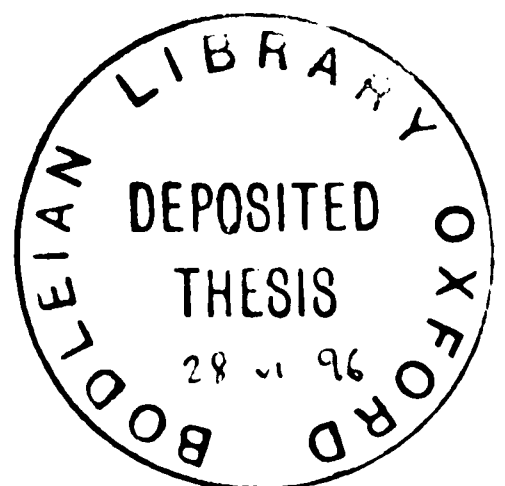


THE SYNTAX AND SEMANTICS OF INFINITIVES OF RESULT IN ENGLISH

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The syntax and semantics of infinitives of result in English

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This thesis concerns infinitives of result in English, examples of which are given under (a-c).

- (a) John designed a battery to operate at high temperatures.
- (b) John designed a battery to win a prize.
- (c) John designed a battery for the competition, only to discover that he was ineligible.

The infinitive in (a) is called a Purpose Clause; the infinitive in (b) is called a Rationale Clause; and the infinitive in (c) is called a Telic Clause. These infinitives are optional modifiers of the verbs with which they occur. I argue, however, that important characteristics of their form and interpretation follow naturally if the infinitives are assumed to have argument structures which must be incorporated into the argument structure of the verb they modify.

In Chapter 1, I introduce the constructions and offer a general discussion of the problems posed by modifiers in a study of natural language semantics, arguing that these problems are best addressed by viewing modifiers as predicates of a standard sort. This establishes a central hypothesis of this thesis, namely that the syntax and semantics of modification should be incorporated into the theory of argument structure, or "theta theory".

In Chapter 2, I offer a summary of key works in the literature in two areas: theories of argument projection by Williams and Higginbotham and studies of infinitives of result by Faraci, Bach, Chierchia, and Jones. In Chapter 3, I apply a range of syntactic tests to establish the structural relation of the infinitives to the sentences they modify. I argue that the infinitives are embedded at an increasing distance from the modified verb, from which important characteristics of their distribution follow.

In Chapter 4, I turn to the internal syntax of the constructions and consider the nature and distribution of the gaps that occur within each infinitive and the manner in which those gaps are interpreted. I relate key characteristics of the infinitives to the nature of their argument grids. I also address constraints on interpretation introduced by pronominal binding in the infinitives.

In Chapter 5, I discuss a variety of problems on the syntax-semantics interface involving argument structure and control. The issues raised move from the relatively syntactic (phrase structure accounts of Purpose Clause antecedence and the possibility of event control for the Rationale and Telic Clauses) to the philosophical semantic (causal efficacy and the nature of resultant states in the interpretation of the Purpose Clause).

I then offer a full sample analysis of a sentence modified by all three infinitives of result. My conclusion points again to the importance of argument structure in an analysis of infinitives of result in particular and of modification in general.

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CHAPTER 1: The Introduction

Section 1.1: Introduction

The infinitive has long been an object of interest in generative linguistics, posing some of the most complex and interesting problems of form and interpretation for the theory of grammar. Interest has tended to focus on infinitives which occur as the Complements of verbs such as *promise* and *persuade*, as in (1-2),

- [1] Sven promised Ute to visit Germany.
- [2] Sven persuaded Ute to visit Iceland.

and analyses of these constructions have tended to focus on the problem of referential control: how is it that we know that in (1) it is Sven who is to do the visiting, where in (2) it is Ute? In this thesis I will be concentrating on a rather different group of infinitives which raise a number of interesting issues concerning the relation between syntax and semantics, issues which can to a large extent be set aside in (1-2). Examples of the infinitives in question are given under (3-5).

- [3] Sven brought a saga along *e* to read *e* to his friends.
- [4] Sven worked at the newspaper *e* to earn money.
- [5] Sven left Oxford forever only *e* to be sent back on an assignment by the newspaper.

The first construction has been discussed extensively in the literature. Following standard usage, I will call it a Purpose Clause in the general sense of Jones (1991: 26, fn 18). The construction in (4) has been discussed less often and has received a systematic treatment principally in Faraci (1974) and Jones (1991); I call this construction a Rationale Clause after Faraci (1974). The construction in (5) has generally gone unnoticed in the generative literature, although Faraci (1974: 45, fn 3) does mention it as a deviant example of a Rationale Clause. The construction has been recognised in traditional grammar, although the classification is rather tentative: Quirk et

al (1985: 629; ¶8.132) refer to it as one of the "somewhat vaguer 'outcome' disjuncts". The use of the term *disjunct* implies that the infinitive is being classed as a peripheral modifier distinct from the infinitives in (3-4), although the nature of the peripherality is not formally defined. In general though the infinitive in (5) has been lumped with the infinitive in (4) and taken as an exceptional case. The general sentiment is well-expressed by Duffley (1992: 21) who provides a functionalist approach to the *to*-infinitive.

The existence of two different ways of actualizing the potential meaning of *to* in discourse is clearly seen in sentences which can be ambiguous:

(6) I got up and opened my mouth *to commence* a downright torrent of abuse.
(E.Brontë 1847: 236)

Here *to commence* could mean either "in order to commence" (implying that the person changed his mind before actually saying anything) or "and commenced" (implying realization).

It will be argued in this thesis that the difference in interpretation to which Duffley refers correlates systematically with a number of features of its syntactic distribution and semantic interpretation which indicate that it is a distinct and independent construction from both the infinitives in (3) and (4): we do not merely understand the presence or absence of intention as the discourse suits but attribute different types of structure and interpretation to sentences which are interpreted in the one way or the other.

For expository convenience, Jones (1991: 25) terms the infinitives in (3-4) *purpose constructions*; not only does this imply that the analysis is intended to apply to all constructions (including the finite) which carry purpose connotations, but the term *purpose* is itself clearly inappropriate for the infinitive in (5), whose reading is purely factive. On the other hand, all of the infinitives in (3-5) are concerned with the notion of result in one way or another: in (3), the saga "ends up" in a place where it is available for Sven to read it to his friends; in (4) Sven's working is intended to have the result of

earning him money; and in (5) the unexpected result or outcome of Sven leaving Oxford forever is that he must return. I will therefore adopt the term *infinitives of result* as an umbrella term for these constructions; it should be noted, however, that in traditional grammar the term is used to apply only to the infinitive in (5).

This thesis will have two main aims:

- [6] to introduce into the discussion concerning the two infinitives of purpose a third related construction, the Telic Clause;
- [7] to provide an account of the syntax and semantics of these infinitival modifiers in terms of a general theory of argument projection (or theta theory).

It should be noted from the outset that I will be excluding certain closely related constructions from discussion. First, I will not address the correspondences between the Purpose Clause which occurs as a modifier of the verb and that which is optionally subcategorised by adjectives such as *easy*, in the classic alternation noted by Chomsky.

- [8] Nick is easy *e* to please *e*.
- [9] Nick is eager *e* to please.

Second I will exclude from discussion those Purpose Clauses which occur with verbs such as *use* and *choose*. It is true that these infinitives are syntactically optional and that they are semantically related to the notion of purpose. However, it seems that they may act as genuine implicit arguments to these verbs, as observed by Bach (1982). Certainly the verb *use* entails that the object used is being used for some purpose, to serve some function: unlike the object of a verb modified by a Purpose Clause, the object of *use* does not become available to serve some purpose by virtue of its participation in the event of using; rather it is serving that purpose simply by virtue of being the object of that event of using. It is less clear whether the infinitive which occurs with *choose* is simply implicit: this would imply that the verb *choose* always implies some purpose for the object chosen, but this need not be the case. If your grandmother offers you one of her chocolates you may choose one because you do not want to offend her but you need not intend to eat it or do anything with it at all. Nevertheless there remains a distinction

between the infinitive which occurs with *choose* and the infinitive which occurs as a true Purpose Clause. In the Purpose Clause reading an object comes to have a property by virtue of its participation in the event: if I bring a bottle opener along to open the wine with then it is implied that the bottle-opener becomes useful for that purpose by virtue of having been brought along. But with *choose* an object is assumed to have a property which already makes it useful for that purpose and the object is chosen precisely because of that usefulness: i.e. the event of choosing is precipitated by the object having that property, rather than the object gaining that property by virtue of being chosen. In this thesis, I will be concerned only with infinitives which are clear cases of optional modification.

Section 1.2: The constructions

The infinitive of result which has aroused most interest in the literature is the Purpose Clause, examples of which are given under (1-3).

- [1] Sven handed Ute the ice-cream *e* to put *e* in the freezer.
- [2] Sven opened the freezer for Ute to put the ice-cream in *e*.
- [3] Sven sent Ute into the kitchen *e* to put the ice-cream in the freezer.

Both Faraci (1974) and Jones (1991) distinguish the infinitives in (1-2) from the one in (3). Faraci calls the infinitive in (3) an Objective Clause and the infinitives in (1-2) Purpose Clauses; Jones calls the infinitives in (3) Subject-gap Purpose Clauses and the infinitives in (1-2) Object-gap Purpose Clauses. Given that principles of syntactic distribution and semantic interpretation which apply to the infinitives in (1-2) generally also apply to the infinitive in (3), I will follow Jones in labelling both infinitives Purpose Clauses and use the qualification "subject-gap" versus "object-gap" to distinguish them where necessary. The Purpose Clause can be identified in three ways: (i) it is always controlled by the direct object or Theme of the main verb, so in (1) the object gap is controlled by the Theme, *ice-cream*, in (2) it is controlled by the Theme, *freezer*, and in (3) it is controlled by the Theme, *Ute*; (ii) a gap in the clause is obligatory (see Section 4.1.2.1); and (iii) the infinitive cannot be prefaced by the phrase *in order*, as shown in (4-6)¹.

- [4] *Sven handed Ute the ice-cream in order *e* to put *e* in the freezer.
- [5] *Sven opened the freezer in order for Ute to put the ice-cream in *e*.
- [6] *Sven sent Ute into the kitchen in order *e* to put the ice-cream in the freezer.

(6) is only well-formed in the rather odd interpretation where Sven sends Ute into the kitchen so that he, Sven, can put the icecream in the freezer. This is in fact a Rationale Clause reading.

¹ Thanks to Joan Maling for pointing out the robustness of these judgements with the strictly subcategorising verb, *put*.

Examples of Rationale Clauses are given under (7-8).

- [7] David spoke to Damian in Welsh (in order) *e* to keep the gossip secret.
- [8] David spoke Welsh (in order) for Damian to feel more at home.

Given the possibility of inserting the phrase *in order* before this infinitive, Jones calls these infinitives In Order Clauses. There is evidence, however, that the phrase *in order* is not a simple marker of the Rationale Clause (see Section 5.4 for detailed discussion). I have therefore decided to adopt Faraci's original term, referring as it does to a stable notional property of the infinitive which is uncontroversial. I will continue to assume, however, that the preface *in order* is associated strongly with the Rationale Clause, *modulo* the reservations expressed in Section 5.4.

Rationale Clauses may be distinguished in four ways: (i) they need not contain any gap, as in (8); (ii) where there is a gap it must be in subject position, as in (7); and (iii) the gap must be controlled by the Agent (in (7), it is David who intends to keep the gossip secret, not Damian); (iv) they can generally be prefaced by the phrase *in order*, as in (7) and (8), *modulo* the provisos mentioned in Section 5.4. Notice that it really is the Agent rather than merely the subject of the sentence which controls the gap; whether the Agent is the subject, as in (11), a *by*-NP adjunct, as in (12), or an implicit argument, as in (13), it is always the controller.

- [11] The terrorists stole the plutonium (in order) *e* to intimidate Western governments.
- [12] The plutonium was stolen by the terrorists (in order) *e* to intimidate Western governments.
- [13] The plutonium was stolen (in order) to intimidate Western governments.

Examples of Telic Clauses are given under (14-16).

- [14] John entered the house, *e* to discover that everyone had already left.
- [15] The leaves were blown by the wind from the trees, *e* to fall in piles at the end of the garden.
- [16] John bought the house, only for his partner to discover that it had rising damp.

The Telic Clause is similar to the Rationale Clause in containing only an optional subject gap. It may be distinguished, however, in three ways: (i) the infinitive is factive (the infinitival event actually occurs); (ii) the gap is controlled by the syntactic subject (regardless of active or passive voice): notice in (14) that it is the Agent John (the syntactic subject) who acts as the subject of *discover*, where in (15) it is *the leaves* (which are syntactic subject), not the Agentive *wind* (now merely an adjunct), which acts as the subject of *fall*; (iii) the Telic Clause may be prefaced by *only* where the infinitival event is an outcome which is somehow unexpected.

In this analysis, I will assume that each construction has the properties it does because it has a head which conditions its form and interpretation. The head has an argument structure, just like any other predicative head, and the interpretation of the modifier with respect to the modified sentence is a reflex of the argument structure of this predicative head, as is the interpretation of the matrix verb (and its arguments) with respect to the infinitival verb (and its arguments). I will adopt the view of argument structure developed by Higginbotham (1985; 1989). Following Stowell (1981), Higginbotham assumes that lexical heads come with a grid specifying the number of their arguments. The grid is a piece of syntactic information associated with a label in the syntax and provides the starting point for the translation rules to the semantics. A verb like *hit* might therefore have a syntactic argument grid, as in (17), interpreted as in (18).

- [17] *hit* <1,2>
 [18] *hit*(x,y)

This tells us that *hit* must occur with two phrases in the syntax and that it must be interpreted with respect to two individuals in the semantics. I assume that amongst the information associated with these grids is some specification of the semantic types over which the variable positions range. So, as suggested, the verb *hit* is associated with information which tells us that both its arguments are drawn from the domain of individuals. A verb such as *believe* on the other hand will specify that one of its

arguments is an individual where the other is a proposition (with respect to which the belief is held).

- [19] believe <1,2>
- [20] believe(x,^p)

In the tradition of Davidson (1966), I will assume that all verbs have an argument position ranging over events², where events are taken to be ontological primitives of the semantics.

Given this approach, the question is what information is associated with the argument grid of each infinitive of result. Say that the head of the Purpose Clause is the predicate *P*, that the head of the Rationale Clause is the predicate *R*, and that the head of the Telic Clause is the predicate *T*, then each of these predicates will have a syntactic argument grid. Let us consider the content of these argument grids.

It seems clear that the Purpose Clause mediates the relation between a verb and its object and that it concerns the function that the object of the verb is to perform.

- [21] John designed the battery.
- [22] John designed the battery to operate at high temperatures.

Consider (21). To design a battery is to assign to some object a particular internal structure such that it can serve a particular function, in this case the function of a battery. In (22), the object is still being assigned an internal structure; and that internal structure still allows it to perform the function of a battery. Now, however, our understanding of the structure and the function which it is intended to perform are more constrained. The battery is being attributed a structure such that it will be able to operate at high temperatures. The action in (21) is one of designing; the action in (22) is of a particular type of designing.

² Higginbotham in fact assumes that all lexical items have an event position available.

We might therefore suggest that the Purpose Clause is headed by a predicate which predicates a relation between an entity, an event, and a property, as in (23).

[23] $P(y, e, \lambda z F(z))$

This says that there is a relation between an entity, an event, and a property, such that the entity is involved in the event for the sake of its having the property. If we take the sentence in (22), it will then have a logical translation as in (24), which can be paraphrased as in (25).

[24] (for x =a battery) design (John, x) & $P(x, e, \lambda z (\exists e') \text{ operate } (z, e'))$

[25] "the eventuality of the battery being designed by John is for the sake of its having the property of operating at high temperatures"

Notice that this predicate is in fact teleological in a quite general sense. It can apply to inherent natural functions of objects, as in (26), to designed or constructed functions of objects, as in (27), as well as to much more general cases, as in (28).

[26] (a) Grass is green to photosynthesise more efficiently.

(b) (for x =grass) GREEN (x, e) & $P(x, e, \lambda z (\exists e') \text{ photosynthesise } (z, e'))$

(c) "the eventuality of the grass' being green is for the sake of its having the property of photosynthesising more efficiently"

[27] (a) This car is contoured to accelerate more quickly.

(b) (for x =car) CONTOURED (x, e) & $P(x, e, \lambda z (\exists e') \text{ accelerate } (z, e'))$

(c) "the eventuality of the car's being contoured is for the sake of its having the property of accelerating more quickly"

[28] (a) John bought some cream cakes at the shop to eat with his grandmother.

