problems, matches intuitions about processing and allows simpler derivations. The biggest payoff, however, is in giving correct readings for non-restrictive modifiers which are deeply embedded and for those in opaque contexts, with no recourse to a quantifying-in transformation. Example (79) is the reanalysis of example (57), which fails under the Rodman-Bartsch type of analysis. As before, the non-restrictive modifier who is pretty is read as applying to the term Mary.

(79) \( (\text{the}_{\text{DET}} \ (\text{man}_{\text{CN}} \ (\{(\text{he}_{\text{1T}} \ (\text{love}_{\text{TV}} \ \\
\text{Mary}_{\text{T}} \ (\{(\text{he}_{\text{2T}} \ (\text{be}_{\text{IV/PRED}} \ \\
\text{pretty}_{\text{ADJ}})_{\text{IV}}; \ R_2^1)_{\text{T}}; \ R_1^1)_{\text{REL}}; \ R_2^8)_{\text{T}}/\text{T}}, \\
R_3^0)_{\text{T}}; \ R_2^9)_{\text{IV}}; \ R_3^1)_{\text{T}}; \ R_1^1)_{\text{REL}}, \\
R_2^8)_{\text{CN}}^2_{\text{CN}}; \ R_1^2)_{\text{CN}}; \ R_1^3)_{\text{T}}; \ R_4^4)_{\text{resign}_{\text{TV}}}_{\text{T}}; \ R_1)_{\text{REL}} \\
\text{Realisation: The man who loves Mary, who is pretty, resigned.} \\
\text{Translation:} \\
1. \text{Mary}_{\text{T}} \Rightarrow \lambda \text{QQ(m)} \quad \text{Proper name} \\
2. \ ((\text{he}_{\text{2}} \ (\text{be}, \text{pretty})))_{\text{REL}} \Rightarrow \lambda x_2[\text{pretty}'(x_2)] \\
\text{See previous examples} \\
3. \ (\{(\text{he}_{\text{2}} \ (\text{be}, \text{pretty})))\}_{\text{T}}/\text{T} \Rightarrow \\
\lambda P{'P}; \ \text{subroutine}(\lambda P[\text{APP}[x_2]) (\lambda x_2[\text{pretty}'(x_2)]) \\
\text{From 2 by R30} \\
\text{S1. } \lambda P[\text{APP}[x_2]) (\lambda x_2[\text{pretty}'(x_2)]) \\
\text{S2. } \text{pretty}'(x_2) \quad \text{Lambda conversion} \)
S3. pretty'(m) : Anaphoric resolution
S4. Return

4. \(\{\text{Mary}, \{\{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\_t \Rightarrow \lambda P(P) (\lambda QQ(m))\) From 1, 3 by R29
5. \(\lambda Q[Q(m)]\) Lambda conversion
6. love\_TV \Rightarrow love' Basic
7. \(\{\text{love}, \{\text{Mary}, \{\{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\}\_IV \Rightarrow \lambda love'(\lambda QQ(m)) \) From 5, 6 by R3
8. he\_1 \Rightarrow \lambda PP(x_1) Pronoun
9. \(\text{\{he\}_1, \{\text{love}, \{\text{Mary}, \{\{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\}\}_t \Rightarrow \lambda PP(x_1) (\lambda [\text{love}'(\lambda QQ(m))])\) From 7, 8 by R1
10. love'(\lambda QQ(m))(x_1) Lambda conversion
11. love'(x_1, m) First-order reduction
12. \(\{\text{\{he\}_1, \{\text{love}, \{\text{Mary}, \{\{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\}\}_REl \Rightarrow \lambda x_1[\text{love'}(x_1, m)]\) From 11 by R28
13. \(\{\{(\text{he}_1, \{\text{love}, \{\text{Mary}, \{\{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\}\}\}_2CN \Rightarrow \lambda \lambda y[P(y) \& x_1[\text{love'}(x_1, m)] (y)]\) From 12 by R12
14. \(\lambda \lambda y[P(y) \& \text{\text{love}'}(y, m)]\) Lambda conversion
15. man\_CN \Rightarrow man' Basic
16. \(\{\text{\text{man}}, \{\{(\text{he}_1, \{\text{love}, \{\text{Mary}, \{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\}\}_CN \Rightarrow \lambda \lambda y[P(y) \& \text{\text{love}'}(y, m)] (\text{\text{man}'}))\) From 14, 15 by R13
17. \(\lambda y[\text{\text{man}'}(y) \& \text{\text{love}'}(y, m)]\) Lambda conversion
18. \(\text{\text{the}'} \_DET \Rightarrow \lambda \lambda Q[Vx[Az[P(z) \leftrightarrow z=x] \& Q(x)]\) Basic
19. \(\{\text{\text{the}'}, \{\text{\text{man}}, \{\{(\text{he}_1, \{\text{love}, \{\text{Mary}, \{(\text{he}_2, \{\text{be}, \text{pretty}\})\}\}\}\}\}_T \Rightarrow \lambda \lambda Q[Vx[Az[P(z) \leftrightarrow z=x] \& Q(x)]\) From 17, 18 by R4
20. \(\lambda Q[Vx[Az[\lambda y[\text{\text{man}'}(y) \& \text{\text{love}'}(y, m)] (z) \leftrightarrow z=x] \& Q(x)]\) Lambda conversion
21. \(\lambda Q[Vx[Az[(\text{\text{man}'}(z) \& \text{\text{love}'}(z, m)) \leftrightarrow z=x] \& Q(x)]\) Lambda conversion
22. resign\_IV \Rightarrow resign' Basic
If Bill utters sentence (79), then the state of the discourse pool will be as in (80).

\[(80) \text{Discourse pool: } \langle \text{Bill, pretty}'(m) \rangle \]
\[\langle \text{Bill, } \lambda x[\exists z(\text{man}'(z) \& \text{love}'(z, m)) \leftrightarrow z=x] \& \text{resign}'(x) \rangle \]

Similarly, non-restrictive modifiers in opaque contexts no longer cause difficulties. If Sue utters (81), the state of the discourse pool will be as in (82); compare this to (63').

\[(81) \text{John believes that Mary, who is pretty, loves Bill.} \]
\[(82) \text{Discourse pool: } \langle \text{Sue, pretty}'(m) \rangle \]
\[\langle \text{Sue, } \lambda x[\exists z(\text{man}'(z) \& \text{love}'(z, m)) \leftrightarrow z=x] \& \text{resign}'(x) \rangle \]

A direct effect of this analysis is to assign all non-restrictive assertions to the speaker of the superordinate sentence. I shall argue that this is fundamentally correct and that exceptions can be explained within an overall strategy for assigning responsibility for utterances. Consider the following exchange between John and Bill.

\[(83) \text{John: Mary, who is pretty, loves Roger.} \]
\[(84) \text{Bill: I don't believe that Mary, who is pretty, loves Roger.} \]

According to the present theory, John's statement in (83) conveys two assertions: (1) that Mary loves Roger and (2) that Mary is pretty. As John is the speaker, both assertions are his own. Although Bill's response, on the surface, may appear to be a denial of all that John has asserted, it is really a denial of only half of it; namely the
proposition that Mary loves Roger. In (84) Bill actually asserts that Mary is pretty just as John does in (83). For Bill to counter both of John's assertions, something like (85) is needed.

(85) I don't believe that Mary is pretty and that Mary loves Roger. The effect is perhaps more easily demonstrated with simple negation. If John utters (83), then Bill's response (84a) denies that Mary loves Roger but not that Mary is pretty.

(84a) It is not the case that Mary, who is pretty, loves Roger. If, as in the Rodman-Bartsch analysis, (83) translated as the conjunction in (83'), then (84a) would translate incorrectly as (84a').

(83') pretty'(m) & love*(m,r)
(84a') 7(pretty'(m) & love*(m,r))

Parallel problems will arise with necessarily, it must be the case that, and other modal adverbials such as it ought to be the case that. The present subroutine analysis, which views the non-restrictive modifier as a separate isolated speech act, faces none of these problems. The correct translation(s) in (84a'') falls out automatically.

(84a'') a. pretty'(m)
   b. 7love*(m,r)

Examples like (86) are especially clear cases where the embedded non-restrictive assertion belongs to the speaker rather than to the believer mentioned in the sentence.

(86) The judge believes that Smuthers, who is guilty, is innocent. The claims that non-restrictive assertions are always analysed as having 'highest scope' and that they are always assigned to the speaker of the sentence have, however, been disputed. Bach (1968:95)
claims that the following example is ambiguous with was.

(87) I dreamt that Rebecca, who \{is\} a friend of mine
\{was\}
from college, was on the phone.

Bach appears to claim that who is a friend of mine and one reading of who was a friend of mine imply real-world existence of Rebecca, requiring the non-restrictive assertion to appear outside the scope of dream as in (88). The other reading with was is apparently to be analysed as (89), where the non-restrictive clause is within the scope of dream, making Rebecca a dream entity only.

(88) (I dreamt that Rebecca was/is on the phone) and
(Rebecca was/is a friend of mine from college)

(89) I dream ((Rebecca was a friend of mine from college) and
(Rebecca was on the phone))

However, the use of naming expressions in transparent contexts, e.g. outside the scope of believe, wish, dream, etc., does not necessarily imply real-world existence. Hamlet, Santa Claus, the cyclops Polyphemus, Puff the Magic Dragon and any other fictional characters exist in a broad sense, and it makes sense to talk about them. I may therefore utter (90) expressing an independent assertion about a dream entity Rebecca just as I can say (91) to express an assertion about the fictional entity Hamlet.

(90) Rebecca was a friend of mine from college.
(91) Hamlet was indecisive.

Present tense is not necessarily more like to convey real-world existence as (92) shows.

(92) I often dream that Rebecca, who is a friend of mine
from college, is constantly on the phone.

I therefore claim that (92) is properly analysed with a separate parenthetical non-restrictive assertion as in (92'). The question of
the real-world existence of Rebecca cannot be tied to syntactic scope.

(92') a. I often dream that Rebecca is constantly on the phone.
    b. Rebecca is a friend of mine from college.

A similar example was suggested to me by Barry Richards, who has a young son named Thomas.

(93) Thomas believes that Santa Claus, who has a white beard, drives an eight-reindeer sleigh.

One's first reaction is to seek a translation something like (93').

(93') Thomas believes ((Santa Claus has a white beard) and (Santa Claus drives an eight-reindeer sleigh))

My analysis would produce two assertions as in (93''), with the second belonging to the speaker of the sentence.

(93'') a. Thomas believes Santa drives an eight-reindeer sleigh.
    b. Santa Claus has a white beard.

The basic argument for (93') is that the proposition that Santa Claus has a white beard is probably part of the belief of Thomas rather than part of the belief of the speaker. However, it is perfectly possible for an informed adult to utter (94) without any commitment to Santa Claus's real existence.

(94) Santa Claus has a white beard.

In fact, any charitable interpretation of an adult uttering (94) will take him to be stating something about an entity which exists only in a fictional world, or in this case, in Thomas's belief world. An interesting development of just such a treatment of 'opacity' appears
Thompson (1971: 86-87) also provides some examples which she claims are ambiguous for responsibility.

(95) Harold says that his girlfriend, who is a little bit crazy, wants to go to Hanoi.

(96) The claims agent said that the paint job, which should have been done long ago, would cost $150.

She claims that the ambiguities can be cleared up with added clauses as in the following.

(97) Harold says that his girlfriend, who is a little bit crazy, wants to go to Hanoi, but I think she's too rational to try it.

(98) The claims agent said that the paint job, which should have been done long ago, would cost $150, but he doesn't know that now is when it should be done.

One problem with these observations is that both involve the verb *say*, which may tend to become quotational. Quotation involves a change of speaker for the purposes of assigning responsibility for assertions. In a sentence like (99), the non-restrictive assertion is rightly assigned to Harold, who is the person being quoted.

(99) Harold said, 'My girlfriend, who is a little bit crazy, wants to go to Hanoi'.

While something of the quotational power of *say* impinges on (95), I maintain that strictly speaking the non-restrictive assertion is correctly assigned not to Harold but to the speaker of the sentence. For me (97) is, strictly speaking, contradictory.17

A final consideration supporting my claims is that there are recognised and general ways by which a speaker can avoid being held responsible for any descriptions or assertions he ostensibly makes. The first type is trivial, and merely illustrates the speaker making
an assertion that someone else is responsible for the contained
description or assertion.

(100) Nixon, who \begin{itemize}
\item claims that he
\item according to X
\item X says/claims/believes
\item supposedly
\item we are meant to believe
\item we are told
\end{itemize}

had to be pardoned.

(101) Thomas said that Santa Claus, who he believes wears a
white beard, drives an eight-reindeer sleigh.

These kinds of non-restrictive assertion are of course correctly
assigned to the speaker, but they consist of assertions about the
claims and beliefs of other parties or contain hedges separating the
speaker from responsibility for the claims. For instance, the non-
restrictive assertion in (101) is roughly 'he (Thomas) believes that
Santa Claus wears a white beard', and it is assigned correctly to the
speaker of the sentence.

A much more subtle technique for escaping responsibility for the
truth of a non-restrictive assertion is to deliver it facetiously,
insincerely or quotationally. A quotational tone of voice can make a
big difference between (102) and (103).

(102) Nixon, who is not a crook, was pardoned.
(103) Nixon, 'who is not a crook', was pardoned.

Given a straight reading, (102) commits the speaker to the belief
that Nixon is not a crook. (103) on the other hand, illustrates a
quotational delivery, and the speaker may even try to imitate Nixon's
own voice and delivery over the quoted section. In effect, the use
of Nixon's voice to deliver an assertion A is the same as saying
'Nixon says A'. In general, a facetious, affected or otherwise
abnormal delivery can simply signal that the speaker does not intend
to be held personally responsible for what he is saying.

This mechanism shows up in a number of non-restrictive constructions. If Algernon is in the habit of referring to his (unique) spouse as 'my beautiful wife', his associates might secretly whisper (104).

(104) Algernon's 'beautiful' wife is rather plain.

Similarly, a speaker can use someone else's referring description of an entity while not believing it himself. This is most helpfully signalled quotationally, but examples can be very subtle. Unmarked quotational descriptions can be used for comic effect as in the pig, referring to a man, in (106).

(106) The other man was lying on the stone floor, covered with a coarse brown coat.

"Get up, pig!" growled the first. "Don't sleep when I am hungry."

"It's all one, master," said the pig, in a submissive manner, and not without cheerfulness; "I can wake when I will, I can sleep when I will. It's all the same."

(Dickens, *Little Dorrit*)

Similar examples occur with non-restrictive modifiers at the proposition and property levels; they will be discussed in later chapters.

Again the referring descriptions can actually be ascribed overtly to someone else.

(107) The judge condemned the man whom X calls a murderer to 20 years.

Just as the X in (107) could be anybody, the quoted descriptions in (105) could presumably 'belong to' almost anyone.
The use of facetious, insincere, ironic and quotational delivery is not limited to non-restrictive assertions but rather is a general way to avoid responsibility for any apparent assertion. I might, on some occasion, utter (108), but I would do so in such a way that no one would take me seriously. I would not really be asserting anything.

(108) Hitler was a splendid chap.

In conclusion, the new theory of non-restrictive modification is an improvement on the Rodman-Bartsch analysis. Old problems in conjunction and quantification are avoided, and arbitrary quantifying-in is eschewed. Derivations are simplified, and the parenthetical nature of non-restrictive modifiers is mirrored in their subroutine derivations. Generally, any non-restrictive assertions are assigned to the speaker, and any apparent exceptions to this are explained by quotation and other pragmatic means for avoiding responsibility for any utterance.

4.6 Appositives

4.6.0 Introduction

Armed with analyses of restrictive and non-restrictive modification, we can now look at some appositive constructions. Delacruz (1976) offers an analysis for MG, but his rules and data are limited to only one variety of restrictive appositive. Chierchia (1982:342, 345, 347) also offers a single appositive rule, but he seems to have in mind only one variety of non-restrictive appositive. I shall examine both solutions and attempt to expand the fragment. Appositives present a thorny problem for any linguistic theory, and the following treatment cannot be exhaustive. The subject properly deserves a whole thesis.
4.6.1 A review of appositive varieties

Traditional grammarians have identified a bewildering wealth of constructions as appositives. Quirk et al. 1972:620ff list a range of examples, some of which, the 'weak' appositives, involve constituents of higher type and will be treated in later chapters. Of individual-level examples, the following varieties are widely recognised and appear amenable to a MG analysis.

(109) a. The boy Bob runs. proper name, restrictive
          b. My friend Peter walks.
(110) John the plumber resigned. definite, restrictive
(111) a. John, the plumber, resigned. definite, non-restrictive
          b. The boss, the woman I love, fired me.
(112) a. That crook Nixon got off easy. definite, epithetical, non-restrictive
          b. The traitor Philby escaped.
          c. My friend Peter cheats.

Care must be taken to distinguish proper name, restrictive appositive readings as in (109) from the epithetical non-restrictive appositives in (112) because the superficial strings are ambiguous.

Whereas appositive constructions are traditionally taken to be paired, with each half called an appositive, this terminology is not helpful in the present grammar. Instead, I shall use 'appositive' to designate only the modifying constituents, which are italicised in the examples above. A traditional variety of appositive which is not considered an appositive at all for the present purposes is shown in (113); Quirk et al. call these 'attribution' appositives. These have already been handled above as non-restrictive PREDs and ADJVLs.

(113) a. John, a plumber, resigned.
          b. John, tired of running, stopped.
          c. Mary, out of breath, fainted.
          d. The general, very angry, ordered a retreat.
I shall proceed to examine the remaining examples by variety.

4.6.1.1 Proper name, restrictive appositives

Delacruz's (1976:187, 191) rule for appositives generates and interprets only proper name, restrictive appositives such as the boy John in (109a). The intended reading for this string is the one where John restrictively pins down which boy is intended. His rule is as follows (with Bennett's simplification added). 19

\[(114) \text{If } \alpha \in \mathcal{B}_T \text{ and } \beta \in \mathcal{B}_{\text{CN}}, \text{ then} \]
\[F_{21}(\alpha, \beta) \in \mathcal{P}_T \text{ provided that whenever} \]
\[\alpha \text{ is of the form } \text{he}_n, F_{21}(\alpha, \beta) = \alpha; \]
\[\text{otherwise } F_{21}(\alpha, \beta) = \beta \alpha. \]

\[(114') \text{If } \alpha \in \mathcal{B}_T \text{ and } \beta \in \mathcal{B}_{\text{CN}} \text{ and } \alpha, \beta \]
\[\text{translate into } \alpha', \beta', \text{ respectively, then } F_{21}(\alpha, \beta) \]
\[\text{translates into } \alpha' \text{ if } \alpha \text{ is of the form } \text{he}_n; \]
\[\text{otherwise } F_{21}(\alpha, \beta) \text{ translates into} \]
\[\lambda \mathcal{P} \mathcal{V}_y[\lambda \mathcal{X}[\beta'(x) \& \lambda \mathcal{P} \mathcal{A} \mathcal{Z} P[\lambda x_1[z=x_1]](\alpha')(x)) \Leftrightarrow x=y] \& \mathcal{P}(y)] \]

Delacruz's rule, limited as it is to basic CNs and basic, non-indexed variable, Ts (i.e. proper names), can only produce examples like (115).

\[(115) F_{21}(\text{horse}_T \text{CN}, \text{Canonero}_T) = \text{the horse Canonero}_T \]

Semantically, the name Canonero functions centrally to specify just which horse is being referred to; it is, in essence, a restrictive modifier on horse. Looked at in this light, the translation in (114') becomes more comprehensible. The original translation of (115), shown in (116), contains \(\lambda \mathcal{P} \mathcal{A} \mathcal{Z} P[\lambda x_1[z=x_1]], \) which is simply the translation of the be of identity. A simplified version of the translation for the horse Canonero is shown in (117).

\[(116) \lambda \mathcal{P} \mathcal{V}_y[\lambda \mathcal{X}[(\text{horse}'(x) \& \lambda \mathcal{P} \mathcal{A} \mathcal{Z} P[\lambda x_1[z=x_1]])
\]
\[\quad (\lambda \mathcal{P} \mathcal{P}(c))(x)) \Leftrightarrow x=y] \& \mathcal{P}(y)] \]
\[(117) \lambda \mathcal{P} \mathcal{V}_y[\lambda \mathcal{X}[(\text{horse}'(x) \& \text{be}'(\lambda \mathcal{P} \mathcal{P}(c))(x)) \Leftrightarrow x=y] \& \mathcal{P}(y)] \]
The translations in (116) and (117) also have a definite article translation \( \lambda \alpha \lambda \nu \psi (\lambda x [Q(x) \leftrightarrow x = \nu] \land \psi (y]) \) built into them; if that is factored out we get (118).

\[
(118) \quad \lambda z [\text{horse}'(z) \land \text{be}'(\lambda \alpha \lambda \nu \psi (\lambda x [\lambda r \lambda y P(\lambda z [y = z])(\alpha'))(x)]]
\]

This is an example of the classic conjunction analysis for a restrictive modifier. It is as if the horse Canonero were translated as 'the [horse such that it is Canonero]'. The be of identity effectively 'demotes' the term Canonero into an IV be Canonero, the translation of which is intersected with the set of horses.

It is quite possible, as Delacruz (1976:191) himself realises, to generate a CN of the form horse Canonero and then allow the definite article to map this CN into the term the horse Canonero in the usual way. A rule like the following would be needed.

\[
(119) \quad \text{If } \alpha \in B_T \text{ and } \beta \in P_{CN}, \text{ then} \\
F_X(\alpha, \beta) \in P_{CN}, \text{ where } F_X(\alpha, \beta) = \beta \alpha. \\
\text{Translation: } \lambda x [\text{be}'(x) \land \lambda \nu \text{where } P(\lambda z [y = z])(\alpha'))(x)]
\]

While formally neater, this solution has the apparent disadvantage of allowing a and every to apply to the resulting CN.

\[
(120) \quad \begin{align*}
\text{a. every horse Canonero} \\
\text{b. a river Thames}
\end{align*}
\]

These terms are semantically coherent but syntactically odd, at least with the intended reading. To ensure the presence of the definite article, Delacruz hard-wires it into the syntax and semantic rules. This illustrates the problems of idiosyncrasy which bedevil any formal analysis of appositives. One must constantly choose between limiting the rules to exclude examples as in (120) or generalising them to generate apparently related terms as in (121).
(121) a. That horse Canonero
b. This river Thames
c. My horse Canonero

To emphasise the similarity between these appositives and other forms of restrictive modification I shall pursue the course of generalisation. The following rule allows one to build up the term the boy Bob much as the grammar already generates the red barn.

R31. If $a \in B_T$ then $[a] \in P_{CN/2CN}$.

Realisation: $a$

Translation: $\lambda P_λx[P(x) \& \lambda λyP(\lambda z[y=z])(\lambda P(x))(x)]$

Examples are quite straightforwardly analysed in this way, but the rule overgenerates.

(122) $\langle [\text{the} \criptive (\text{horse}_{ \text{CN}} (\text{Canonero}_T)_{ \text{CN}})_{ \text{CN}}^{2 \text{CN}},
\ R31^{\text{CN}}, \ R13^{\text{T}}, \ R4^{\text{IV}^{t}}, \ R1^{\text{t}} \rangle$

Realisation: The horse Canonero runs.

Translation:
1. Canonero $\rightarrow \lambda P[P(c)]$  Proper name
2. $[\text{Canonero}_T]_{ \text{CN}}^{2 \text{CN}} \rightarrow$
   $\lambda P_λx[P(x) \& \lambda P_λyP(\lambda z[y=z])(\lambda P(x))(x)]$
   From 1 by R31
3. $\lambda P_λx[P(x) \& x=c]$  Lambda conversion
4. Horse $\rightarrow \text{horse'}$  Basic
5. $[\text{horse}, (\text{Canonero})]_{ \text{CN}} \rightarrow \lambda P_λx[P(x) \& x=c](\text{horse'})$
   From 3, 4 by R13
6. $\lambda x[\text{horse'}(x) \& x=c]$  Lambda conversion
7. $\text{the}_T \rightarrow \lambda P_λQVy[\lambda z[P(z) \leftrightarrow z=y] \& Q(y)]$  Basic
8. $[\text{the}, (\text{horse}, (\text{Canonero}))]_T \rightarrow$
   $\lambda P_λQVy[\lambda z[P(z) \leftrightarrow z=y] \& Q(y)](\lambda x[\text{horse'}(x) \& x=c])$
   From 6, 7 by R4
9. $λQVy[\lambda z[(\text{horse'}(z) \& z=c) \leftrightarrow z=y] \& Q(y)]$  Lambda conversion
10. run$_{\text{IV}} \rightarrow \text{run'}$  Basic
11. (\{the, (horse, (Canonero))\}, run) 
\[\lambda Qy[Qz ((\text{horse}'(z) \& z=c) \leftrightarrow z\leq y) \& Q(y)](\text{run}')\] 
From 9, 10 by R1

12. Vy[Qz ((\text{horse}'(z) \& z=c) \leftrightarrow z\leq y) \& \text{run}'(y)]

Lambda conversion

4.6.1.2 Definite, restrictive appositives.

Definite, restrictive appositives feature a definite term acting as a restrictive modifier on a proper name as in (110), reprinted here for convenience.

(110) John the plumber resigned.

The plumber specifies which John, of the set of people named 'John', resigned. John the plumber is, for instance, a different person from John the butcher. While such obviously restrictive constructions have much in common with examples like the horse Canonero, the differences are significant. First, the most obvious paraphrase of sentences like (110) would appear to be 'the unique John such that he is the plumber resigned'. Equally good or better, however, despite the definite article in (110) is the paraphrase 'the unique John such that he is a plumber resigned' (see, e.g. McKinnon 1979: 47-56, 75-77, 140). Second, whichever analysis is chosen, the PTQ analysis of proper names is inadequate. Montague's simple fragment assumes the uniqueness of proper names in the model. In the real world, however, we have whole sets of Johns, Nigels, Sams, etc. and appositives are just one way of narrowing down the choices. It becomes obvious that John must be treated basically as a special kind of common noun—it denotes that set of individuals called 'John'. Any proper name referring expression like John must therefore be translated as a disguised definite description, as if it bore the definite article: the John. For a similar conclusion from slightly different points of
view, see Barwise & Cooper (1981:174) and Seppänen (1971:322-326).

There are at least two syntactic arguments for this treatment. First, there are certain constructions even in English where determiners mark proper names.

(123) The Nigel whom I know is blond.
(124) The Smiths have invited us to dinner.
(125) Are you the Noam Chomsky?
(126) Every Nigel in Scotland attended the Nigel Conference.
(127) The blond Nigel came in yesterday.

Any complete fragment must therefore be able to generate definite and quantified proper names. Second, other languages provide support for the idea that the bare proper names in English might carry a suppressed definite article. Arnauld & Lancelot (1660:91) cite Greek and Italian as languages which occasionally mark proper names with the definite article; Barwise & Cooper (1981:174) similarly cite German and Spanish. The practice is even more common in Portuguese. Most interesting in this regard are the Iberian languages Gallego and Catalan, where such marking is actually required, even for vocatives. A Catalan speaker calling Mary must yell La Maria!

Let us tentatively assign proper names to the category \( t/e \), abbreviated PROP, and specify that any PROP can operate as a common noun.

\[ R32. \text{ If } \alpha \in P_{\text{PROP}} \text{ then } [\alpha] \in P_{\text{CN}}. \]

Realisation: \( \alpha \)

Translation: \( \alpha' \)

Proper names cannot simply be assigned to CN, except perhaps in a language like Catalan, because of their idiosyncratic syntax. For instance, the simple PROP Fred could be convertible into a term without an explicit article. R33 achieves this.
R33. If \( \alpha \in P_{\text{PROP}} \) then \( \{\alpha\} \in P_T \).

Realisation: \( \alpha \)

Translation: \( \lambda P V y[A x[\alpha'(x) \leftrightarrow x-y] \& P(y)] \)

However, R33 will not constrain determiners from applying to \textit{Fred} just as they apply to \textit{man}. The following change to R4 is necessary.

R4. If \( \alpha \in P_{\text{DET}} \) and \( \beta \in P_{\text{CN}} \) then \( \{\alpha, \beta\} \in P_T \).

Realisation: \( \{\gamma_{\text{DET}}, \delta_{\text{PROP}}\} \text{T} \rightarrow \delta \)
else \( \alpha' \equiv \beta \)

Translation: \( \alpha'(\gamma') \)

This rule forms terms in the usual way but suppresses the realisation of the definite article with simple CNs derived, without modification, from proper nouns. 21

Let us compare the difference between the old and the new analysis for examples like (128).

(128) Nigel sings.

With the former analysis of \textit{Nigel} as \( \lambda P P(n) \), the syntactic structure is (129) and the translation (129').

(129) \( \{\text{Nigel}_T, \text{sing}_{IV}\}_T \)
(129') \( \text{sing}'(n) \)

With a full 'definite' analysis, the derivation is shown in (130). A simpler derivation using R33 is also possible.

(130) \( \{\text{the}_{\text{DET}}, \{\text{Nigel}_{\text{PROP}}, \text{CN}, \text{R32}\}_T, \text{R4' sing}_{IV}\}_T, \text{R1} \)

Realisation: Nigel sings.

Translation:
1. \( \text{Nigel}_T \rightarrow \text{Nigel}' \) Basic
2. \( \{\text{Nigel}\}_\text{CN} \rightarrow \text{Nigel}' \) From 1 by R32
3. \( \text{the}_{\text{DET}} \rightarrow \lambda P \lambda q V y[A x[P(x) \leftrightarrow x-y] \& Q(y)] \) Basic
In short, (130) reads roughly that 'there is a unique individual named Nigel and he sings'. The definite analysis thus translates proper names as basic predicates of individuals, and a derived term like Nigel denotes different people in different situations, just as the man does. The PTQ analysis, besides being inadequate to account for constructions like the Nigel such that I know him, could only be expanded by treating John, Mary, Bill, Sue, etc. as thousands of ways ambiguous.

The treatment of proper names as predicates allows restrictive relative clauses modifying proper names to be handled quite easily.

(131) (theDET (\{NigelPROP\CN, R32')
-> (\{the\IT singIV't, R1\REL,
R28\CN/2CN, R12\CN, R13\T, R4
Realisation: the Nigel who sings
Translation: \lambda QVz[\lambda x((Nigel' (x) & sing'(x))) \leftrightarrow x-z] & Q(z)]

It is only a very small step to restrictive appositives. Taking the view that Nigel the butcher is to be paraphrased as 'the unique Nigel such that he is a butcher', the following rules are needed.

R34. If \alpha \in P_{CN} then \{the, \alpha\} \in P_{PROP/PROP}.
Realisation: the \alpha
Translation: \lambda P\alpha y[P(y) & \alpha'(y)]
R35. If \( \alpha \in P_{\text{PROP/PROP}} \) and \( \beta \in B_{\text{PROP}} \) then \( (\alpha, \beta) \in P_{\text{PROP}} \).

Realisation: \( \beta \vartriangleright \alpha \)

Translation: \( \alpha('\beta') \)

These rules are used to generate and translate examples like *Nigel the butcher.*

(132) \( \{\text{the}_{\text{DET}}, \{(\text{Nigel}_{\text{PROP}})_{\text{PROP/PROP}}, \}
\text{the, butcher}_{\text{CN}}_{\text{PROP/PROP}},
\text{PROP, R35}^{\text{CN}}, \text{R32}^{\text{T}}, \text{R4}\}
\text{Realisation: Nigel the butcher}
\text{Translation:}
1. \( \text{butcher}_{\text{CN}} \Rightarrow \text{butcher}' \) Basic
2. \( \{(\text{the, butcher})_{\text{PROP/PROP}} \Rightarrow \lambda P \lambda y[P(y) \& \text{butcher}'(y)] \) From 1 by R34
3. \( \text{Nigel}_{\text{PROP}} \Rightarrow \text{Nigel}' \) Basic
4. \( \{(\text{Nigel, (the, butcher)})_{\text{PROP}} \Rightarrow \lambda P \lambda y[P(y) \& \text{butcher}'(y)] (\text{"Nigel'\}) \) From 2, 3 by R35
5. \( \lambda y[\text{Nigel}'(y) \& \text{butcher}'(y)] \) Lambda conversion
6. \( \text{the}_{\text{DET}} \Rightarrow \lambda P \lambda V z[\lambda x[P(x) \leftrightarrow x= z] \& V[z)] \) Basic
7. \( \{(\text{the, (Nigel, (the, butcher)))}_{\text{T}} \Rightarrow \lambda P \lambda V z[\lambda x[P(x) \leftrightarrow x= z] \& V[z]] (\text{"\lambda y[\text{Nigel}'(y) \& \text{butcher}'(y)]\}) \) From 5, 6 by R4
8. \( \lambda V z[\lambda x[(\text{Nigel}'(x) \& \text{butcher}'(x)) \leftrightarrow x= z] \& V[z]] \) Lambda conversion

Although proper-name terms must in the end be treated as definite expressions, the Russelian translation makes examples just that much harder to list and read. The PTQ convention is quite adequate for most cases and will be used whenever possible in succeeding examples, purely for the sake of simplicity.

4.6.1.3 Definite, non-restrictive appositives

Definite, non-restrictive appositives, as in (111), feature a definite term modifying another specific term.
(111) a. John, the plumber, resigned.
b. The boss, the woman I love, fired me.

In (111a), for instance, the plumber provides an incidental characterisation, perhaps an alternate naming expression, for John. R36 makes non-restrictive term modifiers out of terms.

R36. If \( \alpha \in P_T \) then \( (\alpha) \in P_{T/T} \).

Realisation: \( \alpha \)
Translation: \( \lambda P(\forall P) \);
subroutine(\( \lambda P[x](^\forall [\lambda Qy_1 Q(\sim \lambda z_1[y_1 = z_1])(\sim \alpha')]))) \)

For simplicity, example (133) uses the PTQ translation of John.

(133) ((John, ((the, plumber))), T)
R4) T/T, R36, R29, 'resign', T, R1
Realisation: John, the plumber, resigned.
Translation:
1. John \( T \Rightarrow \lambda P[j] \)
   Proper name
2. (the, plumber) \( T \Rightarrow \lambda P[Vy[\lambda x[plumber'(x) \leftrightarrow x = y] & P(y)]] \)
   See previous examples
3. ((the, plumber)) \( T/T \Rightarrow \lambda P(\forall P) \);
   subroutine(\( \lambda P[x](^\forall [\lambda Qy_1 Q(\sim \lambda z_1[y_1 = z_1])]
   (\sim \lambda P[Vy[\lambda x[plumber'(x) \leftrightarrow x = y] & P(y)]]))) \)
   From 2 by R36
   S1. \( \lambda P(x)(^\forall [\lambda Qy_1 Q(\sim \lambda z_1[y_1 = z_1])]
   (\sim \lambda P[Vy[\lambda x[plumber'(x) \leftrightarrow x = y] & P(y)]]) \)
   S2. \( \lambda P(x)(^\forall [\lambda yV_1[\lambda z_1[butcher'(z) \leftrightarrow z_1 = y_1] & y = y_1]]) \)
   Lambda conversion
   S3. \( V_1[\lambda z_1[butcher'(z) \leftrightarrow z_1 = y_1] & x = y_1] \)
   Lambda conversion
   S4. \( V_1[\lambda z_1[butcher'(z) \leftrightarrow z_1 = y_1] & y = y_1] \)
   Lambda conversion
   S5. Return
4. (John, ((the, plumber))) \( T \Rightarrow \lambda P(\forall P)(\sim \lambda P[j])) \)
   From 1, 3 by R29
5. \( \lambda P[j] \)
Lambda conversion
6. \( \text{resign}_{IV} \rightarrow \text{resign'} \)  
7. \( [[\text{John}, \{\text{the, plumber}\}], \text{resign}]_t \rightarrow \lambda \text{PP}[j] (\text{`resign'}) \)  
   \( \text{From 5, 6 by Rl} \)
8. \( \text{resign'}(j) \)  
   \( \text{Lambda conversion} \)

If Sue is the speaker, the discourse pool will look like (134).

(134) Discourse pool: \(<\text{Sue, resign'}(j)\>\)  
\(<\text{Sue, } V\gamma_1[\Lambda z_1(\text{plumber'}(z_1) \leftrightarrow z_1=\gamma_1) \& j=\gamma_1)\>\)

The same rules will generate and interpret terms like the plumber, John though idiosyncrasies can be troublesome.\(^\text{24}\)

4.6.1.4 Definite, epithetical, non-restrictive appositives

The final class of appositives prepose epithetically to terms and modify those terms non-restrictively, as in (112), reprinted here.

(112) a. That crook Nixon got off easy.  
b. The traitor Philby escaped.  
c. My friend Peter cheats.

These appositives look superficially identical to the restrictive appositive constructions in Section 4.6.1.1, but the intended readings here are much different. In a restrictive example like the boy Bob, where Bob is the appositive modifier, the proper name specifies which boy is intended. In that crook Nixon, where that crook is the appositive modifier, Nixon does not specify which crook is involved; rather crook' is attributed of Nixon parenthetically. The orthographical strings in isolation are ambiguous. In short, the intended non-restrictive reading of an example like (112a) should be something like the two assertions in (135).

(135) a. Nixon got off easy.  
b. Nixon is a crook.

Chierchia (1982:343, 345) appears to believe that his rule for
appositive handles the same phenomena as Delacruz’s restrictive rule, but his translation and discussion (1982:347, remark IV) shows clearly that he has the epithetical, non-restrictive reading in mind.\(^{25}\)

Once again with this class we find idiosyncrasies plaguing the analysis. These non-restrictive appositives appear to require definite determiners, or at least ‘specific’ determiners in the sense of Bartsch (see Section 4.4.2).

(136) *Every bastard Jones resigned.
(137) *Any fool Algernon escaped.

This appears to be a reflection of the fact that only non-vacuous terms can be non-restrictively modified. The following rules allow an approximate analysis,\(^{26}\) and (138) shows a typical derivation.

\[
\text{R37. If } \alpha \in P_{CN} \text{ then } \{\text{the/this/that, } \alpha\} \in P_{T/2T}.
\]

Realisation: the/this/that \(\alpha\)

Translation: \(\lambda P(\hat{P}); \) subroutine(\(\lambda PP(x_a)(\hat{\alpha'})\))

\[
\text{R38. If } \alpha \in P_{T/2T} \text{ and } \beta \in P_T \text{ then } (\alpha, \beta) \in P_T.
\]

Realisation: \(\alpha, \beta\)

Translation: \(\alpha(\hat{\beta'})\)

(138) (((that, bastard\(\_\_\_CN\)\(\_\_\_\_T/2T\), R37, Smith\(\_\_\_T\)\(\_\_\_\_T\), R38, resign\_IV\)\(\_\_\_\_T\), R1

Realisation: That bastard Smith resigned.

Translation:

1. Smith\(\_\_\_T\) \(\Rightarrow\) \(\lambda PP(s)\) Proper name

2. bastard\(\_\_\_CN\) \(\Rightarrow\) bastard’ Basic

3. (that, bastard)\(\_\_\_\_T/2T\) \(\Rightarrow\)

\(\lambda P(\hat{P}); \) subroutine(\(\lambda PP(x_a)(\hat{\text{bastard'}})\)) From 2 by R37

S1. \(\lambda PP(x_a)(\hat{\text{bastard'}})\)

S2. bastard’(s) Lambda conversion

S3. bastard’(s)

S4. Return Anaphoric resolution
4. \([(\text{that}, \text{bastard}), \text{Smith})_T \Rightarrow \lambda P(\neg P)(\neg \lambda P(s))\] 
\text{From } 1, 3 \text{ by R38}

5. \(\lambda P(s)\) 
\text{Lambda conversion}

6. \(\text{resign}_IV \Rightarrow \text{resign}'\) 
\text{Basic}

7. \([(\text{that}, \text{bastard}), \text{Smith}, \text{resign})_T \Rightarrow \lambda P(s)('\text{resign}')\] 
\text{From } 5, 6 \text{ by R1}

8. \(\text{resign}'(s)\) 
\text{Lambda conversion}

If (138) is uttered by Algernon, then the state of the discourse pool will be (139).

\[(139) \text{ Discourse pool: } <\text{Algernon, bastard}'(s)> \]
\[<\text{Algernon, resign}'(s)>\]

As desired, the state of the discourse model after Algernon asserts (140) on the epithetical reading is (141).

\[(140) \text{ John believes that that thief Smith is honest.}\]
\[(141) \text{ a. } <\text{Algernon, believe-}\text{-that'}(j, '^\text{[honest]'(s)})>\]
\[<\text{Algernon, thief}'(s)>\]

The choice of determiner in such non-restrictive examples is a bit idiosyncratic. That is usually most appropriate, having a certain emotional (usually pejorative) force even by itself as in (142).^{27}

\[(142) \text{ That George is disgusting.}\]

This often has a force somewhat like 'the said' or 'the aforementioned', emphasising that a referring expression has already been used in the discourse.

\[(143) \text{ Mr Smith, a thief, entered the room unseen. Then this}\]
\[\text{ thief Smith opened the safe.}\]

For some reason, the seems more appropriate in non-restrictive, epithetical appositives with surnames rather than with first names.
(144) a. The explorer Biggles set off on a new adventure.
    b. The traitor Philby was sent off to Russia.

(145) a. ?The coward Richard was sent home.
    b. ?The traitor Nigel defected.

Though the present account of appositives is incomplete, it accommodates several constructions in a MG for the first time. The present framework, based on a generalised theory of restrictive and non-restrictive modification, can serve as a foundation for further research. \textsuperscript{28, 29}

4.7 Conclusion

The new subroutine analysis provides a superior means to capture intuitions about non-restrictive modification while avoiding the drawbacks of previous analyses. In particular, linguistic subroutines are naturally parenthetical, are separate speech acts and can occur inside questions and other non-assertions. In addition, the subroutine analysis functions correctly in opaque contexts and under operations such as sentence negation. So far the non-restrictive fragment has been limited to adjectivals and appositives at the individual level. The same machinery will be adapted to handle parallel examples at the proposition and property levels.
Chapter 5. The proposition level in Montague grammar

5.0 Introduction

There are numerous constructions, the simplest being like those in (1), where adjectives modify nominalised sentences. To deal with these and similar proposition-level constructions, it will be necessary to provide an analysis for terms of the form that-t.

(1) a. That John is ill is unfortunate.
b. It is strange that Mary left.
c. It is true that Bill cheats.

There are basically two approaches. The first treats proposition-level terms like individual-level terms: they are both assigned to category T. This general path is followed by Cresswell (1973:165-166), Thomason (1976:79-80; 1980), Klein (1979a:44, 54), Cresswell & von Stechow (1982:14), Chierchia (1982) and Turner (1983), whom I shall refer to collectively as the 'levellers'. The second approach, adopted by Delacruz (1976), Bennett (1975:175-189) and Bartsch (1978:26; 1979:49), is to distinguish proposition-level terms both syntactically and semantically, assigning them to a new category, say T' or T-bar. I shall call this group the 'stackers'. The choice is a real one, involving issues of ontology in the semantics and constraint within the syntax.

For practical and theoretical reasons, the following account sticks to the traditional MG stacking approach. One advantage is that this allows the discussion to continue without any major revision of the semantics. One disadvantage is that the following account suffers from some well-known inadequacies in explaining belief sentences and related constructions. From a syntactic point of view, it will be shown that the newer levelling solutions cause as many problems as they solve. When individual-level terms like John and proposition-level terms like that John is ill are not distinguished by syntactic category (or by type) then the grammar will need some
other mechanism, such as lexical features, to tell them apart.

The nominalisation debate is currently very healthy, with some researchers (e.g. Ben-Chorin 1983) proposing interesting, but radically new semantic solutions which effectively change the game rules. This chapter will proceed to show that the traditional stacking solution cannot be discarded out of hand and will then provide a grammar to account for a wide variety of syntactic structures at proposition level. As any grammar, regardless of the semantics it adopts, will eventually have to deal with these syntactic structures, I should hope that the following account will be a significant contribution to the nominalisation debate.

5.1 The debate on nominalisation

5.1.1 Levellers

Syntactically, the levellers can point to the gross structural similarity of proposition-level terms to individual-level terms. That, for instance, is taken to be a determiner-like word which forms terms from sentences much as the forms terms from common nouns.

(2) that John loves Mary

(3) the man

Pairs like (4) to (6) are cited to show that proposition-level terms fit in familiar term slots.

(4) The man
   That John loves Mary
   is obvious/odd/strange/etc.

(5) The man
   That John loves Mary
   bothers/annoys/pleases Sue.

(6) Bill knows/believes/suspects
   the man
   that John loves Mary.

Semantically, the levellers can simply include propositions in the
domain of the model. Propositions are therefore treated like
tentities in much the same way that Nixon, the Empire State Building,
hedgehogs and toothbrushes are entities.

One variation on the levelling approach is to define a levelling
function $f^1$ whose domain includes propositions and whose range is
included in the domain of the model. That is, for any proposition $p$,
$f^1(p)$ denotes a corresponding entity in the domain of the model. For
all $x$ where $x$ is an individual like $j$ (for John) or $m$ (for Mary),
$f^1(x) = x$. Function application is then redefined as follows:
$[[\alpha(\beta)]] = [[\alpha]] (f^1[[\beta]])$. More simply, functions apply to their
LEVELLED arguments, which are always basic entities in the domain of
the model. This approach is well presented in Chierchia 1982. The
term that John sings would be translated as $\lambda PP([\text{sing}'(j)])$, the set
of all properties of (the entity corresponding to) the proposition
$[\text{sing}'(j)]$. This translation is of the same type as the translation
of an individual-level term like $\lambda PP(j)$.

Proposition-level terms are then manipulated by the syntax rules in
the usual way.

One defence of this treatment is the prima facie superiority of
a unified treatment of terms over a multiform one. Levelling also
allows words like odd and strange to be given a single translation in
sentences like (4); believe and know in example (6) can also be
analysed as normal IVs. This appears to capture some linguistic
generalisations. By translating that John sings as $\lambda PP([\text{sing}'(j)])$
the levelling approach can then treat is true as a normal IV, leading
to translations like (7'). Thus the proposition-level sentence (7)
is generated and translated parallel to the individual-level sentence
(8).

(7) That John sings is true.
(7') true('[\text{sing}'(j)])
(8) John is tall.
(8') tall'(j)
5.1.2 Stackers

The alternative to levelling, here called stacking, is to take propositions at face value as being not basic entities, which are of type $<e>$, but complex constituents of type $<s,t>$. Because $P$ is of type $<s,<e,t>>$ and ranges over properties of individual entities, the set of properties of the entity $j$ is $\lambda PP(j)$. Similarly, let us define $R$ to be a variable of type $<s,<<s,t>,t>>$; i.e. it ranges over properties of propositions. Then a proposition-level term that John sings translates as the set of properties of a proposition, viz $\lambda RR([\text{sing}'(j)])$. These proposition-level terms are distinguished from Ts by type, and they are traditionally assigned to a category T-bar or T'.

The consequences of stacking are immediate and severe. For one, a T' cannot combine with an IV; the types and categories do not match. In fact, none of the previously defined rules for manipulating individual-level Ts will work for a T'. Consider the simplified tree in (9).

(9) John is odd
John T
be odd IV
be IV/PRED odd ADJ

The levelling analysis allows the IV be odd to combine with the term that John sings as well, as in (10).

(10) That John sings is odd
that John sings T
be odd IV
that IV T/t John sings t

For a stacker, however, a T' must combine with a proposition-level intransitive verb, call it IV', as in (11). He will also need proposition-level copulas, adjectives and nouns. All new combination rules will need to be defined.
(11) That John sings is odd
   that John sings \( \text{T} \) be odd \( \text{IV} \),
   that \( \text{T}' \) John sings \( \text{T} \) be \( \text{IV}/\text{PRED} \) odd \( \text{ADJ} \).

One result of stacking is that many words including odd, strange, unusual, weird, good, etc. will now have to be listed in two quite separate categories: i.e. the form strange will be lexically ambiguous between \text{strange}_{ADJ} and \text{strange}_{ADJ}' . There is no obvious way to relate these pairs, though Parsons (1979) has made an attempt to define a grammar with words of 'floating type'.

For the same reasons, the stacking analysis forces us to postulate two separate categories for transitive verbs like interest and believe. The interest that takes an individual-level term subject is interest_{TV} (where TV is an abbreviation for IV/T), and the one which takes a proposition-level term subject will have to be interest_{IV'/T}. Believe will have two versions distinguished by the category of the object term.

(12) John interests_{TV} Mary.
(13) That John is handsome interests_{IV'/T} Mary.
(14) John believes_{TV} Mary.
(15) John believes_{IV/T}, that Mary is pretty.

Levellers see such duplications as needless and unsupported by the facts of English.

Admittedly, it seems unattractive at first glance to have multiple readings, and so multiple categories, for strange, odd, interest and believe; and this looks like a good argument against stacking. Some generalisation appears to be lost. Nevertheless, there are also strong arguments that levelling conflates too much, that helpful and significant grammatical distinctions are lost. Consider the case of interest, surprise, annoy and similar verbs, which seem to take either a T or a T' subject. The passive form of (12), which has a T subject John, is (16), where the former subject turns up as the object of a PP-BY phrase. No PP-BY phrase is possible,
however, in the passive counterpart of (13), which has a T' subject.

(16) Mary is interested by John.
(17) *Mary is interested by that John is handsome.

Also, a T' subject can be postposed to its IV' as in (18), with a dummy subject it placed at the front of the string.

(18) It is strange that John is ill.

Some IV's like seem and appear actually require such postposition.

(19) a. It seems that John is ill.
   b. *That John is ill seems.

The rules which combine terms will therefore have to distinguish between individual-level and proposition-level constituents in one way or another. The distinction is basic in a stacking grammar, but a levelling grammar would have to resort to features or reference to the internal construction of terms.

Some forms, like believe, seem not to be the same verb at all when they apply to individual-level as opposed to proposition-level terms as in (14) and (15). Thus in the semantics as well, it can be argued that there is a palpable difference between the believe\(^*\) which relates two human entities and the believe\(^*\) which relates an entity and a proposition.

(14') believe\(^*\)(j, m)
(15') believe\(^*\)(j, \^[pretty\(^*\)(m)]\)

Indeed the sentence John believes Mary evokes explanatory paraphrases such as (20) and (21).

(20) John believes the proposition asserted by Mary.
(21) John believes something (everything?) that Mary asserts.

In fact, with quite a few verb forms which apparently take either a T or a T' subject or direct object, a good case can be made for
distinguishing separate readings. Consider the following pairs.

(22) a. Peter denied the Saviour.
    b. Peter denied that he was a disciple.

(23) a. James implies that John was lazy.
    b. That Paul left implies that he is guilty.

Some corroborating evidence may come from other languages. French would translate the believe which takes a human object as croire (à) and the believe which takes a sentential object as croire (que). Even more dramatic, the translation of know requires two quite separate verbs: the know relation between a person and a fact is named savoir; the know relation between two persons is named connaître.

(24) Je sais que Jean aime Marie.
(25) Je connais Jean.

A look at some other data in English shows that wordforms with double categorisation, like believe, know, odd and strange, may be the exception rather than the rule. For instance, many predicative words combine exclusively with proposition-level terms.

(26) That John is ill is \{true, false, probable, possible\}

\{a fact, a lie\}

Conversely, many predicative words combine exclusively with individual-level terms. Under a stacking interpretation, the following starred sentences are ruled out as ungrammatical because of type mismatches; levellers must appeal to selection restrictions of some sort.
(27) a. ?John is false.
b. ?Mary is a fact.
c. ?That John is ill is green.

Similarly, most transitive verbs select T and T' subjects and objects more carefully than annoy and believe.

(28) a. I believe \{John. 
\{that John is mad.\}

b. I think \{*John. 
\{that John is mad.\}

(29) a. Mary \{That Mary is pregnant\} annoys Bill.
b. Mary \{*That Mary is pregnant\} kicked Bill.

Every grammar appeals to selection restrictions at some point, and it is difficult to know where they stop and where actual ungrammaticality starts. A leveller can hold that the starred sentences in (28) and (29) merely violate selection restrictions. A more conservative stacker can maintain that the type differences he proposes are linguistically significant in a way that selection restrictions are not. Compare sentences (30) and (31).

(30) This rock is intelligent.
(31) ?This rock is true.

Both stackers and levellers will agree that these sentences are odd, but for different reasons. For both levellers and stackers, (30) violates the selection restriction which states, informally, that only humans, higher animals and perhaps computers can be reasonably described as intelligent. This is a simple reflection of one's knowledge about the world. However, there is no sense in which (30) can be called ungrammatical. In contrast, stackers treat (31) as truly ungrammatical, for the type of this rock precludes any combination with a higher-level intransitive verb like is true. Levellers, on the other hand, take (31) to illustrate simple
violation of selection restrictions just like (30); rocks, they can say, are just not the kinds of things which can reasonably be described as true.

There are significant differences, nonetheless, when we look at the negative versions of these sentences.

(32) This rock is not intelligent.
(33) a. ?This rock is not true.
    b. ?This rock is false.

Example (32) is not only grammatical but seems to 'make sense'. Rocks are indeed not intelligent, and it makes sense to say so. If we think of Intelligent as a characteristic function, we would expect it to assign 0 to any rocks in the domain. The sentences in (33), however, are still decidedly odd. Rocks cannot reasonably be said to be true—but at the same time they cannot reasonably be said to be false or not true or probable or improbable, etc. That is, if true is taken as a characteristic function, it seems very odd to assign either 1 or 0 to a rock. The intuition, for a stacker, is that, when speaking of truth or falsity, rocks just don't get considered at all; they are entities on a very separate plane from propositions. The conclusion, for stackers, is that (31) and (33) are odd, indeed ungrammatical, not just because they violate our knowledge of the way the world is structured, but also because they violate our knowledge of the way that English is structured. In other words, stackers hold that English has grammaticalised the ontological difference between individual entities and propositions.

In counterattack, Chierchia (1982:333) has argued that MG types, being so closely tied to syntactic categories, merely duplicate selectional information already provided in the syntax. For instance, necessarily is a sentence adverb of category t/t, and MG would give its type as <<s,t>,t>. Chierchia, as a leveller, would give its type as <e,t>, a one-place predicate of entities, where entities include propositions. This has the apparent disadvantage of allowing the translation of necessarily to apply to individual human
entities like j (for John) and m (for Mary), and selection restrictions would appear necessary to show why the sentence necessarily\(^{(j)}\) is odd. However, Chierchia argues that such restrictions already appear in the syntax; because necessarily is of category \(t/t\), it can apply syntactically only to a sentence, and therefore the translation of necessarily will always apply to the intension of the translation of a sentence, i.e. to an entity which is a proposition.

The arguments for the redundancy of type look much weaker when one looks wider in the grammar and discovers adjectives and nouns. The translation of necessarily, assuming levelling, will always apply to a proposition entity by virtue of its category \(t/t\), but the related adjective necessary (as in the normal reading of necessary truth) will have no such syntactic restriction in Chierchia's system. There is nothing to prevent the generation of sentences like ?John is necessary, and only selection restrictions can rule them out. Numerous other adjectives and nouns are closely related to sentence adverbs. Chierchia will be unable to coordinate their syntactic categories and their syntactic restrictions.

\[
\begin{array}{llll}
\text{possibly} & \text{possible} & \text{possibility} \\
\text{probably} & \text{probable} & \text{probability} \\
\text{certainly} & \text{certain} & \text{certainty} \\
\end{array}
\]

The stacking analysis holds that necessarily and necessary will both be of type \(\langle s,t,t \rangle\) and will both be of some category \(t^{n}t\). Nouns like possibility, lie, fact, untruth and belief can be assigned to their own distinguished \(t^{n}t\) category. The 'parenthetical' sentence adverbs strangely and oddly also correspond to the adjectives strange and odd which combine with proposition-level terms; these adjectives and adverbs are, for example, factive. And here we have come full circle. If there is a case for assigning both necessarily and necessary to categories \(t^{n}t\) to capture their syntactic and selectional restrictions, then the same holds for strangely\(^{t^{n}t}\) and strange\(^{t^{n}t}\). As a strange of category \(t/e\) is obviously needed for
sentences like *John is strange*, we end up quite naturally with a pair of *strangers*, the situation which the levellers want to avoid in the first place.

Finally, adopting the levelling analysis makes it harder to formulate some useful meaning postulates. Let us assume that we want to capture the factivity of $\text{interest}_{IV}/T$ over its subject term. That is, it is intuitively the case that if *That John is handsome interests Sue* is true, then *John is handsome* is also true. A stacker can appeal to a meaning postulate like M.P. A, where $p$ is of type $<s,t>$.²

\[
\text{M.P. A (stacking analysis)} \\
\Delta p \Delta y [\text{interest}^*(p,y) \Rightarrow \text{true}'(p)]
\]

However, if propositions are 'levelled' into entities, then the straightforward translation of M.P. A is M.P. B.

\[
\text{M.P. B (levelling analysis)} \\
\Delta x \Delta y [\text{interest}^*(x,y) \Rightarrow \text{true}'(x)]
\]

Unfortunately, M.P. B, as it stands, will support the intuitively bad conclusion that if *John interests Mary* is true, then *John is true* is also true. Just as the syntax needs to distinguish between individual-level terms and proposition-level terms, so the semantics needs some way to distinguish between object-like entities (such as $j$ for John) and entities which are prepositions. This is not impossible, of course, but it requires extra test clauses, as in M.P. C (see Chierchia 1982:345), or perhaps the adoption of a multi-sorted logic.

\[
\text{M.P. C (levelling analysis, compensated)} \\
\Delta x \Delta y [(\text{interest}^*(x,y) \& \text{proposition}'(x)) \Rightarrow \text{true}'(x)]
\]

In conclusion, stackers write grammars which inherently force a distinction between individual-level and proposition-level terms (and other categories) in the syntax and between individuals and propositions in the semantics. It has been shown that both types of
distinction are needed. When levellers reduce T's to Ts and treat propositions as entities, the old distinctions eventually have to be rescued by some means. For the present purposes, the stacking solution makes the necessary distinctions more naturally, requires fewer ad hoc restrictions, and generally gives more 'beautiful' results. It also allows the analysis to proceed using the classical MG semantics as defined by Bennett (1975) and Dowty et al. (1981). Much remains to be said in the stacking/levelling debate. What follows in this and the succeeding chapters is a more detailed exposition of the stacking analysis than has previously been offered.