(b) (for y =cream cakes) buy (John, y, e) & $P(y, e, \lambda z (\exists e') \text{ eat } (z, e'))$

(c) "the eventuality of the buying of the cakes is for the sake of their having the property that John eats them with his grandmother"

The point of these examples is that an event can qualify for modification by *to* if the object can be seen as having a particular property by virtue of its relation to the event. In cases where objects have natural or designed properties, this follows straightforwardly;

but an event can also qualify if it is interpreted in the scope of an Agent's intention. Cream cakes may not be for eating with one's grandmother in any sense, but if we attribute the relevant beliefs and intentions to the Agent, then relative to those beliefs and intentions that is exactly what the cream cakes are for. Intended attribution of a property therefore becomes a special subcase of the Purpose Clause reading. And note that that does leave certain types of event out of the domain of the Purpose Clause, as illustrated by the contrast in (29-30).

- [29) The engineers created a channel to drain the lake water away with.
[30) *The earthquake created a channel to drain the lake water away with.

The earthquake's creation of a channel is neither an eventuality which naturally attributes a property to the object, nor is it saved by any intentional reading. The crucial point in each case is that the interpretation is secured (or restricted) on the basis of the meaning of the predicate P itself: we know that it is the object that has the property, that it has the property by virtue of its relation to the event, and that its so having the property is what the event is for, by virtue of the fact that that is what the predicate P actually means (a meaning which will be spelt out in more detail in its conditions on reference).

Unlike the Purpose Clause, the Rationale Clause does not seem to be involved with the nature of the Theme of the construction, nor does it deal with the attribution of properties. The Rationale Clause concerns the intention of the Agent of the main event. We might therefore see the Rationale Clause as headed by a predicate which relates an entity, an event, and a proposition, as in (31).

- [31] $R(x, e, \wedge p)$

This predicate is a relation between an entity, an event, and a proposition, such that the entity acts in the event with the intention that p (i.e. that the proposition be true).

Finally, there is the Telic Clause, as in (32).

[32] John designed a battery for the competition, only to discover that he was ineligible.

This construction does not involve Themes and their properties or Agents and their intentions. It concerns outcomes, expected and unexpected, of main clause events. In fact, it involves a strong sense of inevitable consequence. In the light of examples such as (33) it is tempting to call these infinitives, "clauses of destiny".

[33] Christ entered Jerusalem in triumph, only to die in shame five days later.

The predicate which heads the Telic Clause therefore seems to be genuinely and purely telic. I will treat it as a relation between an ordered pair of events, as in (34).

[34] $\dot{T}(\langle e^1, e^2 \rangle)$

This predicate is a relation between an ordered pair of events, such that the first event finds its conclusion (expected or unexpected) in the second.

Consider now the sort of translation which will be produced in this analysis. The root predicate in (21) is *design* which is a relation between two entities and an event such that *a* designs *b* in *e*. Consider a Purpose Clause modification as in (35).

[35]
design (a, b, e) & P (y, e', $\wedge \lambda z (\exists e''$) operate (z, e''))

The purpose predicate, P, forms a property argument from the infinitival verb which it then directly theta-marks (in a manner to be discussed, see Section 4.1.2.1); it then theta-identifies its event and entity arguments with the event and second entity argument of the verb. This will give a translation as in (36) after existential closure.

[36] $(\exists e) (\exists b: \text{battery } (b)) \text{ design } (\text{John}, b, e) \ \& \ P(b, e, \lambda z (\exists e'') \text{ operate } (z, e''))$

(36) might be paraphrased as: there is an event of designing, e, of an entity, b, by an entity, a; and that design event is for the sake of the entity, b, having the property of operating at high temperatures.

Now consider a Rationale Clause modification as in (37).

[37]
 $\text{design } (a, a \text{ battery}, e) \ \& \ R(x, e', \lambda (\exists e'') \text{ win } (\text{PRO}, a \text{ prize}, e''))$

The rationale predicate, R, forms a proposition from the infinitival verb which it then directly theta-marks; it then theta-identifies its event and entity arguments with the event and first entity argument of the verb. This will give a translation as in (37) after existential closure.

[38] $(\exists e) (\exists a: \text{John } (a)) \text{ design } (a, a \text{ battery}, e) \ \& \ R(a, e, \lambda (\exists e'') \text{ win } (\text{PRO}, a \text{ prize}, e''))$

(38) might be paraphrased as: there is an event of designing, e, of a battery by an entity, a; and the entity, a, intends by that act of designing to make it the case that PRO wins a prize. The value of PRO will be derived under a syntactic principle of control (see Section 4.1.1).

Finally, consider a case of Telic Clause modification as in (39).

[39]
 $\text{design } (\text{John}, a \text{ battery}, e) \ \& \ T(\langle e_1, e_2 \rangle) \ \& \ \text{discover } (x, p, e')$

The telic predicate, T, simply identifies its second event argument with the event argument of the second verb; it then identifies its first argument with the event argument of the first verb. Existential closure will then apply to both event variables

(straightforwardly accounting for the factivity of the constructions), giving the translation in (40).

[40] $(\exists e) (\exists e') \text{ design (John, a battery, } e) \ \& \ \text{discover (PRO, } \wedge p, e') \ \& \ T(\langle e, e' \rangle)$

(40) might be paraphrased as: there is an event of designing, e , by John of a battery; and there is an event of discovering, e' , by PRO that p ; and e' is inevitable outcome of e .

The analysis of infinitives of result set out above is in effect an attempt to integrate the syntax and semantics of modification into theta theory. This raises a number of important questions concerning the nature of modification and the content of the notion "theta role", to which I now turn.

Section 1.3: The semantics of modification

The problem posed by these constructions is how we are to integrate them into the sentences which they modify and, fundamentally, what precisely it means to "modify" a sentence. Our intuitions on the subject are vague but highly suggestive: a modifier is an optional piece of information added to the basic sentence; it tells us more about what is going on by supplementing information already provided by the verb, usually without changing the verb, and so on. Different analyses appeal to different aspects of these intuitions, but in formal terms views on modification have radical implications for the way the grammar is set up. I will assume that there are three basic ways of approaching the problem: the natural augmentation analysis; the higher-order function analysis; and the predicate of events analysis.

The natural augmentation analysis (McConnell-Ginet (1982); see also Chierchia (1989)) characterises certain types of modifier as extra arguments of the verb: certain verbs have the option of expanding their argument structures to take extra arguments. It is argued that in the manner reading of the adverb *rudely*, in (1), the verb itself theta-marks the adverb and gives it its interpretation.

[1] Sven left rudely.

Leave is a verb which in this case relates an individual to a manner on condition that the individual performs the leaving in that manner. This "transitive" *leave* is derived from intransitive *leave* by a lexical rule; the rule is intended to be constrained by an appeal to the "natural" meaning of a predicate, i.e. leaving is something which you can naturally do in a particular way and therefore the lexical rule will allow you to derive from a verb *leave* another verb which means *leave-in-a-particular-way*. This is therefore a sort of natural polysemy analysis. The analysis is in fact limited to a certain class of "modifiers" which are intimately associated with verb. As a general theory of modification it is unattractive because the number of "natural" augmentations to

argument structure is potentially infinite: we can naturally specify all sorts of information on places, times, causes, consequences etc but we do not wish to have a 100-place predicate or lexical rules offering unbounded lexical polysemy. The arguments are most convincing for those adjuncts which are unique and change the meaning of the predicate in some way.

This approach seems to get the selectional properties of modifiers, including infinitives of result, the wrong way around; in the case of infinitives of result it would also require two theories of modification: one for the Purpose Clause which is syntactically closely associated with the verb and another for the Rationale Clause and Telic Clause. Consider (2-4).

- [2] Sven brought Sigrun along to the party to introduce to his friends.
- [3] Sven climbed the glacier to impress Sophia.
- [4] Sven left Oxford forever, only to be sent back on an assignment by his newspaper.

In (2) we are required to understand that Sigrun is brought along to the party for some purpose which she is to serve: she is to be introduced to Sven's friends. In (3) we are required to understand that Sven climbed the glacier with a specific purpose in mind, namely impressing Sophia. In (4) we are required to understand that Sven's leaving of Oxford had the unexpected outcome that he in fact returned. Yet these aspects of the interpretation of (2-4) have nothing to do with the verbs themselves. There is nothing in the interpretation of *bring* that entails that the bringing have a purpose. We have perfectly acceptable examples of the verb *bring* in sentences which clearly imply no intention of any sort.

- [5] Sven has brought his cold along with him.

However, when a Purpose Clause is used to modify the sentence we must have an intentional reading.

- [6] Sven has brought his cold along with him to give to everyone.

In (6) we must take the bringing to be a malicious act intended to harm others. The reading is strictly tied to the presence of the infinitive itself. If we take the Purpose Clause to form part of the argument structure of the verb then we must take *bring* to be ambiguous between a verb *bring*¹ which means "to bring with a purpose" and a verb *bring*² which means "to bring accidentally". This sort of ambiguity analysis does not seem to account naturally for the fact that the relevant reading is obligatory when the infinitive is present and is optional otherwise. A similar point can be made for the other infinitives of result.

There is nothing in the interpretation of *climb* that entails that climb be undertaken with a particular intention in mind. Even if Sven undertakes the climb volitionally he may do so for no particular reason: the infinitive itself requires that the verb be understood as having an intentional Agent. Most clearly of all there is nothing in the interpretation of *leave* that entails the unexpected outcome of a return. In the case of the Telic Clause it is quite clear that the infinitive gives us some additional piece of information concerning the outcome of the event which is entirely independent of the content of the modified event itself. It is interesting to note that Jones (1991) amongst others supports McConnell-Ginet's view of a natural augmentation of meaning on the basis of distinctions between the Purpose Clause and Rationale Clause with respect to phenomena such as iterability and preposing. However, the Telic Clause patterns with the Purpose Clause and not the Rationale Clause in these respects, yet it is clearly not an argument of the verb, being neither VP-internal in the syntax nor in any non-vacuous way based on an "extention" of what the modified verb means.

As the discussion has implied, if we are thinking of selectional restrictions it seems that the important relation is in the other direction: if something is done with a purpose then the matrix event must be the sort of event that will attribute a purpose to the object in question; if something is done with an intention it must be the sort of thing that can be done with an intention in mind; and if an event has an unexpected conclusion it must be the sort of event where such a reversal is possible. If the infinitives are

unselected by the verbs they modify and possibly even select properties of those verbs in some sense then the interpretation of sentences containing infinitives must be reliant in some way on the features of the infinitives themselves. Notice that in other types of modification this is intuitively clear.

[7] Sven bought an apple in the shop.

It is clear that the relation between the buying of the apple and the shop is established in some way by the preposition *in* independently of what it means to buy an apple and independently of what it means to be a shop. However, the infinitives of result are often discussed as if the problem of interpretation is related exclusively to the problem of linking an argument position of the infinitival verb with an argument position of the matrix verb.

[8] Sven bought an apple *e* to give *e* to Sigrun.

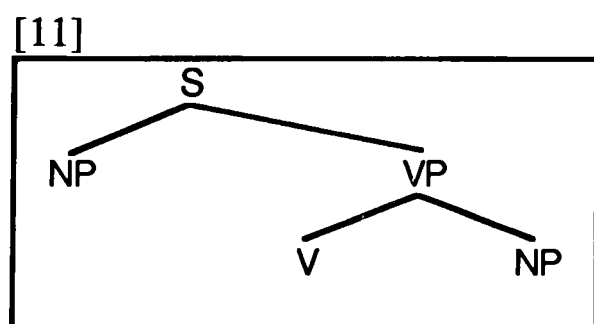
Clearly an account of the infinitive must establish that the object gap in (8) is coreferential with the object, *an apple*, and that the subject gap is coreferential with the subject, *Sven*. Yet the problem of interpretation for these infinitives remains: the infinitive in and of itself introduces a particular type of interpretation, as discussed above. The question is how the infinitive introduces this interpretation itself. Both the higher-order function analysis and the predicate of events analysis provide an answer to this question.

Consider first the higher-order function analysis. In this view the modifier is interpreted as a function from one interpretation (the unmodified) to another interpretation (the modified), where the function is linked to a particular lexeme or construction. This analysis flows naturally from assumptions concerning argument structure and projection in the tradition of Montague (1974). The Montague tradition is founded on the assumption that there is a strict isomorphism between syntactic and semantic structure (every syntactic category maps onto a semantic type and every

syntactic rule maps onto a semantic rule) and that argument discharge proceeds solely by function-argument application. As in traditional logic, the theory assumes only two primitives in the semantics: terms and truth values; all other expressions are functions from the one to the other. For instance, the verb *love* is a two-place predicate, as in (9); say that the proper names *Eloise* and *Abelard* are terms, then the predicate might apply to these terms to yield the proposition in (10), which is true if Eloise loves Abelard and false otherwise.

- [9] love(x,y)
 [10] love(Eloise,Abelard)

Given the isomorphy of syntax and semantics, the syntax must be set up to map directly to the semantics. There is however the well-established fact that constituents in the syntax are hierarchically organised, with the subject dominating all other arguments, as in (11).



Following Schoenfinkel (1924) and Curry (1963), the n-place functions are then treated as a series of one-place functions from an n-place function to an n-1 place function. A verb is then a function from terms to truth values (NPs to Ss) which takes one term at a time until a truth value is yielded. In this view, there must then be a strict divide between arguments (the terms to which the function applies) and true modifiers because the modifiers do not and cannot affect the argument structure of the verbs they modify. Say a phrase modifies an intransitive verb which is interpreted as a one-place function from terms to truth values: that verb clearly does not apply to the modifier as an argument because the subject is interpreted as the subject of the verb; the modifier must

therefore introduce its own interpretation without actually altering the value of the function it modifies. It is therefore a function from a one-place predicate to a one-place predicate: a higher-order function.

Consider a standard case of modification as in (12) and (13).

- [12] Sven walked.
- [13] Sven walked quickly.

Assume *walk* to be a 1-place predicate true of an *x* such that *x* walks. *Quickly* in this view will be a higher order function from 1-place predicates to 1-place predicates; the new 1-place predicate, *walk-quickly*, will be true of an *x* iff *x* walks-quickly. The crucial thing to notice about this analysis is that *walk-quickly* is a new predicate whose interpretation is secured by semantic postulate. Strictly there is no reason for there to be a predictable relation between the input to the function, *walk*, and the output, *walk-quickly*, because the meaning is entirely dependent on the character of the function itself. We cannot prove for example that if Sven walked-quickly then Sven walked, because we cannot be certain of what the relation between walking and walking-quickly is. This relation between the input and output of the function must be stated independently³.

Notice that there are cases where we might wish this failure of entailment to hold, namely in cases of metaphorical extension, where the meanings are related but the trivial entailment described above does not hold. Consider for instance the sentences in (14-15).

- [14] Sam pushed Emily to join the club.
- [15] Sam pushed Emily.

The meanings of *push* in (14) and (15) are clearly related, but the use of the infinitive in (14) forces the abstract metaphorical reading of *push*, meaning *urge*. (14) certainly does

³ I take these observations from lectures delivered by James Higginbotham at the University of Oxford during 1994-5.

not entail (15). It is just this sort of unpredictable relation which is predicted by the function analysis of modifiers but which is clearly inappropriate for modifiers such as *quickly* where the adverb's contribution is clearly isolable and the relevant entailment holds trivially. Notice also that it is not entirely clear that we would really want this function analysis even for the contrast in (14-15) because this is probably best analysed as a case of genuine lexical polysemy, resulting from metaphorical extension, i.e. that there is a verb *push*¹ which is true of x and y iff x shoves y; and there is verb *push*² which is true of x, y, and z iff x urges y to do z. Notice that a lexical ambiguity analysis also predicts that the interpretation of the infinitive will be lexically idiosyncratic.

It is this problem concerning the relation between the interpretation of the modified and the unmodified constituent that is addressed in the predicate of events analysis. Events are taken to be primitives of the model, in fact individuals of an abstract kind. The verb establishes a relation between individuals and an event; modifiers then add additional pieces of information concerning that event. In the famous example of Davidson (1966) under (16) it is therefore assumed that we have three conjoined predicates, as in (17).