5.2 The proposition-level grammar

5.2.1 Categories

The following rules and categories are to be added to the grammar defined in Chapters 3 and 4. All previously defined conventions for type definition, function application and rule notation remain the same. Wherever practical, category labels have been chosen to facilitate comparisons to the individual-level part of the grammar. In general, abbreviated names for proposition-level categories are distinguished from analogous individual-level categories with a superscript bar or prime sign. Therefore, an IV' is a proposition-level intransitive verb as opposed to the individual-level IV.

<table>
<thead>
<tr>
<th>Category</th>
<th>Abbreviation</th>
<th>Basic Expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>t/t</td>
<td>IV'</td>
<td>suffice, count</td>
</tr>
<tr>
<td>t^2t</td>
<td>CN'</td>
<td>fact, lie, truth, untruth, fib, axiom, proposition, possibility, scandal, state-of-affairs, situation, problem, plan, story</td>
</tr>
<tr>
<td>t^3t</td>
<td></td>
<td>true, false, necessary, possible, probable, likely, unlikely, certain, sure, definite</td>
</tr>
<tr>
<td>t^4t</td>
<td>P NOM'</td>
<td>odd, strange, significant, tragic</td>
</tr>
<tr>
<td>t^5t</td>
<td></td>
<td>(none)</td>
</tr>
<tr>
<td>Adjectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>happen, turn out, chance, so happen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(none)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>truly, necessarily, possibly, probably</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oddly, strangely, unfortunately</td>
<td></td>
<td></td>
</tr>
<tr>
<td>matter, make sense, make a difference, occur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>seem, appear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>strike</td>
<td></td>
<td></td>
</tr>
<tr>
<td>apparent, evident, obvious, plain, well-known, clear, manifest, plausible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(none)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>useful, beneficial, pleasant, unpleasant, good, bad, helpful, instructive, convenient, inconvenient, fortunate, harmful, lucky, nice, unlucky, unfortunate, profitable, dangerous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(none)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>it₁, it₂, ..., itₙ, ...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(none)</td>
<td></td>
<td></td>
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<td>(none)</td>
<td></td>
<td></td>
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<tr>
<td>that</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the, a(n), every</td>
<td></td>
<td></td>
</tr>
<tr>
<td>assumption, belief, thought, idea, notion, claim, presupposition, charge, presumption, opinion, guess, supposition, conjecture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>report, statement, allegation, proposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cause, result, consequence</td>
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</tr>
</tbody>
</table>

Let PRED' be a cover category including \( P_{t3} \cup P_{t4} \cup P_{t5} \).
Let ADJ' be a cover category including \( P_{t3} \cup P_{t5} \).
Let ADV' be a cover category including \( P_{t8} \cup P_{t9} \).
Let ADJVL' be a cover class including \( P_{t3} \cup P_{t4} \cup P_{t7} \).
Let $T'$ be a cover category including $P_t^{IV'} \cup P_t^{2IV'}$.

<table>
<thead>
<tr>
<th>IV'/T'</th>
<th>be</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV'/PRED'</td>
<td>be</td>
</tr>
<tr>
<td>PP-BY'/(t/2IV')</td>
<td>by</td>
</tr>
<tr>
<td>PP-OP'/(t/2IV')</td>
<td>of</td>
</tr>
<tr>
<td>IV'/T</td>
<td>amuse, anger, annoy, amaze, astonish, disappoint, disconcert, disturb, depress, encourage, excite, exhilarate, hearten, interest, please, refresh, shock, surprise</td>
</tr>
<tr>
<td>IV'/2T</td>
<td>delight, bother, bug, chuff</td>
</tr>
<tr>
<td>(IV'/T)/ADJ</td>
<td>make</td>
</tr>
<tr>
<td>IV/T'</td>
<td>accept, acknowledge, anticipate, argue, assume, believe, comprehend, conceive, contest, deduce, deplore, doubt, fear, forget, grasp, guess, ignore, know, maintain, mind, notice, presume, presuppose, recognise, remember, regret, resent, suppose, surmise, understand</td>
</tr>
<tr>
<td>IV/(t/IV')</td>
<td>charge, claim, conclude, conjecture, fancy, figure, hope, suspect, think</td>
</tr>
<tr>
<td>(IV/T')/PP-TO</td>
<td>admit, allege, announce, assert, confess, confirm, deny, dictate, emphasise, hint, indicate, intimate, predict, proclaim, profess, promise, prove, repeat, report, say, scream, shout, sign, signal, suggest, whisper, yell</td>
</tr>
<tr>
<td>(IV/(t/2IV'))/PP-TO</td>
<td>tell, recount, relate</td>
</tr>
<tr>
<td>TV/(t/IV')</td>
<td>advise, apprise, assure, convince, inform, persuade, promise, reassure, tell</td>
</tr>
<tr>
<td>TV/PP-OP'</td>
<td>advise, apprise, convince, inform, reassure, tell</td>
</tr>
<tr>
<td>ADJ/(t/IV')</td>
<td>afraid, frightened, aware, certain, confident, conscious, sure, suspicious</td>
</tr>
</tbody>
</table>
ADJ/²(t/IV')

angry, bitter, ecstatic, furious,
glad, grateful, happy, proud, sad,
sorry, thankful

ADJ/PP-BY'

(complete)

(t/³t)/PP-BY

(complete)

Variables of type <s,t> include p and q, supplemented by the subscripted pₙ and qₙ (where n ranges over natural numbers); these variables range over propositions. R and Rₙ are of type <s,<s,t>,t> and range over properties of propositions. A and Aₙ are of type <s,<s,<s,t>,t>,t> and range over properties of properties of propositions. K, of type <s,t>,<e,t>, ranges over two-place relations between individuals and propositions. H, of type <e,<s,t>,t>, ranges over two-place relations between propositions and individuals. L, of type <e,<s,t>,<e,t>>, ranges over three-place relations between individuals, propositions and individuals. M, of type <<s,t>,<e,e,t>>, ranges over three-place relations between individuals, individuals and propositions.

Basic translations:

be IV'/PRED'

be IV'/T'

of PP-OF'/t/²IV'

by PP-BY'/t/²IV'

it n

that (t/IV')/t

the (t/²IV')/CN'

a (t/²IV')/CN'

every (t/²IV')/CN'

\[ \lambda R[\bar{R}] \]

\[ \lambda R \lambda p R(\lambda q[p-q]) \]

\[ \lambda R[\bar{R}] \]

\[ \lambda R[\bar{R}] \]

\[ \lambda R[p] \]

\[ \lambda p \lambda R R(p) \]

\[ \lambda R_1 \lambda R V[p(\lambda q[R_1(q) \leftrightarrow q-p]) & R(p)] \]

\[ \lambda R_1 \lambda R V[p[R_1(p) & R(p)] \]

\[ \lambda R_1 \lambda R A[p[R_1(p) \rightarrow R(p)] \]
Meaning Postulates (incomplete list)

M.P. P1  $\Delta p \square [\delta(p) \rightarrow \gamma p]$
where $\delta$ translates any member of $P_{IV/T}$ or $P_{IV'/2_T}$

M.P. P2  $\Delta p \Delta p \square [\delta(p, P) \rightarrow \gamma p]$
where $\delta$ translates any member of $P_{IV'/T}$ or $P_{IV'/2_T}$

Reduction Rules

RR P1.  $\forall \lambda y \forall \lambda R \square [\delta(y, R) \rightarrow R(\lambda p[K(y, p)])]$
where $\delta$ translates any member of $P_{IV/T}$ or $P_{IV/(t/IV')}$

RR P2.  $\forall \lambda p \forall \lambda R \square [\delta(p, P) \rightarrow P(\lambda y[H(p, y)])]$
where $\delta$ translates any member of $P_{IV'/T}$ or $P_{IV'/2_T}$

RR P3.  $\forall \lambda y \forall \lambda R \square [\delta(y, R, P) \rightarrow P(\lambda x[R(\lambda q[I(y, q, x)])])]$
where $\delta$ translates any member of $P_{IV/T} / PP$ or $P_{IV/(t/2IV')}$

RR P4.  $\forall \lambda x \forall \lambda R \square [\delta(x, P, R) \rightarrow R(\lambda p[P(\lambda y[M(x, y, p)])])]$
where $\delta$ translates any member of $P_{IV/(t/IV')}$ or $P_{IV/PP-OF'}$

5.2.2 Illustrated categorial combination rules

5.2.2.1 Proposition-level terms

A proposition-level term, abbreviated $T'$, is formed by one of the two following rules. $T'$ is actually a cover category including $(P_{t/IV' } \cup P_{t/2IV' })$. It is often necessary to distinguish the two subcategories in the syntax.

R41. If $\alpha \in B_{(t/IV')/t}$ and $\beta \in P_t$ then $(\alpha, \beta) \in P_{t/IV'}$.
Realisation: $\alpha \rightarrow \beta$
Translation: $\alpha'(\beta')$

R42. If $\alpha \in P_{(t/2IV')/CN}$ and $\beta \in P_{CN'}$, then $(\alpha, \beta) \in P_{t/2IV'}$.
Realisation: $\alpha \rightarrow \beta$
Translation: $\alpha'(\beta')$

That is of category $(t/IV')/t$ and its translation is $\lambda p \forall R \forall p$. The is of category $(t/2IV')/CN'$, having the translation $\lambda R_1 \lambda R \forall p[Aq[R_1(q) \leftrightarrow q=p] \land R(p)]$. $T'$ are formed straightforwardly on the following
Beesley models.

(35) \( \{ \text{that} (t/IV')/t', \{ \text{John}, \text{swim}_{IV} \}_t, R1_t/IV', R41 \} \)

Realisation: that John swims

Translation:
1. \( (\text{John, swim})_t \rightarrow \text{swim}'(j) \)
   See previous examples
2. \( \text{that}(t/IV')/t. \rightarrow \lambda p \Lambda R(p) \)
   Basic
3. \( (\text{that, (John, swim)})_t/IV. \rightarrow \lambda p \Lambda R(p)([\text{swim}'(j)]) \)
   From 1, 2 by R41
4. \( \Lambda R([\text{swim}'(j)]) \)
   Lambda conversion

(36) \( \{ \text{the} (t^{2}_{IV'})/CN', \text{fact}_{CN}', t/2 IV', R42 \} \)

Realisation: the fact

Translation:
1. \( \text{the}(t^{2}_{IV'})/CN. \rightarrow \lambda R_1 \Lambda R V p(\Lambda q[R_1(q) \leftrightarrow q=p] & R(p)) \)
   Basic
2. \( \text{fact}_{CN}, \rightarrow \text{fact}' \)
   Basic
3. \( (\text{the, fact})_t/2 IV. \rightarrow \lambda R_1 \Lambda R V p(\Lambda q[R_1(q) \leftrightarrow q=p] & R(p)) (\text{fact}') \)
   From 1, 2 by R42
4. \( \Lambda R V p(\Lambda q[\text{fact}'(q) \leftrightarrow q=p] & R(p)) \)
   Lambda conversion

Note: that \( \wedge.T' \ldots \) translates as the property set of a proposition; much as a \( T \) translates as the property set of an individual.

Within line 4 of example (36), we find the formula \( \text{fact}'(q) \). The explication of such predications at property level is a problem which will return at various places in the coming chapters. One would like to be able to conclude that \( [\text{fact}'(q)]^{w,t} = 1 \) iff \( q(w)(t) = 1 \). Similarly, \( [\text{false}'(q)]^{w,t} = 1 \) iff \( q(w)(t) = 0 \). In other words, the sentence \( \text{fact}'(q) \) should always have the same truth value as the sentence \( \forall q \), and the sentence \( \text{false}'(q) \) should always have the same truth value as the sentence \( \neg (\forall q) \). These conclusions can be guaranteed by meaning postulates such as the following.

\[ \text{M.P. P3. } \Lambda p \square (0(p) \leftrightarrow \forall p) \]

where \( 0 \) translates \( \text{fact, true, truth} \)
The alternative method is to give complex interpretations to individual lexical items, which is to treat them as semantic constants. In PTQ, for instance, necessarily is defined as a sentence adverb of category t/t, and it can apply to any sentence produced by the rules of the grammar. Similarly, be is defined as a copula mapping Ts into IVs. A possible PTQ-generated sentence is shown in (37).

\[(37) \quad \text{Necessarily John is John}_{t}^{t/t} \text{ be John}_{T}^{IV} \]

In PTQ, the translation of John is \(\lambda PP(\cdot j)\). In spite of the fact that \(be\) applies to John, to form the IV \(be\) John, the translation of \(be\) John is not \(be'(\lambda PP(\cdot j))\). This is because Montague specifically designates that \(be\) is a semantic constant and has the translation \(\lambda P\lambda yP(\cdot \lambda z[\cdot y=\cdot z])\). This allows the whole sentence John is John to translate as \(j=j\) rather than as \(be'(\lambda PP(\cdot j))(\cdot j)\). Necessarily applies to the sentence John is John in the usual way but the translation of the result is not necessarily'([\(j=j\)]). Again this is because Montague designates that necessarily has the translation \(\lambda P\Box[\cdot p]\); this allows the translation of the whole sentence to be \(\Box(j=j)\). If necessarily and \(be\) can receive their own tailor-made constant translation in the lexicon, there is nothing inherent in the grammar to stop us translating words like true, truth and fact as \(\lambda P(\cdot p)\). Under such definitions, line 4 of (36) would come out as \(\lambda RVP[\lambda q[q \leftrightarrow q-P] & R(p)]\), and there would be no need for M.P. P3. Semantic constants result in many desirable entailments arising as logical consequences rather than through the restraints imposed on
possible worlds by meaning postulates. The question of how to divide
the labour recurs constantly.

Many nouns at proposition level are intuitively or even
morphologically related to verbs naming transitive relations, and
these nouns display a kind of valence. One way to explicate such
relationships is to treat the nouns as semantic constants, giving
them explicit complex translations in the lexicon. **Belief**, for
instance, is a noun which can have its subject believer specified in
a PP-OF phrase. The category of **belief** is therefore **CN'/PP-OP**, and its
translation can be given in terms of **believe** as

\[
\lambda P \lambda p P[\lambda y[\text{believe}^*(y, p)]].
\]

Rule R43 is needed for example (38).

R43. If \( \alpha \in P \subset \text{CN'}/\text{PP-OP} \) and \( \beta \in P \subset \text{PP-OP} \) then \([\alpha, \beta] \in P \subset \text{CN'}\).

**Realisation:**

\[
\{(y \gamma (CN'/PP-OP)/PP-TO' \delta) \subset PP-TO'CN'/PP-OP'
\begin{align*}
\beta_{PP-OP} & \subset \gamma \quad \beta \subset \delta \\
\text{else} & \quad \alpha \subset \beta
\end{align*}
\]

**Translation:**

\[
a'(\beta')
\]

(38) \( (t/2IV'/CN)', (\text{belief}CN'/PP-OP', \text{of}PP-OF/T',
    \text{John}_T)\subset PP-OF, R25, CN', R43, t/2IV', R42
\]

**Realisation:** the belief of John

**Translation:**

1. \( \text{of} \subset PP-OF/T \quad \Rightarrow \lambda P[^P] \quad \text{Basic} \)
2. \( \text{John}_T \subset \lambda P\{j\} \quad \text{Proper name} \)
3. \( (\text{of}, \text{John})_{PP-OP} \quad \Rightarrow \lambda P[^P] (\lambda P\{j\}) \quad \text{From 1, 2 by R25} \)
4. \( \lambda P\{j\} \quad \text{Lambda conversion} \)
5. \( \text{belief}CN'/PP-OP \quad \Rightarrow \lambda P \lambda p P[\lambda y[\text{believe}^*(y, p)]] \quad \text{Basic} \)
6. \( (\text{belief}, (\text{of}, \text{John}))_{CN'} \quad \Rightarrow \lambda P \lambda p P[\lambda y[\text{believe}^*(y, p)]] (\lambda P\{j\}) \quad \text{From 4, 5 by R43} \)
7. \( \lambda p[\text{believe}^*(j, p)] \quad \text{Lambda conversion} \)
8. \( \text{the} (t/2IV')/CN' \quad \Rightarrow \lambda R_1 \lambda RV P[\lambda q[R_1(q) \leftrightarrow q=p] \& R(p)] \quad \text{Basic} \)
9. \( \text{(the, (belief, (of, John)))} \rightarrow \lambda R_1 \lambda RVp[\Lambda q[R_1(q) \leftrightarrow q=p] \& R(p)] (\lambda p[\text{believe}(j,p)]) \)

From 7, 8 by R42

10. \( \lambda RVp[\Lambda q[\text{believe}(j,q) \leftrightarrow q=p] \& R(p)] \)

Lambda conversion

Given the complex translation for belief, the translation of the belief of John is the property set of that unique proposition such that John believes it. R44 is the relation-reducing rule which allows belief to appear without a PP-OF phrase and to receive the reading equivalent to that for 'belief of someone'.

R44. If \( \alpha \in P_{CN'/PP-OF} \) then \( \{\alpha\} \in P_{CN'} \).

Realisation: \( \alpha \)

Translation: \( \alpha'(\lambda PVz[P(z)]) \)

This rule will allow derivations like (39).

(39) \( \text{(the } t_2^{IV'} \text{) } /CN', (\text{belief } CN'/PP-OF) \rightarrow CN', R44, t_2^{IV'}, R42 \)

Realisation: the belief

Translation: \( \lambda RVp[\Lambda Vz[\text{believe}(z,q)] \leftrightarrow q=p] \& R(p)] \)

If one chooses to give such nouns explicit complex translations, relating them lexically to two-place verbs, the following list provides some sample lexical entries.

(40) \( \text{belief}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{believe}(y,P)]) \)

\( \text{thought}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{think}(y,P)]) \)

\( \text{claim}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{claim}(y,P)]) \)

\( \text{presupposition}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{presuppose}(y,P)]) \)

\( \text{supposition}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{suppose}(y,P)]) \)

\( \text{assumption}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{assume}(y,P)]) \)

\( \text{guess}_{CN'/PP-OF} \)

\( \lambda P \lambda P(\lambda y[\text{guess}(y,P)]) \)

Such definitions must be tailor-made for each word, allowing for lexical limitations and expansions of meaning. The alternative, of
course, is to explicate such nouns in terms of meaning postulates.

Nouns related to three-place verbs, such as report, allegation, statement and proposal, are of category (CN'/PP-OF)/PP-TO and are handled with the following rules.

R45. If \( \alpha \in P_{(CN'/PP-OF)/PP-TO} \) and \( \beta \in P_{PP-TO} \)
then \( (\alpha, \beta) \in P_{CN'/PP-OF'} \)

Realisation: \( \alpha \beta \)
Translation: \( \alpha'("\beta") \)

R46. If \( \alpha \in P_{(CN'/PP-OF)/PP-TO} \) then \( \alpha \in P_{CN'/PP-OF'} \)

Realisation: \( \alpha \)
Translation: \( \alpha'("\lambda PVz[P(z)]") \)

If treated as semantic constants, such nouns will have basic translations as shown in (41).

(41) allegation \( (CN'/PP-OF)/PP-TO \) \( \Rightarrow \)
\( \lambda \rho \lambda Q \lambda p P [\lambda y[Q(\lambda z[allege*(z, p, y)])]] \)
report \( (CN'/PP-OF)/PP-TO \) \( \Rightarrow \)
\( \lambda \rho \lambda Q \lambda p P [\lambda y[Q(\lambda z[report*(z, p, y)])]] \)
statement \( (CN'/PP-OF)/PP-TO \) \( \Rightarrow \)
\( \lambda \rho \lambda Q \lambda p P [\lambda y[Q(\lambda z[state*(z, p, y)])]] \)
announcement \( (CN'/PP-OF)/PP-TO \) \( \Rightarrow \)
\( \lambda \rho \lambda Q \lambda p P [\lambda y[Q(\lambda z[announce*(z, p, y)])]] \)
proclamation \( (CN'/PP-OF)/PP-TO \) \( \Rightarrow \)
\( \lambda \rho \lambda Q \lambda p P [\lambda y[Q(\lambda z[proclaim*(z, p, y)])]] \)
proposal \( (CN'/PP-OF)/PP-TO \) \( \Rightarrow \)
\( \lambda \rho \lambda Q \lambda p P [\lambda y[Q(\lambda z[propose*(z, p, y)])]] \)

Here too one must be careful in proposing such translations. One reading of proposal, for instance, has become solidly tied to marriage. Again the relations between these nouns and three-place verbs could be explicated with meaning postulates. The rules and translations described so far allow the generation and translation of the terms in (42).
(42) a. the belief of John
b. the belief
c. the report of John to Bill
d. the report of John
e. the report to Bill
f. the report

The nouns cause, result and consequence are of category CN'/PP-OF'; they map PP-OF', phrases, which are based on proposition-level terms, into proposition-level common nouns. Terms like the cause and the result of the problem are generated and translated by the following rules.

R47. If \( \alpha \in B_{PP-OF'/ (t^2 IV')} \) and \( \beta \in P_{t^2 IV} \),
then \( (\alpha, \beta) \in P_{PP-OF'}. \)
Realisation: \( \alpha \sim \beta \)
Translation: \( \alpha'( \beta') \)

R48. If \( \alpha \in P_{CN'/PP-OF'} \) and \( \beta \in P_{PP-OF'} \), then \( (\alpha, \beta) \in P_{CN'}, \)
Realisation: \( \alpha \sim \beta \)
Translation: \( \alpha'( \beta') \)

R49. If \( \alpha \in P_{CN'/PP-OF'} \), then \( (\alpha) \in P_{CN'} \).
Realisation: \( \alpha \)
Translation: \( \alpha'( \lambda x \{ [R(q)] \}) \)

If such nouns are treated as semantic constants, their translation might be as in (43). I assume the semantics of CAUSE defined in Janssen 1978.7

(43) cause \( CN'/PP-OP' \) \( \lambda \rho \lambda \rho \{ \lambda q [CAUSE(p, q)] \} \)
consequence \( CN'/PP-OP' \) \( \lambda \rho \lambda \rho \{ \lambda q [CAUSE(q, p)] \} \)
result \( CN'/PP-OP' \) \( \lambda \rho \lambda \rho \{ \lambda q [CAUSE(q, p)] \} \)

Once again, the causality involved in a sentence like The plan caused the disaster could be explicated by meaning postulates rather than in the logical form. From a syntactic point of view, and for
the purposes of this discussion, the choice is open. In what follows, other suggested translations for semantic constants will continue to be provided from time to time, with the understanding that they are to be taken with a grain of salt.

5.2.2.2 IV' and sentence formation

5.2.2.2.1 Copula of identity

To form sentences, proposition-level IV's are joined with proposition-level T's. One simple way to form an IV' is with the proposition-level be of category IV'/T', which maps proposition-level terms into proposition-level intransitive verbs.

R50. If α ∈ P_{IV'/T'} and β ∈ P_T, then (α, β) ∈ P_{IV'}.
Realisation: α ≅ β
Translation: α '(^\beta ')

R51. If α ∈ P_T and β ∈ P_{IV'}, then (α, β) ∈ P_t.
Realisation: α ≅ β
Translation: α '(^\beta ')

(44) \{(the_{t/2IV'})/CN', fact_{CN'}t/2IV', R42'
   (be_{IV'/T'}t', {that_{t/IV'})/t'
   (John_{T'} swim_{IV'}t, R1_{t/IV'}t', R41_{IV'}, R50_{t}, R51
Realisation: The fact is that John swims.
Translation:
1. (that, (John, swim))_{t/IV'} \Rightarrow \lambda RR([swim'(j)])
   See previous examples
2. be_{IV'/T'} \Rightarrow \lambda R\lambda pR([\lambda q[p=q]])
   Basic
3. (be, {that, (John, swim)})_{IV'} \Rightarrow
   \lambda R\lambda pR([\lambda q[p=q]] ([\lambda RR([swim'(j)])])
   From 1, 2 by R50
4. \lambda p[p = [swim'(j)]]
   Lambda conversion
5. (the, fact)_{t/2IV'} \Rightarrow \lambda RVp_1[\Lambda q[\text{factor}'(q) \leftrightarrow q=p_1] & R(p_1)]
   See previous examples
6. ((the, fact), (be, {that, (John, swim)}))_{t} \Rightarrow
   \lambda RVp_1[\Lambda q[\text{factor}'(q) \leftrightarrow q=p_1] & R(p_1)] ([\lambda p[p = [swim'(j)]])
   From 4, 5 by R51
7. \( \text{Vp}_1[\text{Aq}[\text{fact}(q) \iff q=c_1] \land c_1 = \text{\textasciitilde}[\text{swim}(j)]] \)

Lambda conversion

\[
(45) \quad \{\text{the}(t^{2IV'})/CN', \{\text{belief}_{CN'/PP-OF'}, \\
\text{of}_{PP-OF'/T'} \text{John}_{T'PP-OF, R25} \}CN', \\
R43\}t^{2IV'}, R42' \text{be}_{IV'/T'} \\
\text{that}(t/IV')/t' \text{[Mary}_{t'} \text{sing}_{IV'}t', \\
R1\}t/IV', R41\}IV', R50\}t, R51
\]

Realisation: The belief of John is that Mary sings.

Translation: \( \text{Vp}[\text{Aq}[\text{believe}_*(j,q) \iff q=c_1] \land c_1 = \text{\textasciitilde}[\text{sing}_*(m)]] \)

5.2.2.2.2 Copula of predication

5.2.2.2.2.1 Basic ADJ's and PNOM's

The copula of predication, \( \text{be}_{IV'/PRED'} \), makes IV's out of various members of PRED', which is a cover category for \( (Pt/3t \cup Pt/4t \cup Pt/5t) \). The following rules are very similar to those at individual level.

\[
\begin{align*}
\text{R52. If } & \alpha \in \text{B}_{IV'/PRED'} \text{ and } \beta \in \text{P}_{\text{PRED'}}, \text{ then } (\alpha, \beta) \in \text{P}_{IV'}. \\
\text{Realisation: } & \alpha \overset{\sim}{\rightarrow} \beta \\
\text{Translation: } & \alpha'(\sim \beta').
\end{align*}
\]

\[
\begin{align*}
\text{R53. If } & \alpha \in \text{P}_{CN'}, \text{ then } (\alpha(n), \alpha) \in \text{P}_{\text{PNOM}'} \\
\text{Realisation: } & \alpha(n) \overset{\sim}{\rightarrow} \alpha \\
\text{Translation: } & \alpha'.
\end{align*}
\]

Adjectives like \( \text{false}_{t/3t} \) and \( \text{odd}_{t/4t} \) are basic PRED's in this fragment, and they can appear in predicate position without any recourse to dummy noun deletion or any other transformation. Delacruz (1976) follows Montague's precedent for adjective analysis even at proposition level, so all his proposition-level adjectives are basic members of the category CN'/CN'. The arguments against this approach are the same as those used to support my analyses at the individual level (see Chapters 2 and 3) and will not be repeated here.
(46) \((\text{the}(t/IV')/CN', \text{proposition}_{CN', t/IV'}, R42') \)
\((\text{be}_{IV'}/\text{PRED}'', \text{false}_{t/3't}'), R52_1t, R51\)
Realisation: The proposition is false.
Translation: \(Vp[Aq(\text{proposition}'(q) \leftrightarrow q \equiv p] \& \text{false}'(p)]\)

Predicate nominals of category \(t/5t\) (or PNOM') are constructed by
adding apparent indefinite articles to CN's. The following example
assumes that \(\text{fact}_{CN'}\) translates as \(\text{fact}'\).

(47) \(((\text{that}(t/IV')/t', \text{John}_{t', \text{swim}_{IV'}}t, R1_{t/IV'}, R41') \)
\((\text{be}_{IV'}/\text{PRED}'', \text{a, fact}_{CN'}_{PNOM'}, R53_{IV'}, R52_1t, R51\)
Realisation: That John swims is a fact.
Translation: \(\text{fact}'(\{\text{swim}'(j)\})\)

If \(\text{fact}_{CN'}\) translates as \(\lambda p[\text{p}]\), then the translation in (47) would
be \(\text{swim}'(j)\) (see Section 5.2.2.1).

5.2.2.2.2 Adjectives taking PP-TO complements

Berman (1973a:221-222; see also Postal 1971:45) identifies a
small class of adjectives, including clear, unbelievable, inconceivable,
important and obvious, which optionally take PP-TO complements and
combine with proposition-level terms.\(^8\)

(48) That John is ill is clear (to Mary).

The status of these adjectives as proposition-level operators is
fairly uncontroversial, but the treatment of the prepositional phrase
is more difficult. If obvious is translated as a one-place predicate
of propositions, the translation of (48) would be something like
(49), with to Mary acting as some kind of sentence adverbial.

(49) to-Mary'('\{obvious'(\{ill'(j)\})\})

That would leave obvious'(p), for any proposition p, as something
which could be evaluated as it is in any world, including the real
one. The problem here is that the obviousness of a proposition is
relative to psychological states, much like knowledge and belief.
This points to letting the PP-TO phrase supply an individual argument for *obvious*, which translates as a two-place relation between individuals and propositions. This approach is especially attractive given examples like (50a) and (51a), which have closely related paraphrases based on two-place verbs.

(50) a. It is unbelievable to John that Mary cheats.
   b. John cannot believe that Mary cheats.

(51) a. It is conceivable to Mary that John cheats.
   b. Mary can conceive that John cheats.

I have therefore assigned this class to the category \((t/3t)/\text{PP-TO}\). One way to show the relationship of these adjectives to verbs is to give them explicit translations in terms of the two-place relations which translate the verbs.

\[
\begin{align*}
\text{apparent} & : \lambda P \lambda p (\lambda y [\text{appear}*(y,p)]) \\
\text{clear} & : \lambda P \lambda p (\lambda y [\text{clear}*(y,p)]) \\
\text{conceivable} & : \lambda P \lambda p \downarrow (\lambda y [\text{conceive}*(y,p)]) \\
\text{evident} & : \lambda P \lambda p (\lambda y [\text{evident}*(y,p)])
\end{align*}
\]

The following rules are generalised to handle basic two-place adjectives like *clear*, derived two-place adjectives and other similar derived operators to be discussed later.

\[
\begin{align*}
\text{R54. If } & \alpha \in P_{(t/3t)}/\text{PP-TO} \text{ and } \beta \in P_{\text{PP-TO}} \text{ then } \{\alpha, \beta\} \in P_{t/n_t} \\
\text{(where } n \text{ ranges over the set } \{1,3,4,6\}). \\
\text{Realisation: } & \alpha \prec \beta \\
\text{Translation: } & \alpha' (\beta')
\end{align*}
\]

\[
\begin{align*}
\text{R55. If } & \alpha \in P_{(t/3t)}/\text{PP-TO} \text{ then } \{\alpha\} \in P_{t/n_t} \\
\text{(where } n \text{ ranges over the set } \{1,3,4,6\}). \\
\text{Realisation: } & \alpha \\
\text{Translation: } & \alpha' (\lambda p \forall z [P(z)])
\end{align*}
\]

Using these rules, it is possible to handle examples such as (53) and (54).
(53) That Bill cheats is clear to John.
(53') clear\'(j, ^[cheat'(b)])

(54) That Bill cheats is obvious.
(54') Vz[obvious\'(z, ^[cheat'(b)])]

As with many other examples in the fragment, (54') shows that the hole left by a missing optional argument is filled with a bound variable. This is much the same as the treatment of bare passives as in (55).

(55) John is loved.
(55') Vz[love\'(z,j)]

Of course, this solution for a bare obvious has all the drawbacks already noted for a bare past participle such as loved (see Chapter 3 note 16). First, the logical form, involving a quantifier, is somewhat divorced from the syntactic form. Second, the translation with an existential quantifier often appears too weak; when we claim that a proposition is clear, we often mean that it is clear to, or believed by, some significant number of people—one will hardly suffice. In discourse, the bare adjectives clear and obvious are often applied to propositions as a form of social coercion; that is, to assert that p is obvious is often pragmatically equivalent to everyone (and, therefore, you) should believe p. These are general problems also noted by Bach (1980:333-334), and their investigation, which would lead far away from adjectives, cannot be pursued here.

5.2.2.2.2.3 Adjectives taking PP-FOR complements

Whereas the PP-TO complements of adjectives like obvious optionally supply subjects of two-place relations, the PP-FOR complements of adjectives like beneficial and inconvenient generally appear to supply direct objects of two-place relations. Compare the following pairs.

(56) a. That Mary is coming is inconvenient for John.
    b. That Mary is coming inconveniences John.
(57) a. It is beneficial for Mary that John is rich.
   b. It benefits Mary that John is rich.

I have proposed the category \((t^4t)/PP\)-FOR for these adjectives; but the membership is debatable, and individual lexical items can behave idiosyncratically. One possible way to handle this class is to give explicit translations to individual entries as in (58). All the examples involve some variation of beneficiality (or the opposite) to the object.

(58) bad  \[ \lambda P\lambda p(\neg\lambda y[\text{harm},(p,y)]) \]
benificial  \[ \lambda P\lambda p(\lambda y[\text{benefit},(p,y)]) \]
convenient  \[ \lambda P\lambda p(\lambda y[\text{help},(p,y)]) \]
fortunate  \[ \lambda P\lambda p(\lambda y[\text{benefit},(p,y)]) \]
good  \[ \lambda P\lambda p(\lambda y[\text{benefit},(p,y)]) \]
harmful  \[ \lambda P\lambda p(\lambda y[\text{harm},(p,y)]) \]
helpful  \[ \lambda P\lambda p(\lambda y[\text{help},(p,y)]) \]
inconvenient  \[ \lambda P\lambda p(\lambda y[\text{inconvenience},(p,y)]) \]
lucky  \[ \lambda P\lambda p(\lambda y[\text{benefit},(p,y)]) \]
pleasant  \[ \lambda P\lambda p(\lambda y[\text{please},(p,y)]) \]
profitable  \[ \lambda P\lambda p(\lambda y[\text{profit},(p,y)]) \]
unfortunate  \[ \lambda P\lambda p(\lambda y[\text{harm},(p,y)]) \]
unlucky  \[ \lambda P\lambda p(\lambda y[\text{harm},(p,y)]) \]
unpleasant  \[ \lambda P\lambda p(\lambda y[\text{displease},(p,y)]) \]
useful  \[ \lambda P\lambda p(\lambda y[\text{benefit},(p,y)]) \]

However, given the idiosyncratic nature of these adjectives, the harmfulness or benefit reflected in the translations above is better shown through meaning postulates. For instance

\[ A\lambda A\lambda p[\delta(P)(p) \rightarrow P(\lambda x[\text{harm},(p,x)])] \]

where \(\delta\) translates \text{bad}, \text{harmful}, \text{inconvenient}

\[ A\lambda A\lambda p[\delta(P)(p) \rightarrow P(\lambda x[\text{benefit},(p,x)])] \]

where \(\delta\) translates \text{beneficial}, \text{convenient}, \text{fortunate}, \text{good}, \text{helpful}, \text{useful}

Whether explicit definitions or meaning postulates are used, the
following rules will effect the necessary syntactic and semantic combinations.

R56. If $\alpha \in P(t^{4}/t)/PP-FOR$ and $\beta \in PP-FOR$ then $\{\alpha, \beta\} \in P_{t^{4}}$.
   Realisation: $\alpha ' \beta$
   Translation: $\alpha '(' \beta ')$

R57. If $\alpha \in P(t^{4}/t)/PP-FOR$ then $\{\alpha\} \in P_{t^{4}}$.
   Realisation: $\alpha$
   Translation: $\alpha '(' paVz[P(z)])$

As will be seen below, derived members of $P(t^{4}/t)/PP-FOR$ such as disappointing can be formed from disappoint and other verbs of category IV'/T. For now we can handle examples such as (59).

(59) {
   \{the(t^{2}/IV')/CN', situation(CN')t^{2}/IV', R42',
   be(IV'/PREd', bad(t^{4}/t)/PP-FOR',
   [for PP-FOR/T', Mary(T)/PP-FOR, R23], t^{4}/t, R56')IV', R52', R51
   Realisation: The situation is bad for Mary.
   Translation: a. (semantic constant approach)
   \[Vp[Aq[situation'(q) \leftrightarrow q=p] \& harm'(p,m)]\]
   b. (relying on meaning postulates)
   \[Vp[Aq[situation'(q) \leftrightarrow q=p] \& bad'(p,m)]\]

Rule R57 allows the PP-FOR complement to be omitted syntactically; semantically the effect is to fill the direct object slot with an existentially quantified variable.

5.2.2.2.4 Individual-level adjectives with t/IV' complements

There are two classes of individual-level adjectives in the fragment which take that-t complements. The first is of category ADJ/(t/IV') and includes the adjectives in (60). This class was recognised by Lees (1963:22, 81-82).

(60) afraid, aware, certain, confident, conscious, sure, suspicious
Afraid is historically related to the archaic verb affray ('frighten') and might be translated as \( \lambda R \lambda z R(\lambda q[frighten^*(q,z)]) \) or perhaps \( \lambda R \lambda z R(\lambda q[fear^*(z,q)]) \). Similarly, suspicious is related to suspect and could translate as \( \lambda R \lambda z R(\lambda q[suspect^*(z,q)]) \). The other words seem to be loosely related to know, believe, realise or assert (perhaps assert forcefully). In this case, there is little doubt that it is better in the end to let an adjective like certain translate as the two-place relation certain', and force any intuitive consequences with meaning postulates. R58 handles these basic examples and some derived ones to be presented later.

R58. If \( \alpha \in P_{ADJ}^n(t/IV) \) and \( \beta \in P_{t/IV} \), then \( (\alpha, \beta) \in P_{ADJ} \) (where \( n \) ranges over the set \( \{1,2\} \)).

Realisation: \( \alpha \overset{\neg}{\rightarrow} \beta \)
Translation: \( \alpha'(\neg \beta') \)

Assuming, for purposes of exposition, that afraid does translate in terms of fear' as \( \lambda R \lambda z R(\lambda q[fear^*(z,q)]) \), example (61) shows a sample derivation.

\[
(61) \begin{align*}
&\text{(John T', (be IV/PRED' (afraid ADJ/(t/IV')))'} \\
&\text{(that (t/IV')/t'} (Mary T', (be IV/PRED' ill ADJ)IV),} \\
&\text{R2}^{t}, R^{t/IV'}, R^{41})ADJ, R^{58}IV, R^{2}t, R^{1} \\
\text{Realisation: John is afraid that Mary is ill.}
\end{align*}
\]

Translation:

1. \( \text{(that, (Mary, (be, ill)))t/IV'} \Rightarrow \lambda RR(\hat{[\text{ill'}(m)])} \)
   See previous examples
2. \( \text{afraid ADJ/(t/IV')} \Rightarrow \lambda R \lambda z R(\lambda q[fear^*(z,q)]) \)
   Basic
3. \( \text{[afraid, (that, (Mary, (be, ill))))]ADJ} \Rightarrow \lambda R \lambda z R(\lambda q[fear^*(z,q)]) (\lambda RR(\hat{[\text{ill'}(m)])}) \)
   From 1, 2 by R58
4. \( \lambda z[fear^*(z, \hat{[\text{ill'}(m)])} \)
   Lambda conversion
5. \( \text{be IV/PRED} \Rightarrow \lambda P[\neg P] \)
   Basic
of course, another reading of afraid conveys sorrow or regret rather than actual fear.

The lexical rule R59 allows some of these adjectives to appear without the t/IV' complement.

R59 (lexical). If α ∈ P_{ADJ/(t/IV')} then {α} ∈ P_{ADJ}.

Realisation: α
Translation: α'(^λRVq[R(q)])

(62) (Bill, (be, (afraid, (that, (Mary, (be, ill))))))

Realisation: Bill is afraid.
Translation: Vq[fear'(b,q)]

Another treatment for a bare afraid, perhaps involving a separate reading, is simply to classify it as a basic ADJ with the translation afraid'. The sentence John is afraid would then translate as afraid'(j). This would be an especially appropriate solution for a reading in which a person is afraid without there being anything actually frightening him.

A second class of adjective, of category ADJ^2(t/IV') is syntactically similar to the class just discussed, but presents very different problems for interpretation.

(63) angry, bitter, ecstatic, furious, glad, grateful, happy, sad, sorry, thankful, proud

These adjectives take t/IV' complements as in (64).
(64) John is glad that Mary is well.

Such adjectives have been noticed by Lees (1963:81), Quirk et al. (1972:824) and Silva & Thompson (1977:111). Both Silva & Thompson and Jespersen (1940:Pt. V, p.259) suggest that such sentences are properly read with since or because as in (64').

(64') John is glad BECAUSE Mary is well.

Before resorting to because or cause in translating these sentences, it would be well to examine the less drastic alternatives. If glad simply translates as a two-place relation glad', we would get derivations and readings like the following.

(65) John is glad that Mary is well

(65') glad'(j, \text{well}'(m))

This analysis treats glad' like believe' or think' as two-place relations between an individual and a proposition. Two considerations argue strongly against this treatment. First, glad and the other ADJ/2(t/IV') examples appear to be solidly related to one-place rather than to two-place predicates. Glad' intuitively takes a single argument as in (66'). If glad' were a two-place relation as in (65'), then (66) would need to translate as something like (66'').

(66) John is glad.
(66') glad'(j)
(66''') Vp[glad_2(j,p)]

The second consideration is that there exist recognisable two-place relations based on the adjectives in question.
One-Place Two-place

angry       anger
bitter      embitter
glad        gladden
furious     infuriate
grateful    gratify
sad          sadden

Happy is non-morphologically related to the verbs cheer (up) or please, and thankful is close in meaning to grateful. In addition, all ADJ/2(t/IV') forms join with make to form two-place relations: make-sad', make-glad', make-happy', etc.

That Mary is well makes John glad/angry/sad/bitter.

Make-glad' or gladden' could paraphrase as 'cause to be happy', or, like the generative semanticists, 'cause to become happy' (Dowty 1976). In any case, the existence of gladden' and make-glad' make it very difficult to see glad' as other than a one-place predicate. For these reasons I have chosen to analyse this small class of adjectives in terms of the CAUSE relation. The members of the ADJ/2(t/IV') class will receive translations as in (69).

(69) angry \( \lambda R \lambda z R (\forall q [\text{CAUSE}(q, \text{angry}'(z))] ) \)
bitter \( \lambda R \lambda z R (\forall q [\text{CAUSE}(q, \text{bitter}'(z))] ) \)
glad \( \lambda R \lambda z R (\forall q [\text{CAUSE}(q, \text{glad}'(z))] ) \)

The examples in this class all exemplify human emotions or perhaps reactions. If they constitute a distinguishable subclass ADJe of ADJ, we can lexically derive the ADJ/2(t/IV') class from them.

R (lexical). If \( \alpha \in \text{PADJe} \) then \( \{ \alpha \} \in \text{B}_{\text{ADJ/2(t/IV')}} \).

Realisation: \( \alpha \)

Translation: \( \lambda R \lambda z R (\forall q [\text{CAUSE}(q, \alpha'(z))] ) \)

Yet another possibility, that of defining this class of adjectives in terms of make-ADJ readings, will be discussed in Section
5.2.2.2.3.1. Accepting the present translations shown in (69) and using R58, (70) shows a sample derivation.

(70) \[(\text{John}_T', \text{be}_{IV/PRED}', \text{glad}_{ADJ}/(t/IV'))',
\{(\text{that}(t/IV')/t', \text{Mary}_T', \text{be}_{IV/PRED}')\}
\{\text{well}_{ADJ}/IV, R2_1t, R1_1t/IV',
R41_1ADJ, R58_1IV, R2_1t, R1\}
Realisation: John is glad that Mary is well.
Translation: \text{CAUSE}(\text{well}'(m), \text{glad}'(j))

5.2.2.2.3 Verbal IV's

5.2.2.2.3.1 The $IV'/T$ and $IV'/^2T$ transitive verbs

The $IV'/T$ and $IV'/^2T$ classes of transitive verb map individual-level terms into proposition-level IV's; basic members include interest, surprise, bother and annoy. These verbs all appear to have corresponding twins of category TV, and their syntax is very similar.

(71) a. John bothers Mary.
    b. That John cheats bothers Mary.
R60 is much like R3.

R60. If $\alpha \in P_{IV'/^2T}$ and $\beta \in P_{T}$ then \{$\alpha, \beta$\} $\in P_{IV'}$
(where $n$ ranges over the set \{1,2\}).
Realisation: $(\{(\text{make}, \delta_{ADJ}/IV'/^2T, \beta_{T}/IV' \Rightarrow \text{make} \downarrow \beta \downarrow \delta
else \alpha \downarrow \beta
Translation: $\alpha'(\downarrow \beta')$

Examples are straightforward.

(72) $(\{(\text{that}(t/IV')/t', \text{John}_T', \text{swim}_{IV}/t, \text{R1}_1t/IV',
R41_1\text{bother}_{IV'/T}, \text{Mary}_T'/IV', R60_1t, R51\}
Realisation: That John swims bothers Mary.
Translation: bother$_1'(\downarrow \{\text{swim}'(j), m\}$
Derived IV'/Ts are formed with make, which is of category (IV'/T)/ADJ.

R61. If \( \alpha \in P(\text{IV'}/T)/\text{ADJ} \) and \( \beta \in P_{\text{ADJ}} \) then \( \{\alpha, \beta\} \in P_{\text{IV'}/T'} \).

Realisation: \( \alpha \sim \beta \)

Translation: \( \alpha'(\beta') \)

This allows the generation of IV'/Ts like make sad, which are discontinuously realised around their T direct objects as in make Mary sad.

\[ (73) \text{((that, (t/IV'))/t', John, (be, (IV'/PRED')) ill, ADJ, IV, R2, R1)/t'/IV', R41') (make (IV'/T)/ADJ, sad, ADJ)/IV'/T', R61', Mary, IV', R60])/t, R51} \]

Realisation: That John is ill makes Mary sad.

Translation:

1. \( \text{make (IV'/T)/ADJ} \Rightarrow \text{make'} \) Basic
2. \( \text{sad, ADJ} \Rightarrow \text{sad'} \) Basic
3. \( \text{(make, sad)}/IV'/T \Rightarrow \text{make'('sad')} \) From 1, 2 by R61
4. \( \text{Mary}_T \Rightarrow \text{\lambdaPP(m)} \) Proper name
5. \( \text{((make, sad), Mary)}/IV' \Rightarrow \text{make'('sad')}(\text{\lambdaPP(m)}) \) From 3, 4 by R60
6. \( \text{(that, (John, (be, ill)))}/t'/IV' \Rightarrow \text{\lambdaRR(['ill'(j)])} \) See previous examples
7. \( \text{((that, (John, (be, ill))), ((make, sad), Mary))/t} \Rightarrow \text{\lambdaRR('ill'(j)))['make'('sad')(\text{\lambdaPP(m))})] \) From 5, 6 by R51
8. \( \text{make'('sad')(\text{\lambdaPP(m)(['ill'(j)])} \) Lambda conversion

M.P. P7 allows this result to be expressed in terms of CAUSE.

M.P. P7. \( \text{\lambdaPP(\text{CAUSE})[\text{make'}(P)(P)(p) \Rightarrow \text{CAUSE}(p, P(p))]} \)

Using this meaning postulate, we can derive \( \text{CAUSE(ill'(j), sad'(m))} \) from line 8 of example (73). Of course, by treating \( \text{make (IV'/T)/ADJ} \) as a semantic constant, giving it the translation \( \text{\lambdaPP(\text{CAUSE})[\text{\lambdaPP(m)]} \)
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$P(P))$, we can get the same result and dispense with M.P. P7.

This suggests another analysis for the $\text{ADJ/}(t/IV')$ adjectives like 'glad and sad discussed in Section 5.2.2.2.4. If basic glad, sad and the other examples translate as one-place predicates and belong to a distinguishable subcategory $\text{ADJ}_e$ of ADJ, then the following is a lexical rule relating them to $\text{ADJ/}^2(t/IV')$'s.

\[ R \text{ (lexical). If } a \in \text{PADJ}_e \text{ then } (a) \in \text{B}_{\text{ADJ/}^2}(t/IV'). \]

\[ \text{Realisation: } a \]

\[ \text{Translation: } \lambda R \lambda z R(\lambda q[\text{make'}(\hat{a}')(\lambda P P(z))(q)]) \]

The CAUSE relationship intuitively recognised in sentences like (74) would then be explicable by way of M.P. P7.

(74) John is glad that Mary is well.

For basic causative IV'/Ts like sadden and gladden, one could translate them directly as sadden' and gladden', indirectly as $\lambda P \lambda p[\text{make'}(\hat{sad'})(P)(p)]$ and $\lambda P \lambda p[\text{make'}(\hat{glad'})(P)(p)]$, or even less directly in terms of CAUSE. The first alternative is illustrated in example (75).

(75) ([that(\t/IV')\t, (John_\text{IV/PRED}, \text{ill}_{\text{ADJ}})_\text{IV}, R_2]),

\[ \text{Realisation: That John is ill saddens Mary.} \]

\[ \text{Translation: sadden'}('\text{ill'(j)'}, m) \]

We can then supplement the analysis with meaning postulates like those in (76) or (77).

(76) $\Delta P \Delta p[\text{sadden'}(P)(p) \rightarrow \text{make'}(\hat{sad'})(P)(p)]$

(77) $\Delta P \Delta p[\text{sadden'}(P)(p) \rightarrow \text{CAUSE'}(p, P[\hat{sad'}])]$

\[ \Delta P \Delta p[\text{gladden'}(P)(p) \rightarrow \text{CAUSE'}(p, P[\hat{glad'}])] \]
The grammar leaves the choices open.

Verbs of category IV'/T, such as amuse, but not those of category IV'/2T, such as delight, also form adjectivals with an -ing suffix. Both IV'/Ts and IV'/2Ts form passives.

R62 (lexical). If $\alpha \in P_{IV'/T}$ then $(\alpha, \text{ING}) \in P_\text{t/4IV}/(t/nIV)$
(where $n$ ranges over the set $\{2, 5\}$, $t/2IV$ is PP-TO and $t/5IV$ is PP-POR).

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the -ing form

Translation: $\alpha'$

R63. If $\alpha \in B_{IV'/n_T}$ then $(\alpha, \text{PASS}) \in P_{ADJ}/(t/IV')$
(where $n$ ranges over the set $\{1, 2\}$).

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the past participle form

Translation: $\lambda R \lambda x R(\lambda p[\alpha'(\lambda PP(x))(p)])$

R64. If $\alpha \in B_{IV'/n_T}$ then $(\alpha, \text{PASS}) \in P_{ADJ/PP-BY'}$
(where $n$ ranges over the set $\{1, 2\}$).

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the past participle form

Translation: $\lambda R \lambda x R(\lambda p[\alpha'(\lambda PP(x))(p)])$

R65. If $\alpha \in P_{ADJ/PP-BY'}$ and $\beta \in P_{PP-BY'}$ then $(\alpha, \beta) \in P_{ADJ'}$

Realisation: $\alpha'^{\beta}$

Translation: $\alpha'(\beta')$

R66. If $\alpha \in B_{PP-BY'}/(t/2IV')$ and $\beta \in P/t/2IV'$ then $(\alpha, \beta) \in P_{PP-BY'}$

Realisation: $\alpha'^{\beta}$

Translation: $\alpha'(\beta')$

R67. If $\alpha \in P_{ADJ/PP-BY'}$ then $(\alpha) \in P_{ADJ}$

Realisation: $\alpha$

Translation: $\alpha'(\lambda RVq[R(q)])$
As at individual level (compare R20 and R62), present participles of transitive verbs take PP-TO or PP-FOR phrases idiosyncratically. Thus while \( \text{interest}^\text{IV'/T'} \text{ING} \) would appear to be most naturally categorised as a \( (t^4/t)/\text{PP-TO} \), \( \text{bore}^\text{IV'/T'} \text{ING} \) is more comfortably classified as a \( (t^4/t)/\text{PP-FOR} \). Semantically there is no difference between the two constructions as PP-TO and PP-FOR phrases translate with the same type.

(78) a. That John is in gaol is interesting to me.
    b. That Mary has been arrested again is boring for me.

The syntactic alternation in PP complements is also noted in some basic members of \( (t^4/t)/\text{PP-FOR} \) such as beneficial, helpful and instructive. They are capable, with varying degrees of acceptability, of taking PP-TO complements as well.

(79) The report is beneficial \{for us\}
    \{to us\}
(80) This situation is instructive \{for us\}
    \{to us\}

This being the case, we might well include such adjectives as basic members of \( B(t^4/t)/\text{PP-TO} \), which has so far been left empty.

Other candidates for \( B(t^4/t)/\text{PP-TO} \) include adjectives like delightful and bothersome, which are idiosyncratically related to the IV'/2T's delight and bother. The only other two members of IV'/2T listed are bug and chuff. The existence of forms like delightful and bothersome, plus the newness of the slang words bug and chuff, accounts for the separateness of the IV'/2T class and their resistance to taking adjectival ING forms.

(81) *That John won the race is \{delighting\} to Bill
    \{bothering\}
    \{chuffing\}
    \{bugging\}
An example of present participle formation for an IV'/T verb *interest* is shown in (82).

(82) \[((\text{that } (t/IV'))/t' \text{ (John, } \text{ be } IV/PRED' \text{ ill }) \text{ADJ}IV, R2I, R1I/t/IV', R4I' \text{ be } IV'/PRED', \{(\text{interest } IV'/T, \text{ ING}) (t'/4t)/PP-TO, R62' \text{ to } PP-TO/T' \text{ Bill } (t/4t)/PP-TO, R10I/t'/4t, R54'I', R52I', R51I \text{ Realisation: That John is ill is interesting to Bill.} \text{ Translation:} \text{ } \\
1. \text{interest}_{IV'/T} \Rightarrow \text{interest'} \text{ Basic} \\
2. \{(\text{interest}, \text{ ING}) (t'/4t)/PP-TO \Rightarrow \text{interest'} \text{ From 1 by R62} \\
3. \{(\text{to, Bill}) PP-TO \Rightarrow \lambda PP(b) \text{ See previous examples} \\
4. \{(\text{interest}, \text{ ING}), \{(\text{to, Bill})\}_t/t' \Rightarrow \text{interest'}(\lambda PP(b)) \text{ From 2, 3 by R54} \\
5. \text{be } IV'/PRED' \Rightarrow \lambda R[R] \text{ Basic} \\
6. \{(\text{be, } \{(\text{interest}, \text{ ING}), \{(\text{to, Bill})\}_IV' \Rightarrow \lambda R[R](\text{interest'}(\lambda PP(b))) \text{ From 4, 5 by R52} \\
7. \text{interest'}(\lambda PP(b)) \text{ Lambda conversion} \\
8. \{(\text{that, (John, } \text{ be, ill})\}_t/IV' \Rightarrow \lambda RR(\text{ill'}(j)) \text{ See previous examples} \\
9. \{(\text{that, (John, } \text{ be, ill})\}_t \Rightarrow \lambda RR(\text{ill'}(j)) (\text{interest'}(\lambda PP(b))) \text{ From 7, 8 by R51} \\
10. \text{interest'}(\lambda PP(b))(\text{ill'}(j)) \text{ Lambda conversion} \\
11. \lambda PP(b) (\lambda y[\text{interest'}(\text{ill'}(j)), y]) \text{ First-order reduction} \\
12. \text{interest'}(\text{ill'}(j), b) \text{ Lambda conversion} \\

The constituent (interest_{IV'/T} \text{ ING})(t'/4t)/PP-TO can be 'bumped' to a t'/t by the relation-reducing rule R55, allowing the proper generation and translation of sentences with patientless present participles such as That John *is ill* is interesting (see Section
The passives of basic IV'/T verbs behave as individual-level ADJS. As the propositional subject of an IV'/T like bother can hardly be called an agent, I shall adopt the terms bare and full, rather than agentless and agentive, when speaking of these passive examples. Full passives of IV'/T verbs come in both a by and a by-less form. As the translation of the passive verb is the same in both cases, the difference is purely syntactic.

(83) Full passive, by-form

\[
\begin{aligned}
\text{Realisation: } & \text{John is astonished by the fact.} \\
\text{Translation: } & V_p[A_q[fact'(q) \leftrightarrow q=p] \& astonish'_*'(p, j)] \\
\end{aligned}
\]

The translation of (83) is, of course, the same as that for the sentence the fact astonished John. By-less passives are very similar but simply apply to a proposition-level term, in particular a t/IV', rather than to a prepositional phrase based on a t/2IV' term.