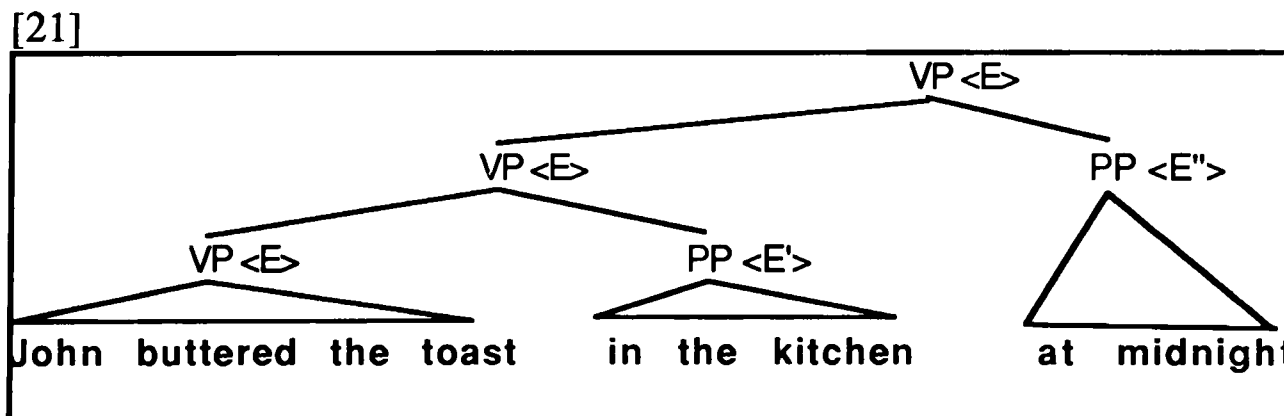
- [16] John buttered toast in the kitchen at midnight.
 [17] butter(John,toast,e) & in(e,the kitchen) & at(e,midnight)

(17) tells us that there is an event of John buttering toast AND that it (the event of buttering) was in the kitchen AND that it was at midnight. Notice that this trivially entails the sentences in (18-20a) whose logical forms are given in (18-20b).

- [18] (a) John buttered toast in the kitchen.
 (b) butter(John,toast,e) & in(e,the kitchen)
- [19] (a) John buttered toast at midnight.
 (b) butter(John,toast,e) & at(e,midnight)
- [20] (a) John buttered toast.
 (b) butter(John,toast,e)

Modifiers are then taken as adding to the meaning of the sentence by simple conjunction, where the event is taken to fall in the intersection of the sets denoted by each predicate⁴. The question is then how these logical forms are derived from the syntax in a compositional theory. Clearly, function-argument application will be inadequate for providing these translations, if for no other reason than that they are recursive.

Higginbotham (1985; 1989) argues that natural language does in fact have more than one principle of argument discharge and that one of the tasks of linguistic semantics is to define a small and explicit set of principles of argument discharge which will apply generally within the grammar. He argues that there are in fact four such principles (see Section 2.1.2). The one which will interest us here is *theta identification*: this allows the values assigned to the argument positions of two syntactic sisters to be identified, with the argument position of the head filtering up to the mother node (and the non-head position being discharged). On this account the patterns shown in (16-20) follow trivially.



⁴ As Shalom Lappin has pointed out to me (personal communication), a simple intersective account fails for a certain class of adverbs, namely the "quantificational adverbs" discussed in Lewis (1975).

- (a) John rarely climbed the mountain to impress Mary.
- (b) John rarely climbed the mountain.

In an intersective account, (a) entails (b), but of course it is not the case that if John rarely climbs the mountain with a particular intention, then he rarely climbs the mountain in general. Within the Davidsonian tradition (cf Higginbotham 1989) it is assumed that such adverbs introduce implicit quantification over events relative to a background, as in (c).

- (c) [Rarely e:B(e)] F(e)

As Higginbotham has pointed out to me (personal communication), in this view such adverbs do not pose a problem for extensionality, and indeed the quantification is a purely extensional context relative to the background B for c.

By theta identification the value of e is assigned to e' ; syntactically the position $\langle E' \rangle$ is discharged but the head position, $\langle E \rangle$, is not and filters up to the mother. Similarly the value of e is assigned to e'' , discharging the syntactic position, $\langle E'' \rangle$; $\langle E \rangle$ filters up. The translation provided will then be as in (22).

[22] $(\exists e)$ butter(John,the toast, e) & in(the kitchen, e) & at(midnight, e)

The modifiers are optional conjuncts and the entailments follow straightforwardly.

These observations follow straightforwardly for the infinitives of result.

Consider (23).

[23] John designed a battery [PC to operate at high temperatures] [RatC to win a prize] [TC only to discover that he was not eligible for the competition]

It is a trivial fact about (23) that it entails the sentences in (24-29).

- [24] John designed a battery to operate at high temperatures to win a prize.
- [25] John designed a battery to operate at high temperatures.
- [26] John designed a battery.
- [27] John designed a battery to win a prize.
- [28] John designed a battery only to discover that he was not eligible for the competition.
- [29] John designed a battery to win a prize only to discover that he was not eligible for the competition.

Given the basic analysis in Section 1.2 of the infinitives of result, the translation of (23) would be as in (30).

[30] $(\exists e^1) (\exists e^7)$ design (John, a battery, e^1) & to¹ (a battery, e^1 , $\wedge \lambda a (\exists e^3)$ operate (a, e^3)) & to² (John, e^1 , $\wedge (\exists e^5)$ win (PRO, a prize, e^5)) & to³ ($\langle e^1, e^7 \rangle$) & realise (PRO, $\wedge p$, e^7)

It is a trivial fact about the representation in (30) that it entails each of the conjuncts which it contains, i.e. (30) entails (31-34).

- [31] design (John, a battery, e^1)
- [32] $P(a \text{ battery}, e^1, \lambda a (\exists e^3) \text{ operate } (a, e^3))$
- [33] $R(\text{John}, e^1, \lambda (\exists e^5) \text{ win } (\text{PRO}, a \text{ prize}, e^5))$
- [34] $T(\langle e^1, e^7 \rangle) \ \& \ \text{realise } (\text{PRO}, \lambda p, e^7)$

Notice also that (30) will entail any proposition identical to itself but with one or more of the conjuncts dropped, i.e. it implies that the interpretation of each infinitive of result is not dependent on the presence of one of the others: notice that it is intuitively clear that (23) entails (27-29) and so this also is correct. The event analysis thus applies naturally and straightforwardly to modification by infinitives of result.

It should be noted, however, that the event analysis is not an addition to the Montague view, simplifying its account of modification: the Davidsonian approach attempts a simplification and restriction of the semantic apparatus at all levels. In the Montague tradition we find the elaboration of higher-order functions and the introduction of type-shifting functions to guarantee compositionality. The Davidsonian tradition attempts to reduce the semantic apparatus to (first-order) predicate-argument application, ordinary quantification, and truth functions, the core apparatus already required in the Montague approach. The Davidsonian approach, as a complete theory of natural language semantics, is therefore more restrictive than its Montagovian rival. This restrictiveness must of course be paid for in ontology: it is only by assuming events as primitives of the model that the other reductions are possible. Much work has therefore been spent on showing the naturalness and necessity of assuming events as primitives: I refer the reader to Davidson (1966), Parsons (1990), Higginbotham (1983a; 1985; 1989); and Schein (1992) for detailed discussion on this issue. This thesis is intended as a contribution to the investigation of the role of events in natural language semantics.

I therefore assume that the Davidsonian analysis of modifiers in terms of predicates of events is the correct one in an analysis of infinitives of result. The infinitives of result are each headed by a predicate whose argument grid contains an

event position which will be identified with the event position of the matrix verb. As will be seen in the sections which follow, I exploit this notion of argument structure as a series of variable place-holders ranging over particular semantic types to derive important properties (both syntactic and semantic) of the constructions. However, such a view of argument grids is not compatible with all views of theta theory which have been developed. I now turn therefore to the question of the nature of argument positions and their relation to thematic roles.

Section 1.4: Argument positions and the theta-role

I am therefore adopting the standard assumption within the Principles and Parameters tradition (following Stowell (1981)) that lexical heads are listed in the lexicon with an argument grid which specifies an addicity for the head and whatever additional information must be stipulated with regard to these positions. I depart from the general convention in assuming that modifiers also have heads (sometimes lexical heads) and that these heads also have argument grids; it is by virtue of these argument grids that the modifier phrase can be integrated into the interpretation of the sentence in the relevant manner. Taking this step, however, of generalising the theory of argument grids, requires a particular view of these grids and the information that they contain. In particular, it requires certain assumptions concerning the nature of theta-roles. Assessing the way that these assumptions relate to others in the literature is complex given that the language of thematic relations is generally adopted but without any commitment to the assumptions of those who are viewed as its principle exponents, namely Gruber (1965) and Jackendoff (1972; 1983; 1990; 1992) (and, orthogonally but in the same spirit, Fillmore (1966) in his work on "deep case").

In the view I am adopting here, which follows Dowty (1989), the meaning of a word may be characterised as the set of lexically specified entailments: those things which must be true whenever a proposition yielded by the predicate is itself true, where these entailments are accessed immediately and without difficulty by the speaker of the language as a part of his knowledge of the meaning of the word in question. Consider the predicate, *love*.

- [1] love <1,2>
- [2] love(x,y)

The argument grid of *love* contains two positions and it translates as a relation between two individuals. *Love* is a two-place predicate which is true of two individuals, x and y, if x loves y, and false otherwise; we know as a direct part of our knowledge about

the predicate *love* that the first individual must be a sentient being, that that being must experience an emotional reaction with regard to some stimulus, and that that emotional reaction must be of a particular kind, i.e. love; we also know that the second object must be related to the first in such a way as to be the cause of the emotional experience in that individual (although that it need not stimulate that reaction intentionally or perform an action which does stimulate the reaction: it is simply a "trigger" of some sort). These entailments might be represented as conditions on the reference of *love*, of the sort given informally in (3).

[3] $\text{love}(x,y)$ iff x is sentient & x experiences an emotional reaction & the emotion is love & y stimulates the emotion in x etc.

Every lexical item will then be provided with a syntactic argument grid, as in (1), a translation of that grid, as in (2), and conditions on its reference, as in (3). The problem with this view is that there will be no fixed way of relating predicates which seem to form lexical classes with important reflexes in syntactic behaviour. For instance the class of experiencer verbs are taken to exhibit peculiar syntactic behaviour cross-linguistically, but in the view offered so far there is no way of making relations between verbs in a particular class necessary facts about the form or interpretation of the lexemes. The problem is intuitively apparent if you consider the meaning of *hate*. It too is a relation between two individuals, x and y , although it is true only if x hates y . If we consider the nature of the entailments of *hate*, however, we find that they are extremely similar to those of *love*. *Hate* also requires that x be sentient, that x experience an emotional reaction, that y stimulate that emotional reaction in x ; it differs only in the entailments which concern the nature of the reaction itself: namely, that the emotion must be that of hatred not of love. The similarity between the two predicates follows only if we offer conditions on the reference of *hate* which take the form of a lexical decomposition, as for *love* in (3).

[4] $\text{hate}(x,y)$ iff x is sentient & x experiences an emotional reaction & the emotion is hatred & y stimulates the emotion in x etc.

We might then take it that particular types of syntactic behaviour correlate with particular sets of lexical entailments. As Dowty (1989) observes, not any old set of lexical entailments is relevant: the verbs *jog* and *walk* both entail that the entity of which they are true must have legs, i.e. the intersect of the entailments lexically specified by *jog* and those lexically specified by *walk* will include the entailment that *x have legs*. However, this is not the sort of entailment set which is generally considered to be syntactically significant. Further, the types of entailments which are considered to be syntactically significant seem to come in clusters. So the relevant observation with regard to (3) and (4) is that both *love* and *hate* entail that *x* is sentient AND that *x* experiences an emotional reaction AND that *y* stimulates the emotion in *x*, etc: this is a significant set of entailments, what Dowty (1989) calls L-Thematic Role Types. We might therefore argue that thematic roles are relations which themselves have these clusters of entailments as conditions on their reference.

[5] *Experiencer(x,y)* iff *x* is sentient & *x* experiences an emotional reaction & *y* stimulates the emotion in *x* etc.

Both *love* and *hate* will then select for this relation as a condition on their reference, along with other lexically idiosyncratic pieces of information.

[6] *love(x,y)* iff *Exp(x,y)* & the emotion is love & ...

[7] *hate(x,y)* iff *Exp(x,y)* & the emotion is hatred & ...

In a Davidsonian analysis such decompositions become particularly attractive as the theta-role can be seen as specifying a relation between some entity and the event in which it participates of a particular type.

[8] *love(x,y)* iff *love(e)* & *Exp(x,e)* & *Stim(y,e)* & ...

"*love* is true of *x* and *y* iff the event is an event of loving and *x* is involved in the event as an Experiencer and *y* is involved in the event as a Stimulus and..."

One important point to note concerns implicit arguments.

- [9] Sven ate some Kentucky Fried Chicken.
[10] Sven ate.

In (10) there is an existential presupposition to the effect that there is some object which bears the same relation to the event of eating as *some Kentucky Fried Chicken* does in (9): i.e. Sven eats **something**. It would be possible to assume that this gives evidence that positions in an argument grid need not be overtly discharged but may (under certain, presumably lexical, conditions) remain implicit. Thus in a theory using thematic labels, the distinction between (9) and (10) would be as in (11-12) (I use the notation of Williams (1994)).

- [11] Svenⁱ ate some Kentucky Fried Chicken^j.
(Agⁱ,Th^j)
[12] Svenⁱ ate.
(Agⁱ,Th)

I will however assume that where a position is present in an argument grid it must be discharged in the standard manner. This will mean that the intransitive use of *eat* will have to be derived by a lexical rule which reduces the number of argument positions of the verb by one. This view gains some support from the fact that the interpretation of intransitive *eat* with respect to its implicit argument is more constrained than the interpretation of transitive *eat* with respect to its internal argument: I can assert that someone eats almost anything (he ate sawdust, he ate fire etc); but the intransitive use must mean that someone has eaten something edible and in fact generally means that he has had a meal of some sort (eaten a portion of food of an appropriate type given the context). The problem is then of relating the meanings of transitive and intransitive *eat*. This however is straightforward in a lexical decomposition: we simply say that the lexical rule does not remove the thematic relation in the translation but supplements it with some further lexically specific relation, C.

- [13] $\text{eat}(x,y,e) \leftrightarrow \text{eat}(e) \ \& \ \text{Ag}(x,e) \ \& \ \text{Th}(y,e) \ \& \ \dots$
 [14] $\text{eat}(x,e) \leftrightarrow \text{eat}(e) \ \& \ \text{Ag}(x,e) \ \& \ \text{Th}(y,e) \ \& \ \text{C}(y,e) \ \& \ \dots$

I make this assumption because it appears that the Purpose Clause cannot take an implicit argument as an antecedent, as pointed out in Jones (1991: 38).

- [15] (a) We've been hiring guards.
 (b) We've been hiring guards to look after the children.
 [16] (a) We've been hiring all week.
 (b) *We've been hiring all week to look after the children.

I take it (in line with the general position) that the Purpose Clause involves predication which will require some form of coindexing or identification of an argument position in the Purpose Clause with the object argument of the main verb (see Section 4.1.2.2 for detailed discussion). If implicit arguments are syntactically available then one would expect (16b) to be well-formed (as far as I can see this is a problem for Jones' theory although he does not mention it). By assuming that implicit arguments are present only in the lexically specified conditions on reference and are not present in the argument grid, the restriction (16b) follows automatically: there will be no appropriate position for the argument of the Purpose Clause to theta identify with.

Thematic relations have a further significance for an analysis of infinitives of result in that they are seen as providing important constraints on the reference of the predicate itself. Chierchia (1989) suggests that the antecedent of the Purpose Clause must be a Theme. In this view, such a restriction would be treated as a condition on the reference of the predicate: the Purpose Clause is a relation between an entity, an event, and a property such that the entity's participation in the event in a Theme-like way is for the sake of its having the property.

- [17] $P(x,e, \lambda z F(z)) \text{ iff Theme}(x,e) \ \& \ \dots$

In fact I will argue in Chapter 5 that thematic relations are inadequate as a characterisation of the linguistically significant constraints on the interpretation of the infinitives, even for the Purpose Clause. Constraints of a rather different kind will be required, which involve relations between events, objects and properties, and individuals and intentions. The view taken here is however naturally open to these types of restrictions as thematic relations are not necessarily privileged as conditions on reference.

This view is different in crucial ways from analyses which presuppose that the theta-role is in some sense a "special" entity with its own characteristics and content. Assume for instance that *love* had a syntactic argument grid as in (18).

[18] *love* <EXPERIENCER, STIMULUS>

Here the verb's argument structure is represented as a list of roles: principles of argument projection must therefore reduce to the assignment of these roles to the relevant phrases; and the notion of (natural language) predicate must reduce to an assigner of such roles. This is rather different to the view given above that the positions in an argument grid were simply minimally differentiated positions, interpreted as variables for the arguments of logical predicates. The positions in the syntactic argument grid now have a privileged status: they are roles or syntactic atoms of a particular type which must be assigned and organised by some set of syntactic principles. The importance of this point can be seen when we turn to infinitives of result (and modifiers in general): it is clear that the Telic Clause does not "assign theta-roles" in the traditional sense.