(84) Full passive, by-less form

\[
\begin{aligned}
\text{Realisation: } & \text{John is astonished that Bill sings.} \\
\text{Translation: } & \text{astonish}'_*'([\text{sing}'(b)], j) \\
\end{aligned}
\]

The translation of (84) is equivalent to that for the sentence that Bill sings astonished John. The bare passive analysis simply fills the missing argument slot with a quantified variable, as with agentless passives at the individual level.
(85) Bare passive
\[\text{(Bill_T, \{be_{IV/PRED}' [(astonish_{IV'/T}' \}
\text{PASS})_{ADJ/PP-BY', R64}]_{ADJ}, R67)_{IV}, R2)}_{t, R1}\]
Realisation: John was astonished.
Translation: Vp[astonish*(p, j)]

There are, understandably, many similarities between passives of TVs (i.e. of IV/Ts) and passives of IV'/T verbs. One difference is the existence of a by-less passive for the IV'/T class. Another difference is that \text{-able forms}, which are closely related to passives, can be generated from TVs but not at all easily from IV'/Ts. Such IV'/T \text{-able forms} would make perfect sense, but it seems that, on the whole, English speakers have not exploited them.

(86) ?John is astonishable that Mary swims.
(86') \text{Vz}[astonish*(\text{swim'(m)}, j)]

5.2.2.2.3.2 Other verbal IV's

The fragment contains a number of examples of verbal IV's, including some questionable basic ones like suffice.

(87) That John survived suffices.
(87') suffice*(\text{survive'(j)}])

Some more solid examples include IV'/PP-TOs like matter and make-sense. Sentences like (88) and (89) can be generated and translated with the rules R54 and R55 defined in Section 5.2.2.2.2.2.

(88) That John survived matters to Mary.
(88') \text{matter*(\text{survive'(j)}, m)}
(89) That John survived matters.
(89') \text{Vz[matter*(\text{survive'(j)}, z)]}

Much more common are proposition-level predicates which require the subject term to be postposed, with a dummy it being placed at the beginning of the sentence. Such predicates, like happen, are assigned to category t/*.t.
R68. If \( \alpha \in P_{t/IV} \) and \( \beta \in P_{t/6t} \) then \( (\alpha, \beta) \in P_t \).

Realisation: \( \text{it } \beta \alpha \)

Translation: \( \alpha'(\beta') \)

(90) \( ((\text{that} \ (t/IV')/t' \ (John_t \ (\text{be}_{IV/PRED} \ ill_{ADJ})_{IV}, R_2_t, R_{1'})_{t/IV'}, R_{41'} \ \text{happen}_{t/6t}, R_{68} \ \text{realisation}) : \ \text{It happens that John is ill.} \)

Translation:
1. \( \text{happen}_{t/6t} \to \text{happen'} \)  
2. \( (\text{that}, (\text{John}, (\text{be, ill})))_{t/IV'} \to \lambda \text{RR}[\text{ill'(j)}] \)  
3. \( ((\text{that}, (\text{John}, (\text{be, ill}))), \ \text{happen})_t \to \lambda \text{RR}[\text{ill'(j)}] (\text{happen'}) \)  
4. \( \text{happen'}(\text{ill'(j)}) \)  

Note that the regular subject-predicate realisation for \( t/6t \)s is blocked.

(91) *That John is ill \( \left\{ \begin{array}{l}
\text{happens.} \\
\text{may be.} \\
\text{turns out.} 
\end{array} \right\} \)

R68 also specifies that the subject of a \( t/6t \) must be a \( t/IV' \) rather than a \( t/2IV' \); this blocks the production of ungrammatical sentences like those in (92).

(92) *It \( \left\{ \begin{array}{l}
\text{happens} \\
\text{may be} \\
\text{turns out} 
\end{array} \right\} \) the fact.

Seem and appear are of category \( (t/6t)/PP-TO \) and are manipulated by R54 and R55 to generate sentences like (93) and (94). The object specified in the PP-TO phrase is optionally omissible.

(93) It seems to John that Mary is ill.
(94) It appears that John is angry.

The transitive verb strike, of category \( (t/6t)/T \), is much like an
IV'/T except that the resulting intransitive verb requires postposition of the subject.

R69. If \( \alpha \in B_{t/6t}/T \) and \( \beta \in P_t \), then \( (\alpha, \beta) \in P_{t/6t} \).

Realisation: \( \alpha \leftarrow \beta \)

Translation: \( \alpha'(\beta') \)

(95) It strikes me that John hates Mary.

(96) *That John hates Mary strikes me.

Finally, it is possible for any IV' formed thus far to act like a t/6t, causing the postposition of a t/IV' subject. The easiest way to allow this is to provide a rule to bump any IV' into a t/6t, but not vice-versa. Neither the realisation nor the translation is affected.

R70. If \( \alpha \in P_{IV'} \), then \( (\alpha) \in P_{t/6t} \).

Realisation: \( \alpha \)

Translation: \( \alpha' \)

(97) should be compared to (82).

(97) (((that(t/IV')/t' (John't' (beIV/PRED'
\_ illADJ'IV, R2't, R1't/IV', R41'
\{beIV'/PRED', \{interestIV'/T' ING(t/4t)/PP-TO, R62'
{toPP-TO/T, Bill'T/PP-TO,
R10't/4t, R54'IV', R52't/6t, R70't, R68
Realisation: It is interesting to Bill that John is ill.
Translation: interest'(\_ill'(j)), b)

5.2.2.2.4 Individual-level IVs involving T' objects

The fragment contains two classes of verb, of categories IV/T' and IV/(t/IV'), which map proposition-level terms into individual-level IVs. Examples of the IV/T' class, which take either that-t or the-CN' terms, include believe and assert; examples of the IV/(t/IV') class, which take only that-t terms, include claim and conclude. These
are essentially transitive verbs which take higher-level objects.

Semantically, belief and similar notions like assertion will be represented as relations between individuals and propositions as in PTQ. However, Montague (PTQ:250) and Bennett (1975:10-11) fail to treat that-t constructions as any kind of constituent; they instead have basic verbs like believe-that and assert-that of category IV/t, which apply to sentences. The following treatment uses the same analysis of proposition-level terms used so far and is based largely on the analysis in Delacruz (1976:189). The following rules are needed.

R71. If \( \alpha \in P_{IV/T} \) and \( \beta \in P_{T} \), then \( \{\alpha, \beta\} \in P_{IV} \).

Realisation: \( \{(\gamma_{IV/T}/PP-TO', \delta_{PP-TO})_{IV/T'}, \beta_t^{2}_{IV'}\} \Rightarrow \gamma \triangleright \beta \triangleleft \delta \)

Translation: \( \alpha'(\triangleright \beta') \)

R72. If \( \alpha \in P_{IV/(t/IV')} \) and \( \beta \in P_{T/IV} \), then \( \{\alpha, \beta\} \in P_{IV} \).

Realisation: \( \alpha \triangleright \beta \)

Translation: \( \alpha'(\triangleright \beta') \)

(98) \( (\text{Mary}_T, (\text{believe}_{IV/T}', (\text{that}_{(t/IV')/t'}_{IV/T'}), (\text{John}_T, \text{swim}_{IV} t, R_l)_{t/IV'}, R_{4l}IV, R_{7l} t, R_l) \)

Realisation: Mary believes that John swims.

Translation:

1. \( (\text{that}, (\text{John}, \text{swim}))_t \Rightarrow \lambda \text{RR}([\text{swim}'(j)]) \)

See previous examples

2. \( \text{believe}_{IV/T} \Rightarrow \text{believe}' \)  

Basic

3. \( (\text{believe}, (\text{that}, (\text{John}, \text{swim})))_{IV} \Rightarrow \text{believe}'(\lambda \text{RR}([\text{swim}'(j)])) \)

From 1, 2 by R71

4. \( \text{Mary}_T \Rightarrow \lambda \text{PP}(m) \)  

Proper name

5. \( (\text{Mary}, (\text{believe}, (\text{that}, (\text{John}, \text{swim}))))_t \Rightarrow \lambda \text{PP}(m) ([\text{believe}'(\lambda \text{RR}([\text{swim}'(j)]))]) \)

From 3, 4 by Rl

6. \( \text{believe}'(\lambda \text{RR}([\text{swim}'(j)]))(m) \)  

Lambda conversion
7. $\lambda R (\lambda p [\text{believe}(m, p)])$ First-order reduction
8. $\text{believe}(m, \lambda x [\text{swim}(j)])$ Lambda conversion

A similar derivation is given to a sentence like (99), where the direct object is of the form the-CN'.

(99) Mary believed the lie.

The IV/(t/IV') class, on the other hand, can apply to proposition-level terms only of the form that-t.

(100) (John$_T$, $\text{hope}_{IV/(t/IV')}$ (that$_{t/IV'}$/t
     (Mary$_T$, survive$_{IV}$/t, R$_1$t/IV', R$_4$Iv, R$_7$2t, R$_1$
Realisation: John hopes that Mary survived.
Translation: hope$_j$/t, $\text{[survive}(m)$$]$

Ungrammatical examples like those in (101) are not generated by the rules of the grammar.

(101) *John hopes
      \{
      \text{the fact.}
      \text{the lie.}
      \text{every state-of-affairs.}
      \text{a claim.}
      \}

A number of modal sentence adjectives, or adjectivals, are syntactically or lexically related to verbs of category IV/T'. These include passives (agentive and agentless) and -able forms. Many of these in turn underly modal sentence adverbs, which will be discussed in Chapter 6.

The rules for IV/T' and IV/(t/IV') passive formation, both agentive and agentless, are much like those for other varieties of transitive verb.

R73. If $\alpha \in (P_{IV/T'} \cup P_{IV/(t/IV')})$ then ($\alpha$, PASS) $\in P_{(t/3t)/PP-BY'}$
Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the past participle form
Translation: $\lambda P \lambda p [\lambda y [\alpha' (\lambda R (p))(y)]]$
R74. If \( \alpha \in P(t/3t)/PP-BY \) and \( \beta \in P_{PP-BY} \), then \( \{\alpha, \beta\} \in P_{t/3t} \).

Realisation: \( \alpha \mapsto \beta \)

Translation: \( \alpha'(\beta') \)

R75. If \( \alpha \in P(t/3t)/PP-BY \), then \( \{\alpha\} \in P_{t/3t} \).

Realisation: \( \alpha \)

Translation: \( \alpha'(\lambda PVz[P(z)]) \)

The resulting passives such as believed and believed by John act like basic \( t/3t \) adjectives such as true and false.

(102) That Mary is ill is

\[
\begin{cases} 
\text{true.} \\ 
\text{false.} \\ 
\text{believed.} \\ 
\text{believed by John.}
\end{cases}
\]

(103) ((the (t/2IV')/CN', fact_CN')t/2IV', R42'

\( (\text{be}_{IV'}/PRED', (\{\text{believe}_{IV'/T'}, \text{PASS}):(t/3t)/PP-BY, R73'

(by_{PP-BY'/T'} John_t) PP-BY, R16) t/3t, R74) IV', R52) t, R51

Realisation: The fact is believed by John.

Translation: \( Vp_1[Aq[\text{fact}'(q) \leftrightarrow q=p_1] & \text{believe}*(j, p_1)] \)

(104) ((that(t/IV')/t', (John_t cheat_{IV'}t, R1) t/IV', R41'

\( (\text{be}_{IV'}/PRED', (\{\text{believe}_{IV'/T'}, \text{PASS}):(t/3t)/PP-BY,

R73) t/3t, R75) IV', R52) t/6t, R70) t, R68

Realisation: It is believed that John cheats.

Translation: \( Vy[\text{believe}*(y, "\text{cheat}'(j)")] \)

This account does not, unfortunately, rule out the generation of sentences like those in (105), which feature passive adjectives formed from IV/(t/IV') verbs.

(105) The lie was

\[
\begin{cases} 
\text{claimed} \\ 
\text{fancied} \\ 
\text{concluded} \\ 
\text{hoped}
\end{cases}
\]

(by John).

That is, these verbs which require t/IV' (that-t) complements also
require $t/IV'$ subjects when they are mapped into adjectivals. This suggests that the restriction may be selectional rather than categorial, in which case the rules are more restricting than they need be. The line between selection restrictions and syntactic restrictions may be truly fuzzy here.

-Able forms based on $IV/T'$ and $IV/(t/IV')$ verbs, such as believable, deducible and claimable vary somewhat in naturalness and acceptability.

(106) a. It is believable that John steals.
    b. It is believable by John that Bill fixes races.
    c. It is deducible by Mary that Jane is guilty.
    d. It is supposable by Richard that Roger eats frogs.

Despite the uneasiness of some of these forms, the possibility of making -able forms out of derived IV/T's, to be discussed below, suggests that the rule needs to be syntactic and potentially productive.

R76. If $\alpha \in (P_{IV/T'} \cup P_{IV/(t/IV')})$
then $(\alpha, ABLE) \in P_{(t/3t)/PP-BY'}$
Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the -able form
Translation: $\lambda P \lambda p \diamond P(\lambda z[\alpha'('\lambda RR(p))(z)])$

(107) $\{(be_{IV'}/PRED', \{deduce_{IV/T'}, ABLE\}(t/3t)/PP-BY',$
R76' $(by_{PP-BY/T'} Bill_T)_{PP-BY}, R16_{t/3t},$
R71_{IV'}, R52_{t/6t}, R70' $(that_{t/IV'})/t'$
$\langle Dick_T, \{be_{IV/PRED'} guilty_{ADJ}\}_{IV},$
R2_{t}, R1_{t/IV'}, R41_{t}, R68
Realisation: It is deducible by Bill that Dick is guilty.
Translation: $\diamond [\text{deduce}_{bt}(b, '\text{guilty}')(d)])$
5.2.2.2.5 Three-place verbs

5.2.2.2.5.1 The (IV/T')/PP-TO class

The (IV/T')/PP-TO class, including admit, announce, promise, say and repeat, have an indirect object introduced with a PP-TO phrase. They are much like the TV/PP-TO verb give, except that the direct objects are higher-level T's.

(109) John gave the book to Mary.
(110) John announced the fact to Mary.

When the direct object is a that-t term, it normally gets postposed to the PP-TO, as do heavy t/2 IV's.

(111) John announced to Mary that Bill was alive.
(112) John announced to Mary the result which they had been expecting.

The following rules are similar to those for the give verbs (compare R7).

R77. If \( \alpha \in B_{(IV/T')/PP-TO} \) and \( \beta \in P_{PP-TO} \) then \( \{\alpha, \beta\} \in P_{IV/T'} \).  
Realisation: \( \alpha \leftarrow \beta \)
Translation: \( \alpha'(\ ^{\sim} \beta') \)

R78. If \( \alpha \in B_{(IV/T')/PP-TO} \) then \( \{\alpha\} \in P_{IV/T'} \).  
Realisation: \( \alpha \)
Translation: \( \alpha'(\ ^{\sim} \lambda P[Vz[P(z)]] \)
The indirect object slot can be filled with an existentially-quantified variable by R78, resulting in sentences and translations as in (114).

(114) John announced that Sue survived.
(114')Vy[announce*(j, [survive'(s)], y)]

The IV/T's generated from R77 and R78 are subject to the previously defined IV/T' rules for passive, allowing the generation and translation of sentences like (115).

(115) It was announced (to Bill) (by John) that Sue survived.

The interplay of combinational and relation-reducing rules allows the indirect object to Bill and the agent by John to be independently omissible.

Like basic members of IV/T', derived members can, sometimes awkwardly, take an -able form, and these are also interpretable with the rules already described.

(116) It is confessable (to Father Dominic) (by John) that he sinned.

The verbs tell, recount and relate are assigned to B(IV/(t/2IV'))/PP-TO as they seem to prefer the-CN' subjects and complements.

(117) John told the story to Bill.
(118) ?John told \{"that Sue survived to Bill.\}, \{to Bill that Sue survived.\}
The fact was told to Bill (by John).

That Mary survived was told to Bill (by John).

Semantically, these verbs are like the \((IV/T')/PP-TO\) verbs above, but their syntax is slightly more restricted.

R79. If \(a \in P_{IV/(t/2IV')}/PP-TO\) and 
\(\beta \in PP-TO\) then \([\alpha, \beta] \in PIV/(t/2IV')\). 
Realisation: \(\alpha \cap \beta\) 
Translation: \(\alpha(\beta')\)

5.2.2.2.5.2 The \(TV/(t/IV')\) class

There is another class of three-place verbs involving proposition-level terms which differ in syntax from the \((IV/T')/PP-TO\) class. These are the \(TV/(t/IV')s\), which include advise, assure, apprise, convince, inform, persuade, reassure and another reading of promise and tell. These verbs are similar to the \(TV/T\) (or \(TTV\)) class, which includes allow and refuse at individual level. The difference is the \(TV/(t/IV')\) class apply to a higher-level \(T'\) object.

(121) \(TTV\) (i.e. \(TV/T\)) example
John refused Bill the money.

(122) \(TV/(t/IV')\) example
John assured Bill that Mary was well.

The following rule is much like R9.

R80. If \(\alpha \in P_{TV/(t/IV')}\) and \(\beta \in P_{t/IV'}\) then \([\alpha, \beta] \in P_{TV}\).
Realisation: \(\alpha \cap \beta\)
Translation: \(\alpha(\beta')\)

(123) \([Mary_{T'} ((inform_{TV/(t/IV')} (that_{t/IV'}/t' (John_{T'}
swim_{IV'}), R1_{t/IV'}, R41_{TV}, R80_{t/IV'}, R3_{t, R1
Realisation: Mary informed Bill that John swims.
Translation: inform' (m, b, '[swim'(j)])
Passives are derived from the derived TVs in the usual way.

(124) (Bill_T, (be_{IV/PRED} (((tell_{TV/(t/IV')})(that (t/IV')/(t/IV'))) (John_T, swim_{IV})),
R1{t/IV'}, R41{TV, R80, PASS}(t/e)/PP-BY,
R14{t/e}, R15{IV, R2{t, R1
Realisation: Bill was told that John swims.
Translation: Vx[tell_{x}(x, b, [swim'(j)])]

(125) Bill was told by Mary that John swims.
(125') tell_{y}(m, b, [swim'(j)])

Tell_{TV/(t/IV')} could be given the translation λΑλΡλγ[tell'(P)(R)(y)], which would give the translations of (124) and (125) in terms of the same tell' relation which translates tell_{IV/(t/2IV')}/PP-TO. A similar solution suggests itself for promise; i.e. promise_{TV/(t/IV')} ⇒ λΑλΡλγ[promise'_{y}(P)(R)(y)]. This treatment is directly parallel to that given to 'Dative' verbs like give in Section 3.2 (see especially R8).

5.2.2.2.5.3 The TV/PP-OF' class

Many of the words in the TV/(t/IV') class, including inform, convince and tell, have twins in the TV/PP-OF' class. Semantically the two classes are identical.

R81. If α ∈ B_{TV/PP-OF'}, and β ∈ P_{PP-OF'}, then (α, β) ∈ P_{TV}.
Realisation: α→β
Translation: α'("β")

(126) (John_T, ((inform_{TV/PP-OF'}, (of_{PP-OF'}/(t/2IV'))
(the_{(t/2IV')/CN'}, fact_{CN'}))t/2IV'),
R42{PP-OF'}, R47{TV, R81, Bill_T, IV, R3{t, R1
Realisation: John informed Bill of the fact.
Translation: Vp[Λq[fact'(q) ⇔ q-p] & inform'_{j,b,p}]

The difference, of course, is that TV/PP-OF' verbs take prepositional phrase complements based on t/2IV' terms. The derived TVs such as
Inform of the fact can be passivised in the usual way, resulting in sentences like (127).

(127) Bill was informed of the fact (by John).

For TVs derived from the TV/(t/IV') and the TV/PP-OF' classes, the rule combining TVs with Ts to form IVs must be augmented to allow the derived TVs to be realised discontinuously. The Rule R3 must now appear in this form:

R3. If $\alpha \in P_{TV}$ and $\beta \in P_{T}$ then $(\alpha, \beta) \in P_{IV}$.

Realisation:

$((\gamma_{TV'}, \delta_{TV'})_{TV'}, (\beta_{T})_{IV} \Rightarrow \gamma \circ \beta \circ \delta$  

$((\gamma_{DTV'}, \delta_{PP-TO})_{TV'}, (\beta_{T})_{IV} \Rightarrow \gamma \circ \beta \circ \delta$  

$((\gamma_{TV/ADJ'}, \delta_{ADJ})_{TV'}, (\beta_{T})_{IV} \Rightarrow \gamma \circ \beta \circ \delta$  

$((\gamma_{TV/(t/IV')}, (t/IV')_{TV'}, (\beta_{T})_{IV} \Rightarrow \gamma \circ \beta \circ \delta$  

$((\gamma_{TV/PP-OF'}, \delta_{PP-OF'})_{TV'}, (\beta_{T})_{IV} \Rightarrow \gamma \circ \beta \circ \delta$  

else $\alpha \circ \beta$

Translation: $a'(\beta')$

5.3 Conclusion

This chapter has illustrated the rules which form the basic syntactic structures at the proposition level. These rules are in many cases analogous to those at individual level, but their richness and characteristic restrictions provide a number of challenges for any levelling analysis. Chapter 6 continues the discussion of the proposition level by looking more closely at adjectives and other adjectivals.
Chapter 6. Adjectivals, adverbs and appositives at proposition level

6.0 Introduction

The proposition-level fragment illustrates a wealth of adjectival constructions, both basic and derived. The aim of this chapter is to examine their combination with sentence adverbs, their behaviour as attributive modifiers of CN's, and their ability to modify non-restrictively. Finally, there is an analysis of appositives at proposition level.

6.1 Adjectivals

6.1.1 Proposition-level ADJVL's

At the proposition level, ADJVL' is a cover category including (P_t/3t U P_t/4t U P_t/7t). The t/7t or REL' class has not been introduced yet; it consists of proposition-level relative clauses formed by abstracting a propositional variable out of a sentence. The following simplified rule will serve for the examples used herein. The notation in this rule is explained in Section 4.3.1.

R82. If α ∈ P_t and α is of the form {...it_n...}
then (α) ∈ P REL'.
Realisation: THAT {...|it_n|...}
Translation: λP_n[α']

A REL' translates as a one-place predicate of propositions, as in example (1).

(1) ((John_T, {believe_IV/T', it_1(t/2IV')_IV}, R71)_t, R1'REL', R82
Realisation: that John believes
Translation:
1. it_1(t/2IV') ⇒ λRR(p_1)
2. believe_IV/T' ⇒ believe'
3. (believe, it_1)_IV ⇒ believe'('λRR(p_1))
From 1, 2 by R71
4. John\textsubscript{T} \rightarrow \lambda PP\{j\} \quad \text{Proper name}

5. ((John, (\text{believe, it}_1))\textsubscript{T} \rightarrow \lambda PP\{j\} (\lambda [\text{believe}'(\lambda RR\{p_1\})])

6. \text{believe}'(\lambda RR\{p_1\})(j) \quad \text{Lambda conversion}

7. \lambda RR\{p_1\}(\lambda q[\text{believe}'(j, q)]) \quad \text{First-order reduction}

8. \lambda q[\text{believe}'(j, p_1)] \quad \text{Lambda conversion}

9. \text{REL}' \rightarrow \lambda p_1[\text{believe}'(j, p_1)]

From 3, 4 by R1

From 8 by R82

The class of ADJVL's now includes examples from various sources.

(2) a. basic \textsubscript{3}t true, false

b. derived \textsubscript{3}t clear (to Bill), believed (by John),

announced (by John) (to Bill)

c. basic \textsubscript{4}t odd, strange

d. derived \textsubscript{4}t interesting (to John),

beneficial (for John)

e. REL'

that John believes

The key feature of ADJVL's is that they can be mapped into attributive modifiers of CN's.

(3) a. a true statement, a false claim

b. a (widely) believed proposition, a proposition believed

by John, a clear idea, an idea clear to Mary,

the announced opinion, the opinion announced (by John)

(to Bill)

c. an odd claim, a strange statement

d. an interesting idea, an idea interesting to Mary,

a proposal beneficial for John

e. the proposition that John believes

R83 creates attributive modifiers out of ADJVL's and R84 orders them relative to the CN's they modify. As at the individual level, attributive modifiers with complements, such as prepositional phrases, need to be postposed to the common nouns they modify.
R83. If \( \alpha \in P_{ADJVL} \), then \( \{\alpha\} \in P_{CN'/CN} \).

Realisation: \( \alpha \)

Translation: \( \lambda \forall \lambda p[R(p) \land \alpha'(p)] \)

R84. If \( \alpha \in P_{CN'/CN} \) and \( \beta \in P_{CN} \), then \( \{\alpha, \beta\} \in P_{CN} \).

Realisation: \( \beta \sim \alpha \) if \( \alpha \) has a syntactic complement

else \( \alpha \sim \beta \)

Translation: \( \alpha'(\beta') \)

Semantically, attributive modification results in a conjunction analysis, just as at individual level.

(4) \( \langle \langle \text{the}(t^2IV'), \langle \text{proposition}_{CN'} \rangle \rangle, \langle \text{proposition}_{CN'} \rangle \rangle \) \( \langle \langle \text{believe}_{IV/T'}, \text{PASS}\rangle \rangle(t^3t) \) \( \text{PP-BY}, R73' \)

\( \langle \text{by}_{PP-BY/T}, \text{John}_t \rangle \) \( \text{PP-BY}, R16't^3t, R74'_{CN'/CN'}, R83'_{CN'}, R84't^2IV', R42' \) \( \langle \text{be}_{IV'/PRED}, \text{false}_{t^3t}, R52't, R51 \rangle \)

Realisation: The proposition believed by John is false.

Translation:

1. \( \langle \langle \text{believe}, \text{PASS}, \langle \text{by}, \text{John} \rangle \rangle(t_3t) \Rightarrow \lambda q[\text{believe}_{j,q}(j,q)] \) See previous examples

2. \( \langle \langle \text{believe}, \text{PASS}, \langle \text{by}, \text{John} \rangle \rangle \rangle_{CN'/CN} \Rightarrow \lambda \forall \lambda p[\text{believe}_{j,q}(j,q)](p) \) From 1 by R83

3. \( \lambda \forall \lambda p[\text{believe}_{j,q}(j,q)] \) Lambda conversion

4. \( \langle \text{proposition}_{CN'} \rangle \Rightarrow \langle \text{proposition} \rangle \) Basic

5. \( \langle \text{proposition}, \langle \langle \text{believe}, \text{PASS}, \langle \text{by}, \text{John} \rangle \rangle \rangle_{CN'} \rangle \Rightarrow \lambda \forall \lambda p[\text{believe}_{j,q}(j,q)](\langle \text{proposition} \rangle) \)

From 3, 4 by R84

6. \( \lambda p[\text{proposition}_{\langle \langle \text{believe}, \text{PASS}, \langle \text{by}, \text{John} \rangle \rangle \rangle_{CN'} \rangle} \rangle \Rightarrow \lambda R_1 \lambda R V p[A q_1(q) \leftrightarrow q=p] \land R(p) \) Lambda conversion

7. \( \text{the}(t^2IV)/CN \Rightarrow \lambda R_1 \lambda R V p[A q_1(q) \leftrightarrow q=p] \land R(p) \) Basic

8. \( \langle \text{the}, \langle \text{proposition}, \langle \langle \text{believe}, \text{PASS}, \langle \text{by}, \text{John} \rangle \rangle \rangle_{CN'} \rangle \rangle(t^2IV) \Rightarrow \lambda R_1 \lambda R V p[A q_1(q) \leftrightarrow q=p] \land R(p) \) From 6, 7 by R42
9. \( \lambda RVp[Aq[(\text{proposition'}(q) \land \text{believe'}(j, q)) \leftrightarrow q = p] \land R(p)] \)  
   \( \text{Lambda conversion} \)

10. \((\text{be, false})_{IV}' \Rightarrow \text{false}') \)  
    \( \text{See previous examples} \)

11. \(((\text{the, (proposition, }\{(\text{believe, PASS}), \text{by, John})\}))\),  
    \((\text{be, false})_t \Rightarrow \lambda RVp[Aq[(\text{proposition'}(q) \land \text{believe'}(j, q)) \leftrightarrow q = p] \land R(p)] \) \( \text{false}') \)

   \( \text{From 9, 10 by R51} \)

12. \( Vp[Aq[(\text{proposition'}(q) \land \text{believe'}(j, q)) \leftrightarrow q = p] \land \text{false}'(p)] \)  
    \( \text{Lambda conversion} \)

Other examples are all worked along the same lines. The proposition that John believes has the same translation (barring tense and aspect as usual) as the proposition believed by John. Adjectival modifiers with argument slots filled by existentially quantified variables pose no difficulty. The following rather lengthy derivation is included to demonstrate the complex interaction of passive formation and relation-reduction in a derived attributive modifier.

\[
(5) \quad \text{Realisation: the whispered proposal}
\]

\[
\begin{align*}
1. \quad \text{whisper'(IV/T')}/PP-TO & \Rightarrow \text{whisper'} & \text{Basic} \\
2. \quad (\text{whisper})_{IV/T'} & \Rightarrow \text{whisper'}(\lambda PVz[P(z)]) & \text{From 1 by R78} \\
3. \quad ((\text{whisper}), \text{PASS})(t/3_t)/PP-BY & \Rightarrow \\
   & \lambda P \lambda P(\lambda y[\text{whisper'}(\lambda PVz[P(z)])(\lambda RR(p))(y)]) & \text{From 2 by R73} \\
4. \quad ((\text{whisper}), \text{PASS})_t/3_t & \Rightarrow \\
   & \lambda P \lambda P(\lambda y[\text{whisper'}(\lambda PVz[P(z)])(\lambda RR(p))(y)])(\lambda QVx_1[Q(x_1)]) & \text{From 3 by R75} \\
5. \quad \lambda P[Vx_1[\text{whisper'}(\lambda PVz[P(z)])(\lambda RR(p))(x_1)]] & \text{Lambda conversion}
\end{align*}
\]
6. \(\lambda p[Vx_1[\lambda pVz[P(z)](\lambda y[\lambda RR(p)(\lambda q[whisper_1(x_1,q,y)])])])\)  
First-order reduction

7. \(\lambda p[Vx_1[Vz[whisper_1(x_1,p,z)]]]\)  
Lambda conversion

8. \(((\text{whisper}), \text{PASS}))_{CN'/CN'} \Rightarrow \lambda Rlq[R(q) & \lambda p[Vx_1[Vz[whisper_1(x_1,p,z)]]](q)]\)  
From 7 by R83

9. \(\lambda Rlq[R(q) & Vx_1Vz[whisper_1(x_1,q,z)]]\)  
Lambda conversion

10. \(\text{proposal} (CN'/PP-OF)/PP-TO \Rightarrow \lambda P\lambda Q\lambda p[\lambda x[Q[\lambda z_1[\text{propose}_1(z_1,p,x)]]]]\)  
Basic

11. \((\text{proposal})_{CN'/PP-OF} \Rightarrow \lambda P\lambda Q\lambda p[\lambda x[Q[\lambda z_1[\text{propose}_1(z_1,p,x)]])] (\lambda PVx_2[P(x_2)])\)  
From 10 by R46

12. \(\lambda Q\lambda p[Vx_2[Q[\lambda z_1[\text{propose}_1(z_1,p,x_2)]]]]\)  
Lambda conversion

13. \((\text{proposal})_{CN'} \Rightarrow \lambda Q\lambda p[Vx_2[Q[\lambda z_1[\text{propose}_1(z_1,p,x_2)]]]] (\lambda PVy_1[P(y_1)])\)  
From 12 by R44

14. \(\lambda p[Vx_2[Vy_1[\text{propose}_1(y_1,p,x_2)]]]\)  
Lambda conversion

15. \(((\text{whisper}), \text{PASS}), ((\text{proposal}))_{CN'} \Rightarrow \lambda Rlq[R(q) & Vx_1Vz[whisper_1(x_1,q,z)]\)  
From 9, 14 by R84

16. \(\lambda q[Vx_2[Vy_1[\text{propose}_1(y_1,q,x_2)]] & Vx_1Vz[whisper_1(x_1,q,z)]\)  
Lambda conversion

17. \(\text{the} (t^2IV')/CN' \Rightarrow \lambda Rl\lambda RVp[\lambda q_1[R_1(q_1) \leftrightarrow q_1=p] & R(p)]\)  
Basic

18. \((\text{the}, (((\text{whisper}), \text{PASS})), ((\text{proposal})))_{t^2IV'} \Rightarrow \lambda R_1\lambda RVp[\lambda q_1[R_1(q_1) \leftrightarrow q_1=p] & R(p)]\)  
From 16, 17 by R42

19. \(\lambda RVp[\lambda q_1[Vx_2[Vy_1[\text{propose}_1(y_1,q_1,x_2)]]] & Vx_1Vz[whisper_1(x_1,q_1,z)] \leftrightarrow q_1=p] & R(p)]\)  
Lambda conversion
6.1.2 Individual-level ADJVLs

At individual level, ADJVL is a cover category for \( (P_t^3 U P_t^5 U P_t^6) \). The category therefore includes basic ADJs like tall, red and good; participles such as walking and loved (by Mary) and relative clauses (RELs) such as that Mary loves. A number of new individual-level ADJVLs are generated by the grammar in Chapter 5. These include the ADJs derived from ADJ/(t/IV')s like aware and from ADJ/(t/IV')s like glad.

(6) Mary is \{tall, aware that John is ill, glad that John is ill\}

Passives of basic IV'/T verbs like annoy also fill such ADJ slots.  

(7) John is \{skilful, annoyed (by the decision), annoyed that Mary won\}

Finally, derived TV's such as advise that John is ill and convince that Bill cheats can be passivised in the usual way to form t/5e participles.

(8) Sue was \{advised that John was ill (by Mary), convinced that Bill cheats (by John)\}

The new ADJVLs, of whatever subclass, modify attributively as expected.

(9) a. The [woman [aware that John is ill]] is Sue.
b. The [man [annoyed (by the situation)]] was John.
c. Several [gamblers [assured that Coe would win (by Bill)]] were angry.
d. A [woman [convinced that all husbands cheat]] bombed the Mens Club.
6.2 Sentence adverbs

6.2.0 Introduction

Much of the work in linguistics dedicated to proposition-level operators, i.e. anything which translates with type $\langle s, t \rangle$, has been concerned with sentence adverbs, of which there are many varieties. It is not my intent to deal with sentence adverbs as a whole but rather with four subclasses of sentence adverb which are especially relevant to adjectives. These are the 'modal', 'parenthetical', 'temporal' and 'hedge' adverbs. I shall show how sentence adverbs enter into constructions directly with adjectives and examine some classes of adjectives which have traditionally been transformed from source strings containing sentence adverbs. The analysis offered in this chapter avoids syntactic transformations and meshes naturally with the grammar posited so far.

6.2.1 Modal adverbs

Modal sentence adverbs are typically described as comments or qualifications on the truth value of a sentence. Most of them are morphologically and semantically related to modal adjectives in the $t^{3}\langle t \rangle$ class. I have assigned the modal adverbs to the category $t^{8}\langle t \rangle$, which is included in the cover category ADV'.

(10) Modal adverb ($t^{8}\langle t \rangle$)  Modal adjective ($t^{3}\langle t \rangle$)

- [actually]  - admitted
- admittedly  - alleged
- allegedly  - apparent
- apparently  - arguable
- arguably  - certain
- certainly  - clear
- clearly  - conceivable
- conceivably  - definite
- definitely  -
<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Natural English</th>
</tr>
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<tbody>
<tr>
<td>doubtlessly-</td>
<td>beyond doubt</td>
</tr>
<tr>
<td>evidently</td>
<td>evident</td>
</tr>
<tr>
<td>incontestably</td>
<td>incontestable</td>
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<tr>
<td>incontrovertibly</td>
<td>incontrovertible</td>
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<tr>
<td>[indeed]</td>
<td>—</td>
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<td>indisputably</td>
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<td>indubitably</td>
<td>indubitable</td>
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<td>[in fact]</td>
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<td>[maybe]</td>
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<td>necessarily</td>
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<td>obviously</td>
<td>obvious</td>
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<td>[perhaps]</td>
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<td>possibly</td>
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<td>presumably</td>
<td>presumable</td>
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<td>purportedly</td>
<td>purported</td>
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<td>probably</td>
<td>probable</td>
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<td>[really]</td>
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<td>reputedly</td>
<td>reputed</td>
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<td>[seemingly]</td>
<td>—</td>
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<tr>
<td>supposedly</td>
<td>supposed</td>
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<tr>
<td>[surely]</td>
<td>—</td>
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<td>unarguably</td>
<td>unarguable</td>
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<td>undeniably</td>
<td>undeniable</td>
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<tr>
<td>understandably</td>
<td>understandable</td>
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<td>undoubtedly</td>
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<td>unmistakably</td>
<td>unmistakable</td>
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<tr>
<td>unquestionably</td>
<td>unquestionable</td>
</tr>
</tbody>
</table>

There are many ways that the class can be divided, and there is much room for disagreement on which words belong at all. The class ranges from strong claims about the truth of a sentence (clearly, obviously, unquestionably) to qualified endorsements (apparently, arguably) to the wishy-washy (possibly, probably, supposedly, conceivably). Actually, in
fact, indeed and really, which have no corresponding \( t^3 \) adjectives, may be better classified as some kind of conjunctive adverb (see e.g. Bellert 1977:348-349; Quirk et al. 1972:520).

It is tempting to derive modal adverbs from the corresponding adjectives by grammatical rule, as, for example, in Jacobson 1971, but the gaps in the paradigm suggest that a lexical rule is the strongest interpretation possible.

R85 (lexical). If \( \alpha \in P_{t^3} \) then \( (\alpha, \text{LY}) \in B_{t^8} \).

Realisation: \( \alpha \rightarrow \text{LY} \)

Translation: \( \alpha' \)

As this is a lexical rule, the possibility exists that any pair including a \( t^3 \) adjective and a morphologically related \( t^8 \) adverb can differ in meaning. However, many such pairs do intuitively share the same reading. If such a rule operates, at least to allow people to derive or decipher new vocabulary, then it is quite easy in the present grammar to show a common reading for different but intuitively related sentences. The following rule for combining sentence adverbs with sentences will be needed.

R86. If \( \alpha \in P_{ADV} \) and \( \beta \in P_t \) then \( (\alpha, \beta) \in P_t \).

Realisation: \( \beta \rightarrow \alpha \) if \( \alpha \) has a complement

else \( \alpha \rightarrow \beta \)

Translation: \( \alpha'(^\prime \beta') \)

Let us assume that possible_{\( t^8 \)} is lexically related to possible_{\( t^3 \)} by R85 and so has the same translation possible'.

(11) (possible_{\( t^8 \)}, (John_{\( t \)}, \text{swim}_{\text{IV}}_{\( t \)}, R1_{\( t \)}, R86

Realisation: Possibly John swims.

Translation:
1. possible_{\( t^8 \)} \( \Rightarrow \) possible'

2. (John, swim)_{\( t \)} \( \Rightarrow \) swim'\((j)\)

3. (possibly, (John, swim))_{\( t \)} \( \Rightarrow \) possible'\(\{\text{[swim'}\( (j)\)\}\})

From 1, 2 by R86
The related adjective-based sentence has the same translation.

\[(12) \langle \text{(that) (t/IV')/t', (John_T, swim_{IV})_t, R_1}_t/IV', R_4 \rangle \]
\[
\langle \text{(be) IV'/PRED'' possible}_{t^3 t/IV'}, R_5 \rangle_t, R_5^1
\]
Realisation: That John swims is possible.
Translation: possible' ('swim'(j))

The sentence It is possible that John swims has a similar derivation and an identical reading.

We might propose yet another lexical rule forming CN's from t/3 t adjectives, including possible, probable and certain. 3

\[R \text{ (lexical). If } \alpha \in P\_t/3_t \text{ then } \alpha-ty \in B_{CN}'.\]
Translation: \( \alpha' \)

This rule would allow us to relate possibility to possible and assign it the same translation possible'. However, given the idiosyncrasy of the noun formations, it is far easier in this case just to treat possibility, for example, as a semantic constant by overtly giving it the translation possible' or perhaps even \( \lambda p(\bigcirc(p)) \).

\[(13) \langle \text{(that) (t/IV')/t', (John_T, swim_{IV})_t, R_1}_t/IV', R_4 \rangle \]
\[
\langle \text{(be) IV'/PRED'' (a, possibility}_{CN'})_{PNOM'}, R_5 \rangle_{t/6_t}, R_7 \rangle_{t/6_t}, R_8
\]
Realisation: It is a possibility that John swims.
Translation:
1. \( \langle \text{(that, (John, swim))}_t/IV', \Rightarrow \lambda R[R(\bigcirc('\text{swim'}(j)))] \) See previous examples
2. \( \text{be}_{IV'/PRED'} \Rightarrow \lambda R[R] \) Basic
3. \( \text{possibility}_{CN'} \Rightarrow \text{possible'} \) Basic
4. \( \langle \text{(a, possibility)}_{PNOM'}, \Rightarrow \text{possible'} \) From 3 by R53
5. \( \langle \text{(be, (a, possibility))}_{IV'}, \Rightarrow \lambda R[R(\bigcirc('\text{possible'})) \rangle \) From 2, 4 by R52
6. \text{possible'} Lambda conversion
7. \([(\text{be}, \{a, \text{possibility}\}))_{t/8}^t \Rightarrow \text{possible'}\]  
   From 6 by R70

8. \([(\text{that}, \{\text{John, swim}\}), \{(\text{be}, \{a, \text{possibility}\})\}]_{t}^t \Rightarrow \lambda RR(\text{swim'}(j))(\text{'possible'})\]  
   From 1, 6 by R68

9. \text{possible'}(\text{swim'}(j)) \text{ Lambda conversion}

The translations of the \(t/8\) adverbs can vary a great deal. Some, like necessarily, possibly, probably, certainly and definitely are straightforwardly related to the simple \(t/3\) adjectives necessary, possible, probable, certain, etc. and preserve the same readings. Truly does not seem to have quite the same force as true, and may need to be handled separately as some kind of emphasiser (Bolinger 1972:95). The adjective likely \(t/3\) does not have an -ly adverb correlate, probably for morphological reasons.

Apparently, evidently, obviously and others are morphologically related to \((t/3)/\text{PP-TO}\) adjectives like apparent, evident and obvious. These bare adjectives, when bumped into \(t/3\)'s, have the readings \(\lambda pVx[\text{apparent'}(x, \lambda RR(p))]\), \(\lambda pVx[\text{evident'}(x, \lambda RR(p))]\) and \(\lambda pVx[\text{obvious'}(x, \lambda RR(p))]\) respectively (see Section 5.2.2.2.2.2), and the related adverbs share these same readings.

(14) \(\text{obviously}_{t/8}^t\) - \{\text{John, } \text{(be IV/PRED')} \text{ill}_{\text{ADJ IV}}, \text{R2}_{t}, \text{R1}_{t}, \text{R6}\}

Realisation: Obviously, John is ill.

Translation:
1. \(\text{obviously}_{t/8}^t \Rightarrow \lambda pVx[\text{obvious'}(x, \lambda RR(p))]\)  
   Basic

2. \([\text{John, (be, ill)}]_{t}^t \Rightarrow \text{ill'}(j)\)  
   See previous examples

3. \([\text{obviously, (John, (be, ill)}]]_{t}^t \Rightarrow \lambda pVx[\text{obvious'}(x, \lambda RR(p))](\text{'ill'}(j))\]  
   From 1, 2 by R68

4. \(Vx[\text{obvious'}(x, \lambda RR([\text{ill'}(j)])])\)  
   Lambda conversion

5. \(Vx[\lambda RR([\text{ill'}(j)])(\lambda q[\text{obvious'}(x, q)])]\)  
   First-order reduction

6. \(Vx[\text{obvious'}(x, [\text{ill'}(j)])]\)  
   Lambda conversion
7. \(((\text{be}, (a, \text{possibility})))_{t/6_t} \Rightarrow \text{possible'}\)

From 6 by R70

8. \(((\text{that}, (\text{John, swim})), ((\text{be}, (a, \text{possibility}))))_t \Rightarrow \lambda RR([\text{swim'}(j)])(\text{possible'})\)

From 1, 6 by R68

9. possible'\((\square \text{swim'}(j))\) Lambda conversion

The translations of the \(t/8_t\) adverbs can vary a great deal. Some, like necessarily, possibly, probably, certainly and definitely are straightforwardly related to the simple \(t/3_t\) adjectives necessary, possible, probable, certain, etc. and preserve the same readings. Truly does not seem to have quite the same force as true, and may need to be handled separately as some kind of emphasiser (Bolinger 1972:95). The adjective likely \(t/3_t\) does not have an \(-ly\) adverb correlate, probably for morphological reasons.

Apparently, evidently, obviously and others are morphologically related to \((t/3_t)/PP-TO\) adjectives like apparent, evident and obvious. These bare adjectives, when bumped into \(t/3_t\)'s, have the readings \(\lambda pVx[\text{apparent'}(x, ^\lambda RR(p))]\), \(\lambda pVx[\text{evident'}(x, ^\lambda RR(p))]\) and \(\lambda pVx[\text{obvious'}(x, ^\lambda RR(p))]\) respectively (see Section 5.2.2.2.2.2), and the related adverbs share these same readings.

\[(14) \text{obviously}_{t/8_t}, \text{John}_{t/8_t}, \text{be'}_{IV/PRED'}\]

ill \(\text{ADJ}_{IV}, R2_t, R1_t, R86\)

Realisation: Obviously, John is ill.

Translation:

1. obviously \(t/8_t \Rightarrow \lambda pVx[\text{obvious'}(x, ^\lambda RR(p))]\)

Basic

2. \((\text{John, (be, ill)}), t \Rightarrow \text{ill'}(j)\)

See previous examples

3. \((\text{obviously, (John, (be, ill))}, t \Rightarrow \lambda pVx[\text{obvious'}(x, ^\lambda RR(p))](\text{[ill'}(j)))]\)

From 1, 2 by R86

4. \(Vx[\text{obvious'}(x, ^\lambda RR(\text{[ill'}(j))])]\)

Lambda conversion

5. \(Vx[^\lambda RR(\text{[ill'}(j))]](\text{[\lambda q[obvious']}(x,q)])\)

First-order reduction

6. \(Vx[\text{obvious'}(x, ^\text{[ill'}(j)))]\)

Lambda conversion
Recognising obvious, and therefore obviously, as being translated in terms of a two-place relation offers a way out of a problem noted by McConnell-Ginet (1982:177-178). She shows that obviously, unlike necessarily and possibly, cannot be translated as a simple function on the intension of its complement sentence. If \( p_1 \) and \( p_2 \) are both logically true, and so denote the same set of possible worlds, then obviously\(^\prime\)(\( p_1 \)) should always have the same truth value as obviously\(^\prime\)(\( p_2 \)), which it often does not. Translating obviously as \( \lambda pVx[obvious'(x, \lambda RR(p))] \) allows the truth of obviously\(^\prime\)(\( p_1 \)) and obviously\(^\prime\)(\( p_2 \)) to vary according to the individuals over which quantification operates.

For some reason, a derived \( t^3t \) like obvious to Mary does not readily form an adverb like obviously to Mary, though it would make perfectly good sense.

(15) a. It is obvious to Mary that John is ill.
    b. *Obviously to Mary, John is ill.

Subcategories may be appealed to in order to rule out such adverbialisations, but the adverb-formation rule is lexical anyway, and such exceptions are expected.

The remaining \( t^3t \) forms in (10) which are morphologically related to modal sentence adverbs are passives or -ible/-able forms of IV/TV verbs. Some \( t^8t \)s are related to bare -able forms and can be assigned the same translations.

(16) \begin{tabular}{lll}
\textbf{ADJ'} & \textbf{ADV'} & \textbf{Common translation} \\
arguable & arguably & \( \lambda pVx[\text{argue'}(x, \lambda RR(p))] \) \\
conceivable & conceivably & \( \lambda pVx[\text{conceive'}(x, \lambda RR(p))] \) \\
presumable & presumably & \( \lambda pVx[\text{presume'}(x, \lambda RR(p))] \) \\
understandable & understandably & \( \lambda pVx[\text{understand'}(x, \lambda RR(p))] \) \\
\end{tabular}

Adjectives like arguable by Mary are already shaky, and any attempt
to adverbialise them results in ungrammaticality: *arguably by Mary.

Other such adverbs are related to bare IV/T' passives, as has frequently been noted (Bach 1968:102-103; Bartsch 1972a:158, 1975:182, 184-185; Bennett 1976:135; Keenan & Faltz 1978:236-237, 309). IV/T' passives are discussed in Section 5.2.2.2.4.

(17) ADJ' ADV' Common translation

alleged allegedly λpVx[allege'(x, ^λRR(p))]
purported purportedly λpVx[purport'(x, ^λRR(p))]
reported reportedly λpVx[report'(x, ^λRR(p))]
supposed supposedly λpVx[suppose'(x, ^λRR(p))]

Keenan & Faltz (1978:213) actually propose a syntax rule generating these attributive adjectives from verbs of category IV/T', but the many gaps in the pattern suggest that a lexical rule is the strongest possible interpretation. We cannot speak of a thought criminal, for instance, as a person thought to be a criminal. Denied, asserted, hoped, grasped and argued criminals are extremely awkward constructions if not completely bad. Said and (afore)mentioned are reserved for careful legalistic language. All in all one must conclude that such adverbs, with their complex translations, belong in the lexicon.

A striking feature of modal adverbs is that none has an overall negative effect. Adverbialisations of inherently negative notions like doubt, denial and questioning require a negative morpheme to make it acceptable. Latinate throwbacks begin to emerge.

(18) ADJ' ADV' Common reading

uncontestable uncontestably λp7ΩVx[contest'(x, ^λRR(p))]
undeniable undeniably λp7ΩVx[deny'(x, ^λRR(p))]
indisputable indisputably λp7ΩVx[dispute'(x, ^λRR(p))]
undoubtable indubitably λp7ΩVx[doubt'(x, ^λRR(p))]
ummistakable unmistakably λp7ΩVx[mistake'(x, ^λRR(p))]
umquestionable unquestionably λp7ΩVx[question'(x, ^λRR(p))]
Like the -able derivatives, the passive group and the negative group resist PP-BY phrases.

(19) a. *Allegedly by John, Mary is a thief.
   b. *Undoubtedly by Mary, John eats toads.

6.2.2 Parenthetical adverbs

A second group of sentence adverbs are of category t/<9t and include unfortunately, oddly, strangely and many other factive examples related to adjectives of category t/<4t, which are themselves factive. I shall argue that these adverbs should properly be analysed as non-restrictive modifiers of the sentences with which they combine, and so I have called this class the 'parenthetical' adverbs. The following list is gleaned from several sources, most of which accept the separateness of this class regardless of the formal analysis recommended.5

(20) ADV' (t/<9t)  ADJ' (t/<4t)
amazingly      amazing
amusingly      amusing
annoyingly      annoying
appropriately  appropriate
astonishingly  astonishing
conveniently  convenient
curiously      curious
delightfully  delightful
disappointingly disappointing
disturbingly  disturbing
fortunately  fortunate
funnily enough  funny enough
happily      ---
incredibly  incredible
interestingly  interesting
ironically  ironic
luckily - lucky
mercifully - merciful
naturally - natural
not unnaturally - not unnatural
oddly - odd
paradoxically - paradoxical
refreshingly - refreshing
regrettably - regrettable
remarkably - remarkable
ridiculously - ridiculous
sadly - sad
significantly - significant
strangely - strange
surprisingly - surprising
suspiciously - suspicious
tragically - tragic
unexpectedly - unexpected
unfortunately - unfortunate
unluckily - unlucky

There is a long history behind the distinction between modal and parenthetical adverbs. It has been noted, for example, that there are no modal adverbs with negative force, although the adjective counterparts produce perfectly grammatical sentences (see Section 6.2.1 and Schreiber 1971:94-95; Bellert 1977:343).

(21) a. \{ *Not clearly, \} John will resign.
   \{ *Unclearly, \}
   b. It is \{ not clear \} that John will resign.
   \{ unclear \}

(22) a. \{ *Not possibly, \} Mary will resign.
   \{ *Impossibly, \}
   b. It is \{ not possible \} that John will resign.
   \{ impossible \}

The apparent exceptions, like undoubtedly and unquestionably, are
negative in form; but it is doubt or question which is negated, making the net effect positive. In practice then, it seems impossible to negate a modal \((t/8t)\) adverb independently of negating the entire sentence it modifies. Parenthetical adverbs, on the other hand, can be negated freely. A parenthetical adverb and the sentence it modifies can be negated separately.

(23) a. Oddly, \(\{\) Bill washed the dishes. \(\}\) Bill did not wash the dishes.
    b. It is odd that Bill \(\{\) washed \(\}\) the dishes. \(\) did not wash

(24) a. Not oddly, \(\{\) Mary scrubbed the floor. \(\}\) Mary did not scrub the floor.
    b. It is not odd that Mary \(\{\) scrubbed \(\}\) the floor. \(\) did not scrub

(25) Fortunately, \(\{\) John escaped. \(\}\)
    Unfortunately, \(\{\) John did not escape.

(26) Unexpectedly, \(\{\) Max did not hit Bill with a flounder. \(\}\)
    Not unexpectedly, \(\{\) Max hit Bill with a flounder.

The two adverb classes also behave differently in questions, hypothetical sentences and belief sentences. Modal adverbs can appear within questions while parentheticals cannot (Schreiber 1971:88, 90; Quirk et al. 1972:517; pace Bellert 1977:344).

(27) Modal adverbs

 a. Is Richard \(\{\) apparently \(\}\) the best candidate?
     \(\) certainly
     \(\) clearly
     \(\) obviously
     \(\) possibly

 b. Is it the case that apparently Richard is the best candidate?
Parenthetical adverbs

a. *Is Richard strangely the best candidate?
   oddly
   unfortunately
   sadly
   expectedly
   ironically

b. *Is it the case that strangely Richard is the best candidate?

The same observations are made for hypothetical sentences (Schreiber 1971:89; Bellert 1977:345), though intuitions often clash over examples like (29).

(29) I wonder whether John apparently certainly clearly obviously possibly strangely unfortunately sadly ironically hated his mother.

Within belief contexts and similar opaque constructions, modal adverbs have the same force as their corresponding adjectives. However, in the same syntactic environments, a parenthetical adverb is odd, if not ungrammatical, while its corresponding adjective is perfectly acceptable.

(30) a. John believes that possibly Mary escaped.
    b. John believes that it is possible that Mary escaped.

(31) a. John believes that unfortunately Mary surrendered.
    b. John believes that it is unfortunate that Mary surrendered.
In explaining these facts, Schreiber (1971:88) and Bartsch (1975:185) have claimed that a parenthetical sentence adverb presupposes that the sentence it modifies is true. Kiparsky & Kiparsky (1970:147) also see factivity in terms of presupposition. This view of factivity has been criticised by Wilson (1972), Bellert (1977:342) and Delacruz (1976), who argue in favour of entailments rather than presuppositions.

Whatever the differences in approach, it must at least be said that parenthetical adverbs are factive. If Unfortunately, \( \Phi \) is true, then \( \Phi \) is also true. This is not sufficient, unfortunately, to explain the syntactic differences between parenthetical and modal adverbs. Some modal adverbs like definitely, indeed, in fact, and necessarily are also factive. Another consideration is that embedded sentences which, by entailment or presupposition, must be true still resist parenthetical adverbs.

(32) John knows that unfortunately Mary escaped.

The more likely factor is this: a parenthetical adverb most naturally applies to a sentence which is being directly asserted by the speaker. Thus such adverbs are inappropriate for modifying questions, commands and hypothetical sentences, and they are felt to be odd when applying to sentences in opaque contexts. The challenge is now to formalise these adverbs and show how the theory explains the syntactic facts. It has already been proposed that sentential adjectives be analysed as predicates of propositions as in (33).

(33) It is possible that Mary escaped.
(33') possible'(^[escape'(m)]))

Modal sentence adverbs have been translated exactly like their corresponding adjectives as in (34).

(34) Possibly Mary escaped.
(34') possible'(^[escape'(m)]))
This paraphrase relation and the identical translations are well accepted (Schreiber 1971: 85, 89). The simple form of the translation in (33') or (34') shows why modal adverbs cannot be negated separately from the modified sentence; to negate the adverb, the main predicate, is to negate the whole sentence. The single translation is also supported by the identical behaviour of equivalently translated adjective- and adverb-based sentences in questions, hypotheticals and opaque contexts. There is no reason why a sentence of the form possibly'([escape'(m)]) should not be questioned, believed or treated as hypothetical.

In the case of adjectives of category t/4t, these too have been translated as predicates of propositions, just like the modal adjectives.

(35) It is strange that Mary escaped.
(35') strange'([escape'(m)])

These parenthetical (t/4t) adjectives are exceptional in their all being factive, but they behave syntactically like the modal group. All the same observations on negation, questions, hypothetical sentences and opaque contexts apply.

The big problem to be explained is why sentences modified by parenthetical adverbs behave differently. Unlike modal adverbs, these parenthetical adverbs can be independently negated. Unlike sentences with modal adverbs, and those based on either modal or parenthetical adjectives, sentences with parenthetical adverbs resist being questioned, made hypothetical or put in opaque contexts. There is thus ample reason to suggest that a sentence like (36), based on a parenthetical adverb strangely, does not translate in the same way as sentence (35), which is based on the corresponding parenthetical adjective strange.

(36) Strangely, Mary escaped.
I shall argue that parenthetical adverbs are different from modal adverbs, and from all proposition-level adjectives, in that they are properly translated as non-restrictive modifiers of sentences. Not only will this difference go some way toward explaining the syntactic behaviour of parenthetical adverbs, but it also accords with the intuitions of several investigators. Schreiber (1971:89-91), for instance, postulates that sentences with parenthetical adverbs are properly derived by transformation from two conjoined sentences, one of them based on the corresponding adjective. He further postulates that these conjoined sentences are derived transformationally from sentences with relative clauses. He provides the following examples.