[19] The side-door on the plane was opened [only for Marcus to realise that his parachute wasn't fastened properly].

The Telic Clause here bears some relation to the sentence, which it was argued above should be seen as a type of argument relation, namely that the Telic Clause is headed by a predicate true of events and predicates itself of the matrix event ($\text{open}(e)$) by the principle of theta-identification. This is an argument relation; it is not however a thematic relation of any sort. If the argument positions in a syntactic argument grid are limited to thematic labels then we are forced away from seeing modification in terms of event predication and hence miss the generalisations concerning systematic entailments and optionality discussed in Section 1.3.

Notice that this follows even in a "bare theta theory" such as the one we find in Williams (1994; 1995). As he observes, his theory does not require any particular definition of the content of theta-roles, merely a list of minimally differentiated roles, as in (20).

[20] love $\langle\theta^1, \theta^2\rangle$

However, the argument positions are still "theta-roles" understood as syntactic atoms of a privileged type. It is possible that this is a notational mirage and that the representation in (20) is intended to be equivalent to the notation in (1). However, this appears not to be the case. Williams (1994: 45) in fact makes precisely the distinction between standard argument projection and modification which necessarily follows if theta-roles are seen as syntactically real, privileged entities.

The relation of the item [the modifier] to the modifiee is structurally identical to the theta relation: that is, absolute locality is required... For these reasons, we will want to subsume this relation under theta theory.

On the other hand, we also want to distinguish this relation from theta relations, for the reason given above: this relation is "transparent" to theta relations in that for a given functor f , the object, shown in {42},

(42) [fX]

has exactly the same potentiality for theta relations that X had. For example, *slowly arrest Bill* has one external argument, just as *arrest Bill* does.

Clearly, the functor relation is a semantic relation, akin to the theta relation. However, rather than filling theta roles, a functor maps theta

assigners into theta assigners. And, as in the case of theta role assignment, the relations are both asymmetric: one item is the functional element, and the other is its argument.

This is in fact a statement of the higher-order function analysis of modification which was argued to be inadequate in Section 1.3. The verb has an argument structure which can be discharged only under a certain type of assignment (here assignment of a theta-role); modifiers clearly do not do this and therefore they must be a higher-order function from theta-assigners to theta-assigners. This position is forced by the assumption that theta roles are syntactic objects of a particular type. Notice that nothing has been said about their interpretation. It may be that the semantics interprets the syntactic theta-label in exactly the manner described above: i.e. as a condition on the reference of variable positions. It may be that this syntactic theory of thematic relations interfaces with a semantic theory such as that of Chierchia (1989), where theta-roles are seen as partial functions from information lists to particular elements on that list. Some such statement needs to be made **whatever view of syntactic argument positions is adopted.**

The question is then whether rejecting the relatively flexible position in (1) for the position in (20) will actually gain anything linguistically, given that it will lose the more convincing view of modification. This is not at all clear. The central problem with thematic relations has always been defining what they actually mean. We have said following Dowty (1989) that the meaning of thematic roles might be seen as clusters of privileged lexical entailments (L-Thematic Role Types); it is significant, however, that Dowty seems unconvinced that defining such privileged sets is possible, given the variability in the situations to which the same theta-role is often applied. Ladusaw and Dowty (1988: 63) comment:

It is possible that if one were to catalog all of the entailments associated with the arguments of predicates and then to consider the intersection of those entailments for all of the arguments which are called "Agents" some non-empty set of entailments would result. We doubt that such a fixed set of roles could be defined in this way.

One possible reason for viewing the theta-role as special comes from the phenomenon of control by implicit arguments (cf the discussion in Williams (1994: 208ff)).

- [21] John performed his first operation yesterday.
[22] John underwent his first operation yesterday.

Assuming that the noun *operation* is understood in parallel to the verb *operate (on)* we can assume that it has an argument structure as in (23).

- [23] operation <AGENT, PATIENT>

It then seems that the verbs *perform* and *undergo* lexically specify with which role of their complement their subject is coindexed: the subject of *perform* always controls the Agent of the complement, i.e. in (21) it is John who does the operating; the subject of *undergo* on the other hand controls the Patient of the complement, i.e. in (22) it is John who is operated on. This however is no reason for assuming privileged thematic labels in the syntax as in (23). As Dowty (1989: 100ff) points out in a discussion of Higgins (1979), these "control" facts may be viewed as lexically specified entailments of the verb.

- [24] $\forall e \forall x [\text{perform}(x,e) \leftrightarrow \text{Agent}(x,e) \ \& \ \dots]$

"for all e and all x, x performs e if and only if x is the Agent of e"

- [25] $\forall e \forall x [\text{undergo}(x,e) \leftrightarrow \text{Patient}(x,e) \ \& \ \dots]$

"for all e and all x, x undergoes e if and only if x is the Patient of e"

That is, the empirical observations concerning (21-22) follow without taking the view that positions in argument grids are restricted to privileged thematic labels. Williams

also observes, however, that there seem to be binding effects in these instances of implicit control, as in (26-27) (Williams 1994: 210f, his {11} and {13}).

[26] *John took his picture.
(Agⁱ...) (Agⁱ, Thⁱ)

[27] John took his own picture.
(Agⁱ...) (Agⁱ, Thⁱ)

The verb *take* is like the verb *perform* in that the Agent of *take* is understood as co-referential with the Agent of its complement. The noun *picture* has an argument structure including an Agent (the individual taking the picture) and a Theme (the individual pictured). It seems that where a pronoun is used as in (26), the Agent of *take* may not be coreferential with the Theme of *picture*; where the anaphoric construction, *his own*, is used, however, coreference is allowed. Williams suggests that this indicates that the binding theory should in fact be relativised to thematic roles rather than the phrases to which they are assigned. This view might be correct. The important point to note however is that relativising the binding theory to argument structure requires only differentiated argument positions (Williams' "bare theta theory") not argument positions which are specifically understood as "thematic". The fact that the subject of *take* is always coreferential with the Agent argument of its complement will follow by lexical entailment as for *perform*. The crucial restriction is that two positions in an argument grid may not be coindexed unless one is assigned to an anaphor. The restriction might as well be represented by (28) as by (29).

[28] * $\langle 1^i, 2^i \rangle$
[29] * $\langle \text{Ag}^i, \text{Th}^i \rangle$

The infinitives of result themselves provide no real support for a specific class of thematic relations. In theories which concern themselves only with the problem of antecedent selection for the gap in the Purpose Clause, the relevant generalisation seems

to be that the controller is a Theme: however, as Bach (1982) first pointed out, the real restriction seems to apply to event structure, Purpose Clauses modify events with "resultant states". In Section 5.1.1 I argue that the notion of Theme is parasitic of the notion of resultant state. The Rationale Clause might conceivably be argued to take an Agent antecedent, but this seems to be far too strong (see Section 5.2); in fact the Rationale Clause seems to modify only events which are "manipulable", where the subject can be construed as manipulating the event with an intention in mind. The Telic Clause clearly does not select for thematic relations at all. In the theory adopted here, whatever restrictions do actually occur as part of the meaning of an infinitive of result will be expressed as a condition on the reference of the predicate of result itself: the verbs which allow modification by this predicate must then be compatible with these particular restrictions. It therefore seems that no advantage in an account of the interpretation of the infinitives of result is to be gained by restricting argument positions to thematic labels; taking the argument positions to be free variable positions on the other hand allows the flexibility required for a unified view of argument projection (without a fundamental distinction between functors and theta-assigners) as well as the flexibility required to explore precisely what sort of generalisations do seem to be active in constraining the interpretation of natural language predicates. In viewing the problem of explaining the interpretation of the infinitives of result in this light I am in effect following Bach (1982: 52) in pursuing an investigation of *natural language metaphysics* in which the nature of the conceptual underpinnings of natural language interpretation are explored. It seems that this exploration (for the infinitives of result at least) is restricted rather than enhanced by a theory which concedes a special place to relations which are "thematic".

In fact, a serious commitment to a thematic semantics in the Principles and Parameters tradition is rare. The actual distinction between the theories of Williams and Higginbotham in this respect is extremely small. Both follow the general tendency in the Principles and Parameters tradition to treat theta-roles as significant only in so far as

they represent syntactic positions which can be used in constraining possible structures.

As Ladusaw and Dowty (1988: 63) observe:

Despite Chomsky's [(1981: 35)] invocation of the work of Gruber, Jackendoff, Fillmore, and Davidson and the suggestive use of the θ , the θ -criterion and θ -roles themselves are a principally diacritic theory: What is crucial in their use in the core of GB is whether an argument is assigned a θ -role or not, which limits possible structures and thereby constrains the application of rules.

The language of theta theory is something of a notational mirage. However, the implications that its use can have for the way a theory is developed is clearly seen in Williams' distinction between theta-assigners and functors. Higginbotham calls his principles of argument discharge *thematic transactions* but the notion of theta role as such is taken less seriously. All that is required in his view is a number of differentiated positions which can be translated as variables in the usual manner. I will adopt this theory as it allows precisely the flexibility that is required to produce an integrated theory of argument projection and modification.

CHAPTER 2: The Literature

Section 2.1: Two theories of argument projection

In the following sections I will discuss two theories of argument projection which have proved important in a discussion of the syntax and semantics of modification. Although similar in many respects, the theories differ significantly in the way they approach the problem of "argument projection". The different conceptions of the problem consequently pull the analyses in different directions. The tension is particularly interesting given that the main work on Purpose Clause modification (Jones (1991)) adopts the theory of Williams, where I will be adopting the theory of Higginbotham.

Section 2.1.1: Williams (1994) and related works

A principle aim of Williams' work is the reduction of a seemingly disparate set of data including NP-movement and certain cases of control to a limited number of principles of theta-role assignment. These principles, constituting the Theta Calculus, involve a number of strictly local relations between the argument positions of heads, mediated by syntactic structure. Following Stowell (1981), Williams assumes that a lexical head has as part of the syntactic information associated with it a specification of its argument structure. He assumes that these positions are minimally differentiated labels, whose notional content is not relevant to the core of his theory. As observed in Sections 1.4, however, the idea that these labels represent relations of a particular type is important to distinctions between standard predicates such as verbs and functors such as adverbials. This theory of minimally differentiated labels Williams calls *Bare Theta Theory*. A predicate such as *hit* will therefore have the argument grid in (1), which might be more fully specified as in (2).

- [1] hit(θ^1, θ^2)
- [2] hit(Ag, Pa)

He assumes that the argument structure (similar to a traditional valency) is an unordered list of roles with the exception that the subject theta-role is distinguished in some manner in the lexicon: in the discussion that follows I will use bold font, as in (3).

- [3] hit(Ag, Pa)

The external argument is taken to be the "head" of the argument structure. The central innovation in Williams' theory is the assumption that it is the theta-roles themselves which refer rather than the NPs to which they are assigned. Argument projection then involves the coindexing of theta-roles with the phrases to which they are assigned; the binding theory is taken to apply to binding relations between thematic roles rather than between the NPs.

Given that all lexical categories can act as predicates, it is assumed that all lexical categories (including nouns) have an argument structure. Even simple nouns have an argument, an external argument, R, indicating their reference. In a simple sentence such as the one in (4) we have the argument structures as in (5).

- [4] John hit Bill.

- [5] (a) hit(Ag^x, Pa^y)
- (b) John(**Rⁱ**)
- (c) Bill(**R^j**)

Argument projection then proceeds by coindexing the external referential role of the noun with the relevant theta-role of the verb, as in (6).

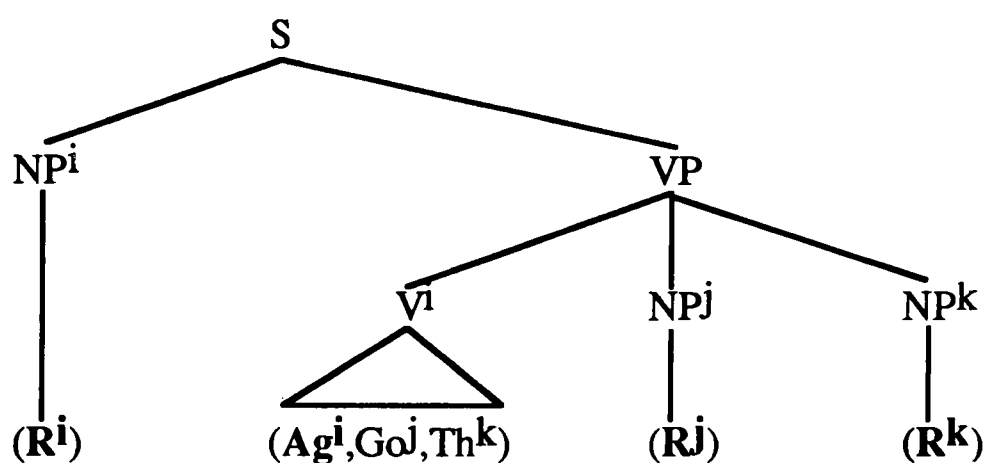
- [6] John hit Bill
- (**Rⁱ=x**) (**Ag^x, Pa^y**) (**R^j=y**)

This coindexing proceeds under certain strict syntactic conditions and Williams explicitly defines three types of coindexing that are allowed, as under (7).

- [7] (a) Internal θ -role assignment
- (b) External θ -role assignment (or vertical binding)
- (c) Predication

Consider the application of the principles in (7) in a traditional phrase structure.

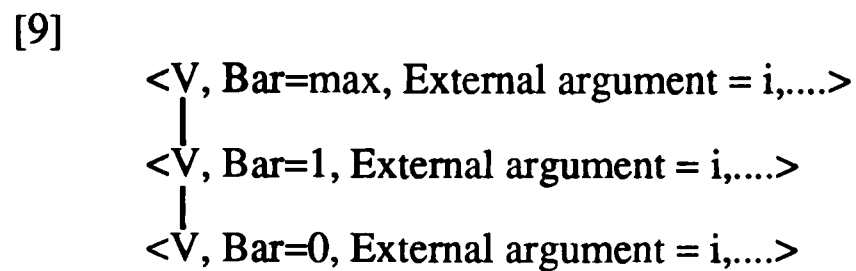
[8]



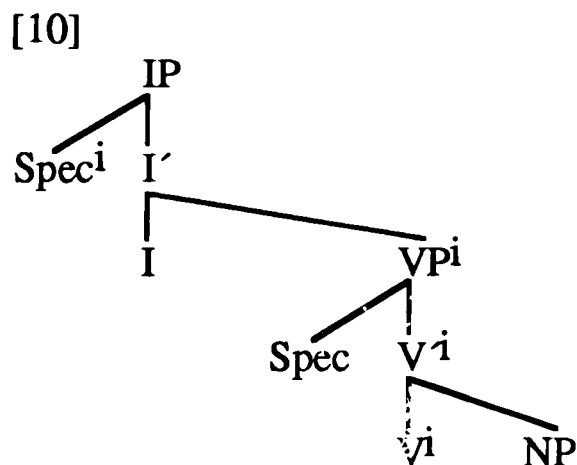
The principle in (7a), Internal θ -role Assignment, discharges (all) internal arguments by coindexing the relevant positions of the head with the external arguments of the head's sisters. This relation is strictly local. The principle in (7b), External θ -role Assignment, allows the external theta-role to be coindexed with the maximal projection of its head. From there it is assigned by the principle in (7c), Predication, to a sister of the maximal projection by coindexing.

Williams in his later work (cf Williams 1994; 1995) presents this theory within an X' phrase structure. There are a number of problems with adapting the theory, however. First, internal θ -role assignment cannot require strict sisterhood because binary branching will not allow ditransitive verbs to project all of their internal arguments as a sister to V. As Williams (1994: 30; 1995: 104) notes, this difficulty is overcome if the restriction is weakened to m-command, so that internal arguments of the verb can be coindexed with any phrase inside the projection of the verb (this will mean, however, that the verb will theta-govern any modifier phrase adjoined to V').

Second, Williams (1994: 33; 1995: 107) argues that vertical binding is reducible to properties of X' theory, given that X'-theory already requires information associated with the head to be projected to its maximal phrase. If we see each node as a label, the idea would work as in (9).



However, this proves to be too restrictive because X'-theory changes not only the structure of the VP but also of the sentence: in the X'-version of S, the VP is not a sister of the subject.



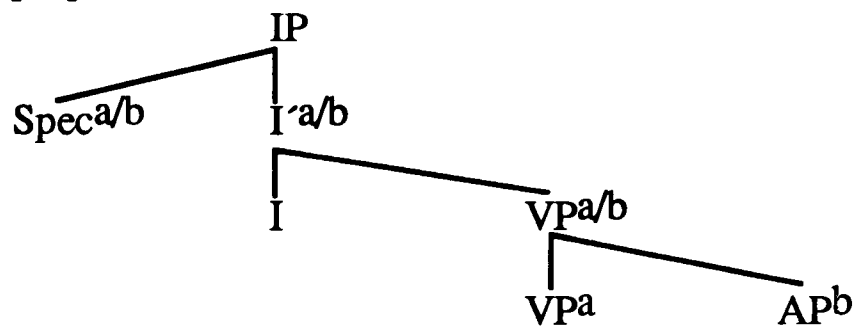
In fact Williams makes the reasonable assumption that the index associated with the external argument can percolate to I' as long as I is not filled with a lexeme with an external argument of its own. Nevertheless if vertical binding is allowed to I' then it must follow from the independent principle in (7b) not from general properties of X'-theory. Predication will then proceed under c-command as before.

These are the three principles of argument projection formally defined by Williams. However, he makes an important assumption concerning the indexing of modifiers which might be seen as a fourth type of principle. Consider a sentence containing a subject-oriented small clause.

[11] John ate his pizza nude.

Williams (1991: 304) observes that a realistic structure for (11) would be the structure in (12).

[12]



The main VP will externally bind the index of its external theta role in the usual fashion, say the index *a*; the modifier AP will also bind an index for its external theta role, say the index *b*. If AP adjoins to VP (as distributional evidence suggests it does) then the mother VP will have to bear the index of both the lower VP and the AP if the NP in IP-Spec is to be the subject of both predicates. The binding of two indices is of course disallowed. Williams (1994: 89) therefore assumes that the two indices can be equated, so that the mother VP is effectively binding only one index. This is effectively a fourth principle of argument discharge, especially given that argument projection in Williams reduces to contexts of coindexation, variously interpreted. I will therefore assume that there is a fourth implicit principle of argument projection, related to vertical binding.

Williams' theory is primarily a syntactic one: argument grids are visible to syntactic rules; the binding principles are revised in terms of relations between theta-roles, making implicit arguments available for binding; roles are related by coindexing, where the indices are syntactic objects requiring explicit syntactic principles to regulate their percolation and value assignments. The mapping between the syntactic representations and the semantic translations which result are not treated systematically. This is quite clear: all of the argument projection principles we have discussed involve coindexing but the interpretation of coindexing is different in different contexts. The

effect of coindexing the verb's internal theta role with the referential role of the noun phrase direct object is shown in (13).

[13] hit (x,y) & Bill(y)

The reference of the noun, *Bill*, acts as a condition on the interpretation of the variable in the verb's structure in a translation often assigned to standard cases of modification. When an index is vertically bound, the interpretation is of lambda abstraction over the external argument.

[14] λx [hit (x,y) & Bill(y)]

However, this use of lambda abstraction is appropriate only to non-nouns. We do not want the external index on a noun to be interpreted as a lambda abstract because the VP/AP/PP will require a term of some sort to fill its external argument position, not a one place function. (15) will not yield (16).

[15] * λx [hit (x,y) & Bill(y)] (λz John(z))

[16] hit(John,y) & Bill(y)

The effect of predication is then to make the subject the argument of this lambda function, as in (17), which by lambda conversion will give the required (18).

[17] λx [hit (x,y) & Bill(y)] (John)

[18] hit (John,y) & Bill(y)

There seems to be no significance to the fact that the object is interpreted by intersection (y is a thing which is hit and a thing which is Bill) where the subject is interpreted by substitution (*hit* is true of John if John hits something).

The effect of coindexing a subordinate predicate with the X' to which it adjoins, as in (12), is presumably intersection and conjunction: however, coindexing in this case

appears to be merely a syntactic manoeuvre to allow the secondary predication to occur in accordance with syntactic principles. As well as the principles of argument projection discussed above we will therefore also require a set of explicit translation rules to spell out exactly how coindexing is to be interpreted in each context.

Williams' focus is not however semantics but syntax and his theory is important in showing how a sophisticated theory of argument projection can obviate the need for certain transformational devices and empty categories. His theory will therefore provide an important orientation point throughout this thesis.

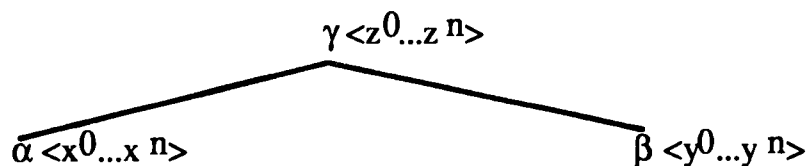
Section 2.1.2: Higginbotham (1985; 1989)

Higginbotham in general discards the language of thematic roles and formulates a theory explicitly in terms of straightforward argument positions. His approach is motivated generally by a desire to "elucidate" the meaning of natural language expressions and lexical items, and to do so he draws on the resources of predicate logic. His theory is therefore intended to address in an explicit and balanced way both the form and the interpretation of sentences and their constituent parts. Like Williams and in keeping with standard analyses he assumes that every lexical argument comes with an argument structure or thematic grid, consisting of bare positions (which may however range over various types of object: individuals, events, propositions, properties etc), as in (1). The grid is straightforwardly translatable into predicate logic, as in (2).

- [1] like<1,2>
- [2] like(x,y)

The information in (1) is part of the syntactic information associated with an item. The central conception of the problem of argument projection in Higginbotham is however slightly different to that of Williams. For Higginbotham the question is how, given two sister nodes in a tree and the argument information associated with them, we can work out the argument structure of the mother of those nodes.

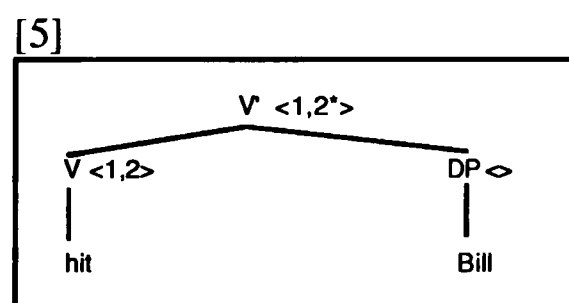
[3]



He argues that Universal Grammar provides a strictly limited way in which daughter nodes may be related to their mother, i.e. functions which specify a particular type of mapping. He suggests four main functions or "thematic transactions", as under (4).

- [4] (a) Direct theta-marking
 (b) Theta-binding
 (c) Theta-identification
 (d) Autonomous theta-marking

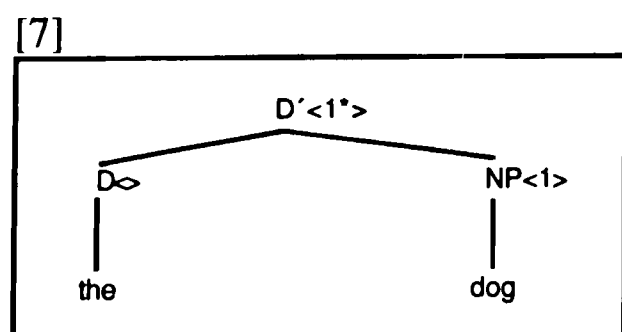
Direct theta-marking specifies a relation between a predicate with an open position and a closed term, such that the mother has the argument structure of the predicate with one less open position. The translation of this substitutes the reference of the closed term into the open position of the predicate. Consider (5).



The verb *hit* is a transitive verb with two argument positions; its sister is a DP headed by a proper name (a closed term). The two nodes project a mother with the argument structure of *hit*, where one position has been saturated or closed (indicated by an asterisk; one could also omit the "2"). The nodes in (5) would receive the logical translation in (6).

- [6] V: hit(x,y)
 DP: Bill
 V': hit(x,Bill)

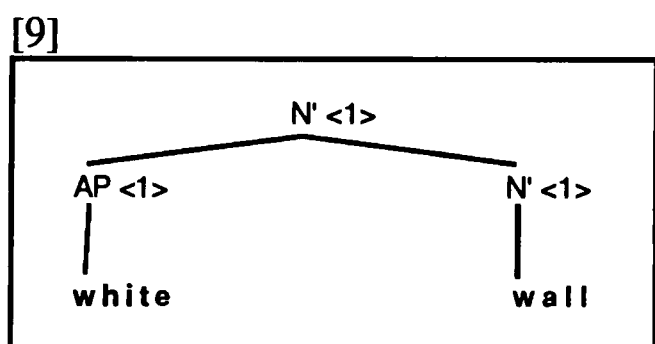
Theta-binding involves the closing of an argument position of a predicate by an operator. Consider (7).



In this view, the determiner, *the*, is an operator; *dog* is a classifier of individuals (i.e. it defines the set of individuals of which *dog* is true). The operator binds the open position, closing it. The translation for the nodes in (7) is as in (8).

- [8] D: THE
 NP: dog(x)
 D': [THE_x: dog(x)]

Theta-identification deals with simple cases of modification, as in (9), where the open position in the argument grid of the modifier is identified with the open position in the argument grid of the head node, the argument grid of the head then filtering up to the mother unaltered.



As the translation of (9) in (10) shows, the semantic effect is literally one of identification: the variable which the AP classifies is assigned the same value as the variable which the lower N' classifies.

- [10] N': wall(x)
 AP: white(y)
 N': wall(x) & white(x)

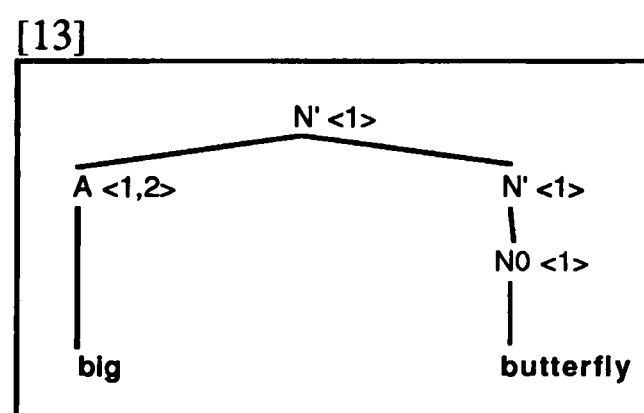
Straightforward conjunction is, however, inappropriate for some adjectival constructions, in one reading at least. For this final class, Higginbotham introduces autonomous θ -marking. Consider the example in (11).

- [11] the big butterfly

(11) could mean that something is both a butterfly and big (by some general standard); it could also mean, however, that the butterfly is big *in so far as it is a butterfly*: a little elephant is still going to be bigger than a big butterfly. Higginbotham therefore suggests that the adjective *big* can be represented as a two-place relation between an entity and an attribute, as in (12).

[12] $\text{big}(y, \lambda x F(x))$

This means that *y* is big for an *F*. Consider the structure for modification in (13).



As in the case of standard modification in (9), the first position of *A* θ -identifies with the argument position of *N'*. Now, however, *A* also autonomously theta-marks *N'* through its second position. Unlike the case of direct θ -marking where a closed term is substituted into the argument position of a predicate (i.e. the argument of the predicate is given the reference of the term), in this case, the second position is given the value of the *N'* node, in this case the attribute of being a butterfly. Both positions of *A* are now satisfied and the grid of the lower *N'* passes up to the upper *N'*. The translation of the nodes in (13) is as in (14).

[14] *N'*: butterfly (*x*)

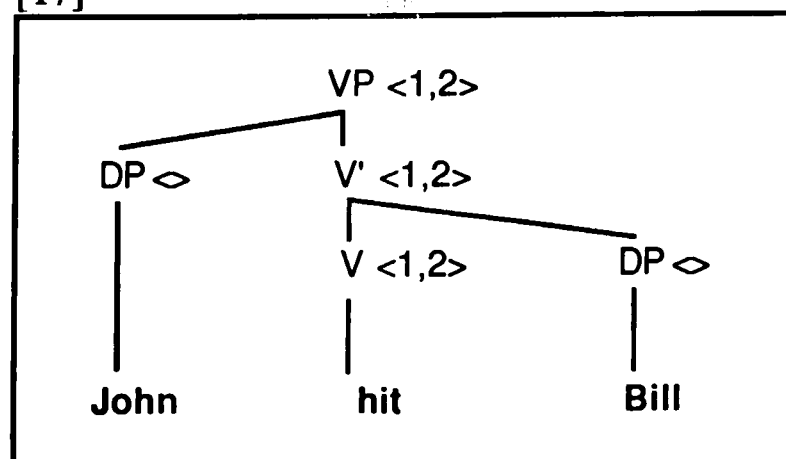
[15] *A*: big (*y*, $\lambda z F(z)$)

[16] *N'*: butterfly (*x*) & big (*x*, λz butterfly (*z*))

"*x* is a butterfly and *x* is big with respect to being a butterfly"

Higginbotham's theory of argument projection is therefore conceived in terms of the systematic composition of meaning. He abandons the Montagovian restriction to function-argument application and argues that Universal Grammar specifies a small number of distinct principles of argument projection. There is an intimate trade-off in this view between the syntax and the semantics. The mapping to the semantics forms an integral part of the definition of the principles of projection themselves. Notice also that it is not a syntactic theory in certain key respects. Where the indices in Williams are syntactically real, the asterisks indicating argument saturation in Higginbotham are not: they are a notational convenience for keeping track of the computation in progress. Higginbotham must assume that the argument grid itself is a syntactic object because the principles of semantic interpretation will need something to specify the addicity of the predicate and relevant aspects of each position's interpretation. Higginbotham (p.c.) assumes that the effect on the argument grid will be syntactically encoded as part of the label information for each node, although this will be formally complex. This formal function can be represented either in the Government and Binding approach of Chomsky (1981) where the whole tree is presented for interpretation or in the bottom-up Bare Phrase Structure account of Chomsky (1994). It is worth noting, however, that there may be no need to represent any such information syntactically. Consider the case of direct theta-marking. Assume that, except for the argument grid itself which specifies the addicity of the predicate, the principles of argument projection do not have syntactic reflexes. Consider then a VP with internal subject as in (17).

[17]



Here the transitive verb *hit* directly theta-marks the object Bill. Assume that this is not marked in the syntax, so that the grid passes up in the expected manner. Now consider the interpretation of V'.

[18] hit(x,Bill)

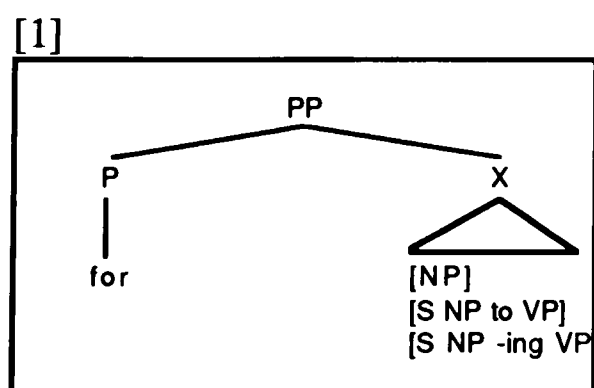
Now assume that the verb directly theta-marks the subject, *John*, through the second position again: this will be uninterpretable. These two nodes do not qualify for direct theta-marking because the relevant position is not an open position but is already referential (it refers to Bill). Direct theta-marking simply cannot apply to the same position twice: the principles of argument projection are so closely integrated in syntax and semantics that the uninterpretability of the structure will block the argument projection. This approach will work best in a simultaneous computation analysis with a bottom-up derivation. Whether this possibility is pursued or whether the thematic transactions are defined in both syntactic and semantic terms, the relevant facts for our analysis will follow.

Section 2.2: Some analyses of infinitives of result

Section 2.2.1: Faraci (1974)

Faraci's doctoral thesis is the pioneering work in the study of infinitives of purpose, establishing some of the major structural distinctions between the two infinitives (Purpose and Rationale Clause) and isolating some key features of interpretation. Faraci's central claim is that the *to*-infinitive and the *for*-NP construction (and in fact the *for*-gerund construction) are not simply related constructions, but are identical at deep structure. Although his view would now be modified considerably, his view that *for* is the head of this construction is still extremely influential. I take it, however, that the syntactic characteristics he isolates are in fact true quite generally of particular classes of adverbial modifiers, and that the semantic relations indicate lexical classes that can be defined in terms of predicates occurring in the conditions on reference of particular items. The key insight of the relation between the constructions, however, comes from this thesis.

Faraci argues that the preposition *for* can take three types of complement at deep structure.



A late transformation then deletes *for* if it is adjacent to *to*. The parallels he offers are striking and cover both distribution and interpretation.

He notes (Pge 48) that those verbs which subcategorise for *for*-NP also subcategorise for *to*-VP, as in (2-4).

- [2] (a) John was waiting for a good movie.
(b) John was waiting to find a good movie.
- [3] (a) John was hoping for a good movie.
(b) John was hoping to find a good movie.
- [4] (a) John was anxious for a good movie.
(b) John was anxious to find a good movie.