(37) Agnew loves Orientals, which is ironic. \(\Rightarrow\)
    Agnew loves Orientals, and it is ironic that he does. \(\Rightarrow\)
    Ironically, Agnew loves Orientals.

(38) Reagan admires radical students, which is fortunate. \(\Rightarrow\)
    Reagan admires radical students, and it is fortunate that he does. \(\Rightarrow\)
    Reagan admires radical students, fortunately.

Schreiber does not postulate such conjunction sources for modal adverbs. Bellert (1977:342) similarly argues that two propositions underlie any sentence with a parenthetical adverb. In a more logical framework, Bartsch (1975:185) translates sentences with parenthetical adverbs with logical conjunction as in (39).

(39) Regrettably, John left.
(39') \(\text{leave'(j)} \& \text{regrettable'(}[\text{leave'(j)}])\)

At the same time, Bartsch translates sentences based on proposition-level adjectives without such a conjunction, as in (40').

(40) It is regrettable that John left.
(40') \(\text{regrettable'(}[\text{leave'(j)}])\)

Two points are worth noting in these proposals. First, the most
basic sentences in the transformational analysis proposed by Schreiber (see (37) and (38)) have relative clauses which are obviously non-restrictive. Second, the conjunction sources or translations postulated by Schreiber and Bartsch are characteristic paraphrases and analyses of non-restrictive modifiers. I propose to outline my own analysis of parenthetical adverbs as non-restrictive modifiers and then show why Bartsch's conjunction account is not quite adequate.

Let us assume the following lexical rule to relate parenthetical (t/9t) adverbs to (t/4t) adjectives. Let pa be an anaphoric variable of type <s,t> which is resolved during a derivation.

R87 (lexical). If α ∈ P_t/4 then (α, Ly) ∈ P_t/9.
Realisation: α", where α" is α with the main adjectival in the -ly form
Translation: λp[p]; subroutine (α'(pa))

If we take strangely as a typical t/9t based on the t/4t strange, its reading, by R87, will be λp[p]; subroutine (strange'(pa)). The following is a sample derivation.

(41) (strangely_t/9 (John_t, leave_III_t, R1_t, R86
Realisation: Strangely, John left.
Translation:
1. (John, leave) ⇒ leave'(j) See previous examples
2. strangely_t/9 ⇒ λp[p]; subroutine (strange'(pa))
   Basic
   S1. strange'(pa)
   S2. strange'("[leave'(j)])
   Anaphoric resolution
   S3. Return
3. (strangely, (John, leave))_t ⇒ λp[p] ("[leave'(j)])
   From 1, 2 by R86
4. leave'(j)
   Lambda conversion

If Sue utters (41), she makes the assertions in (42) and (43).
The effect, therefore, of applying a parenthetical adverb like strangely to any sentence is to assert the sentence and also to assert that the intension of the sentence is strange. Note that in example (41) the sentence leave'(j) follows logically from the translation(s). (Note that now the notion of logical consequence must be defined to operate over the accumulated assertions added to the discourse pool.) This is different from what happens with the adjective construction in (44).

(44) It is strange that John left.
(44') strange'('[leave'(j)]')

In (44'), the sentence leave'(j) is not directly asserted; rather because strange' is factive, leave'(j) is an analytic consequence by way of M.P. P1 (see Section 5.2.1).

As we saw above, parenthetical adverbs apply happily only to those sentences which are asserted directly by the speaker. Such adverbs in questions, hypothetical sentences and sentences in opaque contexts are therefore uneasy. These facts are entirely consistent with the proposed non-restrictive analysis, which inherently involves assertion of the modified sentence. Also, the fact that parenthetical adverbs can be negated independently from the modified sentence is explained by the same analysis: there are two clauses subject to negation.

Other facts about parenthetical adverbs are consistent with non-restrictiveness and not with Bartsch's conjunction translation. First, parenthetical adverbs can be uttered quotationally, removing the speaker from responsibility for that portion of the utterance.

(45) 'Unfortunately', Lee was caught by his supervisor, and was forced to do some work.

In (45), we get the impression that someone other than the speaker,
probably Lee, found doing the forced work unfortunate. A non-restrictive analysis also reflects the subordinate or parenthetical flavour of the second clause. Finally, the conjunction analysis offers no help in explaining why a sentence like (46) is often felt to be odd.

(46) John believes that unfortunately, Mary escaped.

The conjunction analysis would result in a translation like (46'), which is logically coherent.

(46') believe*(j, ^[escape'(m) & unfortunate'([^escape'(m)]]))

However, if (46) has a valid reading at all it is not (46') but (47), where unfortunately forms no part of John's belief but is someone else's, probably the speaker's, parenthetical comment on the object of John's belief.

(47) a. believe*(j, ^[escape'(m)])
   b. unfortunate'([^escape'(m)]]

This translation is coherent, and it falls out naturally in the present analysis, but it can still seem odd for pragmatic reasons. The translation in (47) will normally commit the speaker to the truth of escape'(m) because of the factivity of unfortunate'. But the speaker is also asserting that John believes that Mary escaped, an assertion which invites the implication that the speaker does not himself share that belief. The conflict between factive entailment and invited implication is enough to make such sentences odd. Much better are examples using know, which is itself factive.

(48) John knows that unfortunately, Mary escaped.

Because such a sentence commits the speaker to the truth of escape'(m), it is much easier for him to insert a parenthetical comment on that fact by means of a parenthetical adverb. Such sentences are not, therefore, formally ungrammatical according to the
present grammar.

As with modal adverbs, the translations of parenthetical adverbs reflect the diversity of the adjectives to which they are related. Simple $t/4$ adjectives like odd and strange are related to sentence adverbs by rule R87.

\[(49) \text{odd}_{t/4t} \Rightarrow \text{odd'} \]
\[\text{oddly}_{t/9t} \Rightarrow \lambda p[\text{p}]; \text{subroutine(odd'}(P_{a}))\]

Present participles of $IV'/T$ verbs such as amaze, have more complex translation, but the effect of adverbialisation is the same.

\[(50) \text{amazing}_{t/4t} \Rightarrow \lambda pVx[\text{amaze'}(p, \lambda \text{PP}(x))] \]
\[\text{amazingly}_{t/9t} \Rightarrow \lambda p'[\text{p}]; \text{subroutine(\lambda pVx[amaze'}(p, \lambda \text{PP}(x)))(P_{a}))\]

Other similar examples are also based on two-place relations and can occasionally take PP-FOR phrases expressing the 'direct object'.

\[(51) \text{a. Fortunately for Bill, the fine was waived.} \]
\[\text{b. Unfortunately for Mary,} \]
\[\text{the judge imposed the maximum sentence.} \]
\[\text{c. Annoyingly for Roger,} \]
\[\text{it rained during the outdoor concert.}\]

Given the complex readings already defended for derived $t/4t$ adjectives such as fortunate, R87 can again accommodate such adverbialisations. The derivation of $t/9t$ adverbs like fortunately for Bill $t/9t$ from derived adjectives like fortunate for Bill $t/4t$ requires that rule R87 be somewhat productive.
6.2.3 Temporal adverbials

The semantics of temporal adverbs is a subject of much current debate, and the interplay of time adverbials with tense presents challenging problems outside the scope of this thesis. Syntactically, most if not all temporal adverbials can be assigned to category $t^9$, and their semantics, ignoring tense, is reasonably tractable. Here I shall be interested in temporal adverbials mainly insofar as they interact with adjectives.

The simplest examples such as formerly, presently, and in the future appear in examples such as (53).

(53) a. Formerly, John was rich.
    b. Presently, John is rich.
    c. In the future, John will be rich.

Assuming that formerly translates as formerly', and similarly for the other examples, interpretations like those below will serve the present purposes.

$$[[\text{formerly}'(p)]] = 1 \text{ at } <w,t> \text{ iff there is an interval } t' < t \text{ such that } p<w,t'> = 1.$$  

$$[[\text{presently}'(p)]] = 1 \text{ at } <w,t> \text{ iff } p<w,t> = 1.$$  

$$[[\text{in-the-future}'(p)]] = 1 \text{ at } <w,t> \text{ iff there is an interval } t' < t \text{ such that } t < t' \text{ and } p<w,t'> = 1.$$  

Many other temporal adverbials are similar to these. In-the-past is equivalent to formerly. Recently will intuitively be translated and interpreted much like formerly, with an added requirement that the
pastness not be remote. Soon and one reading of momentarily are non-remote versions of in-the-future. We can postulate other similar interpretations for more complicated adverbials.

\[
\text{[[potentially\'(p)]] = 1 at } <w,t> \text{ iff there is an interval t' such that } t < t' \text{ and there is a possible world w' such that } p < w', t' > = 1.
\]

\[
\text{[[prospectively\'(p)]] = 1 at } <w,t> \text{ iff there is an interval t' such that } t < t' \text{ and there is an entity x such that } \langle \text{[expect\'(x, } [p<w, t'>] \rangle \rangle <w,t> = 1.
\]

Such translations are only suggestions, and the details are in no way central to the present concerns. It is sufficient in dealing with examples involving adjectives with temporal adverbs to translate an adverb like formerly t/st as formerly' and to assume that some convenient semantics will be available to interpret formulas of the form formerly\'(p).

Some more troublesome adverbs indicate frequencies over set periods (Quirk et al. 1972:489; Bellert 1977:34).

(54) hourly, daily, nightly, weekly, fortnightly, monthly, bi-monthly, quarterly, semi-annually, annually, yearly, bi-annually

Stump (1981:225-226) has offered the following semantics for such frequency adverbs. Let f' be a frequency operator (like hourly' or daily') and let 1 be a designated period (like hour or day). Frequency adverbs are then translated and interpreted as operators on propositions.

\[
\text{[[f'(p)]] = 1 at } <w,t> \text{ iff } p \text{ is true in w at nonoverlapping subintervals of t distributed throughout t at periods of a specified length 1.}
\]

Thus Daily, John walks in the park will be true at <w,t> iff John walks in the park is true in w at nonoverlapping subintervals of t.
distributed through t at periods of one day.

Variant frequency adverbs have a similar semantics, but the period t and the details of the distribution through t vary with context (Quirk et al. 1972:489-490; Nilsen 1972:143).

(55) rarely, infrequently, irregularly, intermittently, sporadically; sometimes; occasionally; periodically, regularly, often; frequently, usually, normally, ordinarily, generally, commonly, habitually, customarily, constantly, repeatedly, recurrently, continuously, continually, invariably, incessantly

Again I shall merely translate any temporal adverbial α as α′, a predicate of propositions, and assume that an interpreted semantics exists. 8

6.2.4 Hedges

6.2.4.0 Introduction

The word 'hedge' is used here to refer to a large and varied collection of adverbials which specify or narrow the context or point of view from which the truth of a sentence is evaluated. 9 Generally the effect of hedges is to pin down vague predicates by stating, directly or indirectly, the relevant criteria for their application or the relevant domain of application.

Hedges include adverbials which overtly supply comparison classes (56) and some which overtly supply criteria of application (57). A third type, as in (58), supplies a new context or point of view which in turn can specify a comparison class or criterion.

(56) a. Compared to basketball players, John is short.
     b. For a jockey, John is tall.
(57) a. As far as programming is concerned, Mary is brilliant.
     b. At chess, Mary is poor.
(58) a. From Andropov's point of view, Poland is a free country.
    b. From Reagan's point of view, Poland is an oppressed country.

With the vaguest predicates like *good* and *skilful*, hedges are often essential for useful communication.

(59) \[
\begin{align*}
\text{As far as chess is concerned} \\
\text{As a chess player} \\
\text{Chess-wise} \\
\text{At chess}
\end{align*}
\]

(60) \[
\begin{align*}
\text{Choreographically} \\
\text{Professionally} \\
\text{Artistically} \\
\text{Culinarily} \\
\text{Medically} \\
\text{Manually}
\end{align*}
\]

Even within the same orthographical sentence, two different hedges can designate different criteria for the application of the same predicate, such as *well* in (61).

(61) Physically, John is well, but emotionally, he's not well.

In order to accommodate hedges and their contextual effects, the MG semantic model needs to be expanded to include contexts as well as worlds and times. This addition, though significant, is fairly easily formalised, and the following sections show how it is done.

6.2.4.1 Adding contexts to the model

Following Klein (1979a:24-29; 1980) and Kamp (1975), we can postulate a set \( C \) of contexts as basic entities in the model.\(^{10}\) For any formula \( \Phi \), the semantic value of \( \Phi \) is now evaluated relative not only to a world and a time, but also relative to a context: \( \mathcal{L}_{c,w,t} \) (I leave out indices for the interpretation and the value assignment to variables in the interest of simplicity.) When only world and time indices were relevant, as in PTQ, we could
characterise the intension of an expression $\alpha$ as $\lambda w t [\alpha]_{w, t}$, or, in the object language, as $^*\alpha$. In MG, semantic functions apply uniformly to intensional arguments. This allows functions such as 'formerly' and 'possibly' to influence the time and world indices at which the modified expression will be evaluated. Such functions need to 'know' the intension of their argument.

Just as 'formerly' needs access to time indices and 'possibly' needs access to world indices, so hedges need access to context indices. To allow hedges to do their work, they must apply not just to intensional arguments, which are functions from worlds and times to extensions, but to a new kind of object which is a function from contexts, worlds and times to extensions. These new objects are called CHARACTERS, and the character of $\alpha$, that is $\lambda c w t [\alpha]_{c, w, t}$, is represented by Klein as $^\alpha$ in the object language. For every type $\tau$, the character of $\tau$ is of type $<k, t>$. If $\beta$ is a character, then $^\beta$ is an extension; thus $^\beta \cap \alpha = \alpha$. Now instead of applying uniformly to intensional arguments, as in PTQ, functions in the semantics will apply to character-type arguments. To avoid recasting the rules and examples given so far, I shall not adopt the character notation signs $^\cap$ and $^\cup$ but will instead redefine $^\land$ and $^\lor$; $^\alpha$ should now be read as the character of $\alpha$, and if $\beta$ denotes a character, $^\beta$ denotes an extension. Whenever $\tau$ is a type, $<s, \tau>$ is now the character of $\tau$.

Klein (1980a:11) defines a context-dependent interpretation to be much like a MG interpretation for an intensional language. For example, where the function $F$ assigns meanings to non-logical constants, and $D_\tau$ is the set of possible denotations of type $\tau$, and $CON$ is a non-logical constant of type $\tau$, then $F_{CON}$ is a function in the set $D_\tau^{CXWT}$. $[[\alpha]]_{c, w, t}$ is the extension of $\alpha$ at a context $c$, a world $w$ and a time $t$. Furthermore,
An obvious addition to Klein's outline interpretation is the rule in (63), which simply requires that contexts, along with worlds and times, distribute over conjuncts.

\[(\phi \land \psi)_{c,w,t} = 1 \iff [\phi]_{c,w,t} = [\psi]_{c,w,t} = 1\]

Klein argues that 'degree' adjectives like tall are partial functions from subsets of the universe \(U\) to \([0,1]\). That is, tall divides a set into a positive extension, a negative extension and an extension gap (including those entities which are neither tall nor not-tall).

One thing that contexts do is to determine just which set of entities a predicate like tall is carving up—that is, contexts can specify relevant subdomains.

If John is 5'6" tall, then John is tall may be true in a context which specifies dwarves as the comparison class, but false in a context which specifies basketball players as the comparison class. Formally, Klein defines a function \(U\) from \(C\) to subsets of the universe; thus for any \(c \in C\), \(U(c) \subseteq U\). Intuitively, \(U(c)\) is simply the relevant comparison class at context \(c\). It can also be thought of more generally as the (sub)domain of the model which is relevant for interpreting an utterance or a part of an utterance. For instance, (65) may be true in a context where everyone quantifies over a domain which is contextually restricted to the ten children at a birthday party.
We will return to the use of contexts to delimit the domains of quantifiers in Chapter 7.

In interpreting one-dimensional (linear) vague adjectives like *tall*, we can now require that the extension of the predicate be 'focussed' on the set \( U(c) \), and so the truth value of a sentence of the form *John is tall* can vary according to context. For notational convenience, \( c[X] \) is defined to be that context \( c' \) just like \( c \) except that \( U(c') = X \). *For a pygmy* is a hedge which overtly supplies the relevant comparison class *pygmy*.

Whenever \( p \) is of type \(<s,t>\), \( c \in C \), \( w \in W \), \( t \in T \),
\[
F_{\text{for-a-pygmy}}(c)(w)(t)(p) = p(c[\text{pygmy'}])(w)(t).
\]

In general, we can state that

Whenever \( p \) is of type \(<s,t>\), \( c \in C \), \( w \in W \), \( t \in T \) and \( h \) is a hedge supplying the comparison class \( X \),
\[
F_h(c)(w)(t)(p) = p(c[X])(w)(t).
\]

When a hedge supplies a context, which then indirectly specifies a comparison class by way of function \( U \), then the following rule applies.

Whenever \( p \) is of type \(<s,t>\), \( c \in C \), \( w \in W \), \( t \in T \) and \( h \) is a hedge supplying the new context \( c' \),
\[
F_h(c)(w)(t)(p) = p(c')(w)(t).
\]

For example, the hedge *in Slobovia* effectively designates a new (Slobovian) context \( c' \). This \( c' \) can in turn specify a comparison class by way of the function \( U \). A sentence like (69) translates as (69').
In Slobovia, John is tall.

[[tall'(j)]]_{c',w,t}

where $c'$ is the designated Slobovian context
(and so $U(c')$ is the relevant comparison class).

Using these tools, a number of adjective modifiers can be semantically characterised. The following semantics for very is adapted from Klein (1980a:26); $\tau_A$ is $\langle e, t \rangle$, the type of adjectives like tall.

(70) Whenever $c \in C$, $w \in W$, $t \in T$ and $z$ is of type $\langle s, \tau_A \rangle$,

$$F_{\text{very}}(c)(w)(t)(z) = z(c[X])(w)(t)$$

where $X = \{ u : z(c)(w)(t)(u) = 1 \}$.

More simply, the predicate very tall at $\langle c, w, t \rangle$ is focussed on the set $\text{tall}'$ at $\langle c, w, t \rangle$. The comparison class for very tall is therefore the set $\text{tall}'$. Something will be very tall iff it is tall for a tall thing.

Klein's proposals for comparison classes are less helpful when we move from one-dimensional adjectives like tall to multi-dimensional adjectives like clever and skilful. If we agree, in some context, that the only relevant criterion for cleverness is the ability to learn foreign languages, then varying comparison classes can capture the vagueness in ascribing cleverness. However, criteria themselves vary, and criteria, like comparison classes, can be explicitly supplied via hedges.

(71) As far as learning foreign languages is concerned, Mary is clever.

(72) At mathematics, Mary is not clever.

Such criterion hedges can be handled analogously to comparison-class hedges. Let us propose, by fiat, that $K$ is a function from contexts to criteria. $K$ is therefore analogous to $U$, which is a function from contexts to subsets of the domain (comparison classes).
Thus, for all $c \in C$, $K(c)$ denotes the relevant criterion or criteria to be used in applying multi-dimensional (non-linear) vague predicates like *good* and *skilful*. Let $c < k>$, where $k$ is a criterion, be the context $c'$ just like $c$ except that $K(c') = k$. (Recall that $c[x]$ is the context $c'$ just like $c$ except that $U(c') = X$.) Nothing in the rules prevents both criteria and comparison classes being affected simultaneously by context. This will in fact be necessary to assign a truth value to any sentence like (73).

(73) John is *good*.

If (73) is evaluated at $<c, w, t>$, $K(c)$ might denote the criterion of playing the violin. $U(c)$ would then denote the comparison class of violinists against which John's goodness *qua* violin player could be judged. If that class is rather large, then the standards for judgement would be relatively lax and (73) would have a better chance of being true.

A different context for the same sentence could be supplied overtly by a hedge as in (74).

(74) *In Mary's opinion, John is bad.*

If *in Mary's opinion* supplies the new context $c'$, $K(c')$ might again denote the criterion of violin playing, but $U(c')$ might now denote a very select few violin players of high professionalism. Against such stiffer standards, John is more likely to be considered bad, or at least not good, as a violin player. Given the two contexts just described, (73) and (74) could both be true. Contexts obviously provide a rich source for qualification, shading of meaning, and, inevitably, misunderstanding and disagreement.

When hedges specify (or strongly suggest) criteria directly, thus bypassing the need for the function $K$, we need a slightly different approach. The rule in (75) is analogous to that in (67).
Whenever \( p \) is of type \( \langle s, t \rangle, \ c \in C, \ w \in W, \ t \in T \) and \( h \) is a hedge supplying the criterion \( \kappa \),
\[
P_h(c)(w)(t)(p) = p(c^{<\kappa>})(w)(t).
\]
Typical criterion-supplying hedges are shown in (76).

(76) a. Botanically, a tomato is a fruit.
    b. Culinarily, a tomato is a vegetable.

Paraphrases of botanically include botanically speaking, from a botanical point of view, and in a botanical context or in a botanical sense. Similar paraphrases are available for culinarily. The effect of botanically in (76a) is to specify that the predicate fruit is to have its botanical definition, i.e. 'the product of a pollinated flower'. Under such a definition, tomatoes are indeed fruits, and (76a) is true. In culinary or most common usages, however, the predicate fruit is reserved for sweet fleshy plant products, and does not include tomatoes. Vegetable, in common usage, covers tomatoes, peas and pumpkins, which are all, botanically speaking, fruits.

Similar effects are noted in the following pairs of sentences, which can all be simultaneously true.

(77) a. Technically speaking, a spider is not an insect.
    b. Commonly speaking, a spider is an insect.

(78) a. From a medical point of view, the thigh is not part of the leg.
    b. To the man on the street, the leg includes the thigh.

(79) a. By American standards, John is legally drunk.
    b. By British standards, John is not legally drunk.

In some discourse environments, vaguer hedges are often sufficient to signal the intentions of the speaker.
(80) theoretically, hypothetically, (in)formally, outwardly, superficially, officially, by definition, nominally, essentially, fundamentally, basically, ideally, rightly, properly, correctly

The class tends to blend into what I have called 'modal' notions such as actually, really, apparently and ostensibly. There is no necessary distinction among these classes at the level of syntax and logical form. The details of how various of these adverbials interact with semantic indices will no doubt be a matter for continuing research.

Some of the vaguest hedges of all include in some respects, in a sense, in a real sense, in a way and from one point of view. As noted by Kamp (1975:151), in practice such hedges can be stretched so far that it is difficult to establish that a sentence of the form (81) is false.

(81) In a sense, John is good.

If (81) translates as something like (82), then it is indeed difficult to imagine any person who is so incredibly bad that there is not at least one context in which he can be called good.

(82) \( \forall c \exists w \exists t \text{good}('j') \)

On the other hand, a hearer can respond to an utterance of (81) by asking What sense is that? or What sense are you referring to? Thus even with such apparently vague hedges, the hearer assumes that the speaker intends his utterance to be interpreted according to some specific criterion or criteria. The relationship between contexts and the speaker's intention will be explored in the following sections.

6.2.4.2 Problems in contextual distribution

I shall not enter the involved debate over the ontological status of contexts or their internal composition. I shall simply accept contexts as basic and stipulate that contexts can specify, by way of functions like \( K \) and \( U \), the criteria and comparison classes
needed to narrow the application of vague predicates.

Having said this, there is good reason to fear that the notion of a contextual index is not as straightforward as it first appears. Consider a sentence like (83).

(83) Bill is clever and Mary is clever.

It is intuitively the case that the two clever s in (83) can be interpreted relative to different contexts. Thus Bill's cleverness could be in sewing while Mary's cleverness is in cooking. Yet if contexts are like worlds and times, they will distribute over conjuncts according to the rule in (84).

(84) $[[\Phi \land \Psi]]_{c,w,t} = 1 \iff [[\Phi]]_{c,w,t} = [[\Psi]]_{c,w,t} = 1.$

That is, sentence (83) will be evaluated at some context $<c,w,t>$, and as it is a conjoined sentence, each of the conjuncts will then be evaluated at $<c,w,t>$. Unfortunately, this would appear to force the two predicates 'clever' to be evaluated at the same context $c$, which forces them to be evaluated relative to the same criterion $K(c)$ and the same comparison class $U(c)$. This would rule out the possibility of the two clever s being evaluated relative to different criteria.

The same problems occur within sentences. If someone asks Is John tall?, (85) can intuitively be a true response.

(85) Well, John is tall and short.

Such a response could well mean 'he's tall compared to men but short compared to basketball players'. Again, if contexts distribute over conjuncts, this would appear to force 'tall' and 'short' in (85) to be evaluated at the same context, relative to the same comparison class, making the sentence necessarily a contradiction.

Another difficulty arises with attributive constructions. In Chapter 2 I defended the conjunction analysis for attributive degree and evaluative adjectives, arguing that head nouns cannot necessarily be taken to provide relevant comparison classes and criteria of
application. There are, for example, examples like (86) and (87).

(86) You'll recognise John easily; he is a tall basketball player.
(87) John is a good actor; he always pays his rent on time.

The point is that *tall basketball player* may well mean 'tall for a man and a basketball player' rather than 'tall for a basketball player'. Similarly, *good actor* may mean 'good at paying his rent and an actor' rather than 'good qua actor'.

Equally true is the observation that attributively modified head nouns often do suggest the comparison classes or criteria needed for evaluation. That is, *big flea* usually does mean 'big for a flea' and *bad actor* usually does mean 'bad qua actor'. Immediately one runs into challenges such as (88).

(88) John is a tall man, but he is a short basketball player.

If (88) is uttered at $<c,w,t>$, then the context $c$ will distribute over the two conjuncts, forcing both *tall* and *short* to be evaluated relative to the same comparison class $U(c)$. Clearly something needs to be done to allow different contexts, and, thereby, different comparison classes to apply for the evaluation of two conjoined clauses.

Within the present analysis, it is possible, but not desirable, to wire-in the comparison classes and criteria suggested in the head noun of an attributive ADJ-CN construction. If one retains the conjunction analysis, augmented with contexts, the default reading for *big flea* could be shown as (89).

(89) $[[\lambda x[\text{big}'(x) \& \text{flea}'(x)]]_{c',w,t}$

where $U(c') = \text{flea'}$

Representing *good actor* as 'good qua actor' is somewhat trickier, as even acting criteria vary according to context. Let $\text{Qua}$ be a function from properties and contexts to criteria. $\text{Qua}('\text{actor'})(c)$ therefore denotes a criterion of evaluation for actors qua actors at
c. The default reading for good actor could then be shown as (90).

\[(90) \exists x[\text{good}'(x) \& \text{actor}'(x)]_{c',w,t}\]
where \(K(c') = \text{Qua}('\text{actor'})(c')\)

Unfortunately, the question of whether to adopt these default comparison classes and criteria is itself decided by context. Intuitively, context, overt or not, can override these syntactic suggestions.

The first step in resolving such difficulties is to notice that vaguer hedges can occur with compatible, less vague, hedges within their scope.

\[(91) \text{As a baseball player, [John is good at batting but he is bad at fielding].}\]

As long as at batting and at fielding are criterion specifiers within the wider criterion of baseball playing, their restrictive presence within the scope of as a baseball player is both coherent and useful. The behaviour of temporal adverbials is quite similar. As long as at 3 p.m. and at 4 p.m. designate intervals within the wider interval yesterday afternoon there is no conflict in (92).

\[(92) \text{Yesterday afternoon, [John went shopping at 3 p.m. and and he went to the library at 4 p.m.].}\]

The conclusion, then, is that contexts and time intervals do distribute over conjuncts within a sentence, but that this in no way precludes finer specification by other hedges or time adverbials on each of the conjuncts. The distributed context or time adverbial designated by the wide-scope adverbial becomes the new base index which is further specified by the narrower-scope adverbials.

Now consider a sentence like (93) where finer time specifications on the conjoined sentences are not made explicit.
(93) Yesterday afternoon, [John went shopping, and he went to the library].

I find such a sentence totally unobjectionable and transparent in its most obvious reading. It simply states that within the interval yesterday afternoon, two things happened: (1) John went to the library, and (2) John went shopping. There is no requirement that these two activities be carried out at the same exact time; indeed that seems practically impossible for this example. One assumes naturally that at some interval $t_1$, where $t_1$ is a subinterval of yesterday afternoon, John went shopping, and at some interval $t_2$, where $t_1 \neq t_2$ and $t_2$ is a subinterval of yesterday afternoon, John went to the library.

Hedges behave in exactly the same way. There are, intuitively, readings of (94) which are not at all contradictory.

(94) As a baseball player, [John is good, and he is bad].

All that is needed is that John be good by one criterion, say $k_1$, where $k_1$ is a subcriterion of baseball playing, and that John be bad by criterion $k_2$, where $k_1 \neq k_2$ and $k_2$ is a subcriterion of baseball playing.

One possible way to approach these examples is to appeal twice to the vagueness of hedges like as a baseball player and of time adverbials like yesterday afternoon. I do not believe that this approach can be made to work. Let us look just at the time adverbial, though the argument could equally well use the hedge. It could be argued that a sentence of the form yesterday afternoon, $\Phi$ is true at $<c,w,t>$ iff yesterday afternoon denotes $t'$ (relative to $<c,w,t>$) and there exists some interval $t''$ such that $t''$ is a subinterval of $t'$ and $\Phi$ is true at $<c,w,t''>$. Less formally, this is to argue that the sentence is true if $\Phi$ is true at any particular time within the broad constraining interval of yesterday afternoon. In a sentence of the form yesterday afternoon, [$\Phi$ and $\Psi$] the semantics just explained would force $\Phi$ and $\Psi$ to be true at exactly the same subinterval of yesterday afternoon. To cover the cases such as
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example (93) where the conjoined sentences can intuitively be true at different subintervals of yesterday afternoon, one could appeal twice to the vagueness of the time adverbial by splitting the sentence into yesterday afternoon, $\Phi$ and yesterday afternoon, $\Psi$. Then each of these sentences could be evaluated separately, allowing $\Phi$ and $\Psi$ to be true at different subintervals of yesterday afternoon. Clearly such an approach is not kosher—it requires that the function denoted by a time adverbial know not only the semantic value of its argument but also its internal structure. Knowledge of this internal structure will be necessary for those cases where semantic interpretation is to be delayed and the time adverbial is to distribute vaguely over conjuncts.

6.2.4.3 Resolving contextual dilemmas

6.2.4.3.1 Separating contexts and environments

The workable solution to contextual dilemmas first requires a distinction between what I shall call 'environments' and contexts. Contexts are the elements of $C$; and they function as indices (like worlds and times) in the manner which has already been defined. I would prefer to substitute a term like 'sense' or 'delineation' or 'point of view' for 'context', but this usage has already been established by Kamp (1975) and Klein (1979a, 1980a). By 'environment' I refer to the wider and pretheoretical notion of the context of utterance or discourse environment, which includes a time, a place, interlocutors, their respective and shared knowledge, some record of the immediate discourse, etc. Kamp (1975;150) appears to have this notion of environment in mind when he writes of 'the setting in which an utterance is made'. I emphasise here that what I have called 'environment' and what Kamp has called 'the setting in which an utterance is made' is often called 'context' by linguists, and there is great danger of confusing this notion with the formal contexts (elements of $C$).

This is in no way to say that environments and contexts are not interrelated. In particular, given an environment a hearer can often tell what context is intended by the speaker. In Kamp's terms, a
context is often 'manifest' through the 'setting in which an utterance is made'. Thus after talking about chess for an hour, hearers in such a chess-oriented environment, hearing (95), should be fairly safe in interpreting it relative to a context where the criterion is ability to play chess.

(95) Algernon is very good.

When the environment is not rich enough to determine a context, hedges are required for successful communication. The sensitive speaker will always be weighing the environment, including his estimation of his hearers' knowledge, to judge how much overt hedging, if any, is appropriate. We can then say that sincere speakers use hedges to compensate for inadequate environments; and hedges function to specify or modify contexts, thus helping to ensure that the speaker's intended meaning is successfully transmitted.

It is thus quite possible in any given environment for words to be used according to different contexts. For example, this happens whenever two speakers disagree, knowingly or not, on the meaning or denotation of a predicate. Consider an environment in which a layman and an entomologist are discussing spiders. In this environment the layman may assert (96a) and the entomologist (96b)—both can be simultaneously correct.

(96) a. A spider is an insect.
    b. A spider is not an insect.

This is so because the layman can intend his use of insect to include spiders, and the expert can equally well intend his use of insect to exclude them. This difference in the speakers' intentions is formalised by means of the difference in contexts. Of course, this means that the same speaker could also utter both (96a) and (96b) truthfully, providing that he intends insect to be interpreted according to the appropriate common or entomological context in each
The key point in this discussion is that meaning must be explained at least partly in terms of what the speaker intends to mean. This is the lesson, taken to its extreme, by Humpty Dumpty.

'When I use a word', Humpty Dumpty said in a rather scornful tone, 'it means just what I choose it to mean,—neither more nor less'.

While the environment of an utterance might conceivably be viewed omnisciently and objectively, contexts are ultimately subjective and psychological.

In conclusion, when we say that an utterance is to be evaluated relative to a context, a world, and a time interval, it is a formal context, i.e. an element of C, which is at stake. Contexts are the formal representation of the intentions of the speaker with regard to interpretation, and an utterance must ultimately be interpreted relative to the context intended by its utterer. This context is often obvious to the hearer from the environment, but environments must not be confused with contexts. Hedges are a means the speaker has to make his intentions more explicit.

6.2.4.3.2 Hidden hedges

Kamp (1975:150) points out that a context can be manifest either non-verbally through an environment or through various verbal expressions.

Exclusive preoccupation with shape, for example, can be evident to both speaker and audience either because they have been discussing shape and nothing but shape all along (think of a session about shape during a conference on industrial design); or because the previous sentence was But let us now concentrate exclusively on shape; or because the sentence itself contains the qualifying phrase with regard to shape.

This is true but rather idealised. That is, it is not necessarily evident at all in real discourse what context applies. Let us assume that the individual Mary is well known within a certain club.
speaker in this club should suddenly rouse himself in the midst of a silent conclave and utter, out of the blue, the sentence (97), then it is highly likely that the hearers will be unable to determine its truth value.

(97) Mary is wonderful.

This does not mean, however, that the sentence does not have a truth value. The typical hearer will assume that it does, and he will be actively searching his memory to find a previous discourse or event that will make sense of the utterance. If that fails, the hearers can ask overt questions of the utterer as in (98).

(98) a. In what sense?
b. What do you mean by 'wonderful'?
c. Can you define your terms?
d. What is your criterion for wonderfulness?

If these questions are answered satisfactorily, then the hearers can decide whether they agree.

A more helpful speaker in the environment described would have uttered something more explicit, as in (99).

(99) With regard to intelligence, tennis playing, singing, making money, shape, etc.

Mary is wonderful.

From the formal point of view, where we can again idealise and play the omniscient observer, how are we then to translate and interpret an apparently vague utterance of (97)? I believe the solution is to analyse the utterance as if the appropriate hedge (the one according with the intentions of the speaker) were present. Formally, then, vague sentences will always be interpreted as if they had hidden or understood hedges. In real discourse, careful hearers are engaged in
If a single sentence can be interpreted in the light of a hidden hedge, then a different hidden hedge can apply to each of the conjuncts of a compound sentence. Lakoff (1972:210) cites (100) as such an example.

(100) Nixon is a murderer and he's not a murderer.

It is conceivably true that a person is a murderer, according to some criterion, but that he is not a murderer according to another criterion. In the present analysis, this would mean that the speaker intended murderer to be interpreted two different ways, according to different criteria. By postulating different hidden or understood hedges on the two clauses in (100), an apparent contradiction can be avoided (see also Klein 1980a:8).

As shown in Section 6.2.4.2 above, wide scope hedges can contain compatible, more specific, hedges within their scope.

(101) For a baseball player, John is good at batting but he is bad at fielding.

The context c named by the hedge for a baseball player distributes over the conjuncts of the modified sentence in the usual way. The hedges at batting and at fielding then further specify this distributed context c, avoiding the contradiction. In a similar sentence like (102), contradiction can be avoided simply by assuming a hidden or assumed hedge on each of the conjuncts.

(102) As a baseball player, [John is good and he is bad].

If assumed hedges on isolated simple sentences are accepted, then there is no reason (or principled way) to exclude them on conjoined or embedded sentences. Finally, returning to Lakoff's example (100), the entire sentence can be assumed to have a broad, or even neutral, hedge which designates a broad or neutral context c. This context c will be distributed over the conjuncts Nixon is a murderer and he is
not a murderer. Assumed hedges on each of these conjuncts can then further modify c, saving the sentence from contradiction.

Hidden hedges also resolve problems with vague adjectives in attributive position as in (103).

(103) John is a tall basketball player.

I have argued that tall basketball player translates with a simple conjunction analysis as in (104).

(104) Ay[tall'(y) & basketball-player'(y)].

Whether tall translates as 'tall for a basketball player' or 'tall for a man' or 'tall for a CN', where CN could conceivably be just about anything, has so far been relegated vaguely to context. With the acceptance of hidden or assumed hedges, we can now simply accept that sentence (103), like any other sentence, is subject to assumed hedges which specify the comparison class needed to pin down a predicate like tall'. Similarly, assumed hedges can save conjoined examples like (105) from contradiction.

(105) John is a tall man, but he is a short basketball player.

The most natural reading of this sentence assumes a hedge like 'for a man' pinning down tall and a hedge like 'for a basketball player' pinning down short. These hedges narrow the wide or neutral context assumed to apply to the sentence as a whole.

Understood hedges not only fill a need in the present analysis but can help illustrate how people adjust their interpretations of other people's utterances. Reasonable communicators often minimise disagreement by seeking out their interlocutor's contexts, accommodating to them and even deferring to them in responses. Everyone does this to some extent, and the best communicators are constantly aware that no two people really speak the same language.
Every act of understanding is ultimately an act of translation.

One major strategy of accommodation is to assume that other people do not utter contradictions. If Algernon tells me 'Nixon is a murderer and he is not a murderer', I naturally assume that Algernon intends murderer to be applied according to different criteria—I assume that there are understood hedges on the two conjoined clauses. Similarly, if tall and short threaten to contradict in 'John is a tall man but a short basketball player', appropriate hedges are assumed again. Another strategy of accommodation is simply to ask questions about the speakers intent. When faced with a vague sentence such as 'Mary is clever', a hearer can also explicitly ask In what sense? or How do you mean? These are simple requests for the speaker to make his context, his intended senses, more explicit in hedges.

In conclusion, assumed hedges are both necessary and useful in interpreting utterances. They allow utterances to be interpreted relative to the speaker's intentions, and they rescue many intuitively coherent assertions which superficially appear to be contradictions. Finally, hidden hedges allow contexts to be treated as indices parallel to possible worlds and intervals of time.

6.3 Sentence adverbs and one-place predicates

6.3.1 Combinations of ADV's with one-place predicates

6.3.1.1 Proposition-level predicates

Sentence adverbs combine not only with whole sentences in the syntax, but also with members of \( P_{t/n} \), where \( n \) ranges over the set \( \{1, 3, 4, 5, 6\} \). Let us take obviously' as a paradigm example of an ADV'.

(106) \( t/t \) (IV')
That John sings [obviously [bothers Mary]].

(107) \( t/3t \) (ADJ')
That John cheats is [obviously [possible]].
Similar constructions are possible with derived members of the designated $t^n_t$ categories.

The rule to allow such constructions is R88, which 'bumps' sentence adverbs into modifiers of one-place predicates of propositions. Rule R89 then combines these bumped adverbs with the appropriate structures. The new categories $(t^n_t)/(t^n_t)$, where $n$ ranges over the set \{1,3,4,5,6\}, must be added to the syntax.

R88. If $\alpha \in P_{ADV}$, then $\{\alpha\} \in P_{(t^n_t)/(t^n_t)}$

(where $n$ ranges over the set \{1,3,4,5,6\}).

Realisation: $\alpha$

Translation: $\lambda R\lambda q[\alpha'([R(q)])$

R89. If $\alpha \in P_{(t^n_t)/(t^n_t)}$ and $\beta \in P_{t^n_t}$ then $\{\alpha, \beta\} \in P_{t^n_t}$

(where $n$ ranges over the set \{1,3,4,5,6\}).

Realisation: $\beta \sqcup \alpha$ if $\alpha$ has a complement

else $\alpha \sqcup \beta$

Translation: $\alpha'([\beta')$

Let us assume that $possibly$ translates as $\lambda p[\Diamond[p]]$. The following example is straightforward.

(111) $\left(\left[\left(\left(t^{'IV}\right)/t\right)\left(\left(John\_t\right)\left(be\_IV/PRED\_ill\_ADJ\right)\_IV, R2\_t\right), R1\_t/IV', R41\_t/IV', \left(possibly_{t^8_t}(t^3_t)/(t^3_t), R88\_t/true\_t^3_t, R89\_IV', R52\_t, R51\right)\right)^{\Diamond}\right)$

Realisation: That John is ill is possibly true.

Translation:

1. $possibly_{t^8_t} \Rightarrow \lambda p[\Diamond[p]]$ Basic
2. \((\text{possibly})(t/3^t)/(t/3^t) \implies \lambda R \lambda q[\lambda p[\dot{\diamond}(p)][\dot{R}(q)])\)  
From 1 by R88

3. \(\lambda R \lambda q[\dot{R}(q)])\)  
Lambda conversion

4. \(t/3^t \implies \text{true}'\)  
Basic

5. \((\text{possibly}), \text{true})_{t/3^t} \implies \lambda R \lambda q[\dot{R}(q)](\text{true}')\)  
From 3, 4 by R89

6. \(\lambda q[\dot{R}(q)])\)  
Lambda conversion

7. \(\text{be}_{IV}'/\text{PRED}, \implies \lambda R[\dot{R}]')\)  
Basic

8. \([\text{be}, ([\text{possibly}], \text{true})_{IV}'] \implies \lambda R[\dot{R}][\lambda q[\dot{R}(q)])\)  
From 6, 7 by R52

9. \(\lambda q[\dot{R}(q)])\)  
Lambda conversion

10. \([\text{that}, (\text{John}, \text{be}, \text{ill})])_{t/IV'} \implies \lambda R[\dot{R}[\text{ill}'(j)])\)  
See previous examples

11. \((([\text{that}, (\text{John}, \text{be}, \text{ill})], (\text{be}, ([\text{possibly}], \text{true})_{t} \implies \lambda R[\dot{R}[\text{ill}'(j)])(\lambda q[\dot{R}(q)])\)  
From 9, 10 by R51

12. \(\dot{R}[\dot{R}[\text{ill}'(j)])\)  
Lambda conversion

If \(\text{true'}_{t/3^t}\) were translated directly as \(\lambda p[\dot{R}(p)]\), then line 12 would read \(\dot{R}[\text{ill}'(j)])\). If \(\text{possibly}\) were translated simply as \(\text{possibly}'\) rather than as \(\lambda p[\dot{R}(p)]\); then line 12 would read \(\dot{R}[\dot{R}[\text{ill}'(j)])\)\). These variations do not bear on the gist of the analysis.

Two ADJVL' classes, \(P_{t/3^t}\) and \(P_{t/4^t}\), are among those which can be modified by tamped sentence adverbs. After such modification, they can still become attributive modifiers of CN's, and the correct readings fall out automatically.

\((112)\) \((\text{John}_{t'} \text{ believe}_{IV'} (t/2^t_{IV'})/\text{CN'})\)  
\(\{[[\text{possibly}_{t/3^t}](t/3^t)/(t/3^t),\)  
\(\text{R88}, \text{true}_{t^3^t}, \text{R9}, \text{CN'}/\text{CN'},\)  
\(\text{R83}, \text{proposition}_{\text{CN'}}/\text{CN'}, \text{R84}_{t/2^tIV'} , \text{R42}_{IV'}, \text{R71}t, \text{R1}\)  
Realisation: John believes the possibly true proposition.  
Translation: \(V\text{p}[\lambda q[(\text{proposition'}(p) & \dot{R}(q))])\)  
\(\iff q=p, \text{believe'}(j,p)\)
6.3.1.2 Individual-level predicates

Sentence adverbs also directly modify many one-place predicates of individuals. The rules and examples are parallel to those in Section 6.3.1.1. The categories IV/IV, (t/4e)/(t/4e) and (t/5e)/(t/5e) must be added to the syntax.

R90. If \( a \in P_{ADV} \), then \( \{a\} \in P(t/n_e)/(t/n_e) \)
(where \( n \) ranges over the set \( \{1,3,4,5\} \)

Realisation: \( a \)

Translation: \( \lambda P \lambda y[a'(\langle P(y) \rangle)] \)

Taking formerly (t/8) as a paradigm sentence adverb, the rules allow the generation of structures like the following.

(113) t/e (IV)
John [[formerly] smoked] \( \Rightarrow \)
\( \lambda y[formerly'(\langle [smoke'(y)] \rangle)](j) \)

(114) t/3e (ADJ)
John was [[formerly] brave] \( \Rightarrow \)
\( \lambda y[formerly'(\langle [brave'(y)] \rangle)](j) \)

(115) t/5e (PART)
John was [[formerly] [loved by Mary]] \( \Rightarrow \)
\( \lambda y[formerly'(\langle [love',(m,y)] \rangle)](j) \)

Bare common nouns cannot combine directly with sentence adverbs as in "obviously boy, but PNOMs (t/4es) can.

(116) John was [[formerly] [a student]] \( \Rightarrow \)
\( \lambda y[formerly'(\langle [student'(y)] \rangle)](j) \)

Such modified PNOMs are also eligible, by the normal rules, to be made into non-restrictive appositives (see e.g. Quirk et al. 1972:635).

(117) John, formerly a student, is now a businessman.

(118) Mary, presently a politician, was once a researcher.
Once, as in (118), appears to be a basic \((t/n^e)/(t/n^e)\), where \(n\) ranges over the set \(\{1,3,4,5\}\), with the approximate reading \(\lambda P\lambda y[^{(}\lambda P(y)\,)]\). Always and never are similar with the readings \(\lambda P\lambda y[^{(}\lambda P(y)\,)\,]\) and \(\lambda P\lambda y[^{(}\lambda P(y)\,)]\) respectively. One reading of ever is equivalent to that for always, but it appears to be limited, in modern English, to category \((t/3^e)/(t/3^e)\) as in the ever popular princess.

Generally speaking, almost any ADV' can be bumped by rule R90 into a modifier of one-place predicates. These include temporal, modal and parenthetical examples.

\[(119)\] John is frequently/obviously/fortunately drunk.

Examples of hedges directly modifying vague adjectives are very common (see e.g. Quirk et al. 1972: 280, 822).

\[(120)\] John is [tall [for a pygmy]] but [short [for a man]].

\[(121)\] Mary is [good [from Bill's point of view]] but [bad [from Sue's point of view]].

The following is an outstanding example of contextual hedges, in real data, modifying individual adjectives. All the adverbs, save widely, are hedges.

Abortion is a matter that is morally problematic, pastorally delicate, legislatively thorny, constitutionally insecure, ecumenically divisive, medically normless, humanly anguishing, racially provocative, journalistically absurd, personally biased, and widely performed. (Richard McCormick, quoted by Peter Steinfels in 'Abortion, Religion and the Constitution', Sunstone, vol. 7 no. 3)

There are a number of complications: -ly adverbs with prepositional-phrase complements, such as unfortunately for John, cannot be bumped into one-place predicate modifiers.

\[(122)\] *Mary is [[unfortunately for John] ill].
Such adverbials are exceptional in any case, and they appear only sentence initially, or medially or finally with strong pauses.

(123) a. Unfortunately for John, Mary left.
    b. Mary, unfortunately for John, left.
    c. Mary left, unfortunately for John.

Adverbials in -wise, those formed with at and many other complex hedge adverbials must be postposed when bumped into one-place predicate modifiers. This appears to be another manifestation of the English tendency to postpose modifiers with 'complements'.

(124) a. John is [good [at chess]].
    b. Bill is [irresponsible [money-wise]].
    c. Sue is [strong [from an emotional point of view]].

ADJVs modified by bumped sentence adverbs can still function as attributive modifiers of CNs. The correct translations fall out automatically using the regular rules.

(125) {theDET' ((({(formerly{Yt'ADJ/ADJ, R90, drunkADJ/ADJ,
    R11,CN/2CN, R12, sailorCN/2CN, R13,T, R4
Realisation: the formerly drunk sailor
Translation: λQVy[Xy[\{sailor'\(x\) &
    formerly'('[drunk'(x)')]\) ↔ x-y] & Q(y)]

Similar examples occur commonly and have been noted by a number of authors (see e.g. Quirk et al. 1972:280).

(126) Modal: the [possibly drunk] sailor
(127) Parenthetical: the [unfortunately very ill] student
(128) Temporal: the [frequently drunk] supervisor
(129) Hedge: the [legally blind] pensioner

Parenthetical adverbs modifying adjectivals are slightly more difficult than the others; some informants maintain that constructions like strangely drunk sailor are ambiguous. The first
reading can be paraphrased as 'the sailor such that he is drunk' and 'it is strange that he is drunk'; the second reading is roughly 'the sailor such that it is strange that he is drunk'. The two readings are represented below, but only the non-restrictive reading (130) is accommodated by the present rules.

(130) \( \lambda x[\text{sailor}'(x) \& \text{drunk}'(x)]; \text{subroutine('}\text{strange}'(p_a)'\text{)}\)

(where \( p_a \) will be resolved as ' \( \text{[drunk}'(x_a)'\text{]} \)

(131) \( \lambda x[\text{strange}'(\text{[drunk}'(x)'\text{])} \& \text{sailor}'(x)] \)

Given the somewhat unusual non-restrictive reading for parenthetical sentence adverbs, this ambiguity is not unexpected. \( R91 \) accommodates this 'restrictive' reading.\(^{13}\)

\( R91 \). If \( \alpha \in P_t/A_t \) then \( \{\alpha\} \in B(t/n_e)/(t/n_e) \)

(where \( n \) ranges over the set \( \{3, 5\} \)).

Realisation: \( \alpha'' \), where \( \alpha'' \) is \( \alpha \) with the main adjectival in the -\( ly \) form

Translation: \( \lambda P \lambda y[\alpha''(\text{[P}'(y)'\text{])} \]

6.3.2 Attributive modifiers related to sentence adverbs

6.3.2.0 Introduction

All four classes of sentence adverb discussed in Section 6.2 are idiosyncratically related to small classes of basic attributive adjectives. There is a long history of linguistic analyses which tried to show a transformational relationship between attributive adjectives like possible and sentence adverbs like possibly.\(^{14}\) For instance, a sentence like John Is a possible thief would be transformed from an underlying string more like John Is possibly a thief. In general, frequent visitor would be paraphrased as 'someone who is frequently a visitor' or 'someone who visits frequently'; clear failure would be paraphrased as 'something which is clearly a failure'; and alleged criminal would be paraphrased as 'someone who is allegedly a criminal'. Little by little the shortcomings of transformations became clear, and in Chomsky 1970 and Jackendoff 1972 the move was
already away from such solutions. Berman 1973a:155-156 decisively rejects the transformational approach for handling these adverb-related adjectives, citing the idiosyncratic exceptions and meaning differences between the proposed source and target strings. No transformational solutions will be proposed here.

There remain, of course, a large number of valid generalisations involving adjectives and sentence adverbs, and these require an explanation at some level. In a MG of the type pursued here, the most convenient way to avoid transformations and yet capture the old transformational insights is to treat attributive adjectives like possible, obvious and probable as basic CN/CNs and give them complex translations involving proposition-level predicates. Meaning postulates and customised interpretation rules are another possibility, but the gist of the analysis is most easily conveyed with complex translations.

6.3.2.1 Modal attributive adjectives

A number of attributive adjectives have lexical links with modal adverbs, as in the following examples. Similar data have been cited by many researchers including Quirk et al. (1972:284-286, 259-260) and Berman (1973a:145-154).

(132) a. John is obviously a thief.
   b. John is an obvious thief.
(133) a. Mary is possibly a spy.
   b. Mary is a possible spy.

This is not to say that these pairs are necessarily logically equivalent, but only that they share some element of meaning which can be expressed either in an adjective or in an adverb. The easiest way to handle such adjectives is to classify them as basic members of CN/CN and give them basic complex translations as in (134). The individual examples are cited with a possible head noun which helps make the intended reading of the adjective clear.
Alternately, one can appeal to meaning postulates such as $\lambda P A x (possible'(P)(x) \leftrightarrow \Diamond [P(x)])$. These CN/CN examples are often identical in form to $t/3t$ adjectives and should not be confused with them. On the other hand, the lexical relationship between the two classes is obvious in the semantics. Some examples like obviousCN/CN and clearCN/CN also have homonyms which name one-place predicates of individuals as in (135); these too must be carefully distinguished.

(135) a. A soldier should not make himself obvious.

b. This glass is clear.

The example translations in (134) also do not rule out the possibility of other readings for these CN/CN forms. Possible, for instance, as in possible spy can have a second reading $\lambda P l y (possible'(P)(y) \leftrightarrow \Diamond [P(y)])$. Thus possible spy might be paraphrased in two ways, as 'the set of entities such that it is possible that they are spies' and as 'the set of entities such that it is possible that they will be spies in the future'. The latter reading is somewhat related to that for potential spy. Some readings of probable, likely and unlikely may also involve future tense: e.g. probableCN/CN $\Rightarrow \lambda P l y (probable'(P(y)) \leftrightarrow \Diamond [P(y)])$, so probable failure $\Rightarrow \lambda y (probable'(\Diamond [F U T (failure'(y))]))$. The problem of tense in adjective readings will be taken up in the next section.

Some latinate CN/CNs, and others lacking obvious $t/3t$ homonyms, might be translated as shown below.
(136) credible
manifest
ostensible
plausible
putative
seeming
sure

However, in these examples the morphological evidence for such lexical solutions is very weak or does not exist at all. Rather than overtly translating plausible CN/CN in terms of believe’, it is safer to translate it simply as plausible’ and then appeal to a meaning postulate like (137).

(137) \( \alpha \in P \rightarrow \alpha \in V \)

This sufficiently captures the intuition that plausible has something to do with the possible existence of a believer without claiming that this is all that plausible means. The other examples can be handled similarly.

Many modal CN/CNs are fairly productively related to IV/T' verbs by lexical rule.

R92 (lexical). If \( \alpha \in B \), then \( \alpha \in B \). Realisation: \( \alpha'' \) where \( \alpha'' \) is the past participle form of \( \alpha \). Translation: \( \alpha \in V \).

From IV/T' verbs such as believe, allege and assume we get the following CN/CNs.

(138) accepted, acknowledged, admitted, alleged, assumed, believed, charged, claimed, confirmed, contested, disputed, known, predicted, presumed, proclaimed, recognised, reported, supposed, suspected

For example, the CN suspected spy will be translated as
\(\lambda y Vz[\text{suspect}_i(z, \uparrow[\text{spy}'(y)])]\), the set of individuals such that there exists someone who suspects them to be spies. Related examples which appear more basic than derived include those in (139). They cannot very happily be paraphrased or translated in terms of verbs like purport, repute or rumour. They are probably more safely explicated with meaning postulates.

\[(139) \text{ purported} \quad \lambda P y Vz[\text{claim}_i(z, \uparrow[P(y)])] \]
\[(139) \text{ reputed} \quad \lambda P y Vz[\text{say}_i(z, \uparrow[P(y)])] \]
\[(139) \text{ rumoured} \quad \lambda P y Vz[\text{say}_i(z, \uparrow[P(y)])] \]

Some negatively marked passive CN/CNs appear as well.

\[(140) \text{ undoubted} \quad \lambda P y Vz[\text{doubt}_i(z, \uparrow[P(y)])] \]
\[(140) \text{ unconfirmed} \quad \lambda P y Vz[\text{confirm}_i(z, \uparrow[P(y)])] \]
\[(140) \text{ unsuspected} \quad \lambda P y Vz[\text{suspect}_i(z, \uparrow[P(y)])] \]
\[(140) \text{ uncontested} \quad \lambda P y Vz[\text{contest}_i(z, \uparrow[P(y)])] \]
\[(140) \text{ unrecognised} \quad \lambda P y Vz[\text{recognise}_i(z, \uparrow[P(y)])] \]

A few -able forms are also lexically related to the IV/T' class.

\[(141) \text{ acceptable} \quad \lambda P y Vx[\text{accept}_i(x, \uparrow[P(y)])] \]
\[(141) \text{ believable} \quad \lambda P y Vx[\text{believe}_i(x, \uparrow[P(y)])] \]
\[(141) \text{ undoubtable} \quad \lambda P y Vx[\text{doubt}_i(x, \uparrow[P(y)])] \]
\[(141) \text{ undeniable} \quad \lambda P y Vx[\text{deny}_i(x, \uparrow[P(y)])] \]
\[(141) \text{ conceivable} \quad \lambda P y Vx[\text{conceive}_i(x, \uparrow[P(y)])] \]
\[(141) \text{ unquestionable} \quad \lambda P y Vx[\text{question}_i(x, \uparrow[P(y)])] \]

Odd leftovers with idiosyncratic forms and meanings include the following.

\[\lambda y [\text{proclaim}_i(y, \uparrow[P(y)])] \]
\[\lambda y [\text{profess}_i(y, \uparrow[P(y)])] \]

Self-styled and sometimes admitted also have readings like those in (142). Again the possibility arises of handling such adjectives with a meaning postulate rather than with explicit translations: \(\lambda P \forall x[\delta(P)(x) \rightarrow \text{claim}_i(x, \uparrow[P(x)])]\), where \(\delta\) translates self-
proclaimed, professed, self-styled, or admitted.