More strikingly, he shows that the *for*-NP construction exhibits exactly the same alternation as the *to*-VP construction with regard to "purpose" and "rationale" readings (Pge 49): i.e. the phrase may be interpreted as describing a function of the Theme in which case it cannot be separated from the VP; or it may be interpreted as describing a general intention of the Agent in which case it may optionally be separated from the VP. The parallelism is shown in (5-7).

- [5] (a) John built a robot to entertain his guests.
(b) John built a robot for the entertainment of his guests.
- [6] (a) What John built to entertain his guests was a robot.
(b) What John built for the entertainment of his guests was a robot.
- [7] (a) What John did to entertain his guests was build a robot.
(b) What John did for the entertainment of his guests was build a robot.

The sentences in (5) are ambiguous between purpose and rationale readings. (6) favours a purpose reading and (7) requires a rationale reading. He also notes (Pge 50) that if it is the infinitive which is the focus of the pseudo-cleft (i.e. the phrase which is questioned by the *wh*-element) then the preposition *for* must appear (presumably as the Case-marker of *what*).

- [8] (a) What John built the robot for was to entertain his guests.
(b) What John built the robot for was the entertainment of his guests.

The purpose reading and the rationale reading of each phrase may be disambiguated by preposing (Pge 53), as in (9), where only the rationale reading is possible.

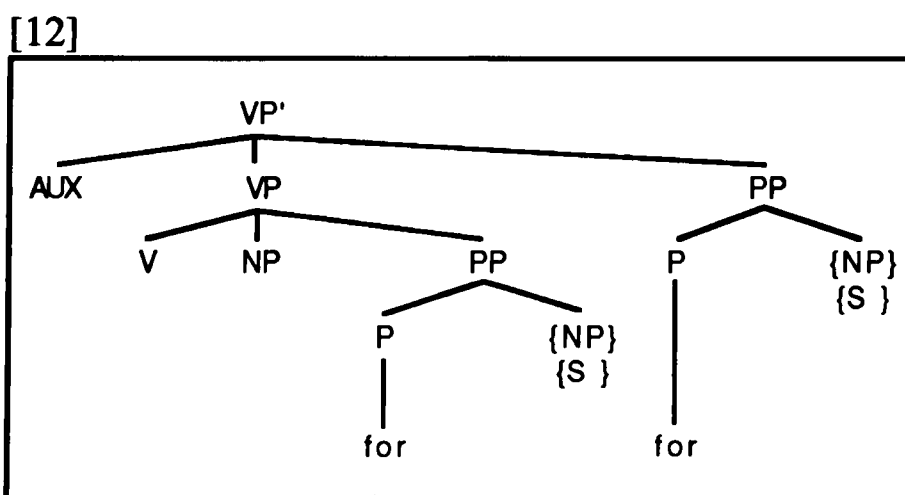
- [9] (a) To entertain his guests, John built a robot.
- (b) For the entertainment of his guests, John built a robot.

When the two readings co-occur, parallel linear precedence restrictions also apply (Pge 57), as in (10-11).

- [10] (a) John built a robot to do the housework to have fun.
- (b) John built a robot for housework for fun.

- [11] (a) *John built a robot to have fun to do the housework.
- (b) *John built a robot for fun for the housework.

On the basis of such alternations, Faraci argues that the constructions are realised in the configuration in (12), where the Purpose Clause is realised as the Complement of V in VP, and the Rationale Clause is realised as the Complement of VP in VP'.



There are a similar number of semantic parallelisms. As with the *to*-VP construction, the property attributed to the object in a *for*-NP purpose construction must be contingent on the main event; that is, the property attributed cannot exist prior to the main event or independently of it.

- [13] (a) We built the car to be durable at high speeds.
 (b) We built the car for durability at high speeds.

In (13), the durability of the car must be result of the particular event of building in which it is involved; it cannot be a pre-existing or inherent property (which would give a reading of (13) in which the durability was the motivation for buying the car). The property expressed by the NP in (13b) can be made an independently-existing property of the object by using a possessive, as in (14).

- [14] *We built the car for its durability at high speeds.

Its implies that durability is already a property of the car and that that property is a motivation for buying. As expected, this sentence is ill-formed. A similar parallelism of *to*-VP and *for*-NP constructions holds for the rationale use of the *for*-phrase. Both constructions are incompatible with insentient subjects, volition-denying adverbs, and statives where the state is not under the control of the subject.

- [15] (a) *The wind knocked down the house to create some open spaces.
 (b) *The wind knocked down the house for the creation of some open spaces.

- [16] (a) *John accidentally entered the competition to win the big prize.
 (b) *John accidentally entered the competition for the big prize.

- [17] (a) *Mary has long legs to do modelling.
 (b) *Mary has long legs for modelling.⁵

⁵ There is interference in the interpretation of this sentence from two readings which we will not discuss here, which may be paraphrased as in (a-b).

- (a) Mary has legs which are rather (too) long for modelling.
 (b) Mary has the legs for modelling.

I will assume that in (a) the infinitive modifies *long* as a degree-adjective and that in (b) it is an Infinitival Relative (with a teleological reading). For the sake of Faraci's present point these two readings are irrelevant.

As for the *to*-VP construction, the *for*-NP construction imposes heavy selectional restrictions on the verb it modifies. In the terminology of Bach (1982), to be discussed in the next section, only verbs with a "resultant state" of a "positive" sort are compatible with the purpose reading of these constructions.

- [18] (a) John built the table to put the flowers on.
(b) John built the table for the flowers.
- [19] (a) *John destroyed the table to put on the bonfire.
(b) *John destroyed the table for the bonfire.

Both *build* and *destroy* are change of state verbs which concern the manipulation of the integrity of an object, but only the positive verb, *build*, is allowed with *to*-VP and *for*-NP in the purpose construction.

Faraci also observes that both the *for*-NP and the *to*-VP purpose construction select the Theme, wherever it occurs.

- [20] (a) John took the horse to the stable to get a rubdown.
(b) John took the horse to the stable for a rubdown.
- [21] (a) John stopped by Henry's to get a massage.
(b) John stopped by Henry's for a massage.
- [22] (a) John took Bill to Henry's to get a massage.
(b) John took Bill to Henry's for a massage.

In (20), it is *the horse* which is Theme and direct object of *take*, as is *Bill* in (22). In (21), however, it is the subject, *John*, who is the Theme, and hence controls the Purpose Clause.

Where the Theme is interpreted as being at the disposal of someone in its attributed property, the person interpreted as being in charge is the Goal/Beneficiary (the Agent being the default Beneficiary of an action).

- [23] (a) Mary bought some rosary beads to do her penance on.
(b) Mary bought some rosary beads for penance.

- [24] (a) Mary bought her daughter some rosary beads to do her penance on.
(b) Mary bought her daughter some rosary beads for penance.

In (24), Mary's daughter is the Beneficiary of the event of buying and hence controls the Purpose Clause; in (23), Mary, as the Agent of the event, is taken as the default Beneficiary.

Faraci thus establishes a striking parallelism between the *to*-VP construction and the *for*-NP construction. The parallelism falls in two domains: syntax and semantics. In the syntax, both the *to*-VP construction and the *for*-NP construction are strictly VP-internal when they are used to modify the object of the verb (the purpose construction); and both are VP-external when they are used to modify the subject (the rationale construction). In the semantics, both the *to*-VP construction and the *for*-NP construction select the Theme in their purpose reading and describe the properties that the Theme comes to have or the purposes it comes to serve by virtue of its participation in the event described by the modified verb; and both the *to*-VP construction and the *for*-NP construction select the Agent in their Rationale reading and concern the general purposes or intentions that motivate the Agent's participation in the event.

In Faraci's analysis this parallelism in syntax and semantics is derived from strict lexical and syntactic identity between the *to*-VP construction and the *for*-NP construction. As can be seen in the diagram in (12), the only difference between the *to*-VP construction and the *for*-NP construction is the alternation between the nominal and the sentential complement of underlying *for*. As observed earlier, Faraci reinforces this claim of strict identity by claiming that the two constructions are subcategorised for by the same verbs and adjectives (e.g. *wait*, *hope*, *be anxious*).

While it is clear that the parallelisms which Faraci discusses do exist, there is strong evidence that they do not exist in the form argued for by Faraci. It will be argued in this thesis that the parallelisms are not uniform and do not derive from strict underlying lexical identity. Rather, the syntactic parallelisms fall out from a general property of adverbial modification in the syntax, conditioned by constraints on

argument projection and c-command (and are not specific to the construction in question); and the semantic parallelisms reflect shared units of meaning in the conditions on interpretation for each lexical predicate, in much the way that verbs which share particular thematic roles may be said to be similar but not identical in meaning. As argued in Section 1.4, however, a satisfactory "elucidation" of the "units of meaning" in question will not necessarily result in thematic relations of the standard type.

In essence, this thesis denies that the *to*-VP construction and the *for*-NP construction are instances of the same construction but rather that they are part of a broader pattern of syntactic and lexical generalisations. The best way to illustrate this is to find a preposition which parallels the *to*- and *for*- constructions in both syntax and semantics in the relevant respects, but which is clearly not an instance of a covert *for*-construction. Consider the behaviour of the preposition, *as*.

Like *for* and *to*, *as* has both a "purpose" and a "rationale" reading. The purpose *as*-NP is forced to remain within VP, where the rationale *as*-NP can be separated from it, as in (25-28).

- [25] John gave Bill a book as a study aid.
- [26] John gave Bill a book as a joke.
- [27] *What John did as study aid was give Bill a book.
- [28] What John did as a joke was give Bill a book.

In (25), the phrase *as a study aid* describes the function that the book was intended to serve having been given to Bill: it thus takes a "purpose" reading. It cannot therefore be separated by pseudo-clefting from the VP containing its antecedent object, as shown by the ill-formedness of (27). In (26) on the other hand, *as a joke* describes how the event is intended to be taken (the general rationale behind the act of giving): as shown in (28), this *as*-phrase can be separated from VP by pseudoclefting. The two phrase-types can also co-occur. Where they do so the familiar linear precedence restrictions apply.

- [29] John gave Bill a book as a study aid as a joke.
- [30] *John gave Bill a book as a joke as a study aid.

Only the "rationale" phrase can be preposed.

- [31] As a joke, John gave Bill a book.
- [32] *As a study aid, John gave Bill a book.

Semantic restrictions pattern in a similar fashion. In the purpose reading, the function which the object serves must be a consequence of the main event, not antecedent to it; and the property must be intended rather than realised.

- [33] John designed the car as an economy model.

In (33), the car has the property of being an economy model only in so far as it is designed to be such (we cannot read (33) as meaning that being an economy model was a property the car had to start with). Attribution of the property is only intended, however, and can be denied without contradiction, as in (34).

- [34] John designed the car as an economy model, but a number of elementary errors in fact made it extremely inefficient.

Also as expected, the purpose *as*-phrase selects only "positive" resultant state verbs, as in (35-36), always selects the Theme as controller, as in (37-38), and shows the expected benefactive alternation, as in (39-40).

- [35] John built the bench as a rest-place for the elderly.
- [36] *John destroyed the bench as wood for the fire.
- [37] John took Bill to the party as the local language expert.
- [38] John stopped in on the party as the local language expert.
- [39] Mary bought a computer game as a companion on the long flight.
- [40] Mary bought her daughter a computer game as a companion on the long flight.

Similarly, in the rationale reading, the *as*-NP construction is incompatible with insentient subjects, volition-denying adverbs, and states where the subject has no control over that state.

- [41] *The river flooded as a threat to the local area.
[42] *John accidentally designed the car as an economy model.
[43] *Mary had long legs as a way of catching men's attention.

It seems that the parallels extend to the Telic Clause in certain important respects.

- [46] John smashed the ball into the net, for a goal in the final minute.
[47] ...and inexplicably quickly the dinosaurs were gone, as a reminder to us all that nothing will endure forever.

The use of *for* in (46) is clearly parallel to the Telic Clause in (48).

- [48] John smashed the ball into the net, to score in the final minute.

Notice that the *for*-phrase in (46) and the infinitive in (48) both receive a factive reading, that is, the goal actually happens. The comma intonation suggests a similar peripheral attachment for the *for*-construction as has been argued for the Telic Clause. The *as*-phrase in (47) is slightly different in interpretation from the other two constructions but is similar in the relevant respects, namely it is factive, i.e. the passing away of dinosaurs does remind us of mortal transience rather than being intended to do so.

The preposition *as* clearly belongs to the same semantic family as *to* and *for*. However, there is no evidence that the *as*-NP construction is the same as the *for*-NP construction; indeed any full specification of the meaning of *as* and *for* will show up clear differences-- but in the relevant respects they are parallel. To account for this family connection, we therefore need something other than syntactic or lexical identity, a way of showing parallelism of interpretation without syntactic isomorphy. It was suggested in Section 1.4 that it was precisely this role that thematic relations play and that the relevant properties could be captured by taking these relations as conditions on the reference of classes of predicates. In this view, each of the related lexemes would have an argument structure (lexically specified), whose conditions on reference would include reference to the same predicate.

- [49] (a) TO(.....) iff $P(x,e,\lambda z F(z)) \& \dots \& \dots$
 (b) FOR(.....) iff $P(x,e,\lambda z F(z)) \& \dots \& \dots$
 (c) AS(.....) iff $P(x,e,\lambda z F(z)) \& \dots \& \dots$

It is perfectly possible of course that, with the exception of the Purpose predicate, the conditions on reference for each preposition will be entirely dissimilar. We thus gain flexibility for lexical variation while giving a precise view of a common lexical element.

Such flexibility is necessary, even in Faraci's own terms. As was observed above, Faraci argues (Pge 48) that the *for*-NP construction and the *to*-VP construction are instances of the same construction because they are subcategorised by the same set of verbs and adjectives (*wait, hope, be anxious*), but this is not so in all cases. In particular, there are verbs such as *pay* and *send* which subcategorise for *for* but not *to*.

- [50] (a) John paid for the books.
 (b) *John paid to own the books.

- [51] (a) John sent for Bill.
 (b) ?*John sent to get Bill.

Further, we have already shown that *as* is parallel to *for* and *to* semantically in precisely the way that Faraci argues that *to* is parallel to *for*, and yet *as* is not similarly subcategorised.

- [52] *John was waiting as a good movie.
 [53] *John was hoping as a good movie.
 [54] *John was anxious as a good movie.

Such lexical anomalies are predicted and allowed in the analysis adopted here because parallelism of meaning points to shared restrictions in the conditions on interpretation, not lexical identity.

Such an approach does not of course account for the striking syntactic parallelisms (where both semantic and syntactic parallelisms in Faraci's account flow

necessarily from constructional identity). However, it appears that the syntactic and semantic parallelisms are not in fact the same; indeed the syntactic parallelism exhibited by the three lexemes are a subpart of a much wider generalisation concerning adverbial modification in the syntax. It appears that any object-oriented modifier is internal to VP and any subject oriented modifier is external to (at least one) VP. Consider the case of the preposition *with*.

With is clearly semantically distinct from *to*, *for*, and *as* with respect to the predication of intentions and purposes, yet it shows exactly the same syntactic restrictions as they do.

- [55] John designed a car with an automatic sunroof.
[56] John built a car with great enthusiasm.

The *with*-modifier in (55) is object-oriented; the *with*-modifier in (56) is subject-oriented. The object-oriented construction is incompatible with pseudoclefting and with preposing, where the subject-oriented construction is compatible with both.

- [57] *What John did with an automatic sunroof was design a car.
[58] *With an automatic sunroof, John designed a car.
[59] What John did with great enthusiasm was design a car.
[60] With great enthusiasm, John designed a car.

It appears that there is also a use of the *with*-construction which parallels the Telic Clause in being strictly VP-external (a traditional S-adverb usage).

- [61] John built the car, with any luck.

Like the Telic Clause, this construction is incompatible with the *do so* construction and with *though*-movement (see Section 3.1 for a more detailed discussion of these examples).

- [62] ?Ruth gave David her article, with any luck, but Kerstin might have done so too, unfortunately.

[63] ?*Give David the code, though Ruth may, with any luck,...

It therefore appears that there are a broad set of restrictions on the distribution of adverbial modifiers, to the effect that object-modifiers must be VP-internal, subject-modifiers must be VP-adjoined, and sentence-modifiers must be strictly VP-external. This has nothing to do with the purpose and rationale constructions themselves, whether with *for*, *to*, or *as*.

The ultimate evidence, however, that the syntactic parallelisms which Faraci sets out derive, not from a shared constructional head, but from general properties of adverbial modification in the syntax, comes from a set of constructions which Williams (1983) takes to be instances of direct predication, and which are generally not taken to be head-mediated-- small clauses. It appears that, just like all the examples discussed so far, where the small clause is object-oriented, as in (64), it is strictly VP-internal and incompatible with pseudoclefting, as in (65), and preposing, as in (66); and where it is subject-oriented, as in (67), it is VP-adjoined and compatible with pseudoclefting, as in (68), and preposing, as in (69).