6.3.2.2 Parenthetical attributive adjectives

Basic CN/CNs related to parenthetical adverbs or \( t^4 t \) adjectives are not common. The following (b) sentences may have unstable readings roughly related to the corresponding (a) sentences.

(143) a. It is odd that John is a candidate.
    b. John is an odd candidate.

(144) a. Strangely, Bill was the choice.
    b. Bill was a strange choice.

(145) a. It was unfortunate that Sue was a candidate.
    b. Sue was an unfortunate candidate.

If necessary, we can postulate lexical entries like the following, but the evidence for such readings is flimsy.

(146) \[ \text{odd}^{\text{CN/CN}}(\lambda P y [\text{odd}([P(y)])]) \]

\[ \text{strange}^{\text{CN/CN}}(\lambda P y [\text{strange}([P(y)])]) \]

\[ \text{unfortunate}^{\text{CN/CN}}(\lambda P y [\text{harm}^*([P(y)], z)]) \]

Such readings of these forms, if they occasionally occur, must be carefully distinguished from more common homonyms like \( \text{odd}^{\text{ADJ}} \), \( \text{strange}^{\text{ADJ}} \), \( \text{odd}^{\text{ADJ}} \) and \( \text{strange}^{\text{ADJ}} \).

6.3.2.3 Temporal attributive adjectives

There are numerous basic CN/CN adjectives with temporal readings, and they have been much discussed in the literature. Many of these adjectives provide ways to inject tense or tense-like notions into terms (Bach 1968:104), and they are quite easy to accommodate in the present grammar. Let PAST, PRES and FUT be tense operators on sentences. The following examples can be defined in terms of tense or, perhaps, in terms of predicates corresponding to time adverbials.
Adjectives

(147) Examples: former, old, past, erstwhile, quondam, whilom, then, ex-
Translation: $\lambda P\lambda y[P\text{A}[P(y)]]$

(148) Examples: present, current, actual
Translation: $\lambda P\lambda y[P\text{R}[P(y)]]$

(149) Examples: future, coming, -to-be
Translation: $\lambda P\lambda y[P\text{F}[P(y)]]$

Such readings are approximate and must be considered subject to refinement. Future-related words like coming, forthcoming, -to-come, eventual, budding, imminent and -to-be will require variations on FUT, with attention to the remoteness of the future interval. Recent involves a limitation on PAST. Late, as in the late Mr Jones combines elements of pastness and death. Previous, prior, earlier, last, subsequent and next are time-related notions but will require a semantics of ordinals before they can be fully captured. Examples like former and then might be better translated as $\lambda P\lambda y[\text{formerly}'([P(y)])]$ and $\lambda P\lambda y[\text{then}'([P(y)])]$ respectively, assuming that a semantics exists for formerly' and then'. The adjectives in (150) combine elements of modality and tense in their translations.

(150) potential $\lambda P\lambda y[\text{FUT}[P(y)]]$
prospective $\lambda P\lambda y[Vx[\text{expect}_t(x, ^{\text{FUT}}[P(y)])]]$

Potential might also be translated simply as $\lambda P\lambda y[\text{potentially}'([P(y)])]$, if a semantics for potentially' is available.

Assuming that former translates as $\lambda P\lambda y[\text{formerly}'([P(y)])]$, the following example is typical.

(151) $(\text{the DET'} \{\text{former CN/CN'}$
president CN/CN, RI3, R4', swim IV', t, RI)$
Realisation: The former president swims.
Translation: $Vy[\text{Az[formerly}'([\text{president'}(x)]) \leftrightarrow x=y] \&$
swim'(y)]
Frequency-related adjectives have one reading which is easily handled.

(152) constant (joker) \( \lambda P \lambda y(\text{constantly}'([P(y)]) \]
  frequent (visitor) \( \lambda P \lambda y(\text{frequently}'([P(y)]) \]
  periodic (nuisance) \( \lambda P \lambda y(\text{periodically}'([P(y)]) \]

Other similar examples are occasional, infrequent and sporadic. These readings occur typically with predicate nominals.

(153) \{ \text{Mary}_n \}, \{ \text{be IV/PRED}, \langle a, \{ \text{frequent}_\text{CN/CN'}
  \text{guest}_\text{CN/CN}, \text{R13/PNOM}, \text{R6/IV}, \text{R2/t}, \text{R1} \}
  \text{Realisation: Mary is a frequent guest.}
  \text{Translation: } y(y)(\text{frequently}'([\text{guest}'(y)]))(m)

Fixed-frequency adjectives which can occasionally take such readings include hourly, daily, weekly, monthly, annual, etc.

Similar adjectives based on duration rather than frequency include those in (154).

(154) permanent \( \lambda P \lambda y(\text{permanently}'([P(y)]) \]
  temporary \( \lambda P \lambda y(\text{temporarily}'([P(y)]) \]

In an excellent article, Stump (1981) has investigated some more difficult readings of frequency 'adjectives'. The first readings, which he terms 'adverbial', are illustrated, with suitable paraphrases in (155) to (157).

(155) a. An occasional sailor strolled by.
  b. Occasionally, a sailor strolled by.

(156) a. A periodic holiday raised spirits.
  b. Periodically, a holiday raised spirits.

(157) a. Mary paid her friend a frequent visit.
  b. Frequently, Mary paid her friend a visit.

Such adverbial examples occur mainly in indefinite terms, (with the
odd sailor and your occasional sailor being idiosyncratic exceptions). To generate these examples directly in a surfacy syntax, Stump found that these frequency 'adjectives' must be treated as determiners; the required indefinite articles in the surface strings are added syncategorematically. The following categorisations, translations and rules are consistent with Stump's approach.

(158) periodic

\[ \lambda P \lambda Q [\text{periodically}' (\forall x (P(x) \land Q(x)))] \]

(and similarly for other \( T//CNs \) such as occasional, frequent, infrequent, sporadic, etc.)

R93. If \( \alpha \in B_{T//CN} \) and \( \beta \in P_{CN} \) then \( (\alpha, \beta) \in P_T \).

Realisation: \( a(n) \sim \alpha \sim \beta \)

Translation: \( \alpha' (\sim \beta') \)

The derivation of the canonical example is shown in (159).

(159) \((\text{occasional}_T//CN \text{ sailor}_CN)_T, \text{ R93}' \text{ stroll-by}_{IV}^T, \text{ R1}\)

Realisation: An occasional sailor strolled by.

Translation:

1. occasional \( T//CN \Rightarrow \lambda P \lambda Q [\text{occasionally}' (\forall x (P(x) \land Q(x)))] \) \( \text{Basic} \)

2. sailor \( CN \Rightarrow \text{sailor}' \) \( \text{Basic} \)

3. (occasional, sailor) \( T \Rightarrow \lambda P \lambda Q [\text{occasionally}' (\forall x (P(x) \land Q(x)))] (\text{sailor}') \)

From 1, 2 by R93

4. \( \lambda Q [\text{occasionally}' (\forall x (\text{sailor}'(x) \land Q(x)))] \) \( \text{Lambda conversion} \)

5. stroll-by \( IV \Rightarrow \text{stroll-by}' \) \( \text{Basic} \)

6. \((\text{occasional, sailor}, \text{ stroll-by})_T \Rightarrow \lambda Q [\text{occasionally}' (\forall x (\text{sailor}'(x) \land Q(x)))] (\text{stroll-by}') \)

From 4, 5 by R1

7. occasionally' (\forall x (\text{sailor}'(x) \land \text{stroll-by}'(x)))

Lambda conversion
There are complications to this approach (see Stump 1981:227-231, 246-250), but the broad outlines appear sound. It seems certain, in any case, that these adverbial 'adjectives' cannot be analysed as ADJs or as CN/CNs. They are, therefore, rather bizarre adjectives if they are adjectives at all, and they are not of immediate interest here.

On the other hand, a second class of adverbial adjectives discussed by Stump are indeed adjectival and cannot be so easily dismissed. They occur in sentences like (160) to (162), which Stump argues are generic.

(160) An occasional cup of coffee helps keep John awake.
(161) A periodic checkup will keep you healthy.
(162) An infrequent trip broke up Jack's dull routine.

These sentences, on the 'generic' reading, cannot be paraphrased with wide-scope adverbials—e.g. (160) is not equivalent to (163)—and so a new analysis is required.

(163) Occasionally a cup of coffee helps keep John awake.

Stump adopts the analysis of generic sentences introduced by Carlson (for a recent explication see Carlson 1982). This assumes that the domain of the model includes not only objects, like John and Fido, but also 'kinds' like man and dog. In a generic sentence like (164), Stump and Carlson argue that the subject dogs denotes a kind entity (let us call it \( x^k_d \)), and that the translation of the term is \( \lambda p.p( x^k_d ) \).

(164) Dogs are mammals.

Sentence (164) therefore translates as an ascription of mammalhood to the entity \( x^k_d \) as in (164').

(164') mammal'(\( x^k_d \))
'Habitual' sentences like John is tall are translated in the familiar way as tall'(j). Generic and habitual sentences are therefore of the same ilk—they translate as assertions that an individual (i.e. an object or a kind) satisfies some predicate. Carlson holds that along with objects and kinds we need to consider impermanent 'stages' (or 'manifestations') of those objects and kinds. For instance, if we utter John is sad referring to John's emotional state at a certain time and place, we do not mean to ascribe sad' of John in the same way that we ascribe tall' of him. Height is something which is characteristic or habitual of John while his emotional state is transitory or accidental. Carlson therefore argues that John is sad is an ascription of sadness to some stage of John, the impermanent manifestation of John at the relevant time and place. If x^s_j is the stage of John when he was sad, then John is sad translates as sad(x^s_j) rather than as sad'(j). The stage x^s_j is said to 'realise' j, and this is represented formally as Re(x^s_j,j).

The concept of stages is also used for explaining bare plurals in episodic, rather than generic, sentences. (165), for example, is not a generic statement about the kind dog (which we designated x^k_d) but a report about something which realises the kind dog—that is, some specific group of dogs.

(165) Dogs chewed my newspaper this morning.

Thus (sets of) objects can realise kinds just as stages realise objects.

Returning to the troublesome adverbial adjectives, Stump argues that just as the term dogs in sentence (164) refers to a generic individual, so does the term an occasional cup of coffee in (160). In particular, an occasional cup of coffee is said to refer to that object which (1) is realised occasionally and (2) is such that each of its realisations is incidental with a cup of coffee. The set of all individuals realised occasionally is named in (166). In these examples, an object variable is represented as x^o, a stage variable as x^s and a kind variable as x^k. An individual (object or kind)
variable will have no superscript.

(166) \( \lambda x[\text{occasionally}'(\forall x^s[\text{Re}(x^s,x)])] \)

In practice, the quality of occasional realisation will be required only during some interval including the now interval at which a sentence is evaluated. The translation is thus altered as in (167). Let \( i \) be an interval of time.

(167) \( \lambda x[\forall i[\text{now} \subseteq i & \text{AT}(i, \text{occasionally}'(\forall x^s[\text{Re}(x^s,x)]))] \]

The second requirement that each stage be incidental with a cup of coffee is coded similarly. (168) names the set of individuals such that each of their realisations is a cup of coffee.

(168) \( \lambda x \lambda x^s \lambda i[\text{AT}(i, \text{Re}(x^s,x) \to \forall z[\text{cup-of-coffee'}(z) & \text{Re}(x^s,z)]] \]

For convenience, being incidental with a property can be abbreviated as a two-place relation \( \text{In}^* \), which abbreviates (169). \( \text{In}^*(P)(x) \) is true at \( \langle w, t \rangle \) iff in \( w \), for every stage \( x^s \) and at any interval \( t' \), if \( x^s \) realises the individual denoted by \( x \) then there is some individual \( z \) having the property denoted by \( P \) such that \( x^s \) realises \( z \).

(169) \( \lambda P \lambda x \lambda x^s \lambda i[\text{AT}(i, \text{Re}(x^s,x) \to \forall z[P(z) & \text{Re}(x^s,z)]] \]

At last we can translate the term an occasional cup of coffee as (170).

(170) \( \lambda P \lambda x^k[\lambda x^o[\text{Re}(x^o,x^k) \leftrightarrow \forall i[\text{now} \subseteq i & \text{AT}(i, \text{occasionally}'(\forall x^s[\text{Re}(x^s,x^o)]))] & \text{In}^*(\text{cup-of-coffee'}(x^o))]]) \]

The sentence (160), reprinted here, will then receive the translation in (160').
An occasional cup of coffee helps keep John awake.

Various indications support the conclusion that this use of occasional is an adjective. Unlike the 'adverbial' usage characterised earlier, where indefinite articles are added in syncategorematically, the 'generic' occasional can appear with various determiners.

An occasional cup of coffee helps keep John awake.

Also, the generic frequency adjectives can stack (Stump 1971:250).

An occasional weekly inspection can be useful for detecting fire hazards.

The generic occasional is therefore treated as a CN/CN and is given the translation in (173).

If such an analysis is accepted, the present rules will effortlessly generate generic common nouns of the form occasional cup of coffee, daily newspaper, weekly article and the like. Unfortunately, Carlson, in recent lectures, has cast some doubt on his ontology of kinds, objects and stages, and Stump's analysis cannot be considered the final word. However, the outlines of the analysis appear sound, awaiting only a more stable formal ontology. Stump's heroic avoidance of transformations, even in the face of such involved
readings, is truly commendable.

6.3.2.4 Hedging attributive adjectives

When predicates are realised as nouns, hedges can appear as basic CN/CN adjectives modifying those nouns. Compare the hedges in (174) with the adjectives in (175).

\[
(174) \begin{cases} 
\text{Biologically,} \\
\text{Agriculturally,} \\
\text{Recreationally,} \\
\text{Domestically,} \\
\text{Industrially,} \\
\text{Sanitarily,}
\end{cases} \text{water is a necessity.}
\]

\[
(175) \begin{cases} 
\text{biological} \\
\text{agricultural} \\
\text{recreational} \\
\text{domestic} \\
\text{industrial} \\
\text{sanitary}
\end{cases} \text{necessity.}
\]

As expected, vague nouns like success and failure go especially well with adjetival-(or adverbial) hedges because success and failure can be judged by so many different criteria and standards.
As with other adjectives related to sentence adverbials, hedge adjectives are basic CN/CNs and can be given readings in terms of the same predicates as the related adverbials.
It is important not to confuse these hedge adjectives with homomorphic adjectives of other categories. Moral, for instance, also names a one-place predicate of individuals as in *John is moral* and in one reading of *moral philosopher*. The other reading of *moral philosopher* (roughly 'philosopher of morals') in effect uses the word moral to specify a certain kind of philosopher. Such kinds are typically a closed class, and combinations like *moral philosopher* often appear as compound words, rather than as apparent ADJ-CN combinations, in other languages. All signs point to treating this latter reading of *moral philosopher* as a basic lexical unit. The hedge adjective moral evokes the paraphrase morally or from a moral point of view. Example (181) shows how hedge adjectives naming different criteria can function within the same sentence.

\[(181) \text{(John, } \{ \text{a, (physical} \text{adult, \text{R13\text{PNOM,}}}
\text{R6T/T, R30'T, R29' } \text{be', IV/PRED', } \{ \text{an, (emotional}\text{child, \text{R13\text{PNOM, R6'IV, R2't, R1}}}
\text{Realisation: John, a physical adult, is an emotional child.}
\text{Translation: a. emotionally'([^child(j)])}
\text{b. physically'([^adult(j)])}
\]

6.3.3 An argument for adjective classification using sentence adverbs

The fact that sentence adverbs can be bumped into modifiers of one-place predicates, including ADJs, indirectly provides a strong argument for the present analysis of individual-level adjectives. To review slightly, I have argued that some adjectives are of category ADJ (t/3e) and translate as basic one-place predicates: these include traditional predicative examples such as metallic, carnivorous and blue-eyed; measure adjectives such as tall and big; and evaluative adjectives such as good, bad and skillful. Other adjectives,
especially those related to sentence adverbials, have been classed as basic attributive modifiers of category CN/CN and include *former, possible, obvious* and *probable*.

In contrast, the Montague-Parsons analysis tries to treat all adjectives as basic CN/CNs. Siegel defends the one-place predicate status of many adjectives, as I have, but concludes that 'relative' (i.e. vague) adjectives such as *good, bad, skillful* and *awful* must be treated as basic attributive CN/CNs. Sentence adverbs provide a strong test of these diverging positions.

I have shown that bumped sentence adverbs, such as *formerly*, often combine with certain PREDs and ADJVLs within a sentence rather than with the sentence as a whole. This is particularly obvious when an ADJVL is functioning as an attributive adjective. The truth conditions of (182) differ markedly from those of (183).

\[
(182) \text{((the}_8^7 \text{formerly}_t^t \text{ADJ/ADJ, R90_rich}_t^t \text{ADJ,} \\
\text{CN/2CN, R12_lawyer}_t^t \text{CN/2CN, R13_T, R4_smoke}_t^t \text{IV}_t^t, R1)}
\]

Realisation: The formerly rich lawyer smoked.
Translation: \( \text{Vy}[\text{Ax}([\text{formerly}'(^[\text{rich}'(x)]) \& \text{lawyer}'(x)]) \leftrightarrow x=^y] \& \text{smoke}'(y)] \)

\[
(183) \text{formerly}_t^t \text{((the}_8^7 \text{rich}_t^t \text{CN/2CN, R12_lawyer}_t^t \text{CN/2CN, R13_T, R4_smoke}_t^t \text{IV}_t^t, R1)}
\]

Realisation: Formerly, the rich lawyer smoked.
Translation: \( \text{formerly}'([\text{Vy}[\text{Ax}([\text{rich}'(x) \& \text{lawyer}'(x)]) \leftrightarrow x=^y] \& \text{smoke}'(y)]) \)

In (183), *formerly* modifies the entire sentence. In (182), on the other hand, *formerly rich* is a syntactic constituent, and the formerness applies only to *rich*, not to *lawyer*, and certainly not to the whole sentence. Because attributive constructions with basically predicative adjectives have a conjunction analysis, a CN like *formerly rich lawyer* translates easily and correctly as (184).

\[
(184) \lambda x[\text{formerly}'(^[\text{rich}'(x)]) \& \text{lawyer}'(x)]
\]
I have also postulated basic attributive adjectives like $\text{former}_{\text{CN/CN}}$ which has the translation $\lambda \text{y}[\text{formerly}'(\widehat{\text{rich}}(y) & \text{lawyer}(y))]$. The grammar therefore generates the strings and translations shown in (185) and (186).

(185) $(\text{former}_{\text{CN/CN}}'((\text{rich}_{\text{ADJ}})_{\text{CN}/2\text{CN}},$
$\text{R12'}_{\text{CN}}\text{CN}, \text{R13'}_{\text{CN}, \text{R13}}$
Realisation: former rich lawyer
Translation: $\lambda \text{y}[\text{formerly}'(\widehat{\text{rich}}(y) & \text{lawyer}(y))]$

(186) $((\text{rich}_{\text{ADJ}})_{\text{CN}/2\text{CN}, \text{R12'}}$
$\text{former}_{\text{CN/CN}}'_{\text{CN}}\text{CN}, \text{R13'}_{\text{CN}, \text{R13}}$
Realisation: rich former lawyer
Translation: $\lambda z[\text{rich}'(z) & \text{formerly}'(\widehat{\text{lawyer}}(z))]$

Again the conjunction analysis allows the correct translation in each case.

The Montague-Parsons analysis cannot handle all such constructions. Let us assume that $\text{lawyer}$ is a CN and that $\text{rich}$ and $\text{former}$ are both basic $\text{CN/CNs}$. Montague will give the translation of $\text{former rich lawyer}$ as (187).

(187) $\text{former}'(\widehat{\text{rich}}(\widehat{\text{lawyer'}}))$

As $\text{rich}$ is an intersective adjective, Montague's meaning postulates (see Section 1.1.2) will enforce the analytic consequence that a rich lawyer is both a lawyer and rich: e.g. if $\text{rich}'(\widehat{\text{lawyer'}})(j)$ then $\text{lawyer'}(j)$ and $\text{rich'}(j)$.\textsuperscript{16} $\text{Former}$ could be given a translation much like my own, leading to a satisfactory analysis. $\text{Rich former lawyer}$ is also reasonably explicable by way of meaning postulates. However, $\text{formerly rich lawyer}$ will cause problems. If the structure of this phrase is $[[\text{formerly rich}] \text{ lawyer}]$, then rules will have to be defined to combine sentence adverbs with $\text{CN/CNs}$ to form new $\text{CN/CNs}$. This will lead to gross ungrammaticalities such as the following.
(188) a. *the [obviously mere] boy
b. *the [formerly alleged] thief
c. *the [probably former] magistrate

Equally odd are the rules necessary if formerly rich lawyer is analysed as [formerly [rich lawyer]]. This would require a rule to combine sentence adverbs with common nouns, leading to other ungrammaticalities.

(189) a. *the [obviously lawyer]
b. *the [formerly thief]

The correct reading formerly rich lawyer translates formerly as an operator only on the clause containing rich', as in (184). Unfortunately, in a classical MG, the separate clause rich'(j) (or, better, rich'("entity'"))(j)—see note 16) never appears in the syntax but arises only by way of meaning postulates. So aside from the syntactic barriers just described, the traditional MG analysis of adjectives would appear to force formerly and other sentence adverbs in a CN like formerly rich lawyer to be described as functions depending not on the intensions of their arguments but on selected analytic consequences of the sentence as a whole. This amounts to an abandonment of compositionality and an invitation to chaos.

The present analysis, which handles formerly rich lawyer and similar examples without difficulty, also provides an indirect test for adjective classification. Recall that R90 bumps an ADV' into an ADJ/ADJ as in (190).

(190) (formerly \textsuperscript{t/8}t')ADJ/ADJ, R90' rich\textsubscript{ADJ}ADJ, R11
    \llap{/} (formerly \textsuperscript{t/8}t')ADJ/ADJ, R90 \textsubscript{richADJ}
    formerly \textsuperscript{t/8}t'

Such a derived ADJ as formerly rich can then be bumped into a derived CN\textsuperscript{CN} by R12. The key point here is that an ADJ can combine with a bumped ADV', but this combination must occur before an ADJ is bumped into a CN\textsuperscript{CN}. There is no rule similar to R90 which allows the
combination of an ADV' and a CN/nCN. Thus a derivation like (191) is impossible.

(191) \[ \{\text{formerly} \{\text{rich}\}\} \text{lawyer} \]
\[ \{\text{formerly} \{\text{rich}\}\}^{CN}_{2CN} \text{lawyer}^{CN}_{CN} \]
\[ \{\text{formerly}\}(\text{CN}^{2CN}_{CN}/\text{CN}^{2CN}_{CN})^{CN}_{ADJ} \]

\[ \text{formerly}^{t/\delta_t} \text{rich}^{ADJ} \]

There is good semantic as well as syntactic justification for this. The translation of \([\text{rich}]^{ADJ}_{CN}CN^{2CN}_{CN}\) is \(\lambda y[P(y) \& \text{rich}'(y)]\). The \text{formerly} in \text{formerly rich lawyer} intuitively modifies only the clause \text{rich}'(y), so it could apply properly to \(\lambda y[P(y) \& \text{rich}'(y)]\) only if it could reach inside its argument and attach magically to the correct conjunct. The lack of a rule for combining sentence adverbs with CN/nCNs is therefore not an accidental but a necessary omission.

This analysis inherently predicts that any string of the form [[sentence-adverb CN/CN] CN] will be ungrammatical, and so no basic CN/CN can ever be modified by a sentence adverb. Basic CN/CNs in the present analysis include former, possible, mere and alleged. As predicted, the following constructions are ungrammatical.

(192) a. *the [obviously former] lawyer
b. *a [formerly possible] thief
c. *a [presently mere] boy
d. *the [fortunately alleged] murderer

These basic CN/CNs are the same adjectives which cannot appear normally in predicate position. Again the rules of the present grammar provide no way to generate the sentences in (193), because \(be^{IV/PRED}_{IV/PRED}\) maps only genuine one-place predicates, including ADJs, into IVs.

(193) a. *The lawyer is former.
b. *The thief is possible.
c. *The boy is mere.
d. *The murderer is alleged.
The distinctions among adjectives which Montague relegated to the meaning postulates are therefore shown to be vital for producing grammatical strings in the syntax.

A corollary of the grammaticality predictions just explained is that any grammatical string of the rough form \([\text{sentence-adverb adjective}] \text{CN}\) must involve an adjective of the category ADJ rather than a CN/CN. Numerous adjective surface forms have both an ADJ and a CN/CN reading. *Obvious* is one of these: obvious\_CN/CN is a basic CN/CN and translates in terms of a two-place relation (call it obvious2\_): \(\lambda x y z [\text{obvious2} (z, \uparrow [P(y)])]\). *Obvious*\_ADJ translates as a basic one-place predicate obvious'. When the basic ADJ obvious is bumped into a CN/\^2CN by R12, its reading is then \(\lambda x y [P(y) & \text{obvious'} (y)]\). Thus the CN obvious lawyer, on the basic CN/CN reading, will translate as \(\lambda x y z [\text{obvious'} (z, \uparrow [\text{lawyer'} (y)])]\)---the set of all entities such that it is obvious to someone that they are lawyers. On the derived CN/\^2CN (basic ADJ) reading, the same string will translate as \(\lambda y [\text{obvious'} (y) & \text{lawyer'} (y)]\)---the set of lawyers who are obvious (stick out or are conspicuous). *Clear* also has an ADJ and a basic CN/CN reading. Other potentially ambiguous structures include strings like the following.

(194) moral philosopher, plastic surgeon, fuzzy logician, abnormal psychologist, criminal lawyer, old bookseller, theatrical remover, English teacher, provincial magistrate, sanitary engineer, romantic poet, dramatic critic, artistic manager, literary critic

When strings like obvious lawyer and moral philosopher occur with sentence adverbs, as in [[formerly obvious] lawyer] or [[obviously moral] philosopher], the ADJ reading of obvious and moral is forced to preserve grammaticality.
(195) a. The formerly obvious lawyer made himself less conspicuous.
   b. The obviously moral philosopher lost his job.
   c. The previously fuzzy logician got a shave.
   d. The occasionally abnormal psychologist needed help.
   e. John is an obviously criminal lawyer.

The sentence adverb test works because the bumped ADV's can be of category ADJ/ADJ but not of category (CN/CN)/(CN/CN) or of category CN/CN. The ADJ/ADJ is, figuratively, looking for an ADJ to modify and so forces an ADJ reading of any potentially ambiguous adjective form that follows. Basic ADJ/ADJs like very, somewhat and a bit have long been known to have the same effect in disambiguating strings such as moral philosopher; they too are looking for an ADJ for modify.

(196) Jane is a very moral philosopher.
(197) The somewhat abnormal psychologist was closely watched.

The disambiguating power of basic and derived ADJ/ADJs can be used to humorous effect. (198) is an exchange in the play On the Razzle by Tom Stoppard (quoted in Newsweek, 20 October 1981).

(198) A: Personal servant, is he?
    B: Yes, a bit.

A similar exchange using an ADV' bumped into an ADJ/ADJ is shown in (199).

(199) A: Is Bill an abnormal psychologist?
    B: Well, occasionally abnormal.

As an overall test for ADJs, the bumped sentence adverbs provide an even more consistent test than very. Some ADJs like pregnant, virgin and carnivorous and also superlatives such as perfect and flawless resist modification by very simply because they lack vagueness. Very pregnant, very virgin, very flawless, etc. take on secondary readings, but
sentence adverbs, bumped into ADJ/ADJs, can apply to any ADJ in its literal sense.

(200) The obviously pregnant princess continued her engagements.
(201) My previously carnivorous friend became a vegetarian.

The surface form *very* also has the disadvantage of having ADJ'/ADJ' and other related readings which confuse the picture. The truth of a sentence, for example, can be 'very obvious', and a *very obvious thief* can be a member of 'the set of individuals such that it is very obvious that they are thieves'.

(202) It is very obvious that John is ill.
(203) John is a very obvious thief.

Siegel (1976a; 1979) and others (see Section 2.1.2.1) claim that degree adjectives (*tall, short, high, low, fat, thin, etc.*) are a subtype of ADJ. The same position has been adopted herein. Given the long history of degree adjectives being translated as basic semantic attributives, this is a bold claim. If the sentence adverb test is valid and this ADJ analysis is correct, then degree adjectives should appear freely with sentence adverbs; and indeed they do.

(204) a. The [obviously tall] ballerina was rejected.
    b. The [previously fat] capitalist lost 20 pounds.
    c. The [philosophically lightweight] lecturer was laughed at.

In the case of evaluative adjectives, however, Siegel claims that *good, bad, skillful, etc.* are 'doublets', having both a relative CN/CN reading and an absolute ADJ reading. When *good thief* has the reading 'good qua thief' or 'good as a thief', Siegel calls this a relative reading and analyses *good* as a basic CN/CN. Her translation for the relative reading of *good thief* is therefore *good*("thief'"). On the absolute reading, *good thief* is translated as *ly*[good'(y) & thief'(y)] and supposedly denotes the set of thieves who are also morally or 'absolutely' good. Robin Hood, who robs from the rich and
I have argued at length in Chapter 2 against this double classification of evaluative adjectives. I have claimed that all evaluative adjectives are basic ADJs and translate as one-place predicates, however vague. Furthermore, I have claimed that evaluative adjectives should receive a conjunction analysis when they attributively modify a common noun. Vagueness has been explained herein as an effect of context rather than as an effect caused by an adjective applying to the intension of its CN argument. In the present analysis, Siegel's claimed absolute reading of good, i.e. 'morally good', is taken to be a simple case of the vague predicate good' being applied relative to moral criteria rather than relative to some other criteria.

As shown in examples like obvious lawyer and fuzzy logician, the presence of a sentence adverb forces an ADJ (absolute) reading of the first constituent. If, as Siegel argues, evaluative adjectives are doublets with both a CN/CN and an ADJ reading, then an evaluative adjective modified grammatically by a bumped sentence adverb should have only its ADJ reading, i.e. the 'absolute' reading. None of the following examples should allow a CN/CN ('relative') reading.

(205) Robin Hood is an [obviously good] thief.
(206) Sue is a [choreographically beautiful] dancer.
(207) John is an [occasionally bad] monk.

The test is decisively against Siegel. An obviously good thief can still be 'good qua thief' rather than morally good. A choreographically beautiful dancer need not be absolutely beautiful but rather 'beautiful qua dancer'—that is, beautiful relative to choreographic criteria. An occasionally bad monk can still be 'bad qua monk'.

In this as well as in other syntactic tests, evaluative adjectives like good consistently act like ADJs rather than like basic CN/CNs. A gross syntactic and logical ambiguity in evaluative
adjectives as proposed by Siegel is neither necessary nor tenable. Evaluative adjectives are simply ADJs which are exceptionally vague.

6.4 Appositives and non-restrictive relative clauses at proposition level

6.4.1 Proposition-level non-restrictive relative clauses

Non-restrictive modification at the proposition level has already been used to translate the parenthetical adverbs in Section 6.2.2. Translations like the following were illustrated and defended.

(208) Sadly, Max failed.
(208') a. fail'(m)
    b. sad'(fail'(m))

Non-restrictive relative clauses also appear at proposition level; example (209) appears equivalent to (208).

(209) Max failed, which is sad.
(210) John wants to retire, which worries Sue.

Such relative clauses, whose syntactic antecedents are whole sentences, have been noted by many researchers (Chomsky 1965:217; Vendler 1968:35, 90, 91; Quirk et al. 1972:519-520, 648, 872-873; Jackendoff 1977:63). There seems little doubt that a non-restrictive analysis is called for. The sentences modified are clearly asserted by the speaker, and the relative clauses have a parenthetical feel to them. In addition, there is a noticeable tendency for researchers to paraphrase the relative which as 'and that' or 'and this', reflecting the anaphoric element in non-restrictive modification (see, for example, Quirk et al. 1972:764-765; Seuren 1969:189; Thompson 1971:88; Jacobs & Rosenbaum 1968:262).

Proposition-level restrictive relative clauses have already been generated by way of R82. Rule R94 is very similar and produces non-
restrictive relative clauses.

R94. If $\alpha \in P_t$ and $\alpha$ is of the form

\[ \ldots \text{it}_n \ldots \] then $\{\alpha\} \in P_{t/9}'$.

Realisation: \textit{which} $\wedge \{\ldots \text{it}_n \! \ldots \}$

Translation: $\lambda p[\!^p\!]; \text{subroutine}(\lambda p[a'](p_a))$

Examples are straightforward.

(211) \{
\begin{align*}
\text{John, } (\text{be}^\text{IV}/\text{PRED'} \text{ill}^\text{ADJ}^\text{IV}, R2)^t, R1'
\{\text{it}^1(t/2^\text{IV'}), (\text{be}^\text{IV'}/\text{PRED'}, \text{odd}^\text{ADJ'}^\text{IV'}, R52)^t,
R51)^t/9_t, R94)^t, R86
\end{align*}
\}

Realisation: John is ill, which is odd.
Translation: a. \textit{ill}'(j)
            b. \textit{odd}'(\textit{ill}'(j))

A pragmatic restriction on the relative clauses modifying assertions is that they be based on factive predicates. Contrast the naturalness of the factive examples in (212) with the unacceptability of the non-factive examples in (213).

(212) a. John is ill, which is funny.
    b. Mary left, which was sad.
    c. Sue died, which was (un)fortunate.
    d. Bob is a thief, which is regrettable.

(213) a. ?John is ill, which is possible.
    b. ?Mary left, which is probable.
    c. ?Sue died, which is false.
    d. ?Bob is a thief, which is unlikely.

The explanation of this restriction is not difficult. To utter a sentence like (213a) is effectively to assert the two sentences in (213a').

(213a') a. \textit{ill}'(j)
        b. \textit{possible}'(\textit{ill}'(j))
It is pragmatically and, in some cases, logically inconsistent to assert that \textit{ill'}(j) is true and also assert (even parenthetically) that \textit{ill'}(j) is possible, false, probable, etc. Factive predicates do not have this problem—it is perfectly coherent to assert \textit{ill'}(j) and also \textit{funny'}(\textit{ill'}(j)) as in (212a). However, factivity is not the whole answer as the factive example \textit{true} shows.

(214) ?John is ill, which is true.

Though (214) may simply owe its oddness to redundancy, a more likely basis for the restriction lies in the distinction between \textit{t/3}t (modal) and \textit{t/4}t (parenthetical) adjectivals. Relative clauses based on modal adjectivals, which intuitively qualify the truth value of a proposition, cannot appear happily as non-restrictive modifiers of assertions. To assert something is to say that its truth value is \textit{1}, and pragmatically there seems to be little room to comment further on that truth value.

Belief sentences illustrate that these restrictions are pragmatic or semantic rather than syntactic. The sentence \textit{John is ill, which is false} would have the structure shown in (215).

(215) (\texttt{\{\textit{John}_T, \{\textit{be}_{IV/PRED}, \textit{ill}_{ADJ}\}_IV, R2}_t, \{L}_t \{t/2}_t\texttt{\})'
\texttt{\{\texttt{be}_{IV'/PRED}, \textit{false}_{t/3}_t\}_IV', R52}_t, R51}_t/9_t, R94}_t, R86}_t, R86

An utterance of this sentence conveys a pair of incompatible assertions. Yet precisely this syntactic structure is necessary when the same sentence is embedded, as when it occurs in the object of \textit{believe}. The following example is perfectly acceptable.

(216) (\texttt{\{\textit{Bill}_T, \{\textit{believe}_{IV/T}, \{that}_t\}_t' \{\{\textit{\texttt{\{\textit{John}_T, \{\textit{be}_{IV/PRED}, \textit{ill}_{ADJ}\}_IV, R2}_t, \{L}_t \{t/2}_t\texttt{\})'}\texttt{\{\texttt{be}_{IV'/PRED}, \textit{false}_{t/3}_t\}_IV', R52}_t, R51}_t/9_t, R94}_t, R86}_t/IV', R41}_t, R71}_t, R1}_t
Realisation: Bill believes that John is ill, which is false.

The rules will give the translation of this sentence correctly as \textit{believe}'(b, \texttt{\{\textit{ill'}(j)\})) with \textit{false}'(\texttt{\{\textit{ill'}(j)\})) also asserted in a subroutine. As the speaker is no longer himself asserting that John
is ill, it is perfectly consistent for him to assert both that Bill believes that John is ill and that it is false that John is ill. Syntactic structures such as (215) are therefore grammatical and useful.

When a $t^3t$-based relative clause appearing in a string can potentially modify either a whole assertion or an embedded sentence, the hearer's natural reaction is to prefer the acceptable reading and assume that the relative clause modifies the embedded sentence.

(217) Potentially ambiguous string:
Mary believes that Bill is unfaithful, which is false.
Syntactically possible but unacceptable reading:
[Mary believes that Bill is unfaithful,] which is false.
Acceptable, and therefore preferred, reading:
Mary believes that [[Bill is unfaithful,] which is false.]

Non-restrictive relative clauses based on $t^4ts$ are not only consistent with asserted sentences, but actually 'prefer' to modify them much as $t^3t$-based relative clauses 'prefer' to modify embedded sentences. Consider example (218) where which is unfortunate could attach syntactically to either the whole asserted sentence Bill believes that John is ill or to the embedded sentence John is ill.

(218) Bill believes that John is ill, which is unfortunate.

In practice, the hearer naturally prefers the reading where the whole asserted sentence is modified. Similar restrictions were noted for parenthetical adverbials (also non-restrictive modifiers) in Section 6.2.2.

6.4.2 Proposition-level appositives

Delacruz (1976:187-188) provides a proposition-level apposition rule which is almost identical to his individual-level apposition rule (see Section 4.6.1.1). In (219), some of the variables have been changed in keeping with the present usage.
(219) Delacruz's Proposition-Level Appositive Rules

S 3.2 If $\alpha \in P_T$ and $\zeta \in B_{CN}$, then $P_{22}(\zeta, \alpha) \in P_T$, provided that whenever $\alpha$ is of the form that $\Phi$, where $\Phi \in P_T$, $P_{22}(\zeta, \alpha) = \zeta \alpha$; otherwise $P_{22}(\zeta, \alpha) = \alpha$.

T 3.2 If $\alpha \in P_T$ and $\zeta \in B_{CN}$, and $\alpha, \zeta$ translate into $\alpha'$, $\zeta'$, respectively, then $P_{22}(\zeta, \alpha)$ translates into $\alpha'$ if $\alpha$ is not of the form that $\Phi$, where $\Phi \in P_T$; otherwise $P_{22}(\zeta, \alpha)$ translates into

$$\lambda R V q [ \lambda R p_1 [ q_1 = p_1 ] ] ( \alpha' ) ( p ) \leftrightarrow p = q \& R( q )$$

These rules are used to derive and translate the proposition-level terms in the following sentences.

(220) The fact that John is ill is significant.

(221) Bill believes the lie that John is ill.

These rules, like Delacruz's rules for individual-level appositives, handle only the restrictive reading. Thus the fact that John is ill in (220) is translated roughly as 'that fact such that it is "John is ill"', and the lie that John is ill is translated roughly as 'that lie such that it is "John is ill"'. Under these readings, (220) might be an appropriate answer to the question What fact is significant? and (221) might answer the question Which lie does Bill believe? Accepting these readings as valid, the rules can be transcribed into the present notation as R95. The rule looks simpler than Delacruz's because the present grammar has a useful syntactic distinction between T's of the form that-t (t/IV's) and all others (t/2IV's).

R95. If $\alpha \in P_T/TIV$ and $\beta \in P_{CN}$, then $(\alpha, \beta) \in P_T/2IV$.

Realisation: the $\alpha \beta$

Translation: $\lambda R V q [ \lambda R p_1 [ q_1 = p_1 ] ] ( \alpha' ) ( p ) \leftrightarrow p = q \& R( q )$
A restrictive example using R95 is shown in (222).

(222) \( \{\text{Sue}_t \text{ believe}_{IV/T'_t} \text{ [lie}_{CN'_t} \text{ that}_{t/IV'_t} \text{ Bill}_t \text{ cheat}_{IV'_t} \text{ R1'}_t/IV'_t, R41'_t/2IV'_t, R95'_t, R71'_t, R1_t \} \text{ Realisation: Sue believes the lie that Bill cheats.} \)

Translation: \( \forall q [\text{Ap}[(\text{lie}'(p) \& p = ^\exists \text{cheat}'(b))] \leftrightarrow p=q] \& \text{believe}'_s(s,q)] \)

A much more likely reading of a propositional term like the lie that Bill cheats takes lie as a non-restrictive speaker's characterisation of the proposition. This reading is analogous to the non-restrictive reading of that bastard in (223) (see Section 4.6.1.4).

(223) Smith hates that bastard Jones.

On the non-restrictive reading, (223) is roughly paraphrased as the two assertions 'Smith hates Jones' and 'Jones is a bastard'. Similarly, sentence (224) on the non-restrictive reading of lie could be paraphrased as in (225).

(224) Mary believes the lie that Bill cheats.

(225) a. 'Mary believes that Bill cheats'
    b. 'It is a lie that Bill cheats'

Similar data are discussed semi-formally by Geach (1965:453-455), who argues that (226) breaks down as (227a) and (227b), where (227b) is an assertion 'smuggled' into the main sentence.

(226) Jim is aware of the fact that his wife is unfaithful.

(227) a. Jim is convinced that his wife is unfaithful.
    b. Jim's wife is unfaithful.

Such 'smuggled' assertions, which I have called 'parenthetical' or generally 'non-restrictive', can even appear in questions.
(228) Is Jim aware of the fact that his wife is deceiving him?

This is classic non-restrictive behaviour, and it can be captured by R96.17

R96. If $\alpha \in P_{CN}$ and $\beta \in P_{t/IV}$, then $(\alpha, \beta) \in P_{t/2IV}$.

Realisation: the $\alpha \beta$

Translation: $\beta'$; subroutine($\alpha'(p_a)$)

If lie is taken as a non-restrictive appositive, the translation of (229) leaves the discourse pool with the two assertions in (229').

(229) John believes the lie that Mary cheats.

(229') a. believe$^*(j, \sim[cheat'(m)])$

b. lie'(\sim[cheat'(m)])

In conclusion, both non-restrictive and restrictive appositives at proposition level can be easily accommodated in the grammar.18

6.5 Conclusion

This chapter has presented the rules to account for various adjectival constructions at the proposition level, including predicative adjectivals, basic and derived attributive adjectivals, adverbially modified adjectivals, and relative clauses. The rules also account for appositives and non-restrictive modification. Though the proposition-level presents many new problems, the rules and solutions offered are compatible with and parallel to those at the individual level.
Chapter 7. The property level in Montague grammar

7.0 Introduction

This chapter includes categories and grammatical rules for structures at the property level, including to-marked infinitives, Tough adjectives and 'human propensity adjectives'. To-marked infinitive phrases are treated herein as property-level terms and are assigned the category $t/IV''$, which is included in the cover category $T''$. They translate as the set of properties of a property: e.g. $to\ swim \Rightarrow \lambda PP('swim')$.\(^1\) Here, as in Chapters 5 and 6, the 'stacking' hypothesis rather than the 'levelling' hypothesis is developed. In the levelling hypothesis, properties can be treated simply as individuals (entities of type $e$) in the domain, and $to\ swim$ then becomes an individual-level $T$ (rather than a property-level $T''$) with the translation $\lambda PP('swim')$. What the levelling hypothesis gains in generalisation and simplified types is paid for in a greater dependence on selection restrictions (see Chapter 5). For the present purposes, the stacking hypothesis has more beautiful results, and it does not require a wholesale revision of the traditional MG ontology and semantics. The question remains moot, and it is hoped that the following chapter, which reviews a wide range of data involving infinitives, will be a valuable source for the continuing debate on formal ontology and nominalisation.

7.1 The property-level categories

Abbreviations for property-level categories are distinguished with double bar or double prime markings. The following categories and rules are very similar to those at the individual and proposition levels.

<table>
<thead>
<tr>
<th>Category</th>
<th>Abbreviation</th>
<th>Basic expressions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t/6IV$</td>
<td>IV''</td>
<td>(none)</td>
</tr>
<tr>
<td>$t/7IV$</td>
<td>CN''</td>
<td>task, feat, assignment, duty, burden, work, job, problem</td>
</tr>
</tbody>
</table>
Let \( P_{t/IV} \) be a cover category including \( P_{t/8IV} \cup P_{t/9IV} \cup P_{t/10IV} \).

Let \( ADJVL'' \) be a cover category including \( P_{t/8IV} \cup P_{t/12IV} \).

Let \( T'' \) be a cover category including \( P_{t/IV''} \cup P_{t/1IV''} \).

\( IV''/PRED'' \) be
\( IV''/T'' \) be
\( (t/2IV'')/CN'' \) the
\( (t/IV'')/IV \) to
\( CN''/CN'' \) (none)

\( ADJ''/ADJ'' \) (none)

\( IV/T'' \) start, begin, undertake
\( IV/(t/2IV'') \) do, perform, finish, accomplish
\( IV/(t/IV'') \) happen
\( (IV/(t/IV''))/PP-TO \) seem, appear
\( IV^2/(t/IV'') \) want, expect, hope, intend, try, desire, decide, plan, agree, like

\( (IV^2/(t/IV''))/T \) promise
\( TV/(t/IV'') \) believe, know, acknowledge, guess, suppose, think, persuade, permit, allow, expect

\( ADJ/(t/IV'') \) sure, likely, certain, unlikely apt
\( ADJ^2/(t/IV'') \) scared, frightened, afraid terrified
Let $B$ be a variable of type $\langle s, \langle s, \langle s, e, t \rangle, t \rangle, t \rangle$; i.e. it ranges over intensions of translations of property-level terms $(T''s)$. $I^I_n$, where $n$ is a natural number, translates as $\lambda PP(P_n)$. All previously defined conventions for type definition, function application and rule notation remain the same.

Semantic constants

\begin{align*}
  t_0(t/IV''/IV) & \text{ translates as } \lambda \forall PP(P) \\
  be_{IV''/PRED'} & \text{ translates as } \lambda P \forall P' \\
  be_{IV''/T'} & \text{ translates as } \lambda B \lambda P \theta(\lambda Q(Q \Rightarrow PP)P) \\
  the_{t'/IV''/CN''} & \text{ translates as } \lambda P_1 \lambda P_1 \forall P_1(Q \Rightarrow Q \Rightarrow PP) \text{ and } P(P)
\end{align*}

7.2 The property-level grammar

7.2.0 Introduction

The stacking analysis, which treats infinitives as property-level terms and Tough adjectives as property-level adjectives, has been suggested or pursued by several researchers.\(^2\) The present grammar expands the fragment and avoids some transformational solutions which have been proposed even within MG (e.g. Bennett 1975:176, 178, 186; Partee 1976b:66).

7.2.1 Tough adjectives and related phenomena

7.2.1.0 Recent analyses

The analysis of Tough adjectives is one of the classic problems in linguistic theory. The simplest examples show Tough adjectives combining with to-marked infinitive phrases as in (1).
(1) a. [To make money] is difficult.
b. It is tough [to write a thesis].

However, Berman (1973a:235-242, 317; 1973b:36) and Berman & Szamosi (1972:320-325) cite examples like the following to argue that all Tough adjectives have sentential complements of the form for T to IV in the syntax.

(2) a. (For Mary to leave] would be tough for John.
b. It is difficult for John [for Mary to leave].

This amounts to a claim that Tough adjectives are just a variant of the (t/4)^t[/PP-FOR] sentential adjectives discussed in Section 5.2.2.2.2.3. That is, (2b) could be paraphrased roughly as (3), and a Tough adjective like difficult would eventually translate as a relation between propositions and individuals as in (3').

(3) It is difficult for John that Mary is leaving.

(3') difficult*(leave'(m),j)

Against this, Bresnan (1971) and Lasnik & Fiengo (1974) have argued persuasively that the examples in (2) above do not involve genuine Tough adjectives at all. They claim that Tough adjectives always have infinitive complements in the syntax.

When reexamined in the light of a MG, where syntax and semantics bear their respective burdens, these claims are not totally incompatible. Here it will be argued that genuine Tough constructions involve the syntactic combination of an adjectival and an infinitive, as argued by Bresnan and by Lasnik & Fiengo. However, the translations of Tough constructions will be expressed in terms of two-place relations between propositions and individuals, just like basic (t/4)^t[/PP-FOR] adjectives and IV'/T participles. Thus Berman and Szamosi are somewhat vindicated semantically—the difference is that the present account captures the semantic intuitions by appealing to lexical relations between words rather than by appealing
to syntactic transformations from deeper structures.

7.2.1.1 Relationships to (\(t^4t\))/PP-FOR adjectives

Genuine Tough adjectives (\(\text{ADJ}'s\)) are lexically related to (\(t^4t\))/PP-FOR adjectives and are translated in terms of the same semantic relations. However, Tough adjectives have become grammaticalised and are set apart by their singular behaviour with infinitives. Most adjective forms which have a Tough reading, like dangerous, difficult and hard, are also capable of receiving (\(t^4t\))/PP-FOR readings, which complicates the data tremendously. In the present grammar, only a (\(t^4t\))/PP-FOR adjective can fit grammatically in the syntactic environment occupied by dangerous in (4).

(4) [For John to leave] is [dangerous for Mary].

There are two PP-FOR phrases in this sentence. For Mary, the immediate complement of the (\(t^4t\))/PP-FOR adjective, supplies the EXPERIENCER Mary. The other PP-FOR phrase, for John, supplies the INFINITIVAL SUBJECT of the infinitive to leave and helps form a kind of t/IV', a FOR-TO clause. FOR-TO clauses are included in the cover class T'. The following rules are needed to allow the derivation in (5).

R97. If \(\alpha \in B(t^IV'/)IV\) and \(\beta \in P_{IV}\) then \((\alpha, \beta) \in P_{t/IV''}\).
Realisation: \(\alpha \leftarrow \beta\)
Translation: \(\alpha'(\beta')\)

R98. If \(\alpha \in P_{t/IV''}\) and \(\beta \in P_{PP-FOR}\) then \((\alpha, \beta) \in P_{FOR-TO}\).
Realisation: \(\beta \leftarrow \alpha\)
Translation: \(\lambda RR(\alpha'(\beta'))\)

(5) \(((\text{for } PP-FOR/T' \text{ John}_T) PP-FOR, R23' (to(t^IV')/IV' leave IV) t/IV'', R97')\)\ FOR-TO, R98' (be IV'/PRED', (dangerous (t^4t)/PP-FOR') (for PP-FOR/T' \text{ Mary}_T) PP-FOR, R23')t^4, R56'IV', R52't, R51 \text{ Realisation: For John to leave is dangerous for Mary.} \)
Translation: dangerous*(\(\{\text{leave'}(j)\}\), m)
Either, and sometimes both, of the PP-FOR phrases can be omitted in a sentence based on a \((t/4t)/\text{PP-FOR}\).

(6) [For John to leave] is dangerous.
(7) To leave is [dangerous for Mary].

The omission of the experiencer of a \((t/4t)/\text{PP-FOR}\), as in (6), is already allowed by the relation-reducing rule R57. The translation of (6) will be (6'), where the experiencer argument slot is filled with an existentially quantified variable.

(6') \(\forall z[\text{dangerous}_i(\langle\text{leave}'(j)\rangle, z)]\)

(6) can therefore be roughly paraphrased as 'For John to leave is dangerous for someone'. Example (7) will need the new rule R99 to get its translation (7').

R99. If \(a \in P_{t/IV}\), then \(a \in P_{\text{FOR-TO}}\).

Realisation: \(a\)

Translation: \(\lambda RVzR(\langle a'(\lambda PP(z))\rangle)\)

(7') \(\forall z[\text{dangerous}_i(\langle\text{leave}'(z)\rangle, m)]\)

Roughly, (7) could be paraphrased as 'For someone to leave is dangerous for Mary'. When both R57 and R99 operate together, the result is a string like (8) with the translation (8').

(8) To leave is dangerous.
(8') \(\forall yVz[\text{dangerous}_i(\langle\text{leave}'(y)\rangle, z)]\)

To grasp the \((t/4t)/\text{PP-FOR}\) reading of (8), imagine a case where a nurse is monitoring a critically ill patient. The nurse might be told To leave is dangerous, meaning roughly 'for someone (you) to leave is dangerous for someone (the patient)'. In conclusion, a sentence based on a \((t/4t)/\text{PP-FOR}\) word and an infinitive can optionally specify the infinitival subject and the experiencer by means of PP-FOR phrases. Even when both are omitted, the subject and the experiencer slots are filled with existentially quantified
variables and can be different.

7.2.1.2 Genuine Tough adjectives

The key semantic difference between (t/4t)/PP-FOR and Tough adjectives is that the latter require the infinitival subject and the experiencer to be identical. Also, a sentence like To leave is dangerous, on the Tough reading, has a rule-like flavour—roughly 'anyone who leaves is himself endangered by so doing'. This reading is shown in (9).

(9) Az[dangerous*([leave'(z)],z)]

The key syntactic difference between the two classes is that Tough adjectives combine with property-level T's rather than with proposition-level T's. It must be emphasised here that most of the traditionally identified Tough forms can also take (t/4t)/PP-FOR readings, so many examples are ambiguous. Easy, tough, difficult and other examples, on their genuine Tough readings, can have the necessary coreference of the experiencer and the infinitival subject wired-in by giving them explicit translations as in (10).

(10) easy_{ADJ.} \rightarrow \lambda PaAz[easy*([P(z)],z)]

(and similarly for tough, hard, difficult, etc.)

The following rules are necessary for examples like (11).

R100. If α ∈ B_{IV''/PRED''} and β ∈ P_{PRED''} then (α, β) ∈ P_{IV''}.
   Realisation: α \rightarrow β
   Translation: \alpha'('β')

R101. If α ∈ P_{CN''} then (a(n), α) ∈ P_{PNOM''}.
   Realisation: a(n) \rightarrow α
   Translation: α'

R102. If α ∈ P_{T''}, and β ∈ P_{IV''}, then (α, β) ∈ P_{t}.
   Realisation: α \rightarrow β
   Translation: \alpha'('β')
R103. If $\alpha \in P_{IV'}$, then $\{\alpha\} \in P_{t/11 IV'}$.
Realisation: $\alpha$
Translation: $\alpha'$

R104. If $\alpha \in P_{t/IV'}$ and $\beta \in P_{t/11 IV}$ then $\{\alpha, \beta\} \in P_t$.
Realisation: $\alpha \sim \beta \sim \alpha$
Translation: $\alpha'(\beta')$

R105. If $\alpha \in B(t_{2IV''}/CN''$, and $\beta \in P_{CN''}$ then $\{\alpha, \beta\} \in P_{t_{2IV''}}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'(\beta')$

R106. If $\alpha \in P_{IV/(t_{2IV''}}$ and $\beta \in P_{t_{2IV''}}$ then $\{\alpha, \beta\} \in P_{IV'}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'(\beta')$

R107. If $\alpha \in P_{IV'/T''}$ and $\beta \in P_{T'}$ then $\{\alpha, \beta\} \in P_{IV'}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'(\beta')$

(11) \{(to(t_{IV''})/IV' run_{IV'} t_{IV''}, R97'
(be_{IV''}/PRED', easy_{ADJ'})_{IV''}, R100't, R102
Realisation: To run is easy.
Translation: $\lambda P_{\text{easy}'}(\sim[P(z)],z)$

R103 and R104 allow $t/IV'$'s to be postposed as in (12). \(^3\) R101 accommodates property-level predicate nominals as in (13).

(12) It is easy to run.
(13) To run is an activity.

Tough adjectives can be productively derived from $IV'/T$ verbs like annoy by R108.

R108. If $\alpha \in P_{IV'/T}$ then $(\alpha,\text{ING}) \in P_{ADJ''}$.
Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the present participle (-ing) form
Translation: $\lambda P_{\text{ANNOY}}(\sim[P(z)],z)$
The Tough reading of annoying translates into
\[ \lambda P \lambda z [\text{annoy}(P(z), z)] \]
and example (14) is straightforward.

(14) \[(t/TV'/IV')/IV' (wash_{TV'} Fido_{TV'}/IV', \text{annoying}_{IV'}/PRED', R3_t/IV', R97') \]
Realisation: To wash Fido is annoying.
Translation: \[ Az[\text{annoy}(\text{wash}(z, f), z)] \]

Finally, members of \text{ADJVL}'', basic or derived, can be bumped into attributive modifiers of \text{CN}''s in a way which should now be familiar.

R109. If \( a \in P_{\text{ADJVL}}' \), then \( \{ a \} \in P_{\text{CN}''}/\text{CN}'' \).
Realisation: \( a \)
Translation: \( \lambda P \lambda Q (P(Q) \& a'(Q)) \)

R110. If \( a \in P_{\text{CN}''}/\text{CN}'' \), and \( b \in P_{\text{CN}}' \), then \( \{ a, b \} \in P_{\text{CN}''} \).
Realisation: \( b \sim a \) if \( a \) has a complement
else \( a \sim b \)
Translation: \( a'(\unicode{^b}') \)

The following strings and translations can now be generated.

(15) To knit is a boring activity.
(15') activity'(\"knit\'\") & \[ \lambda z [\text{bore}(\text{\"knit\'}(z)), z] \]
(16) To eat is an easy job.
(16') job'(\"eat\'\") & \[ \lambda z [\text{easy}(\text{\"eat\'}(z)), z] \]

In the simplest constructions, then, Tough adjectives behave much like \text{ADJS} and \text{ADJ}'s.

7.2.1.3 Tough 'movement' without movement

Having accounted for Tough adjectives in sentences like (17) and (18), it remains to treat sentences like (19).
(17) To please John is easy.
(18) It is easy to please John.
(19) John is easy to please.