[64] Sven served the mutton hot.

[65] *What Sven did hot was serve the mutton.

[66] *Hot, Sven served the mutton.

[67] Sven served the mutton, trembling.

[68] What Sven did trembling was serve the mutton.

[69] Trembling, Sven served the mutton.

The explanation for the syntactic parallelism of *for*-NP and *to*-VP constructions therefore lies in perfectly general principles of adverbial modification and not in any construction-specific feature (such as a shared head).

Thus, although Faraci points to an important set of relations between a group of purpose constructions in English, his view that the relations between them are syntactic rather than lexical misses important generalisations concerning adverbial modification and significant lexical idiosyncracies between the heads of the related constructions.

Section 2.2.2: The account of Bach (1982)

Bach (1982) works within the general framework of Montague grammar, using a non-transformational syntax of the type developed in Bach & Partee (1980) and Partee & Bach (1980), and a semantics like that in Montague (1974). The general aim of his paper is to establish what type of information one might *not* want to include in a syntactic or semantic account of the Purpose Clause (the focus of interest is the Purpose Clause; the Rationale Clause is mentioned principally by way of contrast; the Telic Clause is not mentioned at all).

The core of Bach's analysis lies in the notion of a "resultant state". He begins his discussion by drawing out a number of parallels between the *to*-infinitive and the *for*-NP construction. We have looked at some of these parallels in our discussion of Faraci (1974). Bach defines a resultant state, after Van Wright (1963) and Dowty (1972), as involving an event of the form $p/\neg p$ or $\neg p/p$. The Purpose Clause is then related to the second state of affairs. Consider (1-3) (Bach 1982: 39, his {34-36}).

- [1] Mary got up for an hour.
- [2] Mary got up for an hour but had to lie down again after fifteen minutes.
- [3] For an hour, Mary got up.

(1) can have two interpretations. Firstly (and least plausibly) it could mean that Mary got up over and over again during the course of one hour (the iterative reading). Secondly it could mean that Mary got up, intending to be up for an hour (the Purpose Clause meaning). The *get up* event will be structured as in (4), and, in the Purpose Clause reading, the *for an hour* will apply to the second state of affairs (measuring the duration of that state).

- [4] Mary is not up | Mary is up

Further, in the Purpose Clause reading the *for*-phrase denotes only an intended state of affairs. Mary's intention to stay up for an hour could be thwarted, as in (2). As one

would expect, we cannot prepose the *for*-phrase without losing the Purpose Clause reading: (3) is purely iterative. The notion of resultant state does indeed seem to be an important one and I will return to it later.

It is worth noting in passing that Bach's discussion of the resultant state is odd in two ways. First, he specifies in his list of compatible verb classes that the Purpose Clause selects for transitive verbs; this is clearly an oversight as *get up* is an intransitive verb. In fact, intransitive verbs, particularly the unaccusatives, seem perfectly compatible with the Purpose Clause and indeed interact interestingly with it. Second, (1) is a rather complex example because the iterative reading involves what seems to be a quite different meaning of *for*. In his thesis, Faraci (cited by Bach) gives examples of *for* phrases which clearly parallel the *to*-infinitive in having purpose readings alternating with rationale readings. But the iterative *for* in (1) is in no sense a rationale or intentional reading. This in fact points to the problem of insisting on some sort of underlying lexical identity between *to*- and *for*-constructions.

Bach uses the Purpose Clause to pose a general question concerning the nature of linguistic semantics and in particular thematics. He observes that there are two possible extremes in dealing with the problem of meaning. First, one could take the view that the meaning of these clauses falls outside the domain of linguistics, requiring general theories of human action and cognition. On this view there are no questions to ask and the general issues which we have been discussing will be set aside as linguistically uninteresting. Second, one could take the view that we need "a decompositional treatment in which we actually give an explicit definition of the constants we've used on the basis of more primitive components" (Pge 47). This has in general been the approach adopted by linguists and Bach cites as examples "the syntactic decompositions of generative semantics through the lexical decompositions of some interpretivists to the decompositional translations into intensional logic of some Montague grammarians". This thesis is also written in the latter tradition and Bach's comments spell out the problems for such an approach.

He opens by discussing the sentence in (5) (Pge 48f, his {66}).

[5] John bought *War and Peace* to read.

He observes (Pge 49) that "we might give an explicit meaning rule for *for'* (or, equivalently, give it a more elaborate translation into the intensional logic using either constants corresponding to the English words we use in our meaning rule or semantic primitives of some sort, which usually seem to boil down to the former unless we give explicit meaning rules for *them*)". His attempt at such a rule is given under (6).

[6] **I:** *for'* denotes that function h from properties of individual concepts to functions from TV-type intensions to TV denotations such that for all NP intensions $\mathcal{P}_1, \mathcal{P}_2$ properties P , and intensions of TV meanings R ,
 $h(P)(R)(\mathcal{P}_1)(\mathcal{P}_2)=1$ at w, t, g (g an assignment of values to variables)...

I: (iff) $R(\mathcal{P}_1)(\mathcal{P}_2)=1$ at w, t, g , and the extension of \mathcal{P}_2 at w, t, g includes the property of being an x such that x intends that the extension of \mathcal{P}_1 at w, t', g include P at w, t', g for some t' later than t .

for' might then be translated as:

$$\lambda P[\lambda R[\lambda \mathcal{P}_1[\lambda \mathcal{P}_2[R(\mathcal{P}_1)(\mathcal{P}_2) \mathcal{P}_2\{\hat{x}[\text{intend}'(\wedge \mathcal{P}_1\{P\})(\wedge PP\{x\})\}]]]]]]$$

Bach (Pge 49, his {67-68}) points out that this is inadequate, as it would make both (7) and (8) acceptable, when they are in fact ill-formed.

[7] *John read *War and Peace* to start a fire with.

[8] *I hate *War and Peace* for John to destroy.

(7) is acceptable by (6) because (6) merely requires that John read *War and Peace* and that he intend (after reading it) to start a fire with it. (8) is only well-formed by (6) in a very curious reading. (6) requires in (8) that I hate *War and Peace* and intend (after hating it) for John to destroy it. That temporal requirement, that John destroy the book *after* the time of my hating it, is very odd indeed. (6) therefore seems to be quite inadequate as a description of the semantics of the Purpose Clause. Bach does not, however, suggest that there is any straightforward reason for this inadequacy. The

problem is presumably that the two conditions, (a) that John read the book and (b) that he have the intention during the reading of burning it after the reading, are unrelated. It is not enough that John perform the action denoted by the matrix verb and have an intention, but that he intend that very action to be instrumental in achieving his intention. But his reading of *War and Peace* is not for the purpose of destroying it, any more than my hating of *War and Peace* is for John's destroying it. The predicate of Purpose suggested in my basic analysis of the Purpose construction makes precisely this link: the purpose predicate is a relation between an entity, an event, and a property, such that the entity's involvement in the event is *for the sake* of its having the property. John does not of course read the book *for the sake* of starting a fire with it; nor do I hate the book *for the sake* of John destroying it.

Bach (Pge 50) further objects to the idea of including reference to intentions and agentivity in the translation (as I have done with the Rationale predicate, R) on the grounds of examples such as (9).

[9] John bought *The Golden Notebook* for his children to read.

He comments,

Can't this be true in a situation where after months of clamoring, John finally gave in? Here he is merely making it possible for his children to read the book in question.

But he is surely not *merely* making the book available. An intention need not imply active enthusiasm for the course of action taken, only that that course is pursued in the knowledge of the nature and likely consequences of that action. John's lack of enthusiasm for giving the book may remain constant before and after the event of buying the book, what changes is his volitional state: he *chooses* to buy the book, and does so knowing, indeed intending, that as a consequence his children will read the book. We may concede that his choice is grudging, but a choice it remains.

Ultimately, Bach seems dissatisfied with both extremes in addressing the linguistic meaning of Purpose Clauses. He concludes (Pge 52) by suggesting a general way forward which avoids both extremes, although his suggestions are (as he admits) extremely programmatic.

I believe that there is another way of avoiding the uncomfortable conclusions above: that is to recognize that there are at least two other domains of linguistic inquiry beyond syntax and semantics. One is what I have called elsewhere (Bach 1981) *natural language metaphysics*. In such an endeavor we try to understand the conceptual underpinnings of natural languages and natural language. This study has to deal with the place where there is the most immediate and rich interplay between language, the world, and our conceptualization of the world: lexical semantics. The other domain is the theory of *discourse*, where we study how speakers and hearers construct partial models based on texts in contexts (it thus impinges on pragmatics, in several senses of the word).

Into the domain of natural language metaphysics would fall the theory of action, volition, intention, and the attribution of properties; into the domain of discourse, the way in which we work out who is most likely to have objects within their control in different contexts. The issues that Bach raises here, especially with regard to natural language metaphysics will be taken up throughout this thesis.

Section 2.2.3: The account of Chierchia (1989)

Chierchia (1989) offers an account of the Purpose Clause using structured meanings, thematic relations, and semantic postulates. Meaning is structured in terms of information units. Chierchia comments (Pge 137): "We will call atomic information units "eventualities". If β is an information unit, $E(\beta)$ is a proposition that can be read as "it is the case that β "... We say that an information unit β is true in a world w iff $w [E(\beta)]$." Thematic relations are then viewed as partial functions from eventualities into one of their constituents (Pge 139). The definition for Theme is given under (1).

- [1] $Th(\beta) = x_i$, for that unique $x_i \in \beta$ such that whenever β occurs, x_i moves, changes possession or is acted upon by $Ag(\beta)$. If there is no such x_i , $Th(\beta)$ is undefined.

Chierchia comments (Pge 139): "Thematic roles are therefore viewed not as primitives but as partial functions defined in terms of the entailments associated with eventualities".

Chierchia then defines how eventualities will be classified, as under (2) (Pge 144, his {5}). The formula in (3) means that α is a constituent of β ; and the formula in (4) means that there is an eventuality exactly like β except that γ is uniformly substituted for α .

- [2] The type of an eventuality β is the relation r such that $g(r)$ is the first member of β . g is either an argument manipulating operation... or the identity map. We represent an eventuality of type r as β_r .

[3] $\beta[\alpha]$

[4] $\beta[\alpha/\gamma]$

Chierchia then offers his first version of a general control rule, as under (5) (Pge 144).

- [5] (a) $E(\beta_r[P]) E(\beta_r[P/P^*\theta(\beta)])$
 (b) Th > Go > Ag....

He paraphrases this as: "suppose that an r-eventuality that has property P as one of its constituents is the case; then an r-eventuality obtained from β by replacing P with the eventuality $\langle P, x \rangle$ (where x is the bearer of the role θ with respect to β) is also the case". The value of θ is assigned by taking the highest theta-role in the hierarchy which the eventuality type in question makes available.

(5) is a general rule for control. This means that it applies also to cases where the "purpose clause" is subcategorised by the verb. The way the rule applies is shown under (6) (Pge 144, his {7}).

- [6] (a) John tries to swim
 (b) $E(\langle \text{try}', J, \text{swim}' \rangle)$
 (c) $E(\beta_{\text{try}}[P]) E(\beta_{\text{try}}[P/P^*(\text{Ag}(\beta))])$
 (d) $E(\langle \text{try}', J, \langle \text{swim}', J \rangle \rangle)$

(6b) is the propositional meaning of (6a). (6c) represents the application of the postulate in (5) to a *try*-eventuality: *try* supplies only an Agent theta-role and therefore $\theta(\beta)$ is given the value $\text{Ag}(\beta)$. Assuming (6c), (6b) now entails (6d).

The postulate in (5) captures three important generalisations: that control in these structures is strictly local (the controller must be a lexically specified argument of the main verb); that the controller must be unique; and that the controller must be overtly present (accounting for resistance to detransitivisation where a Theme argument would be selected and resistance to passivisation where an Agent argument would be selected). This third generalisation, however, is problematic for a set of predicates which allow control by an implicit argument, as in (7).

- [7] It was decided to leave.

Chierchia therefore adopts a second control principle which effectively supplies the required controller, as in (8) (Pge 149, his {3}).

[8] $E(\beta_r[P]) \wedge \theta(\beta)=x_i \rightarrow E(\beta_r[P/P^*\theta(\beta)])$

The added conjunct in (8) allows reference to an implicit argument (θ -role) of the verb. This can now be selected as controller without being syntactically available. The assumption is then that there is a parameter allowing predicates to select for either the postulate under (5) or the expanded version in (8).

Chierchia now turns to the problem of the Purpose Clause, commenting that "I will just assume that PC's are attached within the VP. This much seems to be fairly clear, while it is not so clear whether they are VP-complements or VP-adjuncts". Noting that Purpose Clauses are insensitive to the passive, and that they occur with double object verbs without being sensitive to the double object alternation, he concludes that the control principle for these clauses cannot be syntactic (governed by Grammatical Functions such as Direct Object) but must be thematic. Considering examples such as those in (9) (Pge 153, his {6}), he assumes that the accurate generalisation concerning controller choice is that given in (10) (Pge 154, his {7}).

- [9] (a) I gave that_i to John_j [_j to read _i].
 (b) I gave John_j that_i [_j to read _i].
 (c) John_j was given that_i [_j to read _i].

- [10] (a) The obligatory gap of PC's is controlled by the matrix theme.
 (b) The non obligatory gap of PC's is controlled by the matrix goal, if there is one.

The control principle(s) which Chierchia has so far developed apply only to cases where a predicate selects a particular set of thematic roles (or rather where an eventuality is classified by a predicate as having certain sets of ordered entailments). The Purpose Clause, however, seems to be an adjunct, at least syntactically. Chierchia therefore adopts the theory of adverbial modification developed by Sally McConnell-Ginet (1982), in which adverbs, previously classed as functions from TVP to TVP intensions, are taken to be natural augmentations of a verb's meaning, i.e. to count as

extra arguments of the verb. Chierchia offers the postulate in (11) as his formalisation of this approach, (Pge 155, his {11}).

[11] For every ad-verb ξ , ξ^* is a function from properties into properties, such that for any property P and any x, $[\xi^*(P)](x)$ is the case iff x acts ξ -ly in doing P.

There is then another parameter allowing certain verb classes to select for the postulate in (11). This analysis faces all the problems in accounting for the systematic entailments of sentences containing Purpose Clause modification discussed in Section 1.3. The fact that (11) is lexically selected allows Chierchia to account for the restraint on a "positive outcome" for PC-verbs: verbs with a positive outcome, like *build*, select for (11); verbs without, like *destroy*, do not. If a verb selects for (11), then the Purpose Clauses with which it occurs will be converted into arguments of the verb, and consequently fall under the rule for control already adopted. This solution to the positive outcome problem seems extremely ad hoc and addresses none of the problems in defining exactly what set of verbs really do allow Purpose Clause modification. A similar lexical stipulation will be required to account for the restriction concerning resultant states.

In line with the general consensus, Chierchia treats the Purpose Clause as an unsaturated structure. However, in his theory, there is no distinction between empty pronominals (such as PRO) and empty operators. His version of the structure suggested by Chomsky (1981), given under (12), is that given under (13) (Pge 156, his {14}).

[12] O_i [PRO to read t_j to the children]

[13] $\lambda x_i \lambda x_j$ [x_j to read x_i to the children]

Note that in this he departs not only for the position consistently adopted by Chomksy, but also the position adopted by Bach, who treats all infinitival subjects as free pronominals and all objects as obligatorily controlled gaps.

We can now see how Chierchia accounts for control in Purpose Clauses (Pge 157ff). (14) gives his account of a single-gap Purpose Clause.

- [14] (a) John designed a battery to operate at high temperatures.
 (b) $E(\langle \text{design}'_{t_0}, \text{John}, \text{a battery}, \lambda x[x \text{ operate at high temperatures}'] \rangle)$
 (c) $E(\langle \text{design}'_{t_0}, \text{John}, \text{a battery}, \langle \lambda x[x \text{ operate at high temperatures}'], \text{a battery} \rangle \rangle)$
 (d) $E(\langle \text{design}'_{t_0}, \text{John}, \text{a battery}, [\text{a battery operate at high temperatures}'] \rangle)$

(14b) gives the propositional content of (14a). Application of the control postulate in (5) will select the Theme of *design* to supply the argument for the lambda operator, giving (14c). Lambda conversion will give (14d). The correct result.

(281) gives the first stage of his account of a double-gap Purpose Clause.