Traditionally, of course, (19) is transformationally derived from (17) and/or (18) by some kind of Tough-movement or Tough-deletion. Partee and Bennett actually proposed transformational solution within MG, with all the usual difficulties.4

The goal of this section is to provide rules for the generation and translation of Tough-'moved' sentences with no recourse to transformations. The surfacy constituent structure of (19) is roughly that in (20).

(20) John is easy to please
    John be easy to please
    be to please
    easy to please

Assuming that surfacy structures are desirable, a rule must be defined to combine Tough adjectives (ADJ''s) and infinitives (t/IV''s) to form individual-level adjectives (ADJs). The infinitive, however, must be one with a T hole or gap, as shown in the following examples.

(21) a. John is hard [to please ___].
    b. John is hard [to give presents to __].
    c. John is boring [to argue about __].

One possible way to generate structures with such gaps is to use the slash-category notation of Generalised Phrase Structure Grammar.5 In a similar approach more easily implemented in the present approach, Dowty (1978:420) has suggested that Tough 'movement' in a MG be done by binding a free variable generated inside the infinitive phrase. The following rule will do the job.6
If $\alpha \in \mathcal{P}_{\text{ADJ}}$, and $\beta \in \mathcal{P}_{t/IV}$, and $\beta$ is of the form $\ldots \text{he}_n \ldots$, then $(\alpha, \beta) \in \mathcal{P}_{\text{ADJ}}$.

Realisation: $\alpha \leftarrow \ldots \text{he}_n \ldots$

Translation: $\lambda x_1[\beta'(\alpha')]$

(22) (John, (be$^\text{IV/PRED}'$ (easy$^\text{ADJ}'$)

(to$^\text{t/IV}$) (please$^\text{IV}$) he$^\text{IV}$)

Realisation: John is easy to please.

Translation:
1. $\text{please}^\text{IV} \rightarrow \text{please}'$ Basic
2. $\text{he}_1 \rightarrow \lambda \text{PP}(x_1)$ Pronoun
3. $\text{(please, he}_1 \text{)}^\text{IV} \rightarrow \text{please}'(\lambda \text{PP}(x_1))$ From 1, 2 by R3
4. $\text{to}^\text{t/IV} \rightarrow \lambda \theta \lambda \text{PP}(\theta)$ Basic
5. $\text{(to, (please, he}_1 \text{))}^\text{t/IV} \rightarrow \lambda \theta \lambda \text{PP}(\theta)(\text{please}'(\lambda \text{PP}(x_1)))$ From 3, 4 by R97
6. $\lambda \text{PP}(\text{please}'(\lambda \text{PP}(x_1)))$ Lambda conversion
7. $\text{easy}^\text{ADJ}' \rightarrow \lambda x \lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])$ Basic
8. $\text{(easy, (to, (please, he}_1 \text{)))} \rightarrow \lambda x_1[\lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])(\lambda x \lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))]))]$ From 6, 7 by R11
9. $\lambda x_1[\lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])(x_1), x_1])$ Lambda conversion
10. $\lambda x_1[\lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])(x_1), x_1])$ First-order reduction
11. $\lambda x_1[\lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])(x_1), x_1])$ Lambda conversion
12. $\text{be}^\text{IV/PRED} \rightarrow \lambda \text{P}'$ Basic
13. $\text{(be, (easy, (to, (please, he}_1 \text{)))}^\text{IV} \rightarrow \lambda \text{P}'(\lambda x_1[\lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])(x_1), x_1])$ From 11, 12 by R2
14. $\lambda x_1[\lambda \text{PP}([\text{please}'(\lambda \text{PP}(x_1))])(x_1), x_1])$ Lambda conversion
15. $\text{John} \rightarrow \lambda \text{PP}(x_1)$ Proper name
16. $\text{(John, (be, (easy, (to, (please, he}_1 \text{)))})_t \rightarrow \lambda \text{PP}(x_1)(\lambda x_1[\lambda \text{PP}([\text{please}'^\text{IV}(\lambda \text{PP}(x_1))])(x_1), x_1])$ From 14, 15 by R1
Finally, it must be noted that there are a number of restrictions on this variable binding, and these restrictions will be some of the same ones that plague the old movement transformations. For instance, while a direct object, indirect object or object of a preposition can in general be bound inside an infinitive, binding inside an embedded that-t clause (a tensed sentential term of category t/IV') is ungrammatical (Ross 1967:420; Berman 1973b:34-36, 43; Peterson 1979a:136-137). These examples are from Peterson.

(23) That old car is hard [to imagine anyone trying to fix —].
(24) *That old car is hard [to imagine anyone trying to claim that Joe fixed —].

Berman (1973b:38-39; 1973a:25; see also Quirk et al., 1972:827; Lasnik & Fiengo 1974:549-551; Ross 1967:228) also notes that the 'moved' term cannot be one which was previously 'displaced' by the Dative-movement, About-movement, Passive, or Raising-to-Object transformations.

(25) a. John is hard to give presents to ___.
   b. *John is hard to give ___ presents.
(26) a. Mary is difficult to talk to ___ about such things.
   b. ?*Mary is difficult to talk about such things to ___.
(27) *John is unpleasant to be kicked by ___.
(28) *John is difficult to believe ___ to have made such a mistake.

In the face of all this, Berman falls back on global rules to constrain Tough movement.

In the present analysis, it is better to adapt the notion of 'freezing' introduced in Culicover & Wexler 1977, which appears equivalent to the 'bonding' of Peterson 1979a:137-138. They basically argue that that-t clauses are frozen, blocking Tough movement. Here we can postulate a frozen feature for certain
constituents which act like any others save that they block binding of variables, or, equivalently, make variables invisible or inaccessible to rules like Rill. That, presently of category (t/IV')\(t\), would then be assigned to category (t/IV')\[+\text{frozen}\]/t with the result that any term of the form that-\(t\) is frozen. The passive by is now of category PP-BY\[+\text{frozen}\]/T, and the TTV category, which is the lexical alternative to Dative 'shift', will also freeze its results. The same solution should apply easily to any interpretation of About-movement in a MG. There is, unfortunately, no room here to expand on freezing, but it appears quite promising. Freezing restrictions are very similar to the binding restrictions in relative clauses proposed by Rodman (1976).

A few classic problems with Tough 'movement' disappear in the present analysis. Postal (1971:29) notes that 'moved' terms have to be 'definite' in some sense. Everyone, for instance, is not 'definite', and (30) cannot be interpreted as a Tough-'moved' version of (29)

(29) It is hard to please everyone.
(30) Everyone is hard to please.

Some researchers, like Lasnik & Fiengo (1974:544-546) have argued against a movement account precisely because of such restrictions. Partee (1977b:300-301) clings to a movement transformation but adds the constraint that only a free variable can be moved. In a binding account, nothing is moved, and these problems never arise.

A similar problem is faced by Berman (1973b:35-36; see also Perlmutter & Soames 1979:247-250); because she treats Tough adjectives as if they were \(t/^{4}t\)/PP-FOR adjectives, Berman has to explain why that school in (31a) cannot be Tough moved as in (31b).

(31) a. It is [difficult for John] [for his children to go to that school].
   b. *That school is [difficult for John] [for his children to go to ____].
She has to propose a constraint blocking Tough movement from infinitives when a prepositional phrase designating the subject of the infinitive is present. This constraint is ugly in its power and arbitrariness. It is also totally unnecessary in the present account because the difficult in (31a) is not an example of Tough at all but is rather a (t/4t)/PP-FOR.

Another Tough movement that Berman is obliged to rule out is the raising of the subject of the infinitive. Your letter, the subject of the infinitive to be under this bed in (32a), cannot be raised as in (32b).

(32) a. It is impossible [for your letter to be under this bed].
   b. *Your letter is impossible [(for) to be under this bed].

Once again, (32a), and any other sentence with a PP-POR phrase designating either an experiencer or an infinitival subject, is not a Tough sentence at all.

Perhaps the most confusing fact of all about Tough adjectives is that they can appear with one, but never two, FOR-marked prepositional phrases. The sentences in (33) are capable of receiving Tough readings.

(33) a. To assassinate Ortcutt is dangerous for Fred.
   b. It is dangerous for Fred to assassinate Ortcutt.
   c. Ortcutt is dangerous for Fred to assassinate.

The Tough reading of (33a) and (33b) is that where Fred is, intuitively, both the subject of to assassinate and the experiencer of dangerous. Such coreference is a key feature of Toughness. (33a) is also capable of a (t/4t)/PP-POR reading where Fred is the experiencer of the danger while the subject of the infinitive is left wide open. (33b) has two (t/4t)/PP-POR readings: one where, again, Fred is the experiencer of the danger (with the infinitival subject open); and the other reading where Fred is the infinitival subject and the
experiencer of the danger is left open.

For those holding that Tough adjectives are the same as two-place sentence adjectives \(((t/4t)/PP-\text{FORs})\), the problem is to decide whether \textit{for Fred} in (33c) is the subject of \textit{to assassinate} or the experiencer of \textit{dangerous}. Berman (1973b:36), having argued that terms (like Ortcutt in (33c)) cannot be Tough-moved out of an overt FOR-TO clause, concludes that \textit{for Fred} must designate the experiencer of the danger. This also appears to be the intention of Bennett (1975:160-163, 167). Gazdar (1979:16), on the other hand, makes \textit{for Fred} the subject of the infinitive.

There are three problems with these solutions. First, the basic problem is that they are based on an incorrect analysis which holds that Tough adjectives combine with FOR-TO clauses rather than with infinitives, and that they can have experiencers designated in a PP-FOR phrase. Second, if \textit{for Fred} in (33c) is the experiencer of \textit{dangerous}, then the subject of \textit{to assassinate} could be anyone; and if \textit{for Fred} names the infinitival subject, the experiencer could be anyone. However, (33c) is a Tough-'moved' sentence, and therefore \textit{dangerous} must have a Tough reading. This means that the infinitival subject and the experiencer must be identical: in this case, John. Finally, the earlier analyses fail to explain how all the sentences in (34) or (35) can have the same reading.

(34)  
\begin{enumerate}
  \item a. John is easy for Mary to please.
  \item b. For Mary, John is easy to please.
  \item c. John is easy to please, for Mary.
\end{enumerate}

'Unmoved' Tough sentences display the same phenomenon.

(35)  
\begin{enumerate}
  \item a. To please John is easy, for Mary.
  \item b. For Mary, to please John is easy.
  \item c. It is easy for Mary to please John.
  \item d. It is easy to please John, for Mary.
  \item e. For Mary, it is easy to please John.
\end{enumerate}

These examples strongly suggest that a prepositional phrase like \textit{for}
Mary which appears in genuine Tough sentences is not an argument designator at all but rather a sentence adverbial; this conclusion was also reached by Lasnik & Fiengo (1974: 549, 563). In other words, for Mary in Tough examples like (35) names neither the infinitival subject nor the experiencer. In the present analysis, these adverbials are further examples of hedges which limit the domain of application for a quantifier. The effect is best seen in the following examples.

(36) For Frenchmen, it is difficult to travel abroad.
(37) For Englishmen, it is easy to travel abroad.

Both (36) and (37) can be true at the same time—the difference is that the rule about the ease or difficulty of travel is made relative to different subsets of the domain: Frenchmen and Englishmen respectively. If (37) is uttered at c, w, t then the modified sentence will be interpreted relative to the context, world and time as in (37') (see Section 6.2.4).

(37') [Az[easy*(travel-abroad'(z)],z]]c[Englishmen],w,t

Examples like (38), and the Tough readings of the sentences in (33), are simply extreme examples where the domain has been limited to a single individual.

(38) For John(,) to run a marathon is easy.

These findings are quite compatible with the conclusions proposed earlier. The key Tough features are (A) the necessary coreference of the understood infinitival subject and the experiencer, and (B) the rule-like readings which require translation with a universal quantifier. The syntax of Tough adjectives allows no way for a PP-FOR phrase to designate either the infinitival subject or the experiencer—the presence of such an argument-designating prepositional phrase forces a (t/4t)/PP-FOR reading. Consistent with Tough syntax and semantics, hedges can delimit the domain over which the universal quantifier in their translations
operates. In a sentence like (33c), reprinted here, which illustrates Tough 'movement', only the Tough reading of dangerous is possible.

(33c) Ortcutt is dangerous for Fred to assassinate.

It therefore makes no sense, and it causes a lot of confusion, to debate whether for Fred in (33c) supplies the experiencer of dangerous or the infinitival subject of to assassinate. Syntactically, it does neither. Semantically, in a way, it does both; for the basic sentence translates as \[ \lambda x_1 \lambda x_2 [\text{dangerous}(z, x_1), \text{assassinate}(z, x_2)](o) \], where o is Ortcutt, and the hedge for Fred limits the subdomain of quantification to the set including only Fred, who then becomes the only possible semantic subject of assassinate, and the only possible semantic object of dangerous.

As the grammar implicitly predicts, ADJs like easy to please, which are derived from ADJ's, conjoin with other ADJs, appear with sentence adverbs, modify non-restrictively, and, perhaps, take modification by very.

(39) a. John is cheerful and easy to please.
b. John is obviously easy to please.
c. Mary, always difficult to fool, spotted the lie.
d. Bill found Sue very difficult to please.

These ADJs can also be bumped into \( \text{CN}^2 \) NPs to modify common nouns attributively. The complication is that the ADJ usually realised as easy to please must now be realised discontinuously around the CN it modifies.

(40) John is an easy man to please.

Rules [R112 and R113] allow the domain hedge (NOT an argument specifier) for women to be realised linearly between a Tough adjective and the infinitive as in (41), this adverbial must also be ordered after any noun being modified attributively as in (42).
R112. If $\alpha \in P_{\text{ADV}}$, then $(\alpha) \in P_{\text{ADJ}}''/\text{ADJ}''$
Realisation: $\alpha$
Translation: $\lambda P \lambda Q[\alpha'([P(Q)])$

R113. If $\alpha \in P_{\text{ADJ}}''/\text{ADJ}''$ and $\beta \in P_{\text{ADJ}}''$
then $(\alpha, \beta) \in P_{\text{ADJ}}''$
Realisation: $\beta \leftarrow \alpha$ if $\alpha$ has a syntactic complement
else $\alpha \leftarrow \beta$
Translation: $\alpha'(\hat{\beta'})$

(41) John is easy for women to tease.
(42) John is an easy man for women to tease.

Rule R13 for ordering attributive adjectives relative to modified common nouns will need new realisation clauses to handle these cases and others to be discussed below. With suitable conventions for optional set members, some of these clauses might be conflated.

R13. If $\alpha \in P_{\text{CN}}/n_{\text{CN}}$ and $\beta \in P_{\text{CN}}$ then $(\alpha, \beta) \in P_{\text{CN}}$
(where $n$ ranges over the set $\{1, 2\}$).
Realisation: $\{\{\{\{\{\alpha', [\text{ADJ}']}, \text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}\text{ADJ}', [\text{ADJ}'], \text{ADJ}'\}$
Translation: $\alpha'(\hat{\beta'})$

In conclusion, the present analysis holds that genuine Tough constructions are syntactically distinct from those involving FOR-TO clauses and PP-FOR complements. This dichotomy between Tough adjectives and their look-alike $(t^4_t)/PP$-FOR lexical twins has already been noticed by Bresnan 1971:266 and Lasnik & Fiengo 1974:549, 560-564. Silva & Thompson (1977) have also discussed what I classify as $(t^4_t)/PP$-FOR adjectives under the label 'Comment with
Experiencer Class', without identifying them with the Tough class.\textsuperscript{10}

One final bit of evidence for separating the Tough and the \( (t/4t)/PP\)-FOR classes is the existence of words which belong to only one or the other of the classes. Lasnik & Fiengo (1974:562) show that a *breeze* is a Tough predicate nominal which cannot appear grammatically in a typical \( (t/4t)/PP\)-FOR environment such as in (44).\textsuperscript{11}

(43) This house is *a breeze to paint*.\textsuperscript{11}
(44) *[For Mary to paint this house] is *a breeze for John].

Conversely, a *tragedy* is a \( (t/4t)/PP\)-FOR predicate nominal which cannot have a Tough reading.

(45) *Arms are a tragedy for Bill to sell* .
(46) *[For Bill to sell arms] is *a tragedy for Mary]*.

In a similar vein, Berman (1973b:36; see also Silva & Thompson 1977:121) argues that *easy* always requires coreference between the experiencer and the infinitival subject. In the present analysis, this would mean that *easy* has a Tough but not a \( (t/4t)/PP\)-FOR reading. In fact, it is sometimes possible to get a \( (t/4t)/PP\)-FOR reading for *easy*, but the examples are somewhat shaky.

(47) It is *easy for John* [for Mary to do all the work].

Much better are similar sentences with *on*-marked rather than *for*-marked complements.

(48) It is *easy on John* [for Mary to do all the work].

The possibility of *on* complements for \( (t/4t)/PP\)-FOR readings of *easy*, *hard* and *tough* appears to be a mechanism to compensate for the potentially confusing syntactic ambiguity between Tough and \( (t/4t)/PP\)-FOR readings.
7.2.1.4 Tough-like adjectives

A number of attributive adjectives are like Tough adjectives in the way they combine with infinitives having a hole or gap. (49a) is from Vendler 1968:105-106. (49b) is from Berman 1973a:24.

(49) a. This is an improbable plan to follow ___.
b. New York is a stupid place to live in ___.

Other sentences on this pattern include the following.

(50) a. John is an impossible man to find ___.
b. Bill is an unlikely candidate to choose ___.

As Vendler notes, the pattern is rather shaky and does not extend to intuitively similar sentences as in (51).

(51) a. *This is a possible problem to solve ___.
b. ?This is an unnecessary tree to cut ___.
c. ?Eucalyptus is an improbable tree to grow ___ in this climate.

Note also that the acceptability of non-attributive versions of such constructions also varies.

(52) a. John is [impossible to find ___].
b. This problem is [possible to solve ___].
c. *This plan is [improbable to follow ___].
d. *Bill is [unlikely to choose ___]. (compare to (50b)).

With such examples, we seem to be on the slippery edge of grammaticality. Berman (1973a) examines many such constructions under the label of 'Hard Nuts' (from This construction is a hard nut to crack) and concludes that they are highly idiosyncratic.

Under the label of 'Complement Object Deletion', Lasnik & Fiengo (1974) examine the adjectives in (53), which appear in sentences such as (54).
(53) pretty, delicious, fragrant, graceful, melodious, tasty, cacophonous, beautiful, slippery, pungent, scratchy, smooth, soft, hard, rough, bitter, sweet, sour

(54) a. Mary is [pretty to look at ___].
    b. Mary is a pretty girl to look at ___.
    c. The cake is [delicious to eat ___].
    d. This is a delicious cake to eat ___.

Predicate nominals and productive *like-CN constructions that can function the same way include those in (55).

(55) a hornet's nest, a pigsty, a marvel, a bastard, a nice guy, a tyrant, an angel, a prince, like tar, like cement, like glue

(56) a. His style is [a marvel to behold ___].
    b. Mary is [a tyrant to work with ___].
    c. Bill is [a nice guy to be related to ___].
    d. This cake is [like cement to eat ___].

These adjectives and predicate nominals thus appear, like Tough adjectives, to combine with infinitives having a gap, and Lasnik & Fiengo actually identify Tough deletion and Complement Object deletion.

Despite the similarities, these constructions are not quite the same as Tough. Tough adjectives can have infinitive subjects, but 'Complement Object' words cannot.

(57) Tough
    a. Mary is [easy to please ___].
    b. To please Mary is easy.
    c. It is easy to please Mary.

(58) Complement Object
    a. Mary is [pretty to look at ___].
    b. *To look at Mary is pretty.
    c. *It is pretty to look at Mary. (on the intended reading)
Complement Object words also name one-place predicates of individuals in their own right, unlike Tough adjectives.

(59) Complement Object words
a. John is [an angel to work for].
b. John is an angel.
c. Mary is [pretty to look at].
d. Mary is pretty.

(60) Tough words
a. John is [a bitch to argue with]. (see note 11)
b. *John is a bitch. (on the intended Tough reading)
c. Mary is [hard to convince].
d. *Mary is hard. (on the intended Tough reading)

These facts suggest that Complement Object words should be translated differently from Tough words.

If we are to preserve the intuition that pretty basically names a one-place place predicate, the problem becomes what to do with the infinitive in Mary is pretty to look at. Semantically, the infinitive identifies the way that Mary's beauty is being judged or, more specifically, identifies the relevant judging criterion. Thus Mary can, at the same time, be pretty to look at but ugly to listen to. Listening to Mary and looking at Mary are two tests one can use for evaluating the truth of a potentially vague sentence like pretty'(m). According to the present analysis, such specifiers of criteria are adverbial hedges.

Syntactically, hedges should be able to appear as sentence adverbials, and this is the case for the 'infinitives' in Complement Object constructions. Note how the gaps must here be filled with pronouns.

(61) a. To look at her, Mary is pretty.
b. To look at it, this surface is rough; but to feel it, this surface is smooth.

More general hedges of this form are shown in (62).
(62) a. To listen to the Russians, Reagan is a menace.
   b. To judge from recent events, the enemy is demoralised.

The easiest, but not necessarily the only, way to handle such hedges is to deny their infinitive status and treat them simply as hedges supplying judging criteria. Let c(P) be the context c' just like c except that the property of judgement is P. Example (61a) is true at <c,w,t> iff pretty'(m) is true at <c("look-at-Mary"),w,t>. That is, the relevant criterion for judging the prettiness of Mary is stated to be looking at her, rather than listening to her, or whatever. The following rule handles hedges of this variety.

Whenever c∈C, w∈W, t∈T, p is of type <s,t> and h is a hedge supplying the judging property P, then
\[ h(c)(w)(t)(p) = p(c(P))(w)(t). \]

Let us define the Complement Object (CO) words in (53) to be a subclass of ADJ. The following rules join COS with hedges supplying judgement properties (ADV'-TOs) in order to generate examples like Mary is pretty to look at. Informally, we can state that ADV'-TOs are constituents of the form to-IV and that they supply the judging property α, where α is the translation of the IV.

R114. If α ∈ P_{CO} and β ∈ P_{ADV'-TO} and β is of the form (...) he_n ... then (α, β) ∈ P_{ADJ}.
Realisation: α^n(...)he_n...
Translation: \[ λx_ν[β'(α'(x_ν))] \]

7.2.2 Individual-level PREDs involving full infinitives

7.2.2.0 Introduction

A number of individual-level PREDs are constructed from or combine with full infinitives. 'Full' infinitives are here taken to be those which have no gap and, so, no argument slot abstracted out.
7.2.2.1 Human propensity adjectives

The t⁹/IV class contains the adjectives in (63), which have been called 'Human Propensity Adjectives' (HPAs).

(63) bold, brutal, careful, careless, childish, clever, clumsy, courageous, crazy, disgraceful, criminal, crude, cruel, evil, fair, foolish, generous, good-natured, greedy, honest, humble, inept, impious, irresponsible, irritating, lazy, magnanimous, nice, pious, polite, rude, savage, selfish, selfless, spiteful, stupid, sweet, treacherous, uncouth, understanding, thoughtful, thoughtless, vicious, vile

HPAs, like Tough adjectives, can appear with infinitive subjects.

(64) a. To escape is stupid/wise/clever.
    b. It is stupid/wise/clever to escape.

However, there are many differences between these two classes. For one thing, HPAs appear primarily to denote one-place predicates of individuals rather than of properties.

(65) a. John is stupid/wise/clever.
    b. John is a stupid/wise/clever boy.

When adjectives which look like Tough adjectives apply to individuals, the readings are not at all Tough-like. Indeed, they appear to be different adjectives altogether.

(66) Mary is hard/difficult/easy.

HPAs also appear happily in the following constructions with full (i.e. gap-less) infinitives, while Tough adjectives cannot (at least with genuine Tough readings).

(67) a. HPA: John was stupid/wise/clever to run away.
    b. Tough: *John was hard/easy/difficult to run away.
(68) a. HPA: It was stupid/wise/clever of John to marry Sue.
b. Tough: *It was hard/easy/difficult of John to marry Sue.

Finally, there is a striking difference in possible paraphrases; HPA-based sentences like To save money is wise can be paraphrased as 'to save money is to be wise'; whereas a Tough-based sentence like to save money is difficult does not paraphrase as 'to save money is to be difficult'.

These facts appear to indicate that HPAs are indeed basically ADJs and that Tough adjectives are basically ADJ's. The immediate syntactic and semantic problem is how to explain the appearance of HPAs with infinitives as in (69).

(69) To escape is foolish.

If foolish is translated as a one-place predicate of individuals, with type \( e, t \), then it cannot combine with a \( T' \) such as to escape. One way to resolve the problem is to adopt Carlson's type-levelled ontology and argue that to escape is really a \( T \) denoting the kind 'escape' just like the term dogs in the sentence Dogs bark denotes the kind 'dog' (see Section 6.3.2.3 and Carlson 1982:166). If the kind 'escape' is \( x_k^e \), then (69) would translate as (70).

(70) foolish'\( (x_k^e) \)

Carlson goes to special pains to argue that a sentence like (69) should not be translated with a universal quantifier as in (71). In particular, he (correctly) wishes to avoid labelling the sentence as false if there are only a few exceptions.

(71) Az[escape'(z) \rightarrow foolish'(z)]

Unfortunately, if infinitives are translated uniformly as denoting kinds, Carlson's approach will be unsuitable for examples with Tough adjectives. To assert the sentence To escape is difficult does not
involve asserting anything about escapers being difficult.

The following is a return to the analysis using universal quantification; I shall argue that the problems cited by Carlson can be avoided if one accepts the role of hedges, both overt and hidden, in contextually limiting the domain over which quantification operates. Quantification is suggested by the paraphrase relation between (72) and (73).

(72) To save money is wise.
(73) To save money is to be wise.

Roughly, each of these sentences seems to be asserting that anyone who saves money is wise, a reading formalised with a universal quantifier as in (74).

(74) Ay[save-money'(y) → wise'(y)]

Intuitively, even a sentence like (75), which overtly uses the word everyone, is not falsified by the existence of a few exceptions in the world.

(75) Everyone who saves money is wise.

'Everyone' ranges only over those individuals who are relevant in the context. If exceptions, like Argentinians, are cited to a statement like (75), the speaker can justify his claim by saying that Argentinians do not count or that he was only thinking of Britons or Americans.

A second observation supporting the quantificational approach is that overt hedges occur freely and naturally with HPA sentences.
(76) a. For Argentinians to save money is foolish.
    b. For Germans to save money is wise.
    c. For Britons,
       In the case of Canadians, to belch is rude.
       As a rule,
       Generally,
    d. As far as Vulgarians are concerned,
       In Slobovian society,
       Among the Slobovians,

The limited subdomain can be as small as one individual. ¹³

(77) a. For John, to escape is wise.
    b. In the case of John, to protest is foolish.
    c. As far as John is concerned, to give up now is cowardly.

So far, all of the HPA examples discussed have been hypothetical, or at least vague as to whether or not the agent is properly ascribed the underlying HPA. To state (78) does not necessarily mean that there is anyone who is an escaper or is stupid—it merely asserts that IF there is an escaper (in the contextually relevant domain, THEN he is also stupid.

(78) To escape is stupid.
(78') Az[escape'(z) \rightarrow stupid'(z)]

Many examples, especially in the past tense, can be felt to 'refer' to actual events, thereby entailing that the HPA is properly ascribed to the responsible agent.

(79) To close the meeting early last Friday was stupid.

Such sentences, however, are best treated as vague as to event-hood; they can, for instance, still be questioned or followed with disclaimers.
(80)  A: To close the meeting early last Friday was stupid.
     B: Well, did he do it?

(81) For Bill to speak to Mary yesterday was unwise, so he didn't do it.

The systematic absence of tense and aspect markers on infinitives makes it unattractive to see these sentences as ambiguous. Such examples as (79) and (80) also invite readings where the subject is a full or understood FOR-TO rather than just an infinitive (see note 13).

Unlike the examples just discussed, the HPA constructions in (82) and (83) definitely convey that the HPA applies to the named agent (Berman 1973a:232; Vendler 1968:64). (Berman (1973a:230) stars sentences like (82a), but I find them perfectly acceptable.)

(82) a. To escape was stupid of Mary.
     b. It was stupid of Mary to escape.

(83) Mary was stupid to escape.

Whereas an utterance of For Mary, to escape was stupid entails neither stupid'(m) nor escape'(m), an utterance of (82) or (83) intuitively conveys both stupid'(m) and escape'(m). It is therefore anomalous to follow such sentences with a disclaimer.

(84) ?To escape was stupid of Mary, so she didn't.
(85) ?It was stupid of Mary to escape, so she didn't.
(86) ?Mary was stupid to escape, so she didn't.

Of phrases differ from the hedging for phrases in earlier examples in that they cannot be moved about in the sentence; they appear to form a constituent with the HPA. 14

(87) a. *Of Mary to escape was stupid.
     b. *To escape, of Mary, was stupid.
     c. *To escape was stupid, of Mary.
Where *for Jane* is a domain-limiting hedge, the following sentences are odd or anomalous.

(88) a. ?Mary was stupid for Jane to escape.
    b. ?For Jane, Mary was stupid to escape.
    c. ?Mary was stupid to escape for Jane.

One possible syntactic analysis of (82a) is (89); the syntactic rigidity of the *of*-phrase suggests that it does form a constituent with the HPA (Berman 1973a:233).

(89) To escape was stupid of Mary
    to escape be stupid of Mary
    be PRED stupid of Mary
    stupid HPA of Mary

Semantically, such a sentence conveys not only escape'(m) and stupid'(m) but intuitively ascribes stupidity to Mary because or by virtue of the fact that Mary escaped (Silva & Thompson 1977:116). The following rules attempt to capture these intuitions about HPA-related constructions.

R115. If \( \alpha \in P_{HPA} \) then \( (\alpha) \in P_{t/4} \)
   Realisation: \( \alpha \)
   Translation: \( \lambda P \alpha y [P(y) \rightarrow \alpha'(y)] \)

R116. If \( \alpha \in P_{HPA} \) and \( \beta \in P_{PP-OF} \) then \( (\alpha, \beta) \in P_{t/4} \)
   Realisation: \( \alpha \Rightarrow \beta \)
   Translation: \( \lambda Q [CAUSE(\beta(Q), \beta('\alpha'))] \)

(90) ((to(\( t/4 \))/IV resign IV t/IV\'), R97', ((be IV'/PRED...
Translation:

1. wise $\Rightarrow$ wise'
   \hspace{1cm} \text{Basic}

2. \((\text{of, John})_{\text{PP-OP}} \Rightarrow \lambda P(j)\)
   \hspace{1cm} \text{See previous examples}

3. \((\text{wise, (of, John)})_{t/IV} \Rightarrow \lambda Q(\text{CAUSE}(\lambda P(j)(Q), \lambda P(j)(\text{\textquoteright}wise\text{'j))))}\)
   \hspace{1cm} \text{From 1, 2 by R116}

4. be\text{'IV'}/PRED\cdot \Rightarrow \lambda P(\text{'P})
   \hspace{1cm} \text{Basic}

5. \((\text{be, (wise, (of, John))})_{IV'} \Rightarrow \lambda P(\text{'P})(\lambda Q(\text{CAUSE}(\lambda P(j)(Q), \lambda P(j)(\text{\textquoteright}wise\text{'j))))}\)
   \hspace{1cm} \text{From 3, 4 by R100}

6. \lambda Q(\text{CAUSE}(Q(j), wise'(j)))
   \hspace{1cm} \text{Lambda conversion}

7. \((\text{be, (wise, (of, John))})_{t/IV} \Rightarrow \lambda Q(\text{CAUSE}(Q(j), wise'(j)))\)
   \hspace{1cm} \text{From 6 by R103}

8. \((\text{to, resign})_{t/IV'} \Rightarrow \lambda P(\text{'resign'})
   \hspace{1cm} \text{See previous examples}

9. \((\text{to, resign}), ((\text{be, (wise, (of, John))})_{t} \Rightarrow \lambda P(\text{'resign'})(\lambda Q(\text{CAUSE}(Q(j), wise'(j))))\)
   \hspace{1cm} \text{From 7, 8 by R104}

10. CAUSE(resign'(j), wise'(j))
    \hspace{1cm} \text{Lambda conversion}

In sentences such as Mary was stupid to escape, the phrase stupid to escape forms a complex ADJ.\textsuperscript{15}

R117. If $\alpha \in P_{\text{HPA}}$ and $\beta \in P_{t/IV'}$, then \([\alpha, \beta] \in P_{\text{ADJ}}$.

Realisation: $\alpha \models \beta$

Translation: $\beta'(\lambda P \lambda x[\text{CAUSE}(P(x), \alpha'(x))])$

(91) \((\text{John})_{t} \text{[be}_{IV/PRED, \text{[rude}_{\text{HPA}}\text{'(to}_{t/IV'}\text{'}/IV'}\text{belch}_{IV'}t/IV'}, \text{R97}_{\text{ADJ}}\)

R117\textsuperscript{1}, R2\textsuperscript{1}t, R1

Realisation: John was rude to belch.

Translation: $\lambda y[\text{CAUSE}(\text{belch'}(y), \text{rude'}(y))(j)\]

Adjectives like wise to escape appear in the usual ADJ constructions.

(92) a. The [man wise to escape] was Bill.

b. Bill thought John [foolish to escape].

c. John is obviously [brave to defy the state].

d. Sue is ungrateful and [foolish to protest].
In conclusion, HPAs in their various constructions can be handled in the present grammar in an orderly and satisfying fashion.

### 7.2.2.2 The ADJ/\(n(t/IV')\) categories

The ADJ/\(n(t/IV')\) categories are divided here reflecting the different problems in their translations; syntactically they might be considered one category. The small ADJ/(t/IV'') class, including *sure* and *likely*, appear in sentences with infinitive complements.

(93) a. John is sure to succeed.
    b. Bill is likely to fail.

Such adjectives are lexically related to *t*\(^3\)/t adjectives and can be defined in terms of the same predicates (Quirk et al. 1972:955-956; Dowty 1978:416). The translations of this class also involve future tense.

(94) \[
\begin{align*}
\text{sure}_{\text{ADJ}/(t/IV')} & \quad \lambda B \lambda z [\text{sure}'([FUT][B(\lambda PP(z)])])] \\
\text{certain}_{\text{ADJ}/(t/IV')} & \quad \lambda B \lambda z [\text{certain}'([FUT][B(\lambda PP(z)])])] \\
\text{likely}_{\text{ADJ}/(t/IV')} & \quad \lambda B \lambda z [\text{likely}'([FUT][B(\lambda PP(z)])])] \\
\text{unlikely}_{\text{ADJ}/(t/IV')} & \quad \lambda B \lambda z [\text{unlikely}'([FUT][B(\lambda PP(z)])])]
\end{align*}
\]

Rule R118 allows the generation of the ADJs in examples like (93b) and gives its translation as (93b').

R118. If \(a \in P_{\text{ADJ}/(t/IV')}\) and \(\beta \in P_{t/IV'}\), then \((a, \beta) \in P_{\text{ADJ}}\) (where \(n\) ranges over the set \(1, 2, 3\)).

Realisation: \(a \sim \beta\)

Translation: \(a'('\beta\')\)

(93b') \(\lambda z [\text{likely}'([FUT][\text{fail}'(z)])])(b)\)

This, of course, is different from the translation of *it is likely that Bill will fail*, which is shown in (95).

(95) *likely'([FUT][\text{fail}'(b)])*
The ADJ/²(t/IV''') class includes scared and frightened, which are lexically related to IV'/T verbs like scare and frighten.

\[
\begin{align*}
\text{scared}_{\text{ADJ}/²(t/IV''')} & : \lambda B \lambda y[\text{scare}^{*}(\ ^B\lambda \text{PP}(y)), y]) \\
\text{frightened}_{\text{ADJ}/²(t/IV''')} & : \lambda B \lambda y[\text{frighten}^{*}(\ ^B\lambda \text{PP}(y)), y]) \\
\text{terrified}_{\text{ADJ}/²(t/IV''')} & : \lambda B \lambda y[\text{terrify}^{*}(\ ^B\lambda \text{PP}(y)), y]) \\
\text{afraid}_{\text{ADJ}/²(t/IV''')} & : \lambda B \lambda y[\text{frighten}^{*}(\ ^B\lambda \text{PP}(y)), y])
\end{align*}
\]

The rules already defined will now generate sentences like (97) with translations like (97').

(97) John is frightened to jump.
(97') \( \lambda y[\text{frighten}^{*}(\ ^[\text{jump}'(y)], y))(j) \)

The ADJ/³(t/IV''') class includes reluctant, eager, willing, unwilling, anxious, hesitant, ready and perhaps inclined and disinclined. The semantics of such adjectives is problematic. One approach is to give them readings as in (98). This translates reluctance, for example, as a relation between an individual and a proposition.

(98) reluctant \( \Rightarrow \lambda B \lambda y[\text{reluctant}^{*}(y, \ ^B\lambda \text{PP}(y))])
\]

The other members of the class would be translated similarly. The grammar will now handle sentences such as (99).

(99) John is reluctant to leave.
(99') \( \lambda y[\text{reluctant}^{*}(y, \ ^[\text{leave}'(y)]))(j) \)

**7.2.2.3 The IV/ⁿ(t/IV''') classes**

**7.2.2.3.1 The IV/(t/IV''') class**

Verbs which apply to infinitives are not of central concern here, but the following discussion is included for reasons of completeness. Happen and perhaps tend (Bresnan 1978:25) are members of IV/(t/IV'''), and they can be translated in terms of one-place proposition-level predicates.
With such translations and R119, the grammar will now generate sentences like (101) and assign them translations like (101').

R119. If $\alpha \in B_{IV/IV''}$ and $\beta \in P_{IV}$, then $(\alpha, \beta) \in P_{IV}$ (where $n$ ranges over the set $\{1, 2\}$).

Realisation: $\alpha^\beta$
Translation: $\alpha'(\beta')$

(101) John happened to arrive.
(101') $\lambda y[\lambda B y[P[\lambda P(y)]]](j)$

Seem and appear are very similar to happen, but they are translated in terms of relations between individuals and propositions, and their individual argument is optionally provided by a PP-TO phrase.

The following new syntax rule and translations are needed.

R120. If $\alpha \in B_{IV/(t/IV''')}$ and $\beta \in P_{PP-TO}$ then $(\alpha, \beta) \in P_{IV/(t/IV''')}$.

Realisation: $\alpha^\beta$
Translation: $\alpha'(\beta')$

R121. If $\alpha \in B_{IV/(t/IV''')}$/PP-TO then $\alpha \in P_{IV/(t/IV''')}$.}

Realisation: $\alpha$
Translation: $\alpha'(\lambda P V z[P(z)])$

The grammar will now accommodate examples such as (102) and (103).

(102) Mary seems to be well.
(102') $\lambda y V z[\lambda B y[P[\lambda P(y)]]](m)$
(103) Mary seemed to John to be well.

(103') \( \lambda y[\text{seem}(j, \ \text{well}(y))](m) \)

7.2.2.3.2 The \( \text{IV}/^2(\text{t/IV''}) \) and \( \text{TV}/(\text{t/IV''}) \) classes

\( \text{IV}/^2(\text{t/IV''}) \) verbs like want and like can be translated on the following models.

(104) \( \text{want}_{\text{IV}/^2(\text{t/IV''})} \Rightarrow \lambda B\lambda y[\text{want}(y, \ \text{FUT}(B(\text{APP}(y))))] \)

(and similarly for hope, intend, decide, plan, expect, agree)

(105) \( \text{manage}_{\text{IV}/^2(\text{t/IV''})} \Rightarrow \lambda B\lambda y[\text{manage}(y, \ \text{FUT}(\text{APP}(y))))] \)

(and similarly for try, fall, like, hate)

The translations shown in (104) are like those in Klein 1979a:49-50 except that infinitives are here treated as \( \text{t/IV''} \) terms. These verbs appear in examples such as (106).

(106) (Bill \( \text{hope}_{\text{IV}/^2(\text{t/IV''})} \) (to(\text{t/IV''})/\text{IV}

\( \text{escape}_{\text{t/IV''}}, \text{R97}_\text{IV}, \text{R119}_\text{t}, \text{R1} \)

Realisation: Bill hopes to escape.

Translation: \( \lambda y[\text{hope}(y, \ \text{FUT}(\text{escape}(y)))](b) \)

These verbs bring up the old control problems and the persuade-promise debate. The following categories and rules follow Bach 1980 in spirit, though the formalism and categories are adapted to the present analysis.

(107) \( \text{promise}_{\text{IV}/^2(\text{t/IV''})/\text{T}} \Rightarrow \lambda P\lambda B\lambda y[P(\lambda z[\text{promise}(y, \ \text{FUT}(B(\text{APP}(y))))], z)] \)
(108) a. persuade \(_{TV/(t/IV)}\) \(\Rightarrow\)
\[\lambda B \lambda P \lambda y P(\lambda z [\text{persuade}^* (y, z, \,(B(\lambda P P (z))))])\]
(and similarly for tell, force, ask, advise, convince permit allow)

b. expect \(_{TV/(t/IV)}\) \(\Rightarrow\)
\[\lambda B \lambda P \lambda y P(\lambda z [\text{expect}^* (y, \,(B(\lambda Q Q (z))))])\]
(and similarly for want, like)

R122. If \(\alpha \in P_{(IV^2/(t/IV'))}^P\) and \(\beta \in P_{TV}^P\) then \((\alpha, \beta) \in P_{IV^2/(t/IV')}^P\).
Realisation: \(\alpha \sqcap \beta\)
Translation: \(\alpha' (\beta')\)

R123. If \(\alpha \in P_{TV/(t/IV')}^P\) and \(\beta \in P_{TV}^T\) then \((\alpha, \beta) \in P_{TV}^P\).
Realisation: \(\alpha \sqcap \beta\)
Translation: \(\alpha' (\beta')\)

These rules allow the generation of strings and translations such as the following.

(109) John promised Bill to leave.
(109') \(\lambda z [\text{promise}^* (z, \,(\text{FUT}(\text{leave}'(z))), b)](j)\)

(110) John persuaded Bill to leave.
(110') \(\lambda z [\text{persuade}^* (j, z, \,(\text{leave}'(z))))(b)\)

Note in (110) that the TV persuade to leave is realised discontinuously around the direct object Bill. This TV can also be passivised as in (111a) and such passives can even be bumped into attributive modifiers as in (111b) by the usual rules.

(111) a. Bill was [persuaded to go (by John)].
     b. The [man [persuaded to leave]] was Bill.

The lack of similar passive forms for sentence (112) tends to support the different syntactic analysis.

(112) a. *Bill was promised to leave (by John).
     b. *The man promised to leave was Bill.
There is, however, plenty of room for disagreement over the analysis of such structures. Klein (1979a:51-52) (see also Bartsch 1978) has argued that there is no syntactic difference between promise and persuade and that their different control properties can be accommodated in the translations. Adapting Klein's notations to the present analysis, he effectively classes both persuade and promise in $P_1(IV/(t/IV'))/T'$ leading to the following IV structures.

\[
\begin{align*}
(113) & \quad \text{persuade John to leave } IV \\
& \quad \text{persuade John } IV/(t/IV') \quad \text{to leave } t/IV'' \\
& \quad \text{persuade } (IV/(t/IV'))/T \quad \text{John}_T \\
(114) & \quad \text{promise John to leave } IV \\
& \quad \text{promise John } IV/(t/IV') \quad \text{to leave } t/IV'' \\
& \quad \text{promise } (IV/(t/IV'))/T \quad \text{John}_T
\end{align*}
\]

Part of Klein's motivation for such an approach is his use of a strictly ordered phrase-structure grammar which eschews discontinuous constituents. The present analysis therefore starts with rather different assumptions about what syntax and syntactic evidence are. The presence of a regular TV passive as in the persuade example (111) and the lack of one in the promise example (112) is rather compelling evidence for someone working within a categorial grammar for English. The present approach to persuade, promise and similar verbs is defended at length in Bach 1980.22

7.2.2.4 Subject to object 'raising'

Sentences like (116) were once thought to be transformationally derived from sentences like (115) by raising Mary, the subject of the embedded sentence, to become the object of believe.

(115) John believes that Mary is pregnant.
(116) John believes Mary to be pregnant.

Though a transformational approach has been suggested within MG (Delacruz 1976:197), lexical rules allow the sentences to be
generated directly and related in the semantics. The lexical approach also provides a natural way to let the readings of (115) and (116) be different; in particular, Mary in (116) is usually held to be referentially transparent. 23 Besides believe, canonical examples of 'subject-to-object raising' triggers include know, think, conceive, prove and allege. These forms are primarily basic, or in the case of prove and allege, derived IV/T's. Assuming that the raising triggers are of category TV/(t/IV'''), the following lexical rule can be defined.

R124 (lexical). If $\alpha \in (B_{IV/T'} \cup B_{IV/(t/IV'')})$
then $(\alpha) \in ^{TV/(t/IV''')}$

Realisation: $\alpha$

Translation: $\lambda B \lambda y P(\lambda z [\alpha'(\lambda R R(\lambda B(\lambda Q Q(z))))(y)])$

(117) (John$_T$, (believe$_{TV/(t/IV''')}$, (to$_{t/IV''}$)/IV'
be$_{IV/PRED}$, pregnant$_{ADJ IV}$, R2$_{t/IV''}$,
R97$_{TV}$, R123$_{MaryT}$, IV, R3$_t$, R1
Realisation: John believes Mary to be pregnant.
Translation: $\lambda z [\text{believe}_j(j, \text{pregnant'}(z))](m)$

The TV believe to be pregnant can be passivised in the usual way. 24

(118) a. Mary was believed to be pregnant (by John).
b. The woman believed to be pregnant was Mary.

7.2.3 Non-restrictive modifiers at the property level

Just as at the individual and proposition levels, it is possible to have non-restrictive modifiers of IVs. Examples can be based on HPAs or Tough adjectives and IV-level common nouns.

(119) a. Mary ran away, which is wise.
b. John escaped, which is foolish.

(120) a. John climbed Mt. Everest, which is difficult.
b. Sue wrote a thesis, which is a tough task.
c. Bill knitted a sweater, which is boring.
Some even more-transparent IV non-restrictives have a subject and an auxiliary do in the relative clause (example from Thompson 1971:84).

(121) Joe debated in high school, which Chuck did too.

An oddity of these constructions is that the relative pronoun in the non-restrictive clause intuitively substitutes for an untensed infinitive or 'refers' to just the property named by the antecedent.

(122) a. Algernon trusted Nixon, which is stupid.
    b. Algernon trusted Nixon; to trust Nixon is stupid.

The looseness of the fit between the tensed IV and the untensed infinitive is handled naturally by treating the linkage between matrix sentence and the non-restrictive modifier as anaphoric. Other researchers discussing such sentences have frequently resorted to 'and this' and 'and that' paraphrases, common signs of non-restrictiveness (Thompson 1971:84, 88; Seuren 1969:189).

(123) Algernon trusted Nixon, and that is stupid.

The anaphoric approach to non-restrictive modifiers has already been explained and defended at the individual and proposition levels. Let us assume that there is an anaphoric pronoun Pa which is assigned the value of a property just as xa is assigned the value of an individual (see Section 4.5) and pa is assigned the value of a proposition (see Sections 6.4 and 6.2.2). Let Pn, for all natural numbers n, be a set of properties. In the syntax, let itn, for all natural numbers n, be a set of property-level pronouns such that itn translates as \( \lambda PP(P_n) \).

R125. If \( \alpha \in P_t \) and \( \alpha \) is of the form

\[ \ldots \text{it}_n \ldots \]  \( \alpha \) \( \in \) \( P_{IV/IV'} \)

Realisation: WHICH \( \sim \{ \ldots \text{it}_n \ldots \} \)

Translation: \( \lambda Q[\alpha'](\lambda P_n(\alpha'))(P_a') \)

Examples are straightforward.
Similarly, the sentence John jogs, which is boring will translate as the two assertions jog(j) and Ay[bore'("jog'(y)", y)]. The analysis is completely parallel to that for non-restrictive modifiers at other levels.

7.3 Conclusion

This chapter has been a demonstration that the present grammar can accommodate infinitives and other property-level constructions. The syntactic analysis of Tough adjectives, largely inspired by Lasnik & Fiengo 1974, is provided with a semantics and is coordinated with the grammar at the individual and proposition levels. Tough- 'moved' sentences are generated directly rather than with transformations. By appealing to the contexts, hedges, and discontinuous constituents motivated in earlier chapters, the analysis also accommodates Complement object adjectives (pretty to look at), Human Propensity Adjectives (foolish to run away) and other adjectives and verbs which take infinitival complements.
Chapter 8. General conclusion

8.1 Accomplishments

The diversity of adjectives has long been appreciated by linguists (see e.g. Vendler 1968), but even very recent logical grammars (such as Keenan & Faltz 1978) have followed the early MG attempts to treat all adjectives as basic ad-common nouns. Following work by Kamp (1975), Klein (1980a) and especially Siegel (1976a), I have argued that many adjectives, including examples like metallic, red, pregnant and sick, and degree adjectives such as tall, short, big, fat, large and small, are properly analysed not as basic ad-common nouns but as one-place predicates of individuals. As such, these basic adjectives appear in predicate position much like predicate nominals, which also name one-place predicates.

(1) a. John is a boy.
   b. John is tall/sick/fat.

Going beyond Siegel (1976a, 1979), I have shown that evaluative adjectives such as good, bad, awful and wonderful should also be translated as one-place predicates.

(2) Mary is good/bad/awful/wonderful.

Syntactic arguments for such an analysis were presented in Chapter 2 and in Section 6.3.3.

The translation of vague adjectives such as tall and good as one-place predicates requires an appeal to formal contexts (Section 6.2.4). The dependence on context to supply comparison classes for degree adjectives has a long history, especially in the treatment of comparatives (Klein 1980a). When a sentence like (3) is translated simply as (3'), the truth value of the sentence will depend on what comparison class is assigned by the context.

(3) Mary is tall.
(3') tall'(m)
That is, the truth of (3) will depend on what class of things Mary is being compared to, and that class can easily vary from context to context.

Whereas 'one-dimensionally' vague predicates like *tall* are easily accommodated with appeals to comparison classes, 'multi-dimensionally' vague predicates such as *good* and *bad* are more difficult and less well studied. The truth value of a sentence like (4) depends not only on what comparison class is assigned but on what counts as 'good' in the context.

(4) Bill is good.
(4') good'(b)

To accommodate such multi-dimensional vagueness, I have appealed to contextually supplied 'criteria' of application as well as to comparison classes. The truth of (4) therefore depends as much on the criterion of goodness which applies as on the comparison class.

Contexts are formally treated as indices like times and possible worlds. Whereas in a PTQ-like semantics sentences are evaluated relative to worlds and times, in a context-dependent semantics all sentences must be evaluated relative to contexts as well as to worlds and times.

(5) [[good'(b)]c,w,t

Just as time adverbials affect the time index at which a sentence is evaluated and just as modal adverbials affect the possible world index, so adverbial 'hedges' affect the context index.

(6) Time adverbials
   a. Yesterday, John left.
   b. At 5:00 a.m. on 10 May 1954, Rex was born.

(7) Modal adverbials
   a. Possibly, John will survive the attack.
   b. Necessarily, Mary is Mary.
Hedges
a. Compared to pygmies, John is tall.
b. As a basketball player, John is short.
c. Botanically speaking, the tomato is a fruit.
d. Culinarily speaking, the tomato is a vegetable.
e. Musically, Bill is wonderful.
f. Romantically, Bill is awful.

This analysis is applied in parallel fashion to adjectives at the proposition and property levels, which involve higher-type nouns, infinitives and nominalised sentences (that-\( t \) phrases).

(9) a. That proposition is true/false.
b. That John deserted is unlikely.

(10) a. The task is hard/difficult/tough.
b. To swim upstream is hard/easy/difficult/tough.

Instead of naming one-place predicates of individuals, adjectives like \textit{true} name predicates of propositions, and adjectives like \textit{difficult} name properties of properties.

The analysis of many adjectives as one-place predicates is consistent with the existence of other adjectives which act, as Montague (EFL) proposed, as basic ad-common nouns. The examples in (11) are analysed as basic attributive modifiers of common nouns.

(11) a. John is a future/former/present spy.
b. Mary is a(n) possible/obvious/potential infiltrator.
c. This project was a financial/artistic/political failure.

Such adjectives, with the same readings, cannot appear alone in predicate position.

(12) a. *John is future/former/present.
b. *Mary is possible/obvious/potential.
c. *This project was financial/artistic/political.

Basic ad-common nouns also resist being conjoined with adjectives.
naming one-place predicates.

(13) a. *John is tall and future.
b. *John is a tall and future spy.

(14) a. *Mary is potential and good.
b. *Mary is a potential and good infiltrator.

As is obvious in the examples in (11), basic attributive adjectives are closely related to sentence adverbials, especially to time adverbials, modal adverbials and contextual hedges.

Many adjectives which do not themselves translate as one-place predicates nevertheless combine with various complements to form derived 'adjectivals' which do name one-place predicates. Such adjectivals include various passive participles, present participles, -able forms, and others taking prepositional and nominalised complements. The derived individual-level adjectivals in (15) are shown in italics.

(15) a. John is loved by Mary.
b. Mary is lovable.
c. Bill is hitting Roger.
d. This book is interesting to Sam.
e. That man is stupid to escape.
f. Rasputin was hard to kill.
g. John is easy to please.
h. Sue is afraid that Bill will leave.
i. Bill was convinced that Mary will succeed.

In the face of this diversity, the need for a unifying feature is satisfied in the analysis by a productive 'bumping' rule (R12) which maps various adjectivals into attributive modifiers of common nouns. For example, red_{ADJ} is a basic adjective which names a one-place predicate of individuals, named red'. R12 maps tall_{ADJ} into \( \text{tall}_{ADJ}^{CN/2CN} \), a derived attributive modifier. R13 combines attributive modifiers, both basic and derived, with common nouns to help form sentences like (16).
R12. If $\alpha \in P_{\text{ADJVL}}$ then $(\alpha) \in P_{\text{CN}^2/\text{CN}'}$

Realisation: $\alpha$

Translation: $\lambda P\lambda y[P(y) \& \alpha'(y)]$

R13. If $\alpha \in P_{\text{CN}^n/\text{CN}}$ and $\beta \in P_{\text{CN}}$ then $(\alpha, \beta) \in P_{\text{CN}}$

(where $n$ ranges over the set $\{1,2\}$).

Realisation: $\{[[\alpha_{\text{ADJ}}..., \delta_{\text{ADV}}/\text{ADJ}', \ldots/\text{ADJ}]_{\text{ADJ}}]_{\text{CN}^2/\text{CN}'} \gamma_{\text{CN}}]_{\text{CN}} \Rightarrow \alpha \gamma \delta \beta$

$\{[[\alpha_{\text{ADJ}}..., \delta_{\text{ADV}}/\text{ADJ}', \ldots/\text{ADJ}]_{\text{ADJ}}]_{\text{CN}^2/\text{CN}'} \gamma_{\text{CN}}]_{\text{CN}} \Rightarrow \alpha \gamma \delta \beta$

$\{[[\alpha_{\text{CO}}, \gamma_{\text{ADV}}/\text{TO}]_{\text{ADJ}}]_{\text{CN}^2/\text{CN}'} \beta_{\text{CN}}]_{\text{CN}} \Rightarrow \alpha \beta \gamma$

$\beta \cap \alpha$ if $\alpha$ has a syntactic complement

else $\alpha \cap \beta$

Translation: $\alpha' (\beta')$

(16) (John$_n$, $\text{be}_{\text{IV/PRED}}\{a, \{\text{tall}_{\text{ADJ}}]_{\text{CN}^2/\text{CN}'} \text{man}_{\text{CN}}]_{\text{CN}} \text{PNOM}_{\text{IV}}\}$

Realisation: John is a tall man.

Translation: tall'(j) & man'(j)

Just like tall, the other adjectivals in (15) can also be mapped into attributive modifiers of common nouns using rules R12 and R13. Thus the grammar will generate and translate sentences like those in (17). For clarity, the attributive modifiers are shown in italics.

(17) a. The man loved by Mary is John.
   b. Mary is a lovable woman.
   c. The boy hitting Roger is Bill.
   d. The book Interesting to Sam is obscene.
   e. John was a stupid man to escape.
   f. Rasputin was a hard man to kill.
   g. John is an easy person to please.
   h. The person afraid that Bill will leave is Sue.
   i. Bill is a person convinced that Mary will succeed.

Using the quite parallel rules (R83, R84, R109, R110) higher-level adjectivals can be 'bumped' into attributive modifiers of appropriate higher-level common nouns.
(18) a. The proposition is true.
    b. That John is stupid is a true proposition.

(19) a. That job is difficult.
    b. To pick apples is a difficult job.

It should be noted that derived attributive modifiers can appear linearly before, after and sometimes even around the common nouns which they modify. The use of a hierarchy-realisation grammar, which makes a rigorous distinction between constituent relations and the linear realisation of those constituents, highlights the unity of the attributive modifiers. That is, the fact that $\text{red}_{\text{CN}}^2\text{CN}$ combines with $\text{barn}_{\text{CN}}$ to be realised as the string red barn while (painted by Bill) $\text{CN}^2\text{CN}$ combines with $\text{barn}_{\text{CN}}$ to be realised as the string barn painted by Bill is an effect of morphological realisation rather than a difference in constituent structure. Similarly, R13 guarantees that $\text{easy to please}_{\text{CN}}^2\text{CN}$ is realised discontinuously around $\text{man}_{\text{CN}}$ as easy man to please. In a grammar employing ordered phrase structure trees, which combine hierarchical constituency and linear order in a single representation, this unity in attributive modification is obscured.

Another innovation in the thesis is the 'subroutine' analysis of non-restrictive modification, which is generalised to handle some adverbials, appositives and adjectivals and relative clauses at all levels of the grammar. In short, it is argued that the traditional conjunction analysis of non-restrictive modifiers leads to paradoxes and invalid readings in a grammar which respects compositionality. For example, if a sentence $\Phi$ translates as $\Phi'$, then the sentence $\text{It is not the case that } \Phi$ should translate as $\neg \Phi'$. But if sentence (20) translates according to the conjunction analysis as (20'), then the negated sentence (21) should translate as (21').

(20) John, who is handsome, loves Mary.

(20') $\text{love}^{*}(j,m) \& \text{handsome}'(j)$

(21) It is not the case that John, who is handsome, loves Mary.

(21') $\neg (\text{love}^{*}(j,m) \& \text{handsome}'(j))$
Unfortunately, (21') is not a valid reading of (21) because the clause handsome'(j) is not properly negated. That is, sentence (21) still conveys the positive assertion that John is handsome. The subroutine analysis of (21) treats the non-restrictive clause as an independent assertion which is effectively delivered while the superordinate sentence is on hold. This is shown diagrammatically in (22).

(22) It is not the case that John, who is handsome,

loves Mary.

Under the subroutine analysis, the speaker makes two separate assertions when he utters (22): these are handsome'(j) and \( \ell(\text{love};(j,m)) \). This accords with intuition and avoids a great many difficulties in opaque contexts.

Much of the work in Montague grammar has been an attempt to expand the fragment of English which can be accommodated. From a syntactic point of view, the present grammar is a significant demonstration of the viability and advantages of hierarchy-realisation grammars, which have been proposed, but often not very far developed, by linguists, logicians and even psychologists (see Section 0.2).

8.2 Directions for further research

As with any research project, the present investigation of adjectives raises as many questions as it answers. One issue, which is already a current topic of debate in the literature (see Chapter 5), is the syntactic and semantic treatment of nominalisation. The human propensity adjectives and Tough adjectives discussed in Chapter 7, and the varied adjectival and adverbial constructions presented in Chapters 5 and 6 should be grist to the mill for further investigations in formal or psychological ontology. A second course for further research is to computerise the present grammar. It is already too intricate to keep 'in the head' for any period of time, which makes testing and cross-checking of changes and additions very tedious. The realisation component needs to be made more explicit to
handle tense, cases, and other morphological markings. The complexity of this task makes a computer-assisted approach a necessity. A third topic, which has been skirted several times (see Chapter 7 note 18) is the treatment of subjunctive mood and putative should within a Montague grammar. As mood affects entailments, this topic has both a linguistic and logical appeal, and it promises to be just about the right size problem for a thesis.

Another thesis-sized problem concerns the formal interaction of hedges and formal contexts, which has not been treated in detail herein. The problem is analogous to the interaction of time adverbials with time indices, but the challenges promise to be even more demanding. It is fairly satisfactory to appeal to points of time or time intervals which are formally given a linear (i.e. temporal) ordering. Some time adverbials, as in At 5:00 a.m. on 10 May 1954, Roger was born, specify a specific t' at which the sentence born'(r) must be true. Tenses can be analysed in terms of earlier and later orderings long the time line.

However, contexts have been used to provide 'comparison classes' for degree adjectives like tall, 'criteria' for multi-dimensionally vague evaluative adjectives like good, and even 'properties of judgement' in sentences such as To look at it, this surface is rough, but to feel it, this surface is smooth. The formal status of comparison classes, criteria, properties of judgement and the functions which derive them from context are far from obvious. Contexts have also been appealed to for limiting the universe of quantification for sentences like Everyone had a good time last Thursday and for those involving domain hedges as in For Frenchmen, to travel abroad is difficult. The mechanics of such limiting have not been worked out. Much formal work remains to be done here, but the success of the present analysis, where these notions are assumed, is itself an argument for investigating and answering these questions more satisfactorily.

Perhaps the most profound question raised by this thesis is what happens when the semantics recognises and accommodates pervasive
vagueness in natural language (see Section 6.2.4). Contexts, as formal objects, are at least as problematic as possible worlds, and a dependence on them threatens even such fundamental notions as truth in a model and logical consequence. The problem is this: whereas time and world indices can be viewed objectively as part of the background environment of an utterance, contexts have been used to help capture the vagueness arising from the subjective, psychological intentions of speakers (see Section 6.2.4.3). For example, in a context-dependent semantics the truth value of a sentence like Mary is good, which is based on the very vague predicate good', is partially dependent on what the speaker means by 'good'. If speakers have different ideas about what good means, that is, if they use the word with different intentions, then it will be impossible the say whether the sentence is intersubjectively true or true in the model. If it is ultimately impossible to agree exactly on what words mean, then intersubjective entailments cannot be defended either.

This kind of vagueness is accepted as a matter of course by most people in the humanities. Textual commentary is often centered around what a speaker or writer intended to mean by his use of a word in a given text. In the real world, it is also common to find exchanges like the following, where speakers try to accommodate to each others use of words.

(23) A: Is John a good man?
   B: That depends on what you mean by 'good'.

If all predicates are potentially vague, and if only psychological intentions can ultimately make them precise, then nothing but a rather fluid and fallible social contract holds language together. That is, it may be wise and considerate to use words as much as possible like those around you, but it is only perverse and confusing, rather than incorrect or illogical, to use words any way you like. Because people cannot get into other people's heads, they may never be able to know for certain if they understand each other
and are using words in the same way.

Linguists, being accustomed to dealing with historical meaning shifts and variations between dialects and idiolects, will not lose much sleep over this; from a linguistic perspective, people do seem to spend a lot of time accommodating or disagreeing with everyone else's use of words. From a logical perspective, however, such radical vagueness threatens fundamental notions of intersubjective truth and logical consequence. Radical vagueness suggests that idealisations about people knowing the same language, and knowing it perfectly, are chimeras. This topic is as dangerous as it is interesting, and it will no doubt continue to be a healthy topic of debate.
Appendix. Collected combination rules

R1. If $\alpha \in P_T$ and $\beta \in P_{IV}$ then $(\alpha, \beta) \in P_t$.
   Realisation: $\alpha \supseteq \beta$
   Translation: $\alpha' (\beta')$

R2. If $\alpha \in B_{IV/FRED}$ and $\beta \in P_{FRED}$ then $(\alpha, \beta) \in P_{IV}$.
   Realisation: $\alpha \supseteq \beta$
   Translation: $\alpha' (\beta')$

R3. If $\alpha \in P_{TV}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_{IV}$.
   Realisation: $((\gamma_{TV}, \delta_{TV}), \beta)_{TV} \supseteq \gamma \cap \beta \cap \delta$
   $\{((\gamma_{TV}, \delta_{FRED-TO}), \delta_{TV}), \beta)_{TV} \supseteq \gamma \cap \beta \cap \delta$
   $\{((\gamma_{TV/adj}, \delta_{adj}), \beta)_{TV} \supseteq \gamma \cap \beta \cap \delta$
   $\{((\gamma_{TV/(t/IV)}'), \delta_{TV/(t/IV)}'), \beta)_{TV} \supseteq \gamma \cap \beta \cap \delta$
   $\{((\gamma_{TV/PP-OF'}, \delta_{PP-OF'}), \beta)_{TV} \supseteq \gamma \cap \beta \cap \delta$
   $\{((\gamma_{TV/(t/IV'')}, \delta_{TV/(t/IV'')}'), \beta)_{TV} \supseteq \gamma \cap \beta \cap \delta$
   else $\alpha \supseteq \beta$
   Translation: $\alpha' (\beta')$

R4. If $\alpha \in P_{DET}$ and $\beta \in P_{CN}$ then $(\alpha, \beta) \in P_{T}$.
   Realisation: $[\gamma_{DET}, \delta_{PROP}, \beta]_{CN} \supseteq \delta$
   else $\alpha \supseteq \beta$
   Translation: $\alpha' (\beta')$

R5. If $\alpha \in B_{IV/2T}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_{IV}$.
   Realisation: $\alpha \supseteq \beta$
   Translation: $\alpha' (\beta')$

R6. If $\alpha \in P_{CN}$ then $(a(n), \alpha) \in P_{PNOM}$.
   Realisation: $a(n) \supseteq \alpha$
   Translation: $a'$

R7. If $\alpha \in P_{DTV}$ and $\beta \in P_{PP-TO}$ then $(\alpha, \beta) \in P_{TV}$.
   Realisation: $\alpha \supseteq \beta$
   Translation: $\alpha' (\beta')$

R8. (lexical) If $\alpha \in P_{DTV}$ then $(\alpha) \in P_{TTV}$.
   Realisation: $\lambda P \lambda Q \lambda x [\alpha' (Q) (P) (x)]$
R9. If \( \alpha \in P_{TV} \) and \( \beta \in P_T \) then \( (\alpha, \beta) \in P_{TV} \).
Realisation: \( \alpha \sim \beta \)
Translation: \( \alpha'(''') \)

R10. If \( \alpha \in B_{PP-TO/T} \) and \( \beta \in P_T \) then \( (\alpha, \beta) \in P_{PP-TO'} \).
Realisation: \( \alpha \sim \beta \)
Translation: \( \alpha'(''') \)

R11. If \( \alpha \in P_{(t/e)/(t/e)} \) and \( \beta \in P_{t/n_e} \) then \( (\alpha, \beta) \in P_{t/n_e} \)
(\( n \) ranges over the set \( \{1,3,4,5\} \)).
Realisation: \( \beta \sim \alpha \) if \( \alpha \) has a complement
\( \alpha \sim \beta \)
Translation: \( \alpha'(''') \)

R12. If \( \alpha \in P_{ADJVL} \) then \( (\alpha) \in P_{CN/2CN'} \)
Realisation: \( \alpha \)
Translation: \( \lambda y[P(y) \& \alpha'(y)] \)

R13. If \( \alpha \in P_{CN/n_CN} \) and \( \beta \in P_{CN} \) then \( (\alpha, \beta) \in P_{CN} \)
(\( n \) ranges over the set \( \{1,2\} \)).
Realisation: \( (((\alpha_{ADJ...} \{\beta_{ADV.}/ADJ'\})_{ADJ'}_{ADJ''} \{\gamma_{CN}/2CN' \gamma_{CN} \} \Rightarrow \alpha \sim \gamma \sim \beta \)
\( (((\alpha_{ADJ...} \{\beta_{t/IV'}/ADJ'\})_{ADJ'}_{ADJ''} \{\gamma_{CN}/2CN' \gamma_{CN} \} \Rightarrow \alpha \sim \gamma \sim \beta \)
\( (((\alpha_{CO'} \{\gamma_{ADV'-TO}ADJ'_{CN}/2CN' \delta_{CN} \} \Rightarrow \alpha \sim \delta \sim \gamma \)
\( \beta \sim \alpha \) if \( \alpha \) has a syntactic complement
\( \alpha \sim \beta \)
Translation: \( \alpha'(''') \)

R14. If \( \alpha \in P_{TV} \) then \( (\alpha, PASS) \in P_{(t/e)/PP-BY'} \)
Realisation: \( \alpha'' \), where \( \alpha'' \) is \( \alpha \) with the main verb in the past participle form
Translation: \( \lambda P\lambda xP(\lambda y[\alpha'(''') \lambda PP(x))(y)] \)

R15. If \( \alpha \in P_{(t/e)/PP-BY} \) then \( (\alpha) \in P_{t/e} \).
Realisation: \( \alpha \)
Translation: \( \alpha'(''') \)

R16. If \( \alpha \in B_{PP-BY/T} \) and \( \beta \in P_T \) then \( (\alpha, \beta) \in P_{PP-BY} \).
Realisation: \( \alpha \sim \beta \)
Translation: \( \alpha'(''') \)
R17. If $\alpha \in \mathcal{P}(t/n_e)/\mathcal{P}_{\text{PP-BY}}$ and $\beta \in \mathcal{P}_{\text{PP-BY}}$ then $(\alpha, \beta) \in \mathcal{P}_{t/n_e}$

(where $n$ ranges over the set $\{3,5\}$).

Realisation: $\beta \sim \alpha$ if $\alpha$ has a syntactic complement
else $\alpha \sim \beta$

Translation: $\alpha'(\ ^{^\beta'})$

R18. If $\alpha \in \mathcal{B}_{\text{TV}}$ then \{$(\alpha, \text{ABLE}) \in \mathcal{P}_{\text{ADJ/PP-BY}}$\}

Realisation: $\alpha''$ where $\alpha''$ is $\alpha$ with the main verb in the -able form

Translation: $\lambda P \lambda x \phi[\mathcal{P}(\ ^{\lambda y[\alpha'(\ ^{\lambda PP(x)})(y)]})]

R19. If $\alpha \in \mathcal{P}_{\text{ADJ/PP-BY}}$ then $(\alpha) \in \mathcal{P}_{\text{ADJ}}$

Realisation: $\alpha$

Translation: $\alpha'(\ ^{\lambda \text{P}Vz[P(z)]})$

R20. (lexical). If $\alpha \in \mathcal{B}_{\text{TV}}$ then

$(\alpha, \text{ING}) \in \mathcal{P}_{\text{ADJ/(t/n_{IV})}}$ (where $n$ ranges over the set $\{2,5\}$; $t/2_{IV}$ is PP-TO and $t/5_{IV}$ is PP-FOR).

Realisation: $\alpha'$ where $\alpha'$ is $\alpha$ with the main verb in the present participle (-ing) form

Translation: $\lambda P \lambda x \phi[\mathcal{P}(\ ^{\lambda y[\alpha'(\ ^{\lambda PP(y)})(x)]})]

R21. If $\alpha \in \mathcal{P}_{\text{ADJ/(t/n_{IV})}}$ then $(\alpha) \in \mathcal{P}_{\text{ADJ}}$

(where $n$ ranges over the set $\{2,5\}$).

Realisation: $\alpha$

Translation: $\alpha'(\ ^{\lambda \text{P}Vz[P(z)]})$

R22. If $\alpha \in \mathcal{P}_{\text{ADJ/PP-TO}}$ and $\beta \in \mathcal{P}_{\text{PP-TO}}$ then $(\alpha, \beta) \in \mathcal{P}_{\text{ADJ'}}$

Realisation: $\alpha \sim \beta$

Translation: $\alpha'(\ ^{\beta'})$

R23. If $\alpha \in \mathcal{B}_{\text{PP-FOR/T}}$ and $\beta \in \mathcal{T}$ then $(\alpha, \beta) \in \mathcal{P}_{\text{PP-FOR'}}$

Realisation: $\alpha \sim \beta$

Translation: $\alpha'(\ ^{\beta'})$

R24. If $\alpha \in \mathcal{P}_{\text{ADJ/PP-FOR}}$ and $\beta \in \mathcal{P}_{\text{PP-FOR}}$ then $(\alpha, \beta) \in \mathcal{P}_{\text{ADJ'}}$

Realisation: $\alpha \sim \beta$

Translation: $\alpha'(\ ^{\beta'})$

R25. If $\alpha \in \mathcal{B}_{\text{PP-OP/T}}$ and $\beta \in \mathcal{T}$ then $(\alpha, \beta) \in \mathcal{P}_{\text{PP-OP'}}$

Realisation: $\alpha \sim \beta$

Translation: $\alpha'(\ ^{\beta'})$
R26. If \( a \in B_{\text{ADJ/PP-OP}} \) and \( \beta \in P_{\text{PP-OP}} \) then \( (a, \beta) \in P_{\text{ADJ}} \).
Realisation: \( a \overset{\sim}{\beta} \)
Translation: \( a'(\overset{\sim}{\beta'}) \)
R27. If \( a \in P_{\text{IV}} \) then \( (a, \text{ING}) \in P_{t/5}^e \).
Realisation: \( a'\overset{\sim}{\beta} \), where \( a'\overset{\sim}{\beta} \) is \( a \) with the main verb in
the present participle form
Translation: \( a' \) [ignoring aspect and tense]
R27X. If \( a \in B_{\text{TV/ADJ}} \) and \( \beta \in P_{\text{ADJ}} \) then \( (a, \beta) \in P_{\text{TV}} \).
Realisation: \( a \overset{\sim}{\beta} \)
Translation: \( a'(\overset{\sim}{\beta'}) \)
R28. If \( a \in P_{t} \) and \( a \) is of the form \( \ldots \text{he}_n \ldots \),
then \( (a) \in P_{\text{REL}} \) (where \( n \) is a natural number).
Realisation: \( \text{THAT} \overset{\sim}{\ldots \text{he}_n \ldots} \)
Translation: \( \lambda x_n[a'] \)
R29. If \( a \in P_{t/t} \) and \( \beta \in P_{t} \) then \( (a, \beta) \in P_{t} \).
Realisation: \( \beta \overset{\sim}{\alpha} \), if \( a \) has a complement
\( \alpha \overset{\sim}{\beta} \) if \( a \) is a simple adjective and \( \beta \)
is a proper name
else \( \{[\overset{\sim}{\text{DET}}, \overset{\sim}{\delta_{CN}}]_T, \alpha_{t/t} \} \Rightarrow \gamma \overset{\sim}{\alpha} \overset{\sim}{\delta} \)
Translation: \( a'(\overset{\sim}{\beta'}) \)
R30. If \( a \in P_{(PRED \cup ADJV)} \) then \( (a) \in P_{t/t} \).
Realisation: \( a \)
Translation: \( \lambda P^{[P]}, \text{subroutine} (\lambda PP[x_a](\overset{\sim}{a'})) \)
R31. If \( a \in B_{t} \) then \( (a) \in P_{\text{CN/2CN}} \).
Realisation: \( a \)
Translation: \( \lambda P \lambda x[P(x) \& \lambda P \lambda y[P(\overset{\sim}{\lambda z[y=z]})(\overset{\sim}{a'})(x)] \]
R32. If \( a \in P_{\text{PROP}} \) then \( (a) \in P_{\text{CN}} \).
Realisation: \( a \)
Translation: \( a' \)
R33. If \( a \in P_{\text{PROP}} \) then \( (a) \in P_{t} \).
Realisation: \( a \)
Translation: \( \lambda P \lambda y[Ax[a'(x) \leftrightarrow x=y] \& P(y)] \)
R34. If \( a \in P_{\text{CN}} \) then \( \text{the, } a \) \in P_{\text{PROP/PROP}} \).
Realisation: \( \text{the} \overset{\sim}{a} \)
Translation: \( \lambda P \lambda y[P(y) \& a'(y)] \)
R35. If \( \alpha \in P_{PROP/PROP} \) and \( \beta \in B_{PROP} \) then \( (\alpha, \beta) \in P_{PROP} \).
Realisation: \( \beta \to \alpha \)
Translation: \( \alpha(\beta') \).

R36. If \( \alpha \in P_T \) then \( (\alpha) \in P_T/T^* \).
Realisation: \( \alpha \)
Translation: \( \lambda P(\gamma') \);
subroutine(\( \lambda P\{x_\alpha\}(\alpha') \))

R37. If \( \alpha \in P_{CN} \) then \( (\text{the/this/that}, \alpha) \in P_T/2_T \).
Realisation: \( \text{the/this/that} \to \alpha \)
Translation: \( \lambda P(\gamma'); \) subroutine(\( \lambda P\{x_\alpha\}(\alpha') \))

R38. If \( \alpha \in P_T/2_T \) and \( \beta \in P_T \) then \( (\alpha, \beta) \in P_T \).
Realisation: \( \alpha \to \beta \)
Translation: \( \alpha'(\beta') \).

R39. If \( \alpha \in B_{(T/T)/PROP} \) and \( \beta \in P_{PROP} \) then \( (\alpha, \beta) \in P_T/T' \).
Realisation: \( \alpha \to \beta \)
Translation: \( \alpha'(\beta') \).

R40. If \( \alpha \in B_{(T/T)/T} \) and \( \beta \in P_T \) then \( (\alpha, \beta) \in P_T/T' \).
Realisation: \( \alpha \to \beta \)
Translation: \( \alpha'(\beta') \).

R41. If \( \alpha \in B_{(t/IV)/t} \) and \( \beta \in P_T \) then \( (\alpha, \beta) \in P_T/IV \).
Realisation: \( \alpha \to \beta \)
Translation: \( \alpha'(\beta') \).

R42. If \( \alpha \in P_{t/2IV}/CN \) and \( \beta \in P_{CN} \) then \( (\alpha, \beta) \in P_T/2IV \).
Realisation: \( \alpha \to \beta \)
Translation: \( \alpha'(\beta') \).

R43. If \( \alpha \in P_{CN'/PP-OF} \) and \( \beta \in P_{PP-OF} \) then \( (\alpha, \beta) \in P_{CN} \).
Realisation: \( \gamma(\alpha'/PP-OF)/PP-TO' \delta_{PP-TO}' \gamma_{PP-OF} \gamma_{CN'/PP-OF} \beta_{PP-OF} \gamma_{CN'} \Rightarrow \gamma \to \beta \to \delta \) else \( \alpha \to \beta \)
Translation: \( \alpha'(\beta') \).

R44. If \( \alpha \in P_{CN'/PP-OF} \) then \( (\alpha) \in P_{CN} \).
Realisation: \( \alpha \)
Translation: \( \alpha'(\lambda P V[z[P[z]]) \).
R45. If $\alpha \in P_{(CN'/PP-OF')/PP-TO}$ and $\beta \in P_{PP-TO}$ then $(\alpha, \beta) \in P_{CN'/PP-OF'}$.
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta}')$

R46. If $\alpha \in P_{(CN'/PP-OF')/PP-TO}$ then $\{\alpha\} \in P_{CN'/PP-OF'}$.
   Realisation: $\alpha$
   Translation: $\alpha'(\bar{\beta})$

R47. If $\alpha \in B_{PP-OF'/(t'/IV')} \cdot \beta \in P_{t'/IV'}$ then $(\alpha, \beta) \in P_{PP-OF'}$.
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta})$

R48. If $\alpha \in P_{CN'/PP-OF'}$ and $\beta \in P_{PP-OF'}$ then $(\alpha, \beta) \in P_{CN'}$.
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta})$

R49. If $\alpha \in P_{CN'/PP-OF'}$ then $\{\alpha\} \in P_{CN'}$.
   Realisation: $\alpha$
   Translation: $\alpha'(\bar{\beta})$

R50. If $\alpha \in B_{IV'/T'}$ and $\beta \in P_{T'}$ then $(\alpha, \beta) \in P_{IV'}$.
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta})$

R51. If $\alpha \in P_{T'}$ and $\beta \in P_{IV'}$ then $(\alpha, \beta) \in P_{t'}$.
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta})$

R52. If $\alpha \in B_{IV'/PRED'}$ and $\beta \in P_{PRED'}$ then $(\alpha, \beta) \in P_{IV'}$.
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta})$

R53. If $\alpha \in P_{CN'}$ then $\{a(n), \alpha\} \in P_{PNOM'}$.
   Realisation: $a(n) \circ \alpha$
   Translation: $\alpha'$

R54. If $\alpha \in P_{(t'/n)/PP-TO}$ and $\beta \in P_{PP-TO}$ then $(\alpha, \beta) \in P_{t'/n}$
   (where $n$ ranges over the set $\{1, 3, 4, 6\}$).
   Realisation: $\alpha \circ \beta$
   Translation: $\alpha'(\bar{\beta})$
R55. If $\alpha \in P_{t^{n_t}}(t^{n_t})/PP-TO$ then $(\alpha) \in P_{t^{n_t}}$

(where $n$ ranges over the set $\{1,3,4,6\}$).

Realisation: $\alpha$
Translation: $\alpha'(\lambda P[Vz[P(z)]]$

R56. If $\alpha \in P_{t^{4_t}}(t^{4_t})/PP-FOR$ and $\beta \in P_{PP-FOR}$ then $(\alpha, \beta) \in P_{t^{4_t}}$

Realisation: $\alpha\beta$
Translation: $\alpha'(\beta')$

R57. If $\alpha \in P_{t^{4_t}}(t^{4_t})/PP-FOR$ then $(\alpha) \in P_{t^{4_t}}$

Realisation: $\alpha$
Translation: $\alpha'(\lambda P[Vz[P(z)]]$

R58. If $\alpha \in P_{ADJ}(t/t^IV')$ and $\beta \in P_{t/IV'}$ then $(\alpha, \beta) \in P_{ADJ}$

(where $n$ ranges over the set $\{1,2\}$).

Realisation: $\alpha\beta$
Translation: $\alpha'(\beta')$

R59 (lexical). If $\alpha \in P_{ADJ}(t/t^IV')$ then $(\alpha) \in P_{ADJ}$.

Realisation: $\alpha$
Translation: $\alpha'(\lambda V[R[q]])$

R60. If $\alpha \in P_{IV'/n_T}$ and $\beta \in P_T$ then $(\alpha, \beta) \in P_{IV'}$

(where $n$ ranges over the set $\{1,2\}$).

Realisation: $\{(\text{make}, \delta_{ADJ}^{IV'/T'}\beta_T^{IV'}) \Rightarrow \text{make} \beta \delta$

else $\alpha\beta$
Translation: $\alpha'(\beta')$

R61. If $\alpha \in P_{IV'/T}/ADJ$ and $\beta \in P_{ADJ}$ then $(\alpha, \beta) \in P_{IV'/T}$

Realisation: $\alpha\beta$
Translation: $\alpha'(\beta')$

R62 (lexical). If $\alpha \in P_{IV'/T}$ then $(\alpha, \text{ING}) \in (P_{t^4_t}/(t^nIV))$

(where $n$ ranges over the set $\{2,5\}$; $t^5_{IV}$ is $PP-TO$ and $t^2_{IV}$ is $PP-FOR$)

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the -ing form
Translation: $\alpha'$
R63. If $\alpha \in B_{IV}'/n_{T}$ then $(\alpha, \text{PASS}) \in P_{\text{ADJ}}/(t/IV')$
(where $n$ ranges over the set $\{1,2\}$).

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the past participle form

Translation: $\lambda R \lambda x R(\lambda p[\alpha'('\lambda pp(x))(p)](x))$

R64. If $\alpha \in B_{IV}'/n_{T}$ and $\beta \in B_{IV}'/n_{T}$ then $(\alpha, \text{PASS}) \in P_{\text{ADJ}}/PP-BY'$
(where $n$ ranges over the set $\{1,2\}$).

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the past participle form

Translation: $\lambda R \lambda x R(\lambda p[\alpha'('\lambda pp(x))(p)](x))$

R65. If $\alpha \in P_{\text{ADJ}}/PP-BY'$ and $\beta \in P_{\text{PP-BY}}$, then $(\alpha, \beta) \in P_{\text{ADJ}}$

Realisation: $\alpha \beta$

Translation: $\alpha'(\beta')$

R66. If $\alpha \in B_{IV}'/(t/IV')$ and $\beta \in P_{t/IV'}$

then $(\alpha, \beta) \in P_{PP-BY'}$

Realisation: $\alpha \beta$

Translation: $\alpha'(\beta')$

R67. If $\alpha \in P_{\text{ADJ}}/PP-BY'$ then $(\alpha) \in P_{\text{ADJ}}$

Realisation: $\alpha$

Translation: $\alpha'(\lambda RVq[R(q)])$

R68. If $\alpha \in P_{t/IV}$ and $\beta \in P_{t/6}$ then $(\alpha, \beta) \in P_{t}$

Realisation: $\alpha \beta$

Translation: $\alpha'(\beta')$

R69. If $\alpha \in B_{6}/t/6/6$ and $\beta \in P_{T}$ then $(\alpha, \beta) \in P_{t/6}$

Realisation: $\alpha \beta$

Translation: $\alpha'(\beta')$

R70. If $\alpha \in P_{IV}$, then $(\alpha) \in P_{t/6}$

Realisation: $\alpha$

Translation: $\alpha$

R71. If $\alpha \in P_{IV}/T'$ and $\beta \in P_{T}$, then $(\alpha, \beta) \in P_{IV'}$

Realisation: $((\gamma(IV/T'/PP-TO')(\delta pp-TO'IV/T', \beta_{t/2IV'})) \Rightarrow$

$\gamma \beta \delta$

else $\alpha \beta$

Translation: $\alpha'(\beta')$
R72. If $\alpha \in P_{IV/(t/IV')}$ and $\beta \in P_{t/IV'}$, then $(\alpha, \beta) \in P_{IV}$.

Realisation: $\alpha \alpha' \beta$

Translation: $\alpha'('\beta')$

R73. If $\alpha \in (P_{IV/T} \cup P_{IV/(t/IV')})$

then $(\alpha, \text{PASS}) \in P_{(t^3t)/PP-BY}$.

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the past participle form

Translation: $\lambda P \lambda \alpha \lambda y[\alpha'(\lambda R y(p))(y)]$

R74. If $\alpha \in P_{(t^3t)/PP-BY}$ and $\beta \in P_{PP-BY}$ then $(\alpha, \beta) \in P_{t^3t}$.

Realisation: $\alpha \beta$

Translation: $\alpha'('\beta')$

R75. If $\alpha \in P_{(t^3t)/PP-BY}$ then $(\alpha) \in P_{t^3t}$.

Realisation: $\alpha$

Translation: $\alpha'('\beta')$

R76. If $\alpha \in (P_{IV/T} \cup P_{IV/(t/IV')})$

then $(\alpha, \text{ABLE}) \in P_{(t^3t)/PP-BY}$.

Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main verb in the -able form

Translation: $\lambda P \lambda \alpha \lambda z[\alpha'(\lambda R z(p))(z)]$

R77. If $\alpha \in B_{(IV/T')/PP-TO}$ and $\beta \in P_{PP-TO}$ then $(\alpha, \beta) \in P_{IV/T'}$.

Realisation: $\alpha \beta$

Translation: $\alpha'('\beta')$

R78. If $\alpha \in B_{(IV/T')/PP-TO}$ then $(\alpha) \in P_{IV/T'}$.

Realisation: $\alpha$

Translation: $\alpha'('\beta')$

R79. If $\alpha \in P_{(IV/(t/2IV'))/PP-TO}$ and $\beta \in P_{PP-TO}$ then $(\alpha, \beta) \in P_{IV/(t/2IV')}$.

Realisation: $\alpha \beta$

Translation: $\alpha'('\beta')$

R80. If $\alpha \in B_{TV/(t/IV')}$ and $\beta \in P_{t/IV}$, then $(\alpha, \beta) \in P_{TV}$.

Realisation: $\alpha \beta$

Translation: $\alpha'('\beta')$

R81. If $\alpha \in B_{TV/PP-OF}$ and $\beta \in P_{PP-OF}$, then $(\alpha, \beta) \in P_{TV}$.

Realisation: $\alpha \beta$

Translation: $\alpha'('\beta')$
R82. If $\alpha \in P_t$ and $\alpha$ is of the form \ldots , then $\langle \alpha \rangle \in P_{REL}$.  
Realisation: \text{THAT} \ldots , \ldots . 
Translation: $\lambda P_n[\alpha']$

R83. If $\alpha \in P_{ADV}'$, then $\langle \alpha \rangle \in P_{CN'/CN}$.
Realisation: $\alpha$
Translation: $\lambda R \lambda p[R(p) \& \alpha'(p)]$

R84. If $\alpha \in P_{CN'/CN}$, and $\beta \in P_{CN}$, then $\langle \alpha, \beta \rangle \in P_{CN}$.
Realisation: $\beta \wedge \alpha$ if $\alpha$ has a syntactic complement
else $\alpha \wedge \beta$
Translation: $\alpha'(\beta')$

R85 (lexical). If $\alpha \in P_{t/3}$ then $\langle \alpha, LY \rangle \in P_{t/8}$.
Realisation: $\alpha \wedge ly$
Translation: $\alpha'$

R86. If $\alpha \in P_{ADV}$, and $\beta \in P_t$ then $\langle \alpha, \beta \rangle \in P_t$.
Realisation: $\beta \wedge \alpha$ if $\alpha$ has a complement
else $\alpha \wedge \beta$
Translation: $\alpha'(\beta')$

R87 (lexical). If $\alpha \in P_{t/4}$ then $\langle \alpha, LY \rangle \in P_{t/8}$.
Realisation: $\alpha'$, where $\alpha'$ is $\alpha$ with the main adjectival in
the $-ly$ form
Translation: $\lambda p[y]$; subroutine $(\alpha'(p_a))$

R88. If $\alpha \in P_{ADV}$, then $\langle \alpha \rangle \in P_{(t/n)/(t/n)}$
(\text{where } n \text{ ranges over the set } \{1,3,4,5,6\}).
Realisation: $\alpha$
Translation: $\lambda R \lambda q[\alpha'[\{R(q)\}]]$

R89. If $\alpha \in P_{(t/n)/(t/n)}$ and $\beta \in P_{t/n}$ then $\langle \alpha, \beta \rangle \in P_{t/n}$
(\text{where } n \text{ ranges over the set } \{1,3,4,5,6\}).
Realisation: $\beta \wedge \alpha$ if $\alpha$ has a complement
else $\alpha \wedge \beta$
Translation: $\alpha'(\beta')$

R90. If $\alpha \in P_{ADV}$, then $\langle \alpha \rangle \in P_{(t/n)/(t/n)}$
(\text{where } n \text{ ranges over the set } \{1,3,4,5\})
Realisation: $\alpha$
Translation: $\lambda p[\alpha'[\{P(y)\}]]$
R91. If $\alpha \in P_{t/A_t}$ then $(\alpha) \in B_{(t/h_e)/(t/h_e)}$
   (where $n$ ranges over the set $\{3, 5\}$).
   
   Realisation: $\alpha''$, where $\alpha''$ is $\alpha$ with the main adjectival
   in the $-ly$ form
   
   Translation: $\lambda P\lambda y[\alpha'(\lceil P(y)\rceil)]$

R92 (lexical). If $\alpha \in (B_{IV/T'} \cup B_{IV/(t/IV')})$ then $(\alpha) \in B_{CN/CN}$

Realisation: $\alpha''$ where $\alpha''$ is the past participle form of $\alpha$.

Translation: $\lambda P\lambda y Vz[\alpha'_{*}(z, \lceil P(y)\rceil)]$

R93. If $\alpha \in B_{T'/CN}$ and $\beta \in P_{CN}$ then $(\alpha, \beta) \in P_T$.

Realisation: $\alpha(n) \cap \alpha \cap \beta$

Translation: $\alpha'(\beta')$

R94. If $\alpha \in P_{t}$ and $\alpha$ is of the form
   
   $\{\ldots \text{it}_n \ldots\}$ then $(\alpha) \in P_{t/A_t}$
   
   Realisation: $\text{which} \cap \{\ldots \text{it}_n \ldots\}$
   
   Translation: $\lambda P[p]; \text{subroutine}(\lambda P_n[\alpha'](p))$

R95. If $\alpha \in P_{t/IV}$, and $\beta \in P_{CN}$, then $(\alpha, \beta) \in P_{t/2IV}$$'$

Realisation: $\text{the} \cap \beta \cap \alpha$

Translation: $\lambda RVq[\text{Ap}((\beta'(p)) \&$
   
   $\lambda R\lambda q_1 R(\lambda P_1[q_1=p_1])(\lambda P[p]) \iff p=q \& R[q]]$

R96. If $\alpha \in P_{CN}$, and $\beta \in P_{t/IV}$, then $(\alpha, \beta) \in P_{t/2IV}$$'$

Realisation: $\text{the} \cap \beta \cap \alpha$

Translation: $\beta'; \text{subroutine}(\alpha'(p_a))$

R97. If $\alpha \in B_{(t/IV')/IV}$ and $\beta \in P_{IV}$ then $(\alpha, \beta) \in P_{t/IV}$$'$

Realisation: $\alpha' \cap \beta$

Translation: $\alpha' (\beta')$

R98. If $\alpha \in P_{t/IV}$$'$, and $\beta \in P_{PP-\text{FOR}}$ then $(\alpha, \beta) \in P_{\text{FOR-TO}}$

Realisation: $\beta \cap \alpha$

Translation: $\lambda R\lceil [\alpha'(\beta')]\rceil$

R99. If $\alpha \in P_{t/IV}$$'$, then $(\alpha) \in P_{\text{FOR-TO}}$

Realisation: $\alpha$

Translation: $\lambda RVzR(\lceil \alpha' (\lambda PP(z)) \rceil)$

R100. If $\alpha \in B_{IV'/\text{PRED}'}$, and $\beta \in P_{\text{PRED}}$, then $(\alpha, \beta) \in P_{IV}$$'$

Realisation: $\alpha' \cap \beta$

Translation: $\alpha' (\beta')$
R101. If $\alpha \in P_{CN}$, then $(\alpha(n), \alpha) \in P_{POM}$.
Realisation: $\alpha(n) \sim \alpha$
Translation: \alpha

R102. If $\alpha \in P_{T}$ and $\beta \in P_{IV}$, then $(\alpha, \beta) \in P_{t}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'('\beta')$

R103. If $\alpha \in P_{IV}$, then $(\alpha) \in P_{t/11 IV}$.
Realisation: $\alpha$
Translation: \alpha

R104. If $\alpha \in P_{t/IV}$ and $\beta \in P_{t/11 IV}$ then $(\alpha, \beta) \in P_{t}$.
Realisation: $\alpha \sim \beta \sim \alpha$
Translation: $\alpha'('\beta')$

R105. If $\alpha \in B_{(t/2 IV)/CN}$ and $\beta \in P_{CN}$, then $(\alpha, \beta) \in P_{t/2 IV}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'('\beta')$

R106. If $\alpha \in P_{IV/(t/2 IV)}$ and $\beta \in P_{t/2 IV}$, then $(\alpha, \beta) \in P_{IV}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'('\beta')$

R107. If $\alpha \in P_{IV/T}$ and $\beta \in P_{T}$, then $(\alpha, \beta) \in P_{IV}$.
Realisation: $\alpha \sim \beta$
Translation: $\alpha'('\beta')$

R108. If $\alpha \in P_{IV/T}$ then $(\alpha, \text{ING}) \in P_{ADJ}$.
Realisation: $\alpha'$, where $\alpha'$ is $\alpha$ with the main verb in the present participle (-ing) form
Translation: $\lambda P \alpha[z](\alpha'([P(z)], z))$

R109. If $\alpha \in P_{ADJVL}$, then $(\alpha) \in P_{CN'/CN}$.
Realisation: $\alpha$
Translation: $\lambda P \alpha[Q](P(Q) \& \alpha'(Q))$

R110. If $\alpha \in P_{CN'/CN}$ and $\beta \in P_{CN}$, then $(\alpha, \beta) \in P_{CN}$.
Realisation: $\beta \sim \alpha$ if $\alpha$ has a complement
else $\alpha \sim \beta$
Translation: $\alpha'('\beta')$
R111. If $\alpha \in P_{\text{ADJ}}$, and $\beta \in P_{t/IV}$, and $\beta$ is of the form $\ldots \text{he}_n \ldots$, then $(\alpha, \beta) \in P_{\text{ADJ}}$.

Realisation: $\alpha \cap \{\ldots \text{he}_n \ldots\}$
Translation: $\lambda x_n[\beta'(\alpha')]$

R112. If $\alpha \in P_{\text{ADV}}$, then $(\alpha) \in P_{\text{ADJ}''/\text{ADJ}'''}$.

Realisation: $\alpha$
Translation: $\lambda P\lambda Q[\alpha'(\lambda [P(Q)])]$

R113. If $\alpha \in P_{\text{ADJ}''/\text{ADJ}'''}$, and $\beta \in P_{\text{ADJ}''}$, then $(\alpha, \beta) \in P_{\text{ADJ}''}$.

Realisation: $\beta \cap \alpha$ if $\alpha$ has a syntactic complement
else $\alpha \cap \beta$
Translation: $\alpha'(\beta')$

R114. If $\alpha \in P_{CO}$ and $\beta \in P_{\text{ADV}-\text{TO}}$, and $\beta$ is of the form $\ldots \text{he}_n \ldots$ then $(\alpha, \beta) \in P_{\text{ADJ}}$.

Realisation: $\alpha \cap \{\ldots \text{he}_n \ldots\}$
Translation: $\lambda x_n[\beta'(\lambda [\alpha'(x)_n)])$

R115. If $\alpha \in P_{\text{HPA}}$ then $(\alpha) \in P_{t/IV}$.

Realisation: $\alpha$
Translation: $\lambda P\lambda y[P(y) \rightarrow \alpha'(y)]$

R116. If $\alpha \in P_{\text{HPA}}$ and $\beta \in P_{PP-OF}$ then $(\alpha, \beta) \in P_{t/IV}$.

Realisation: $\alpha \cap \beta$
Translation: $\lambda Q[\text{CAUSE}(\beta(Q), \beta'(\alpha'))]$

R117. If $\alpha \in P_{\text{HPA}}$ and $\beta \in P_{t/IV}$, then $(\alpha, \beta) \in P_{\text{ADJ}}$.

Realisation: $\alpha \cap \beta$
Translation: $\beta'(\lambda P\lambda x[\text{CAUSE}(P(x), \alpha'(x))])$

R118. If $\alpha \in P_{\text{ADJ}''/t/IV}$ and $\beta \in P_{t/IV}$, then $(\alpha, \beta) \in P_{\text{ADJ}}$ (where $n$ ranges over the set $\{1, 2, 3\}$).

Realisation: $\alpha \cap \beta$
Translation: $\alpha'(\beta')$

R119. If $\alpha \in P_{IV/\ldots t/IV''/t/IV'}$, and $\beta \in P_{t/IV}$, then $(\alpha, \beta) \in P_{IV}$ (where $n$ ranges over the set $\{1, 2\}$).

Realisation: $\alpha \cap \beta$
Translation: $\alpha'(\beta')$
R120. If $\alpha \in B_{(IV/(t/IV'))/PP-TO}$ and $\beta \in P_{PP-TO}$
then $(\alpha, \beta) \in P_{IV/(t/IV')}$.  
Realisation: $\alpha \mapsto \beta$
Translation: $\alpha'(\mapsto \beta')$

R121. If $\alpha \in B_{(IV/(t/IV'))/PP-TO}$ then $(\alpha) \in P_{IV/(t/IV')}$. 
Realisation: $\alpha$
Translation: $\alpha'(\mapsto \beta')$

R122. If $\alpha \in P_{IV/2(t/IV')}/T$ and $\beta \in P_T$ 
then $(\alpha, \beta) \in P_{IV/2(t/IV')}$. 
Realisation: $\alpha \mapsto \beta$
Translation: $\alpha'(\mapsto \beta')$

R123. If $\alpha \in P_{TV/(t/IV')}$ and $\beta \in P_{t/IV'}$, then $(\alpha, \beta) \in P_{TV}$.  
Realisation: $\alpha \mapsto \beta$
Translation: $\alpha'(\mapsto \beta')$

R124 (lexical). If $\alpha \in (B_{IV/T'} \cup B_{IV/(t/IV')})$ then $(\alpha) \in B_{TV/(t/IV')}$. 
Realisation: $\alpha$ 
Translation: $\lambda B \lambda \rho \lambda y P(\mapsto \lambda z[\alpha'(\mapsto \lambda \rho \rho \rho [\lambda z[\beta(\mapsto \lambda \rho \rho \rho (z)])](y)])$

R125. If $\alpha \in P_{t}$ and $\alpha$ is of the form

(...it_n...) then $(\alpha) \in P_{IV/IV'}$.
Realisation: WHICH $\mapsto (\ldots |it_n| \ldots)$
Translation: $\lambda Q[Q]$; subroutine($\lambda P_a[\alpha'](P_a)$)

R126. If $\alpha \in B_{IV'/T'}$, and $\beta \in P_{T'}$, then $(\alpha, \beta) \in P_{IV'}$. 
Realisation: $\beta \mapsto \alpha$
Translation: $\alpha'(\mapsto \beta')$

R127. If $\alpha \in (B_{IV/T'} \cup B_{IV/(t/2IV')})$
then $(\alpha, PASS) \in P_{(t/12IV)/PP-BY}$. 
Realisation: $\alpha''$ where $\alpha''$ is $\alpha$ with the main verb in
the past participle form
Translation: $\lambda P \lambda PP(\mapsto \lambda z[\alpha''(z,P)])$

R128. If $\alpha \in P_{(t/12IV)/PP-BY}$ and $\beta \in P_{PP-BY}$ then $(\alpha, \beta) \in P_{t/12IV'}$.  
Realisation: $\alpha \mapsto \beta$
Translation: $\alpha'(\mapsto \beta')$

R129. If $\alpha \in P_{(t/12IV)/PP-BY}$ then $(\alpha) \in P_{t/12IV'}$.  
Realisation: $\alpha$
Translation: $\alpha'(\mapsto \lambda P W[y](P[y]))$
Notes to Chapter 0

1 A full discussion of Bennett's simplification to the PTQ semantics is given in Appendix III of Dowty et al. 1981.

2 I leave open the question of whether general ordering principles can obviate the need for specifying the order of realisation for each categorial combination rule (see e.g. J.M. Anderson 1976, Vennemann 1973, Vincent 1979).

3 Realisation rules, like translation rules, need not apply at the same time as the categorial combination rules. PTQ orders constituents immediately as it builds them from the bottom-up. Dahl's Operational grammar builds hierarchical trees from the bottom-up, but then codes ordered strings from them from the top-down. Schlesinger has argued that a psychologically real grammar must be able to order output strings from hierarchical trees top-down, bottom-up or both directions at the same time.

4 The desire to avoid the 'transformation' of quantifying-in, also called NP-lowering or Quantifier-lowering, is the major inspiration behind the 'Cooper-Store' (Cooper 1975:145-200). Quite simply, Cooper doubts that there is the slightest evidence that syntactic quantifying-in really takes place. Similar views are held by Bartsch (1979), who denies that there is any syntactic difference between the narrow-scope and wide-scope readings of a woman in the string Every man loves a woman. As syntactic quantifying-in involves operations beyond simple concatenation of constituents, it is also a transformation for Gazdar (1979, 1982) and is therefore not a valid operation in his grammars.

Cooper retains semantic quantifying-in by generating and translating noun phrases in place by 'storing' their translations for later application at higher places in the derivation. I have no proof that such an approach is valid, necessary or unnecessary, but I shall generally assume that such machinery is not available. The
approach to non-restrictive modification in Chapter 4 is in many ways an attempt to see how far one can get without quantifying-in of any kind.
Notes to Chapter 1

Other evaluative adjectives include execrable, terrible, awful, miserable, sorry, lousy, mediocre, average, OK, swell, wonderful, remarkable, marvelous, fantastic, and divine.
Notes to Chapter 2

1 For a related discussion see Klein 1980a:13-16.


3 Similar claims have appeared in Chafe (1970:195) and even in Bartsch (1972a), but the inadequacies of this approach have been widely exposed (see McConnell-Ginet 1973:89; Damerau 1975:3; Siegel 1976a:129; 1979:243-244; Bierwisch 1969:165-168). Determining the comparison class for derived lexical items, which have no dictionary codings, is one obvious problem. Chafe, Bierwisch and Bartsch appreciate that genericness and specificness can weight the choice of comparison class, and Bartsch (1972a:165) and Sampson (1970:257) point out further that proper name subjects like John give little clue as to what comparison class applies—so the context has the last say again.

4 McConnell-Ginet (1973:90-91, 133-134) proposes that the comparison class of basketball players can be chosen not only from the actual world but from a 'close' possible world. Therefore, if a sudden epidemic were to wipe out the taller basketball players, comparisons of height relative to basketball players could still be made based on the class of players as it existed before the epidemic. Unfortunately, defining what a 'close' possible world is and when one can appeal to it raises as many problems as it tries to solve.

5 See e.g. Nilsen 1972:90; Vendler 1968:21-22; Keenan & Faltz 1978:134, 289. There have been many attempts by heroic transformationalists to derive evaluative adjectives from deep manner adverbs. Thus good boxer would actually be transformed from an underlying string containing box well, and bad ruler would be transformed from the underlying rule badly. Such proposals require brute transformations of the most unpopular kind and only paraphrase,

6In the original PTQ semantics (without Bennett's simplification) the type of a CN/CN is <<s,<<s,e>,t>>,<<s,e>,t>>.

7Without Bennett's simplification, the type of a one-place predicate is <<s,e>,t> rather than <e,t>.


6.2.4.1). The very different very in *That was the very man I saw yesterday* is discussed in Smith 1964:39 and Bolinger 1967:18-19.

10 The terms 'one-dimensional' and 'multi-dimensional' are borrowed from Kamp (1975:141). Klein (1980a:6ff) writes of 'gradual' or 'linear' vagueness instead of 'one-dimensional'; 'indeterminate' and 'non-linear' are used for 'multi-dimensional'. For similar distinctions see McConnell-Ginet 1973:92-93, 140; 1979:136.
Notes to Chapter 3

1. The work of slash categories could just as well be done with some kind of feature marking, which would be more familiar to linguists. However, the PTQ notations are more convenient for highlighting similarities between superficially different categories and for abbreviation in rules that treat multiple categories as if they were one.

2. In PTQ there is a single copula which maps terms into IVs. Predicate nominals are treated, rather suspiciously, as normal indefinite terms. The provision of a separate copula for mapping PREDs (including predicate nominals) into IVs follows work by Klein (1979a:39-42), Siegel (1976a:34-35, 82), Bach (1968:103; 1980:308-309) and others.

3. The EXT category also includes not at all, not a bit, a bit, more-or-less, pretty, damn, bloody, relatively, slightly, and profoundly.

4. This rule represents a not completely satisfactory compromise between the typing function of PTQ and that of Bennett 1975. In PTQ, any slash category $a/n\beta$ is assigned the type $<[s,f(\beta)],f(a)>$. Thus an IV $(t/e)$ or a CN $(t/e)$ has type $<[s,e],t>$, which means that they translate as functions mapping individual concepts $(s,e)$ into truth values. 'Bennett's Simplification' (see Bennett 1975, Dowty et al. 1981:Appendix III) bypasses individual concepts in favour of individuals; thus CNs and IVs are given the type $<e,t>$. To accomplish this, Bennett adopts $t$, IV, and CN (rather than $t$ and $e$) as his basic syntactic categories, with the following type definition.

\[
\begin{align*}
f(t) &= <t> \\
f(IV) &= <e,t> \\
f(CN) &= <e,t> \\
f(a/\beta) &= <[s,f(\beta)],f(a)>
\end{align*}
\]
From the present perspective, Bennett's solution of making CN and IV basic categories is unattractive for several reasons. First, whereas PTQ highlights the syntactic relatedness of CNs and IVs by assigning them similar categories (differing only in the number of slashes), Bennett can show their relatedness only in the syntax. Second, if predicate nominals, relative clauses, many adjectives and many participles are also treated as one-place predicates of individuals (as in the present analysis) these classes too would have to be treated as basic, resulting in a profusion of basic categories in the syntax. Third, even if it is argued that only a finite number of new basic categories need be adopted, an appealing universal aspect of Montague's original formulation would be lost. That is, it is likely that Montague's original t and e could serve as the basic categories not only for English but for any human language. Adjectives, however, are not universal to human languages (Dixon 1977), and so including ADJ as a basic category cannot be motivated cross-linguistically.

I hasten to add that there is no formal conflict of substance between Bennett's solution and my own. Bennett avoids dealing with individual concepts by slightly augmenting his class of basic categories. I achieve the same end by slightly complicating the function which maps categories into types. The present grammar would function exactly the same if Bennett's solution had been adopted, and I suspect the choice in the end is one of taste.

If the de re and de dicto readings of seek a unicorn and similar examples are to be differentiated by scope, then the application of these reduction rules must be restricted.

The issue of proper name translation is taken up again in Section 4.6.1.2.

Consistent with the assumptions of this thesis, the outputs of R3 could be given more precisely as $\gamma \rightarrow \text{Acc}(\beta) \rightarrow \emptyset$ and $\alpha \rightarrow \text{Acc}(\beta)$,
where Acc(\(\beta\)) indicates that \(\beta\) is realised in the accusative case form (Staal 1967:66; Dahl 1977a:82; Partee 1979b:65-66; Dowty 1980:9-10). Similar case markings could be added to all the realisation rules involving terms. A different proposal for case marking is put forward by Partee (1979b:91), who suggests that one could generate case-marked terms bottom-up in the grammar; the T which combines with an IV to form a sentence would then be required to be a T[Nom] whereas the T which combines with a TV to form an IV would be a T[Acc].

The Staal-Dahl-Dowty proposal leaves case out of the hierarchical analysis and treats it as a morphological marking of the realisation rules, like gender and number agreement. It thereby allows the hierarchical analysis to be less language specific.

8Accusative case could be specified for the direct and prepositional objects involved in these rules. See note 7.

9The prepositional phrase to John is given the same interpretation as the term John. It would be possible to add prepositions syncategorematically; for instance a rule could state that for any term \(\alpha\), (to, \(\alpha\)) is a prepositional phrase which has the same interpretation as \(\alpha\). Prepositions could also be added like case markings by realisation rules.


Two features distinguish discontinuous realisation from the old transformational solutions. First, unordered trees have no basic or underlying order to begin with, so no actual 'movement' or reordering of constituents is involved (Dahl 1977a:81, 105; Stewart 1976:157).
Second, transformations are mappings from trees to trees, and so the result of a transformation is not just a string but an ordered phrase-structure tree (or, equivalently, a labelled and bracketed string). In contrast, realisation rules take an unordered hierarchical tree and derive from it a linear output string; this string, be it orthographical or phonological, is not itself a tree and has no hierarchical organisation.

The RWRAP ('Rightwrap') operation of Bach (1979b:516) is very similar to discontinuous realisation, but it retains some features of an ordered phrase-structure analysis. It is, for instance, defined as an operation on strings rather than a rule for realising an unordered, hierarchical structure.

Two types of constraint need to be considered with regard to extent adverbs (members of $B_{(t/3^\text{e})/(t/3^\text{e})}$ or $B_{\text{EXT}}$). First, some precise adjectives like *perfect resist extent modification altogether, though *very *perfect is acceptable where some arbitrary standard of perfection applies, as with diamonds (Sapir 1944:148; Damerau 1975:2). Second, most extent adverbs applying to adjectives block further modification by other extent adverbs: *quite extremely *ill. The exceptions are *very, *quite, *too and perhaps *terribly, which can iterate: *very *very *very *ill. But even these iterations must be homogeneous: *very *quite *ill. In Beesley 1982 I suggested that extent adverbs be of category $(t/4^\text{e})/(t/3^\text{e})$; this would allow only one extent adverb to apply to a given adjective. Adjectives like *perfect and *carnivorous could be assigned to $t/4^\text{e}$ from the beginning. (Predicate nominals and adjectives modified by sentence adverbials were then assigned to categories with yet more slashes.) However, the proliferation of slash categories complicates the grammar, makes derivations hard to read and still fails to capture the idiosyncrasies. I am now more inclined to see the restrictions as pragmatic and not to be accommodated in the syntax. A great deal of work remains to be done in this area.
Such a rule was also suggested to me independently by Theo Janssen.

Siegel's (1976a:10-42; 1976b) attempt to analyse Russian LF adjectives as basic CN/CNs and SF adjectives as basic absolute (t///e) adjectives fails at several points. First, Siegel's syntactic dichotomy between CN/CN adjectives, which apply directly to nouns, and t///e adjectives, which reach attributive position by way of relative clause reduction, is a false one. No promotion rule like R12 is even considered. Second, Siegel is forced to the absurd conclusion that almost every adjective in Russian has both a basic CN/CN and a t///e reading—with no obvious semantic link between the two. Finally, the Russian data contradict her own analysis. Siegel goes to great lengths to defend the one-place predicate analysis of vague adjectives like tall, and insists they be assigned to the t///e class. Unfortunately for Siegel, the Russian word for tall has both a SF (Siegel's t///e) and a LF (Siegel's CN/CN)—(see Babby 1973:359).

Wasow (1977) lists a number of tests to separate passive form adjectives, which are lexically derived, from genuine passives, which are syntactically derived. His tests for adjective status are (1), ability to prenominally modify a common noun; (2), grammatical appearance after verbs subcategorised for adjective complements (acted, became, looked, remained, seemed, sounded); (3), compatibility with an un- prefix; and (4), compatibility with extent modifiers other than much. Tests 1 and 4 are not much good, even for fairly well accepted adjectives; i.e. some adjectives resist extent modifiers in any case and others must be postposed attributive modifiers because they have syntactic complements. The other tests are more compelling. Although Dowty 1978:422 offers a 'lexical' rule for deriving adjectives from transitive verbs, it is identical to R14 except that the translation adds past tense: that is, where α' translates a TV, Dowty's lexical passive is given the reading λxVy Past[α'((λAPP(x))(y))]. Dowty uses this rule to explain the 'already
'stolen' reading of this ambiguous sentence: The book was stolen at noon. More convincing lexically derived adjectives have more idiosyncratic readings. For instance, the lexical reading of closed in the closed window is simply 'not open'; a closed window may have been build closed, so there may not exist a someone who closed it. Similarly, a broken box may not have been broken by anyone; an elated woman may not have been elated by anyone. A man may be convinced, in the sense that he has an intractable or sure state of mind, without anyone having convinced him. Often these lexical passives can be replaced by other one-place adjectivals. Untouched might be replaced by virgin, uninhabited by empty, unsupported by without foundation, elated by happy, convinced by certain. In the present context, lexical passives are best treated as simple basic adjectives. The rules in the text are concerned only with syntactic passives.

15 The intransitive reading for changeable may not be a serious counterexample to formulating a productive rule for deriving -able adjectives from TVs. Assuming that the form changeable sometimes has the meaning 'capable of being changed', the intransitive reading 'capable of changing' can be ascribed to a homonym lexically related to the intransitive verb change. The following lexical rule would appear to be somewhat useful, at least for the small class of basic IVs related to change, such as alter, adapt, modify, accommodate.

If \( \alpha \in P_{IV} \) then \( \{ \alpha, ABLE \} \in P_{ADJ} \).

Realisation: \( \alpha \sim -able \)

Translation: \( \lambda x \circ [\alpha'(x)] \)

This translation is only suggestive of the full meaning of changeable, which is more likely to mean 'prone to change' or 'disposed to change' rather than just 'capable of changing'.

16 Dowty (1978:408-411; 1979a:300-301) provides only for agentless -able forms, but the extension to agentive forms is required for examples like This sonata is playable by Perlemann. This
extension also reflects the parallelism of -able forms to passives, which are also derived from TVs.

The Dowty translation of John is lovable as $\lambda z \forall y[\text{love}'(y,z)](j)$, also adopted here, is intuitively not strong enough a reading. Conversely, to translate The property is undesirable as $\forall y[\exists x[\text{property}'(x) \leftrightarrow x=y] \land \forall z[\text{desire}'(z,y)]]$ is much too strong. Quite possibly these readings of lovable and undesirable are just basic adjectives and should be translated simply as lovable' and undesirable' respectively. If they are given translations in terms of love' or desire', different quantifiers or some kind of typically operator may be needed.

The same problem arises with passives as well. Nigel is loved often conveys more than just $\forall x[\text{love}'(x,n)]$. For a frank discussion of the metaphysical weaknesses of such an analysis see Bach 1980:333-334.

Dowty (1979a:223) actually translates make TV/ADJ as $\lambda P \lambda x P(\forall y[Q(x) \text{CAUSE BECOME P}(y)])$. That is, to make John angry is to 'cause John to become angry'. Given a workable semantics for BECOME, this variation is a reasonable possibility.

Janssen (1978:219-220) defines a usable semantics for CAUSE within a modal logic. Assume a model $A$ with a domain $D$, a set of time intervals $T$ and a set of possible worlds $W$. Let $g$ be an assignment of values to variables. For a proposition $p$ and a world $w \in W$, let $f$ be a selection function such that $f(p,w) \in W$. In particular, $f(p,w)$ is that possible world most like $w$ with the possible exception that $p$ is the case.

If $\Phi, \Psi \in ME_t$ then $[[\text{CAUSE}(\Phi, \Psi)]]_{A,w,t,g} = 1$ iff $[[\Phi \& \Psi]]_{A,w,t,g} = 1$ and $[[\neg \Psi]]_{A,w',t,g} = 1$, where $w' = f(\neg(\forall \Phi), w)$.

An example is in order. Let $\Phi$ be love'(m,j), which translates Mary loves John. Let $\Psi$ be happy'(j), which translates John is happy. Now
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the sentence John$_j$ is happy BECAUSE Mary loves him$_j$ can be translated as CAUSE(love$_i$(m,j), happy'(j)). Janssen's semantics says that this sentence will be true at a world w and a time t if and only if (1) both love$_i$(m,j) and happy'(j) are true at <w,t> and also (2) in a world w' just like w except for the possible difference that love$_i$(m,j) is false at <w',t>, then happy'(j) would also be false at <w',t>.

Examples such as catch the guard asleep and see the bathers nude, where the adjective names a 'concomitant state' of the direct object are what Live (1977) calls Type 1 pseudo-adjective appositives. Live's Type 2 pseudo-adjective appositives include the following examples, which convey a causitive relation between the action and the resulting state of the direct object.

John beat the eggs stiff.

Mary planed the wood smooth.

Dowty (1979a:220-221) provides the following rule for such constructions.

\[
S26. \text{ If } \delta \in P_{TV} \text{ and } \alpha \in P_{ADJ} \text{ then } F_{26}(\delta, \alpha) \in P_{TV}, \text{ where } F_{26}(\delta, \alpha) \in \delta \alpha.
\]

\[
T26. F_{26}(\delta, \alpha) \text{ translates into:}
\lambda P\lambda xP(\lambda y[\delta'(x, \lambda P(y)) \text{ CAUSE BECOME } \alpha'(y)])
\]

The very similar Type 3 constructions, which involve 'empty causitive words' such as make and render, have already been handled in the text.

Live's Type 4 constructions include the following, which are characterised by reflexives with apparently intransitive verbs.

Phil slept himself sober.

Mary drank herself sick.

The sergeant yelled himself hoarse.

Dowty (1979a:221-222) provides the following rule, which also handles
examples such as John yelled Mary deaf.

S27. If $\delta \in P_{IV}$ and $\alpha \in P_{ADJ}$,
then $F_{27}(\delta, \alpha) \in P_{TV}$ where $F_{27} = \delta \alpha$.

T27. $F_{27}(\delta, \alpha)$ translates into:
$\lambda P \lambda x P(\lambda y[\delta'(x) \text{ CAUSE BECOME } \alpha'(y)])$

Type 5 pseudo-adjective appositives such as Mary held the reins loose are, as Live recognises, vaguely adverbial and will not be considered here.
Notes to Chapter 4


2 In a careful study of relative clauses in educated spoken English, Quirk (1957) found one non-restrictive relative clause, out of 174 in his corpus, introduced with *that*. Subsequent tests showed that many informants would accept *that*-clauses as non-restrictives, but that given a choice, *which*-clauses were preferred in all cases. Only *which*-clauses were accepted when the antecedent was a sentence or other non-nominal constituent. Quirk cites Tennyson (who disliked *which*) and Graham Green as writers who used a non-restrictive *that*. I have found the following examples in casual reading.

(A) So the Norman childe, Cospetric, that was young and landless and fell brave and well-armoured, mounted his horse in Edinburgh Town and came North . . . .

(John G. Gibbon, *A Scots Quair*, 1932, p. 15)

(B) Here he could give himself to excitement without the interference of the Church, that wanted to regulate even human emotions. (K. Seligmann, *Magic, supernaturalism and religion*, 1971, p. 250)

Example (A) is in a variety of Scots, and it appears that non-restrictive *that*-clauses are quite common for Scots speakers. Indeed, in a large corpus study of colloquial Scottish English, Brown (1981:7, 9, 28) found 'very few' wh-forms for nominal relative clauses. *That* was used for both restrictive and non-restrictive relative clauses, and the few examples of *which*-clauses that did occur usually involved non-nominal antecedents. Brown writes (1981:10, see also pp. 37-40)

In these circumstances *which* is always deictic and usually anaphoric. Its antecedent may be an NP as in
["Louise has got a car—which she never uses"], an entire proposition, as in ["they got another keyboard player frae the Paris—which really annoyed me"], or some portion of a proposition...
The present analysis is at least broadly consistent with these observations in that all non-restrictive modifiers are claimed to be linked to their antecedents anaphorically.

3 For parallel examples from seventeenth-century grammars see Salmon 1969:180.

4 The prepose/postpose mechanism has been recognised by most Iberian grammarians; see, for example, Bull 1950; Cuesta & Mendes da Luz 1961:426-427; Alonso 1968:47; Escarpanter 1974:120-121. Bolinger (1972:33-36) argues that this is a general process in languages and that it operates in English adverbials, where ordering is relatively free. See also Siegel 1976a:123-124 and Quirk et al. 1972:858-859.

5 In the case of subject modification, non-restrictive modifiers with complements can also appear before the whole term, in sentence-initial position.

(A) Disguised as Clark Kent, Superman worked as a reporter.

However, this is different from the preposition of a non-restrictive adjective such as clever in my clever wife; an adjective with a complement cannot appear between a determiner and a noun in English.

(B) *The disguised as Clark Kent superhero fought crime.

I shall ignore sentence-initial non-restrictive modifiers on subject terms.

6 In real dialogue, which is full of performance quirks, a restrictive relative clause can be separated from the common noun it modifies by a pause, making it superficially resemble a non-restrictive relative clause. This happens commonly when the relative
clause is added as an afterthought. Imagine the following example uttered by a gangster.

(A) The boss never killed any man [pause] who didn't ask for it.

Examples (23) and (24) in the text are grammatical if they are read with such performance pauses and the relative clauses are given a restrictive reading.

7 An exception to this is the 'stereotype' reading recognised by Bartsch 1979:34-35, 41. I shall ignore it here.

8 Richards (1982) argues that all indefinite terms are translated with existential quantification and that subsequent reference to an indefinite term by an anaphoric pronoun is what makes such a term 'specific'. This is potentially compatible with the present analysis because I shall argue that all non-restrictive modifiers are anaphorically linked to the terms they modify. In example (32) then, Richards can argue that it is the presence of the non-restrictive modifier, with its anaphoric pronoun, which causes a novel to be read specifically. By making specific/non-specific an effect of discourse anaphora, Richards avoids treating indefinite terms as fundamentally ambiguous.

The present analysis works from the different assumption that indefinite terms are indeed ambiguous and that a uniform translation is to be avoided. Therefore, indefinite terms are either specific or non-specific to begin with, and only specific terms can be linked meaningfully to an anaphoric pronoun. This position is inspired by the way that many languages, including to some extent English, can or must distinguish specific and non-specific terms syntactically (see note 15). The difference in assumptions and intuitions is formidable, and I doubt that the two views can be fully reconciled.

9 A possible counter-example to Thorne's argument is the sentence The John who is frankly a bore ruined the party. If the argument fails, it does not necessarily mean that non-restrictive modifiers
are not independent speech acts, but only that performative adverbs are not conclusive evidence either way (see Fairclough 1973: 527-528).


11 Arnauld & Lancelot (1660: 99; see also Salmon 1969: 180-183; Chomsky 1966: 33-37) present an analysis something like Ross's; they claim that when they utter (A), 'three judgments pass through my mind which are included in this proposition'. The three are listed in (B).

(A) Invisible God created the visible world.

(B) 1. God is invisible.
    2. He created the world.
    3. The world is visible.

Of these three 'judgments', (B2) is called the principal one and the others are called subordinate. Much is made of the fact that these subordinate 'judgments' can be spelled out more obviously with relative clauses. Although (C) is given as an example without comma punctuation, the intention is obviously to treat the relative clauses as non-restrictive.

(C) God WHO is invisible created the world WHICH is visible.

The same example is taken up in the Port-Royal Logic, where this distinction between restrictive modification ('détermination') and non-restrictive modification ('explication') is outlined more overtly (Arnauld & Nicole 1662: 115-116, 59-60).

(D) Alexander, who was the most generous of all kings, conquered Darius.

Arnauld & Nicole claim that if they had asserted a 'compound'
sentence like (D), then 'we obviously would have asserted two things of Alexander--(1) that he was the most generous of kings, and (2) that he was the conquerer of Darius'.

Ross's rejection of the conjunction analysis has been challenged by Thompson (1971:85), who argues that all non-restrictive modifiers are transformed from conjoined sentences. In examples like the following, Thompson deletes the conjunctions transformationally, thereby allowing the second clause to be read as an assertion. The assertion is then transformed into a non-restrictive relative clause.

(E) Tell your father that supper is ready and he is outside →
(F) Tell your father that supper is ready --- he is outside →
(G) Tell your father, who is outside, that supper is ready.

Given present assumptions about transformations, Thompson's suggestion is totally unconvincing.

McCawley (1978:163-164) eventually derives non-restrictive modifiers from conjoined sentences but argues that the non-restrictive part is effectively a quite separate sentence.

should attach to CNs. This has been challenged by Bach & Cooper (1978), who defend an NP-S analysis for restrictive relative clauses. As Partee (1979a:279) herself and others (see von Stechow 1980; Gazdar 1981:162, 178 and works cited therein) have accepted the Bach-Cooper arguments, I shall explain briefly why I reject them.

Bach & Cooper show that some languages always put restrictive relative clauses at the beginning or at the end of sentences; these relative clauses do not, therefore, necessarily appear contiguously with the nominals which the Nom-S analysis claims they modify. Appealing to a Gazdar-like grammar where 'extraposed' constituents are handled by passing gaps down trees, Bach & Cooper conclude that the alleged Nom-S combination is not a constituent, and that an NP-S analysis, for restrictive relative clauses, is just as easy to formalise as a Nom-S analysis.

Bach & Cooper's arguments rest on three supports, all of which are at least questionable. First, the argument is based largely on examples gleaned from Hittite cuniform inscriptions, though more accessible languages like Hindi are also cited. Because any real data should be considered good data, this objection is the weakest of the three, but one cannot help taking these strange examples with a grain of salt (see also Cooper 1979). Second, Bach & Cooper are dedicated to a strict form of ordered phrase-structure grammar, trying at the same time to apply a Montague-style combinatorial semantics. Such grammars rule out all possibility of discontinuous constituents because constituents can be built only by simple concatenation. Bach & Cooper are forced to adopt semantic complexities which need not arise in a generalised categorial grammar, where syntactic orderings other than simple concatenation are allowed. A different theoretical perspective changes everything. In Daughter Dependency Grammar, for instance, Hindi relative clauses are cited triumphantly as firm evidence for the separation of the unordered constituent relations and the superficial linear relations defined by 'sequence rules' (Schachter 1980:269-270). For those grammarians advocating an unordered dependency structure, the fact that restrictive relative clauses in Hindi are never realised
contiguously with the nominals they modify is no calamity.

Third, and most serious, Bach & Cooper's NP→NP S rule forces them to allow at least two distinct readings for every noun phrase. For example, *every man* must be allowed to translate as in PTQ (A) or with a dummy property R representing a hole to be filled by a subsequent relative clause (B).

\[
(A) \lambda P\Box [\text{man}'(x) \rightarrow P(x)]
\]

\[
(B) \lambda P\Box [(\text{man}'(x) \land R(x)) \rightarrow P(x)]
\]

If a discontinuous restrictive relative clause turns up, the R in (B) is abstracted out allowing the property denoted by the relative clause to be lambda-converted in. The 'correct' translation of *every man* is the one which happens to combine correctly with any subsequent relative clause or clauses. The obvious objection to this approach is that it requires a non-compositional semantics or the adoption of multiple determiners like *every*, each one having a distinct translation. I find this highly counterintuitive. Given the assumptions of this thesis, where discontinuous constituents are both allowed and desirable, the Bach-Cooper analysis is not compelling.

\[13\] This rule is related to the traditional MG analyses of relative clauses (e.g. Rodman 1976). The GPSG approach to defining categories with gaps (Gazdar 1979:16) is an appealing alternative, but I have not had time to adapt it to the present kind of categorial grammar.

\[14\] See note 7. Also, there are, in fact, some cases where non-restrictive clauses appear to attach to vacuous, but not stereotypical, indefinite NPs, but the effect is very different.

\[(A)\] I have never seen a sea eagle, which are beautiful birds.

If *a sea eagle* can be interpreted as referring somehow to a class, then the plural verb form in the non-restrictive clause could reflect
the plurality of the class, i.e. they are beautiful birds. Nigel Shadbolt suggested (B) to me as a similar example involving an anaphoric pronoun.

(B) Napoleon was a Corsican. They are volatile people.

It is not possible here to do justice to the rich debate on the scope of operators and quantifying-in. For an overview of the basic problems in MG see Dowty et al. 1981:162-169, 230-233. For general syntactic arguments against any syntactic form of quantifying-in transformation see Cooper 1975:145-160; Bartsch 1979 and Gazdar 1982. For a defence of quantifying-in for differentiating de re (transparent) and de dicto (opaque) readings see Klein 1979a:34-36, 81, 93-94, 102-104. Bennett (1975:49-60) argues that wide scope should be interpreted as 'definite' (or 'particular' or 'specific') and narrow scope as 'indefinite' (or 'any-old' or 'non-specific'); for arguments against this distinction being semantically significant see Klein 1979a:181-196. Bennett's distinction, let us call it specific/non-specific, is overtly expressed in the syntax of various languages (Dahl 1970; Givon 1973), and is very hard to explain away. For instance, indefinite French terms with restrictive relative clauses mark specificity by putting the relative clause main verb in the indicative mood and non-specificity by putting the verb in the subjunctive.

(A) Jean cherche une femme qui est belle.
   (John seeks a woman who is-indic beautiful.)
   'John seeks a (particular/specific) woman who is beautiful.'

(B) Jean cherche une femme qui soit belle.
   (John seeks a woman who is-subj beautiful).
   'John seeks a (any-old) woman who is beautiful.'

English has words like particular, specific, any-old and perhaps arbitrary and random for forcing certain readings, but on the surface indefinite terms are usually ambiguous or vague. One argument that this is a real ambiguity is that only a specific term may be
coherently questioned with *which*. If the speaker of (C) is looking for a particular dog, then (D) is a coherent response. If, however, the speaker of (C) is dog-shopping in general, (B) indicates a serious misunderstanding; something like (E) is more appropriate.

(C) I'm looking for a dog.
(D) Which dog are you looking for?
(E) What kind of dog do you want?

The specific/non-specific distinction must be carefully isolated from questions of reference and identifiability. Criticisms often center around the claim that 'having a particular entity in mind' is too psychological a notion to be representable in semantics. And 'having a particular entity in mind' is usually taken to mean something like being able to identify or refer to (in the logician's sense) the entity in the world. Specificity need not be such a rich notion. I may, for instance, say (F), with a specific reading, even if I do not know or cannot identify the bear involved in any way.

(F) John seeks a particular bear.

Indeed it could be the case that John himself is not able to identify the bear involved, but even so it is not just any old bear that he seeks. John might, for instance, be after the bear who kills his sheep, and he may not know he has killed the right one until after the sheep killing stops. He might never know exactly which bear it was. However, it makes sense to ask which bear it was even if the question cannot be answered more helpfully than 'the one who killed my sheep'. What is important when someone believes in or seeks a particular entity is that the believer or seeker also believes the entity to be POTENTIALLY identifiable, even if only by something like omniscient deity.

Similarly, the specificity of a term does not entail real world existence. It is perfectly coherent to assert (G), with a specific reading, even if no unicorns exist in the real world.
Jean cherche une licorne qui est blanche.

(John seeks a unicorn which is white.

'John seeks a (particular) unicorn which is white.'

It might be argued that the particular unicorn that John is seeking has a fictional existence, and that would be an argument for Bennett's broad sense of existence. However, without a radical reinterpretation of the existential quantifier it is difficult to see how Bennett's analysis can be helpful. Indeed it is far from obvious that quantifier scope has anything at all to do with the specific/non-specific distinction. Where the difference is overt in natural language, it always appears to be shown by some marker within the ambiguous term. For a sketch of a non-scope analysis see Bartsch 1979:26ff.

16 This also provides a possible way to distinguish restrictive and non-restrictive modifiers on indefinite terms. Under the Rodman analysis, sentence (A) translates as (B). The translation for Bartsch would be (C), where \( v_1 \) is the constant corresponding to the entity 'referred to'. (B) and (C) are also the readings for a sentence like (A) where who was ill is a restrictive modifier.

(A) A man, who was ill, left.

(B) \( \text{Vy}[\text{man}'(y) \land \text{ill}'(y) \land \text{leave}'(y)] \)

(C) \( \text{man}'(v_1) \land \text{ill}'(v_1) \land \text{leave}'(v_1) \)

In contrast, the present analysis would yield (B) for the restrictive reading and (D) for the non-restrictive reading, where \( x_a \) is an anaphoric variable assigned the value of the constant instantiating \( y \) in the previous clause.

(D) \( <\text{speaker}, \text{Vy}[\text{man}'(y) \land \text{leave}'(y)]> \)

\( <\text{speaker}, \text{ill}'(x_a)> \)

If we adopt Bartsch's analysis of specific terms, where constants are introduced directly into the translation of specific indefinite articles, then the present analysis would yield (C) for the
restrictive reading and (E) for the non-restrictive.

(E) \langle \text{speaker, man}'(v_1) \rangle \& \langle \text{leave}'(v_1) \rangle
\langle \text{speaker, ill}'(v_1) \rangle

By setting off ill'(v_1) in a separate clause, reflecting its status as a separate speech act, (E) allows it to be separately tagged, given its own performative adverb, given its own emphasis or attenuation, or even its own quotational delivery (which effectively puts the words in someone else's mouth).

It must be granted that some have disagreed with my intuitions on this point, and such clashes of intuition are perhaps unresolvable. Ultimately I must say that the analysis reflects my own and others' intuitions satisfactorily. However, to accommodate Thompson's intuitions about (97), something equivalent to the Rodman-Bartsch conjunction analysis of non-restrictive modifiers would have to be allowed as an alternative (not a replacement) to the present subroutine view. The formal cost of this move would, I feel, be very dear. First, this conjunction analysis fails spectacularly for negation (see examples (83) to (84a')). Second, providing two alternative translations for non-restrictive modifiers threatens to violate the principle of compositionality.

Author Noel Langley (Cage me a peacock, Penguin 1960) has special fun with quotational definite descriptions. Note the use of the pretty one, referring to a little girl, in the following passage.

He [Sextus] reined up and leaned forward in his saddle.

'Ho there, pretty one,' he said gallantly.

'Ho there, sojerl' the pretty one made reply, flashing a row of even white teeth. 'Nisorse.' (PP. 24-25)

In the next passage, the author uses Sextus's description 'lady of the town', still referring to the same little girl, but here he puts
She's going to show us a short cut sir,' Sextus explained, 'She's a lady of the town, I gather'.

If you turn up 'ere, said the Lady of the Town conversationally, 'and parst them trees, there's a smorl road that gets you there a nour quicker'.

If this turns out to be a wild-goose chase,' said the General to the Lady of the Town with beetling brows, 'I'll smack your bottom for you!' (p. 25)

The game continues as the author picks up 'smorl road' and uses it in his omniscient description.

As they advanced towards the smorl road, the Lady of the Town regaled Sextus with a bright and diverting commentary on the social life of Versalium. (p. 26)

Yet another example is the author's quotational reference to the greatest and most just men in Rome in the following selection.

'I have requested your presence here because you are—all of you—the greatest and most just men in Rome today, and it is only great and just men that can put to rights the terrible wrong that has been done the house of Collatinous.'

The greatest and most just men in Rome, feeling something was expected of them, made suitably inaudible noises of polite incredulity. (p. 147)

Janssen (1978:220) has criticised the reference of (114') to the syntactic forms of the semantic arguments, arguing that any necessary distinctions between proper names and indexed pronouns should be enshrined in the syntax. I shall assume that Delacruz's reference to the form of arguments could be legitimately replaced with some kind of reference to syntactic features. Janssen also points out that the translation in (114') could be given more simply as $\lambda PVy[\lambda x(\beta'(x) \& \alpha'(\lambda y[x=y] \& P(y)))] \leftrightarrow x=y$; this is simply an alphabetic variation of Delacruz's translation after two
applications of lambda conversion.

20 Where constraints on grammatical over-generation are more important than semantic exposition, idiosyncratic rules for idiosyncratic data will be preferable. Those seeking to generate all and only the grammatical strings of English will therefore prefer Delacruz's original rule (114). However, from a processing point of view, it is unlikely that a human or computer parser will break down the horse Canonero any way other than *the horse, Canonero*, with the being analysed as a normal definite article. Criteria for constraint and conventions for constraining categorial grammars are by no means obvious, and the whole question must be considered open.

21 The definite article associated with a proper name should not be thought of as deleted or 'doomed' (Postal 1970:486-487) but rather as unrealised, much like a gene can be unexpressed. For similar ideas see the 'incomplete lexicalisation' of Bartsch & Vennemann 1972:42; the 'zero expression' of Dik 1980:60, 70 and the 'lexical hiatus' of Lytle 1971:90-91. It is very common for researchers using categorial grammars to make a clear distinction between the unordered, immaterial and generally abstract level of combinatorial syntax and the ordered, phonological or graphic strings of speech and writing. See, for example, the genotype/phenotype distinction of Shaumyan 1965, 1971, 1977 (also Lytle 1971:88-89; Sanders 1975a:9-12; 1975b:400; 1980:244; Dowty 1980:11-12; Staal 1967:66-69; Schlesinger 1977:17-19; Bartsch & Vennemann 1972:18-42, 76-77; Vincent 1979:4-5; Gleason 1964:77, 81; L.B. Anderson 1971:9; Dahl 1977a:87-91; Chafe 1970:4-5, 27-28; Keenan & Faltz 1978:20, 45, 205; Boas 1975:36-39). Usually the unordered level is considered to represent semantic or cognitive substance. For arguments that the 'words' in base structures should really be abstract morphemes, sememes or protoverbal elements which are given tangible shape by lexicalisation rules see Schlesinger 1977:18; Bach 1968:117-118; Sanders 1980:243; Partee 1975:214.
Marrying a Bartsch-like analysis of definite descriptions with the present analysis of non-restrictive modifiers offers yet another alternative. Let the $\alpha$ translate as $\lambda P P(v_n)$; subroutine($\lambda Q Q(x_0)(^\alpha(n))$, where $\alpha$ is a CN and $v_n$ is an individual constant. If the person being referred to is the individual $v_2'$, then (the) Nigel sings will translate as the two assertions sing'($v_2'$) and Nigel'($v_2'$).

A rule similar to R35, perhaps with just an alternative realisation clause, would accommodate appositive constructions like the poet John, where the stress is on poet. Just as John the butcher (stress on butcher) is a different John from John the poet (stress on poet), so the butcher John (stress on butcher) is a different John from the poet John (stress on poet).

Rule R36 will also allow us to generate terms like John, John and the plumber, the plumber, which are undeniably odd. However, reasonable pragmatic considerations should rule out such redundant non-restrictive modifiers. Occasionally there is a genuine need to use a proper name appositive to a proper name.

(A) Mark Twain, Mr Samuel Clemmens, was a famous humourist.
(B) Coco, M. Louis Lepage, was a famous French clown.

Chierchia's rule, which is meant to serve for appositives at both individual and propositional level, is as follows.

S34. If $\alpha \in B_T$ -(he, they, they) or $\alpha =$ that $\phi$, and $\beta \in P_{CN}$ then $F_{20}(\alpha, \beta) \in P_T$ where $F_{20}(\alpha, \beta) = the \beta \alpha$.

T34. If $\alpha \in P_T$ and $\beta \in P_{CN}$ then $F_{20}(\alpha, \beta)$ translates as $\lambda P V x[\beta'(x) \& \alpha' = \lambda Q Q(x) \& P(x)]$
Thus $F_{20}(\text{horse}_\text{CN}, \text{Canonero}_T) = \text{the horse Canonero}$ and translates as $\lambda p \forall x [\text{horse}'(x) \land \lambda p \forall [c = \lambda \exists q(x) \land p(x)]]$. Note that unlike in Delacruz's rule, where appositives are restrictive modifiers (i.e. they narrow the scope of the class within a definite description), Chierchia's rule translates appositives as logical conjuncts at the highest level, as with non-restrictive modifiers. Thus instead of Canonero acting restrictively to specify which horse is intended, horse acts non-restrictively to characterise what Canonero is.

26 The rule overgenerates. Constraints on the rule might be found given standard theories of definiteness, specificity or reference. There is, unfortunately, no room to pursue this issue here.

27 One is tempted to create a category $T/PROP$ containing $that$, but the semantics of the result is far from obvious. $That$, on a proper name does not necessarily connote disapproval. Some emotional colouring appears to be involved, whatever it is. In Portuguese, where definite articles optionally mark proper names, the presence of the definite article usually connotes familiarity of the speaker with the referent, or even intimacy and esteem.

28 Some non-restrictive adjectives applied to proper names must also have some provision for definite marking. While Homeric epithets like Brave Ulysses have already been treated, the following constructions still need an account.

(A) The beautiful Helen launched 1000 ships.
(B) The traitorous Philby defected.
(C) I dislike that dishonest Murphy.

The similarity between the traitor Philby and the traitorous Philby is obvious, and a rule parallel to R37 should do.

29 A number of explicit markers of apposition have been discussed in the literature (Quirk et al. 1972:627ff; McKinnon 1979:41ff).
They are highly idiosyncratic.

(A) The boss, \{namely
i.e.
that is to say
in other words\} Bill, retired.

(B) An MP, namely Joe Bloggs, was caught with pants down.

(C) Many people, \{including
for example
such as
to wit
for instance
especially
in particular
mainly
chiefly
mostly\} X, want disarmament.

Examples like (A) and (B) at least are fairly easily accommodated in the present framework. *Namely* appears to operate only on proper names; let us assign it to \((T/T)/PROP\) and give it the translation $\lambda P[\lambda P(yP); \text{subroutine}(\lambda QQ(x_a)(P))]$.

R39. If $\alpha \in B_{(T/T)/PROP}$ and $\beta \in P_{PROP}$ then

\(\{\alpha, \beta\} \in P_{T/T}\).

Realisation: $\alpha \overset{\sim}{\beta}$

Translation: $\alpha'(\overset{^\sim}{\beta}')$

The translation in R39 assumes that names are predicates of individuals; in an appositive construction like *namely* John the speaker is simply supplying the conventional name, as an extra parenthetical bit of information, of the person referred to. Markers like *i.e.* and *in other words* appear to apply to terms; let us assign them to \((T/T)/T\) and translate them as $\lambda Q[\lambda P(yP); \text{subroutine}(\lambda PP(x_a) (\overset{^\sim}{\lambda P_1 \lambda yP_1(\overset{^\sim}{\lambda z(y-z)})(Q)}))]$. 
R40. If $\alpha \in B_{(T/T)/T}$ and $\beta \in P_T$ then
$\langle \alpha, \beta \rangle \in P_{T/T}$.

Realisation: $\alpha ' \sim \beta$

Translation: $\alpha ' (\hat{\beta} ')$

Such rules raise the question whether null members of $(T/T)/T$, rather
than bumping rules like R30, could function to produce non-restrictive appositives. The whole area is in need of more work. Appositives, and especially those with apposition markers, are serious problems for a transformational theory (see McKinnon 1979:51 for arguments), and a detailed treatment in a non-transformational MG could be very enlightening.
Notes to Chapter 5

1 Alternative translations for proper names are proposed in Chapter 4, but the details of such translations are not at issue here. In particular, the semantic type of the alternative translations is identical to that for Bennett's proper names (and, indeed, for all other individual-level terms).

2 I assume, following Delacruz 1976:189; Bennett 1975:167, 159; and Keenan & Faltz 1978:71, 233 that the predicate true can be handled by a meaning postulate and read 'redundantly'. To assert $\Phi$ is true is intuitively equivalent to asserting $\Phi$, and this is captured in the following rule.

$$\text{Ap[true'(p) \rightarrow p]}$$

3 Other adjectives which may eventually need to be added to the t/class include common, nice, peculiar, weird, crazy, ridiculous, absurd, typical, o.k., logical, fashionable, rare, just, proper, customary and scandalous. However, such adjectives combine most easily with FOR-TO clauses (see Silva & Thompson 1977:122) or sentences with a putative should, which will be discussed further in Chapters 6 and 7.

It is logical [FOR John TO leave].
It is just [that Mary should be imprisoned].

4 This rule holds only for those propositions which translate a sentence in the indicative mood. See note 3.

5 If scope is used to separate 'propositional' beliefs from 'non-propositional' beliefs, the operation of this meaning postulate will have to be restricted. The problems of belief sentences are peripheral to adjectives and cannot be pursued here.
6. The CN' report is translated in terms of the three-place relation report'. Thus in the sentence The report of John to Bill is that Mary is ill, the 'subject' of report' is named by John, the 'indirect object' by Bill, and the 'direct object' by that Mary is ill. It might be thought that Max is also an argument in a term like the report of John to Bill about Max, requiring that report' be a four-place relation. However, about Max describes the nature of the report rather than providing an argument. Similarly, we can speak of a book about Max or the story about Max, and there is no more justification for treating report' as a four-place relation than there is for treating book' and story' as two-place relations.

7. See Chapter 3 note 17.

8. Important, vital, essential, and imperative take PP-TO complements but combine most happily with sentences in the subjunctive mood or with a putative should.

   It is vital (to me) that Jane should be here.
   It is important (to me) that Bill leave the room.

See note 3.

9. An even simpler approach would be to translate (A) not with CAUSE but with simple logical conjunction as in (A').

   (A) John is glad that Mary is well.
   (A') glad'(j) & well'(m)

Then pragmatics could sort out the causal relationship between the two states of affairs. A similar solution is usually proposed for capturing the causality often felt in sentence (B).

   (B) John shot Mary and she died.
   (B') shoot'(j,m) & die'(m)

It is possible for (B) to be uttered without conveying or requiring
any causality, and so \((B')\) can be argued to capture the truth conditions. That is, if it is true that John shot Mary and it is also true that Mary died (for whatever reason), then \((B)\) is also true. This translation also allows \textit{and} to be translated straightforwardly as logical conjunction.

In the case of \((A)\), however, I cannot conceive of a reading wherein causality is not a necessary factor in the truth conditions. That is, if it is the case that John is glad and it is also the case that Mary is well, this is not enough to justify the conclusion that John is glad that Mary is well. Also, there is no syntactic conjunction in the surface structure, and so inserting logical conjunction into the translation is just as strong a measure as inserting \textsc{cause}. 
Notes to Chapter 6

1. The classification of IV'/T passives as ADJs reflects their ability to take modification by very, to appear after seem, and to otherwise act in an ADJ-like manner. TV passives, whether from basic or derived TVs, usually fail such tests.

(A) IV'/T passives
John seemed very annoyed (by the situation).

(B) TV passives
*Sue seemed very advised that John is ill (by Mary).

As both ADJs and t\textsuperscript{5} e participles translate as type \(e,t\), the syntactic differences are comparatively superficial.

2. In Schreiber 1971 and in Bellert 1977 these are called 'modal' adverbs. Quirk et al. (1972:511) use the term 'Group 1. Attitudinal Disjuncts'. Nilsen (1972:157) writes of 'affirmation adverbials', and Bartsch (1976:19-22) refers to them as the 'K\textsubscript{0}' class.

3. One should take care in pursuing explanation via lexical rules. Not only do many modal adverbs lack corresponding adjectives, but some obvious candidates for modal adjectives, true and false, have no exact adverb equivalents. Nominalisation threatens to be even more idiosyncratic.

4. Although alleged thieves are certainly those in the set \(\lambda x \forall y [\text{allege}_x(y, \text{'thief' } (x))]\), many legalistic usages of the form alleged do not fit this pattern. The Times of 12 April 1982 reported a charge that a fox had been illegally trapped and then released alive to a pack of hounds; the report continued, 'the alleged incident took place on Ministry of Defence land'. The alleged incident cited is not 'something alleged to be an incident' but rather 'an incident alleged to have occurred'. Similarly, the alleged letters could be 'letters alleged to exist', and an alleged payment could be a 'payment alleged to have been made'.
Schreiber (1971) and Bellert (1977) call these 'Evaluative adverbs'; Quirk et al. (1972:512) call them 'Group 2. Attitudinal disjuncts, type a'; Bartsch (1976:23) treats them under the label 'K₁ class'.

Quirk et al. (1972:514-517) have shown some syntactic differences between modal (t/₃t) and parenthetical (t/₄t) adjectives with regard to putative should. In short, a parenthetical adjective can apply to a sentence with a putative should, but any modal adjective applying to the same sentence forces a deontic ('ought-to') reading for should.

Parenthetical adjective—can be putative
It is \{unfortunate\} that John should leave.  
\{strange\}  
\{odd\}

Modal adjective—cannot be putative
It is \{possible\} that John should leave.  
\{probable\}  
\{true\}  
\{false\}  
\{obvious\}

Another possibility is to postulate adverbials of category (t/₉t)/PP-FOR including (un)fortunately and annoyingly. As (un)fortunate and annoying are of category (t/₄t)/PP-FOR, the relationship between adjective and adverb would have to be described by a new rule.

A few leftovers appear to indicate not so much frequency, but the limits or lack of limits on the time some sentence will be true. They answer the question How long? rather than How often?

momentarily, temporarily, permanently, perpetually, forever

Also in this class are the composite members for a minute, for a day,
A curiosity of this class is that they resist being placed at the beginning of a sentence, which suggests that they are of syntactic category IV/IV. This may also be the case for a few frequency adverbs including rarely, often, never, always and seldom.

9 The term 'hedge' is used by G. Lakoff (1972) to refer to a wide class of qualifying expressions, many of which are not at all adverbial. What I have called hedges, Quirk et al. (1972:277, 280, 429-430) have called 'viewpoint' adverbs; some of their 'attitudinal disjuncts' (pp. 511-512) are also treated as hedges herein. Vennemann (1973:15) writes of 'limiting' adverbs (see also Bartsch & Vennemann 1972:112-113); Bellert (1977:347-348) calls them 'domain' adverbs; and Bartsch (1976:58-59) calls them 'adverbials limiting predication'.

10 The Klein account of context and hedges was developed to capture adjectival vagueness, and it works very satisfactorily in the present analysis. There have, however, been other notable schemes for formally accommodating vagueness. For instance, Lewis (1976:47) proposes that the index of evaluation for a sentence must contain a 'delineation coordinate' to specify the value of vague predicates. The truth of a sentence like (A) will then depend on the value of the delineation coordinate, i.e. the truth of the sentence depends on what tall is taken to denote at the relevant index.

(A) John is tall.

McConnell-Ginet (1973:115) informally employs 'delineations' which are written as a subscript 'd' on degree adjectives. These delineations are taken to be contextual variables which fix extensions.

(B) tall_d(j)

The present approach to sentence 'meaning' being a function from contexts to traditional propositions is ultimately traced back to Stalnaker 1972.
In his analysis of hedges, Lakoff (1972:199-202) makes a distinction between four kinds of criteria: 'Definitional' (DEF) criteria provide a legalistic characterisation of what the members of a set must be; 'Primary' (PRIM) criteria combine definitional criteria and primary (intuitively essential but not legally necessary) criteria; 'Secondary' (SEC) criteria are significant but insufficient for a definition; and 'Characteristic' (CHAR) criteria are characteristic but 'incidental'. The hedge technically is claimed to specify that DEF criteria rather than PRIM criteria apply. For an example like fish', Lakoff formalises the technical notion of a fish as Itechnically'\((\text{'fish'})\) = DEF(\[\text{'fish'}\]) \(\cap\) NEG(PRIM(\[\text{'fish'}\])), where \[\text{'fish'}\] is the 'vector' of fish', which includes various evidence like fins, gills, scales, shape, living in the sea, etc. Thus something which is 'technically a fish' must satisfy the definitional criteria for fishhood but must also lack some primary qualities—for instance, a fishy shape or scales. The hedge strictly speaking is held by Lakoff to require the satisfaction not only of DEF criteria but also of PRIM criteria. His example is Richard Nixon is technically a Quaker, but strictly speaking he is not a Quaker. Lakoff seems to imply that Nixon lacks the pacifism and good works which are primary marks of Quakerism, though he may be on the Quaker membership rolls. The hedge loosely speaking specifies that SEC, rather than DEF, criteria apply, and regular picks out CHAR criteria while spurning all the others.

Though cleverly laid out, such distinctions are limited in their usefulness and are resistant to proper formalisation. What counts as DEF, PRIM, SEC or CHAR criteria is itself subject to context or personal point of view, as Lakoff himself notes (pp. 207-208). Expanding such a system to capture yet more hedges would appear to require yet more distinctions of criteria, which places the whole approach in doubt.

Heny (1978:207) has argued that criteria are always held constant within a sentence, and that therefore the two clevers in sentence (A) will always be evaluated relative to the same criterion.
(A) John is very clever and Bill is (only) rather clever.

As Heny points out, sameness of criterion for clever is necessary for the conclusion that John is more clever than Bill. These intuitions do not match my own, though I concede that usually criteria do remain constant throughout a sentence, and, ideally, throughout any coherent discourse. That is, I believe that two different criteria of cleverness can be read in (A); therefore, it is possible to believe (A) and yet deny that John is more or less clever than Bill because the two types of cleverness involved are incommensurable. Klein (1980a:7-8) has also defended such intuitions against Heny's objections.

13 A similar ambiguity with a parenthetical adverb was claimed by Montague (EFL:214) for the string the man such that that man fortunately loves Mary is tall. One claimed reading is the non-restrictive 'the man such that that man loves Mary is tall, and it is fortunate that that man loves Mary'. The other, restrictive, reading is 'the man such that it is fortunate that that man loves Mary is tall'. The two readings are distinct and coherent.

If desired, such restrictive readings can easily be accommodated by generalising R91 to generate restrictive IV/IVs as well as ADJ/ADJs and (t/5t)/(t/5t)s. The semantic types and translations would be exactly the same.


15 See Bolinger 1967:4-5, 18ff; Wheeler 1972:318; Quirk et al. 1972:239, 262, 282-285; Berman 1973a:154-155; Sussex 1974:124-125; Levi 1976:226-231. Jespersen's (1933:78-79) theory of 'ranks' was an early recognition that adverbial (primarily 'tertiary') notions are injected into terms in the form of adjectives (usually 'secondaries') in order to satisfy the syntactic convention that adjectives modify
nouns (which are fundamentally 'primaries').

16 What rich'(j) means, when the adjective rich is a basic member of CN/CN is in fact undefined. More precisely, then, Montague could represent the entailments of John is a rich lawyer as lawyer'(j) and rich'('entity')(j), where U is the universe of the model and \( \Delta x[x \in U \leftrightarrow entity'(x)] \).

17 Chierchia (1982: 342, 345, 347) provides a rule for appositives, which uses the conjunction analysis. Besides failing to distinguish between restrictive and non-restrictive appositives, Chierchia's rule will generate inappropriate logical conjunctions when appositives appear within questions and commands. The pitfalls of the conjunction analysis are discussed in depth in Chapter 4.

18 In Kiparsky & Kiparsky (1970), a very different view of such constructions is defended. They argue that 'factive' verbs presuppose the truth of their propositional term objects (the embedded sentences) because such verbs apply only to terms of the form the fact that-t in deep structure. A sentence with ignore, a factive verb, will therefore have a derivation like that in (A), with the fact possibly deleted by transformation at a later stage.

(A) Bill ignored (the fact) that Mary was pregnant.

Bill ignored the fact that Mary was pregnant

Non-factive verbs, on the other hand, are held not to presuppose the truth of their propositional objects, and the Kiparskys claim that this is explained by the fact that such verbs never combine with terms of the form the fact that-t.
Although at least one attempt has been made to translate the Kiparskys' analysis into a MG (Wotschke 1972), the logico-linguistic community has, on the whole, been critical. The whole concept of semantic presupposition is suspect and has generally been recast in terms of entailment. Delacruz (1976:179-185) has argued persuasively that selection restrictions, rather than gross grammatical differences, are responsible for the distinctions, a position which is consistent with the present arguments in Sections 6.2.2 and 6.4. Using the supposedly 'factive' example ignore, Delacruz shows that by replacing fact with thought, sentence (D) no longer even entails the truth of the embedded sentence; the factivity in (C) is explained by 'fact ascription'.

(C) Bill ignored the fact that Mary was pregnant.
(D) Bill ignored the thought that Mary was pregnant.

Even worse examples, supposedly involving factives, can be constructed.

(E) Bill
\[ \begin{align*}
&\text{ignored} \\
&\text{took note of} \\
&\text{took into account} \\
&\text{forgot}
\end{align*} \]
\[ \begin{align*}
&\text{the lie} \\
&\text{impossibility} \\
&\text{untruth} \\
&\text{rumour} \\
&\text{misconception} \\
&\text{suspicion} \\
&\text{belief} \\
&\text{stupid notion}
\end{align*} \]

that Mary was pregnant.

The non-restrictive appositive treatment in Section 6.4, more than
Delacruz's own account, better captures the observation that 'fact ascription' rather than presupposition is working in such examples.
The to of infinitives, like the that in that-t phrases, is added syncategorematically, as a result of combination rules, by Dowty (1980:19; see also Dowty 1978:416; Partee 1979b:88; Cooper 1980:26-27). Trees like the following are generated.

\[
\text{persuade} \bullet \text{TO go}_{TV} \quad \text{persuade}_{TV/IV} \bullet \text{go}_{IV}
\]

Earlier treatments in MG also avoid treating infinitives as a category by defining verbs like \text{try-to}_{IV/IV} (PTQ:250; Bennett 1975:10-11, 160).

\[
\text{try to go}_{IV} \quad \text{try-to}_{IV/IV} \bullet \text{go}_{IV}
\]

I find that such approaches, which effectively deny the term-hood of infinitives and that-t clauses, divide structures counter-intuitively; also, they cannot be extended very easily to cover the cases when such terms function as the subject of a sentence as in (A) and (B). For similar views see Bartsch 1978:18.

(A) [That John is ill] is true.

(B) [To swim] is difficult.


Bennett (1975:162-163, 176, 184-186; 1976:123, 145) generates strings like \text{It is easy to please John} with a similar rule. However, extraposed strings like \text{It is ADJ'' to IV} are considered basic, and strings such as \text{To please John is easy} and \text{John is easy to please} are derived from them by syntactic transformations.
See Partee 1975:261-262; 1976b:66; 1977b:298ff; 1979a:306; 1979b:57; Bennett 1975:160-163, 167, 184ff; 1976:120-125, 158. The problems include difficulty in specifying the transformation and wholesale changes in the scope of moved constituents. The presence of the constituent *easy to please* in the following sentences is also a challenge to any transformational analysis.

John is jovial and *easy to please*.
John strikes Bill as *easy to please*.
John tries to be *easy to please*.
Mary wants to marry an *easy man to please*.
Who here is *easy to please*?


5See e.g. Gazdar 1979:16. The GPSG approach to defining categories with gaps is very appealing, not only for Tough constructions but also for relative clauses. The adapting of gap categories to a categorial grammar is an interesting possibility that I have not yet had time to investigate.

6Rule R11 is a pattern for similar rules at the property and proposition levels. When property-level variables in a \( T' \) are bound, the grammar will generate sentences like (A).

(A) The assignment is difficult to do ____.
Similarly, when proposition-level variables are bound, examples like (B) are possible.

(B) The claim is hard to believe.

That is, the category TTV, which was previously an abbreviation for TV/T (or, more basically, (IV/T)/T), will now abbreviate (IV[+frozen]/T)/T. It should be noted that the freezing of IV constituents like give John presents has nothing to do with any movement transformation or the fact that the TTV give is lexically related to a DTV (i.e. TV/PP-TO) give. Even the basic TTVs spare, allow and refuse, which have no DTV twins, freeze the IVs that they help create. I find (B) and (C) ungrammatical.

(A) Bill spared John the trouble.
(B) *John is hard to [spare ___ the trouble].
(C) *The trouble is easy to [spare Bill ___].

The claim that easy to read is a discontinuous constituent in easy book to read goes back at least as far as Wells 1947:104.

Rules R112 and R113 are analogous to R90 and R11 at the individual level.

Silva & Thompson (1977) are generally concerned with examples involving adjectives and FOR-TO clauses, and many of their 'Comment with Experiencer' examples, like imperative, prefer FOR-TO clauses over those of the form that-t.

(A) 1. It is imperative for John [for Mary to visit him].
   2. ?It is imperative for John [that Mary visits him].

Such adjectives combine better with that-t clauses where the verb is in the subjunctive mood or where a putative should is involved.
(B) 1. It is imperative for John that Mary visit him.
   2. It is imperative for John that Mary should visit him.

FOR-TO clauses appear to share the subjunctive feel, or the tenselessness, of such examples. Investigation of such phenomena will require a detailed theory of tense and mood and cannot be pursued here. See note 18.

Lasnik & Fiengo (1974:568; see also Postal 1971:27-28; Quirk et al. 1972:955) have cited a number of predicate nominals which act like Tough adjectives. Most must carry indefinite articles. They have a strong flavour of slang.

(A) It was [a bear  
   a bitch  
   a breeze  
   a cinch  
   a challenge]
   (also a delight, a drag, a real drag, a joy, a gas, a mother,  
   a pain, a real pain, a pain in the ass/neck, a pleasure,  
   the shits (gratia Bob Fisher), the pits)

(B) The stable was [a bear  
   a bitch  
   a joy  
   the pits  
   etc.]

The name 'Human Propensity Adjective' is borrowed from Dixon (1977:34, 39-40). This class has been identified and discussed by many researchers, including Vendler 1963:458; 1968:63-64, 103; Lees 1963:22 (A class), 82-83; Bolinger 1967:2; Fraser 1970:95-96; Lakoff 1970a:157; Berman 1973a:228; Dik 1975:99-104; Silva & Thompson 1977:110-116; McConnell-Ginet 1982:150.
A sentence adverbial of the form *for John* can also have the reading 'in John's opinion' or 'from John's point of view', but this reading is not at issue here. Also, sentences like (A) also have a reading wherein *for John to escape* is a FOR-TO clause.

(A) For John to escape is wise.

In such a reading, wisdom is ascribed to whoever has brought about the state of affairs of John escaping. This could be John himself, the military officer who chose John to escape, the guard who lets him escape, etc. Such readings are similar to those involving the 'sentence adverbial' wisely.

The FOR-TO readings are especially easy to get in the sentences in (B).

(B) 1. [For 25,000 people to run the marathon] was foolish.
   2. [For Ian Paisley to give the speech on religious tolerance] was insensitive.
   3. [For the platoon to shell the hospital] was criminal.

On the FOR-TO clause reading of (B1), foolishness is not ascribed of the 25,000 runners but probably of the organisers of the race who allowed so many entrants to compete. Similarly in (B2), insensitivity is ascribed of whoever chose or allowed Ian Paisley to give the speech. The soldiers in (B3) could be reasonably moral creatures following the orders of an officer who gave the orders for the shelling of the hospital. The officer would then be the person responsible for bringing about the shelling of the hospital, and so he would be the one labelled criminal.

See Berman 1973a:233. Of-marked phrases occur only weakly together with *for*-phrases, the result resembling the sentences discussed in note 13.
(A) *For the platoon to fire on the hospital was criminal of the officer.

Where the for-phrase is a domain-limiting hedge, the only possibly acceptable of-marked phrase is one where the object of the preposition is a pronoun coreferential with the object of the for-marked prepositional phrase (see McConnell-Ginet 1982:150; Dik 1975:104).

(B) *For John to escape was stupid of Bill

(C) *For John_i to escape was stupid of him_i.

All in all these sentences seem odd, and (C) especially has the feel of a patching together of two structures. I shall henceforth ignore such examples.

15 Quirk et al. 1972:826-827 and Berman 1973a:232 have noted that some predicate nominals also act like HPAs (their examples).

He is \{splendid\} to wait.
    \{a gentleman\}

He is \{clever\} to make so much money.
    \{a magician\}

You are \{foolish\} to spend so much.
    \{a fool\}

You are \{wonderful\} to do this for me.
    \{an angel\}

Jeb was \{a genius\} to burn those documents.
    \{a fool\}
    \{an idiot\}
    \{clever\}
    \{thoughtful\}
    \{wrong\}

Not just any predicate nominal can fit in such a slot.
He is a doctor to make so much money.
a lawyer
a plumber
etc.

The admissible nouns, which Quirk calls 'degree nouns' are of course those which are active and can appear in progressive predications (Berman 1973:87; Bach 1968:117; Chomsky 1970:198-199).

He is being
a fool.
a gentleman.
an angel.
*a doctor.
*a lawyer.
*a plumber.

Adjectives of class HPA are paradigm active predicates (Dik 1975:99), and all that is necessary to handle these nominal constructions is to modify rule R117 slightly to take active nouns. Note that the of construction excludes even active nominals.

It is foolish of him to wait.
*a fool

In general, it appears justified to assume a future element when the verb in the infinitive is active. Thus John is certain to come will be translated much like John certainly will come. Stative infinitives, however, may not require the tense specification. That is, the sentence John is certain to know invites a paraphrase such as John certainly knows as easily as John certainly will know.

Many IV/T past participle forms such as annoyed, astonished, bored, disgusted, excited, puzzled, etc. can also take certain t/IV complements; e.g. John was disgusted to hear the news (Quirk et al. 1972:828-829). The following lexical rule reflects the default reading:
R (lexical). If \( a \in B_{IV}/T \) then \( \{a, \text{PASS}\} \in B_{\text{ADJ}}/(t/IV') \).

Realisation: \( a'' \) where \( a'' \) is \( a \) in the past participle form.

Translation: \( \lambda y [a'_y (B\{\lambda x (\text{PP}(y))\}, y)] \)

The translation provided for "John is scared to jump" comes out roughly equivalent to that for "That John jumps scares John," and that translation threatens to entail \( \text{jump}'(j) \), which is not intuitively justified for the infinitive sentence. The infinitive sentence is much closer in force to the FOR-TO sentence "For John to jump scares John;" neither intuitively entails \( \text{jump}'(j) \). Unfortunately, a satisfactory analysis of FOR-TO and related constructions would require an excursus into mood and tense which is impossible here. See note 18.

This analysis is somewhat supported by the following examples, where "reluctant" combines with proposition-level terms.

John is reluctant for Mary to leave.
John is reluctant that Mary should leave.
Mary is willing for John to depart.
Mary is willing that John should depart.

Examples like these are interesting because they involve tenseless FOR-TO clauses and a \( t/IV' \) (i.e. a \( \text{that-}t \) clause) with a putative should, which may indicate subjunctive mood. For comments on such clauses see Vendler 1968:102; Levi 1976:226; Quirk et al. 1972:466, 784, 823-829; Lees 1963:22; McConnell-Ginet 1982:150; Kiparsky & Kiparsky 1970:169-171. Providing a semantics for putative should constructions would be a good thesis topic; see Palmer 1979:160-162; Coates 1980:117-132 and the papers cited therein.

In examples such as (A), (B) and (C), happy and glad appear to have much the same force as willing, and sad is read much like reluctant.
(A) John is happy to go.
(B) Bill is glad to wash the dishes.
(C) Mary is sad to go away.

20 The semantic distinction between expect and persuade was pointed out by Chomsky (1965:22-23), who, lacking a semantic component, had to argue that I persuaded John to leave and I expected John to leave receive different structural (i.e. syntactic) analyses at some level.

21 To allow the discontinuous realisation of TVs like persuade to leave and believe to be pregnant around their direct object, the following new realisation clause needs to be added to R3.

Realisation: \[\{(\gamma_{TV}/(t/IV'), \delta_{t/IV'}, )_{TV}, \beta_{IV}\} \Rightarrow \gamma \cap \beta \cap \delta\]

22 Klein's account also differs from the present one in interpreting the promise which combines with an infinitive (A) in terms of a relation, call it promise\(_1\), which is a three-place relation between individuals, individuals, and propositions as in (B). (The details of the notation are adapted to match the present conventions.)

(A) John promised Bill to leave.
(B) 1. John promised Bill that he would leave.
   2. \(\lambda z[\text{promise}_1(z, b, \hat{\text{leave}}(z))](j)\)

There is a promise of category TV/(t/IV') in the present grammar (see Section 5.2.2.2.5.2) which, if treated as basic, would translate like promise\(_1\) in (B2). The present analysis also has a second verb promise of category (IV/T')/PP-TO (see Section 5.2.2.2.5.1) which, if treated as basic, translates as a three-place relation (let us designate it here as promise\(_2\)) between individuals, propositions and individuals as in (C).
(C) 1. John promised to Bill that he would leave.
2. promise2*(j, [leave*(j)], b)

Such a translation reflects the intuition that Bill is a semantic indirect object, the person to whom a promise is made. If Bill is felt to be the semantic indirect object in (B1) as well, as I believe it does, then promiseTV/(t/IV') should be translated not in terms of promise1 as in (B2) but in terms of promise2: i.e. promiseTV/(t/IV') \rightarrow \lambda A \lambda P \lambda y[promise2*(P)(R)(y)]. Such an analysis is directly parallel to that given to Dative examples such as give (see Section 3.2, especially rules R7, R8, R9 and examples (6) and (7)). In example (A), Bill is again the semantic indirect object; he is the target of the promise rather than the individual or proposition being promised. PromiseIV/(t/IV')/T is therefore translated in terms of promise2* rather than in terms of promise1* (see example (107) in the text).

Failure to distinguish these readings is a fault in the raising solution offered in Dowty 1978:416.

Want, love, hate, like and prefer appear superficially to be of category TV/(t/IV'').

John wants Bill to be good.
John prefers John to live abroad.

However, derived constructions such as want to be good cannot be passivised as believe to be pregnant can (Bresnan 1979:154-155; Perlmutter & Soames 1979:87-91).

John believed Mary to be pregnant.
Mary is believed (by John) to be pregnant.
*Bill is wanted (by John) to be good.
*John is preferred (by Mary) to live abroad.

Excluding the lack of passive, the syntax and semantics of this small
want class appears identical to the TV/(t/IV'') class. These
intuitions can be accommodated by assigning the want group to a
separate category of the same type, say (IV/²T)/(t/IV''), and
redefining R5 and R123 as follows:

\[ \text{R5 (tentative). If } \alpha \in P_{IV/²T} \text{ and } \beta \in P_T \text{ then } (\alpha, \beta) \in P_{IV''} \]

Realisation: \( \{ (\gamma_{IV/²T}/(t/IV''), \delta_{t/IV''} )_{IV/²T', \beta_T} \} \rightarrow \gamma \sim \beta \sim \delta \)

else \( \alpha \sim \beta \)

Translation: \( \alpha'(\beta') \)

\[ \text{R123 (tentative). If } \alpha \in P_{(IV/²T)/(t/IV'')} \text{ and } \beta \in P_T \text{ then } (\alpha, \beta) \in P_{IV/²T, \beta_T} \text{ (where } n \text{ ranges over the set } \{1,2\}) \]

Realisation: \( \alpha \sim \beta \)

Translation: \( \alpha'(\beta') \)

25 These \( n \) pronouns at property level should not be confused
with the similar \( n \) pronouns at proposition level.
Bibliography


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