- [15] (a) John gave Mary a book to read.
 (b) $E(\langle \text{give}'_{t_0}, \text{John}, \text{a book}, \text{Mary}, \lambda x \lambda y[y \text{ read } x'] \rangle)$
 (c) $E(\langle \text{give}'_{t_0}, \text{John}, \text{a book}, \text{Mary}, \langle \lambda x \lambda y[y \text{ read } x'], \text{a book} \rangle \rangle)$
 (d) $E(\langle \text{give}'_{t_0}, \text{John}, \text{a book}, \text{Mary}, \lambda y[y \text{ read a book}'] \rangle)$

(15b) gives the propositional content of (15a). Application of the control postulate in (5) will select the Theme of *give* to supply the argument for the first lambda operator, giving (15c). Lambda conversion will give (15d). Chierchia assumes that P in (5) ranges over both propositional and eventuality functions, which means that rule (5) will apply to (15d) again (Pge 158). However, the account now breaks down.

- [16] (a) $E(\langle \text{give}'_{t_0}, \text{John}, \text{a book}, \text{Mary}, \langle \lambda y[y \text{ read a book}'], \text{a book} \rangle \rangle)$
 (b) $E(\langle \text{give}'_{t_0}, \text{John}, \text{a book}, \text{Mary}, [\text{a book read a book}'] \rangle)$

Application of (5) to (15d) will of course select the Theme of *give* once again, giving (16a). Lambda conversion will then give (16b): an incorrect result. Chierchia therefore introduces a disjointness requirement (Pge 158f). He defines the notion of theta-identity as in (17), where $=_{\theta}$ may be read as "has the same theta-role as". He then updates the (parametrised) control principle to that given in (18).

- [17] (a) $\beta = \theta\gamma =_{df} \theta(\beta) = \theta(\gamma)$
 (b) $\alpha = \theta\gamma =_{df} \forall x [\alpha(x) = \theta\gamma]$

- [18] (a) $E(\beta_r[\alpha]) (\wedge \theta(\beta) = x) \rightarrow E(\beta_r[\alpha/\alpha^* \theta(\beta)])$
 (b) where α is any function and θ is the highest θ -role on the scale in c such that $\theta(\langle r, x_1, \dots, x_n \rangle)$ is defined and $\alpha \neq \theta\beta$
 (c) Th > Go > Ag....
 (d) the parenthesized part may be selected by specific types of eventualities.

To return to (15d), we can now reapply the control postulate in (18). Because of the condition of thematic disjointness in (18b), the next highest role in the thematic hierarchy (i.e. the Goal) will be selected as the argument for the second lambda abstractor, giving (19a). Lambda conversion will give (19b): the correct result.

- [19] (a) $E(\langle \text{give}'_{to, John, a book, Mary, \lambda y [y \text{ read a book}']}, Mary \rangle)$
 (b) $E(\langle \text{give}'_{to, John, a book, Mary, [Mary \text{ read a book}']} \rangle)$

One problem to note in Chierchia's account is his rejection of any distinction between the subject- and object-gap of a two-gap infinitive. As has been pointed out above, where the Purpose Clause contains two gaps, the object-gap is obligatorily controlled by the Theme but the the subject gap seems to be freer, being controlled by some sort of "beneficiary". This beneficiary can be an explicit Goal or Agent, but it can be an implicit entity at whose disposal the Theme is placed (however generally), as in (20).

- [20] John brought some wine along to drink with dinner (which was very considerate given that he is teetotal).

As the parenthetical extension suggests, (20) can be true where John does not intend to drink the wine himself, but intends it to be generally available. How would Chierchia's account extend to such examples?

As a starting point, Chierchia would have to assume that the "beneficiary" relation is a standard thematic relation, Ben(θ); this is a possibility he allows for straight-forwardly (Page 139). Certain predicates would then be allowed to select for Ben(θ) as an implicit argument. *Bring* would need to be one of these predicates. Given that *bring* allows control by an implicit Beneficiary, it would then have to select for the extended version of the control rule in (18). However, if *bring* were to select for the extended control rule it should allow implicit control in general. As (21) shows, it does not.

[21] *John brought for Mary to drink with dinner.

The first problem therefore is that the beneficiary relation would have to be characterised as a thematic relation to play a role in the account at all. Its presence would, however, require *bring* to select the extended control rule: but the extended control rule is appropriate *only* for the Beneficiary argument of *bring* not for its other arguments. We cannot separate the Beneficiary relation from the Theme relation, however, because selection of the simple or the extended control rule is a property of *predicates* not the roles for which they subcategorise.

The second problem is that the implicit Beneficiary reading of (20) is only one reading (and the dispreferred one): the natural interpretation is that John brought the wine along because *he* intended to drink it. This reading would follow straight-forwardly if *bring* selected for the simple version of the control rule, because, after the Theme had saturated the object gap, the Agent (the next available role on the thematic hierarchy) would be selected to saturate the subject gap. This would mean, however, that *bring* selects both for the simple and for the extended version of the control rule. This would miss the intuition that the reason the Agent is selected is that an Agent is viewed (by default) as a Beneficiary of his own actions. If this default equation were possible, then only the extended version of the control rule would be required. However, this would mean that an entity could bear two θ -roles with regard to one

predicate (this is a possibility, but one not mentioned by Chierchia here). This problem is made particularly clear in the overt contrast between (22) and (23) (discussed in Section 4.3.3).

- [22] Davidⁱ brought Ruth^j some articles^k *e^j* to explain *e^k* to himⁱ.
[23] Davidⁱ brought Ruth^j some articles^k *eⁱ* to explain *e^k* to her^j.

In both (22) and (23) the object gap is controlled by the Theme as expected. However, there is then a choice with regard to the control of the subject gap: it can be controlled by the Goal as in (22), with the pronoun bound by the Agent; or it can be controlled by the Agent as in (23), with the pronoun bound by the Goal. The alternation does seem to be linked to some notion of beneficiary but it is not the expected one: in (22) there is an implication that David will benefit from the explanation, but of course the subject gap is coreferential with Ruth; in (23) the implication and the control reverses. This however is a pragmatic factor concerning our understanding of explainings, particularly in an academic context. It seems that the notion of Beneficiary must be distinguished from the general notion of "who benefits" or the explanation in terms of an implicit beneficiary role must be abandoned. In any case, (22-23) constitute clear counterevidence to the thematic hierarchy in (18c).

Chierchia's account is a particularly clear and well-argued defence of a thematic view and this clarity also brings out sharply the problems which such an account faces.

Section 2.2.4: The account of Jones (1991)

The most comprehensive work on constructions of purpose is that of Jones (1991) who offers a detailed and wide-ranging discussion of the Purpose Clause, supplemented by an explicit account of the Rationale Clause. His account draws heavily on the works of three scholars: Edwin Williams (1980; 1981; 1987a,b; 1989), Gennaro Chierchia (1984; 1989), and Emmon Bach (1982).

He develops his account of the syntax of the Purpose Clause from Edwin Williams' Theta Theory, which is intended to offer a non-transformational account of the A-system of Universal Grammar and of certain types of modification. The general thrust of Jones' analysis is to argue that Purpose Clauses are bare VPs which predicate themselves of the direct object (i.e. directly assign their undischarged external theta-role to the direct object); the Rationale Clause on the other hand is a fully clausal structure, loosely related to the main sentence in both syntax and semantics. In Jones' view, the Rationale Clause is a saturated structure (a CP); the external θ -role of the infinitival verb is assigned in the usual fashion to PRO in IP-Spec. The infinitival CP then freely adjoins either to VP or to IP, as in (1-2). It is interpreted by some general notion of responsibility (after Farkas (1988)).

- [1] [IPJohn [VP[VPdesigned a battery] [C_PPRO to win a prize]]]
[2] [[IPJohn [VPdesigned a battery]] [C_PPRO to win a prize]]

The subject-gap Purpose Clause is a bare VP, vertically-binding an external theta-role. It adjoins to VP only and assigns its role by predication to the Theme (direct object) of the main verb, as in (3).

- [3] Johnⁱ [VP[VPdesigned a battery]^j] [VP to operate at high temperatures]^j
[Ag^j...]

The object-gap Purpose Clause is also a bare VP; it vertically binds its *internal* argument. It also adjoins to VP and assigns its (now) external role to the Theme (direct object) of the main verb, as in (4).

[4] Johnⁱ [VP[VPbought a book^j] [VP to read to the children]^j]
 [...Th^j]

Let us look at this account in more detail.

The account of the Rationale Clause is relatively uninteresting in that it posits the weakest relations possible between the infinitive and its containing sentence in both syntax and semantics: free adjunction and discourse control. As is clear from my own account, I view the relation between the Rationale Clause and the sentence it modifies as being more strictly controlled and richer in content. In particular, I have argued for a single adjunction point for the infinitive and derived differences between the Purpose Clause, the Rationale Clause, and the Telic Clause on the basis of systematically higher adjunction points. Jones attempts to exploit free adjunction to VP and IP to explain the Rationale Clause's ability to appear inside and outside of the VP with regard to *do so* anaphora and negative scope. In such an account, however, he would presumably have to treat the Telic Clause (which is never discussed) as a CP adjunct. Such a high adjunction point would seem to be untenable. My discussion of the local nature of Agent-selection specifically argues against Jones' view that some general notion of discourse control is sufficient for capturing the constraints on the interpretation of this construction.

Although seemingly straightforward, his account of the subject-gap Purpose Clause also faces a number of problems. First, consider his treatment of *to*. He argues that *to* forms part of the VP, independently of INFL; indeed he treats *to* as some sort of verbal head, giving the structures in (5) and (6).

[5] [VP to [VP...]]
 [6] [VP...]

He argues that the subject-gap Purpose Clause and the normal matrix VP are essentially parallel in that they predicate some argument of an NP subject. But of course the distributions of a bare VP and the phrase containing *to* are not parallel, as shown in (7-8).

[7] John designed a battery [VP to operate at high temperatures].

[8] *John designed a battery [VP operate at high temperatures].

However, there is no *prima facie* reason, if both constructions are simply VPs, why they should not be distributionally equivalent. The only reason that the two constructions behave differently is the presence of *to*. Jones will later use *to* as a way of specifying an event type (which will trigger the relevant semantic postulate for the interpretation of the construction). He must presumably use the presence of *to* here to govern the syntactic distribution, although for reasons that will become apparent he cannot allow *to* itself to have selectional properties. Nor can he allow *to* to be an element of INFL (as in Bach) because this would require a clausal structure, which Jones is arguing against.

Jones reinforces this move away from *to* as an element of INFL in his discussion of event variables. He claims that only a VP governed by INFL has an event variable which can be bound by aspectual and tense operators. The Rationale Clause has such a variable, but, he argues, the Purpose Clause does not. Therefore the *to* cannot be in INFL. Jones is therefore strongly committed to the view that *to* occurs as the head of an upper VP (which does no work); in the Rationale Clause *to* raises to INFL. Notice that *to* is playing an important role in conditioning the syntactic distribution of the construction and its semantic interpretation, because the *to*-VP seems to escape the ban on VPs adjoining to a matrix VP purely because of the presence of *to* and the infinitive receives its interpretation because it counts as a *to*-event type; however, *to* has no content, it is placed in an extra VP-shell just to get it out of the way,

and that shell serves no other function than to host *to*. Given the necessity of using *to* to distinguish the bare VP from the infinitive, we have focused properties of the construction in *to* itself.

Jones' account of the subject-gap infinitive clearly cannot be extended straightforwardly to the object-gap infinitive because it is not the external argument of the infinitival verb which is coindexed with the matrix Theme, but the internal argument. The external argument is either realised by an NP case-marked by *for* or it is left implicit. Jones thus needs a rule for suppressing the external argument of the Object-gap Purpose Clause and forcing the externalisation of the internal argument. He therefore develops an analogy with the passive.

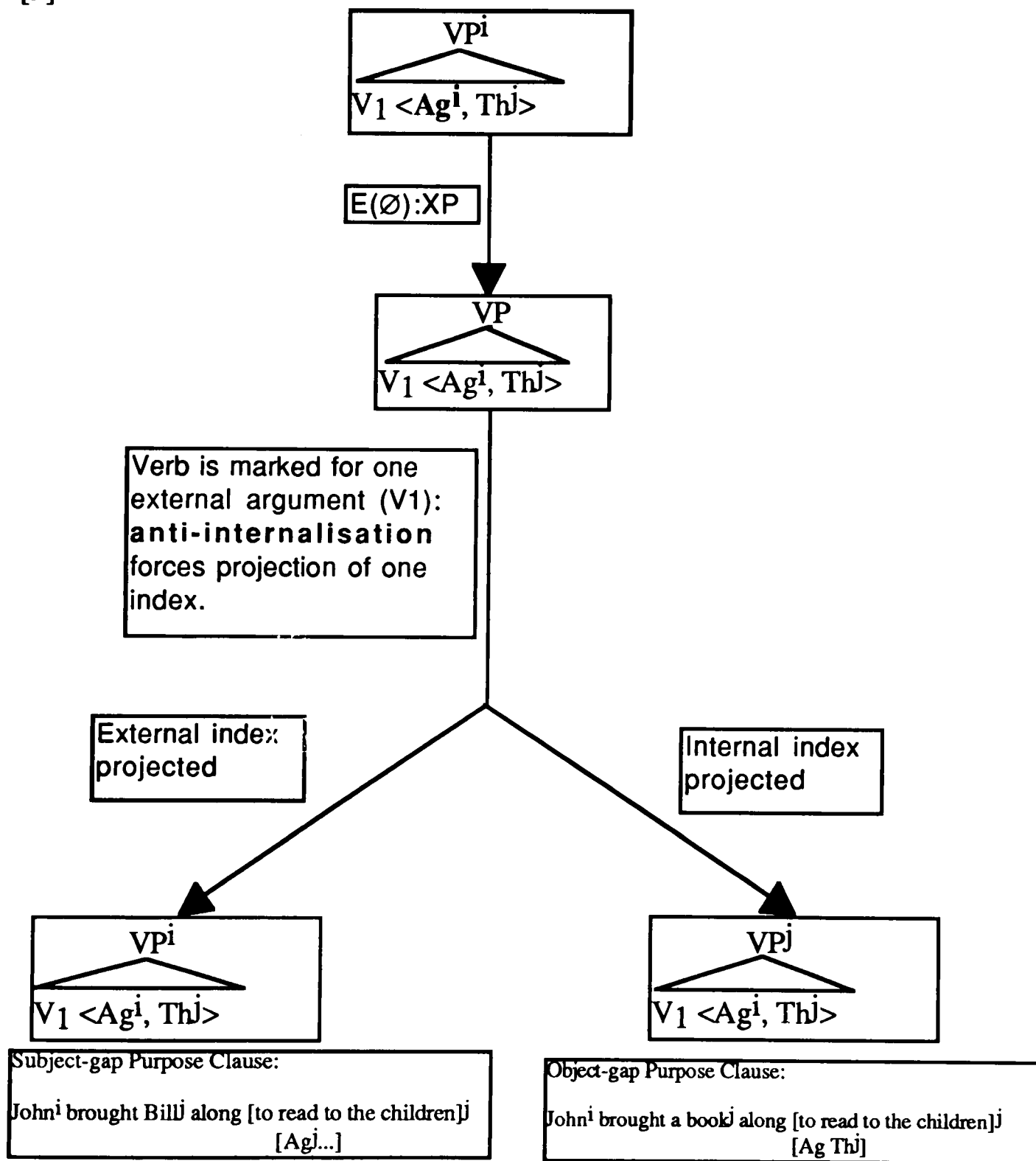
Jones (Pge 99ff) cites Williams' (1981) suggestion that passive morphology triggers a lexical rule which suppresses the external argument of the verbal head (leaving it as an implicit argument on the verb's *internal* subcat list) and which forces the externalisation of the main internal argument: i.e. a passive verb becomes the sort of verb which vertically binds its internal argument and predicates it of its subject.

Jones suggests that there is a phrasal counterpart to this rule which operates in the syntax. This rule takes a VP which is vertically binding its external θ -role and internalises that external θ -role as an implicit argument. This of course does not force externalisation of the internal argument, for which Jones seeks some more "general" motivation. He argues that a verb is listed in the lexicon for the number of external arguments it projects (i.e. $\{V_0, V_1\}$). This marking cannot be changed. Therefore, if a syntactic rule removes a vertically bound external argument, then a verb marked V_1 must project some argument externally. In fact, the phrasal rule for argument internalisation is not exactly the same as its lexical equivalent.

In adopting this account of the OPC, Jones creates a discrepancy between the subject-gap Purpose Clause and the object-gap Purpose Clause: the SPC is a straightforward VP directly predicating itself of the matrix direct object; the OPC is the output of a special syntactic rule. Jones therefore suggests that the OPC account be generalised to cover both types of Purpose Clause. The Externalisation rule applies to a

VP (presumably triggered by the presence of *to* although this is not clear). One of the arguments must be externalised. If it is the usual external argument we get an SPC, if it is the usual internal argument, we get an OPC. This Jones illustrates, as in (9), where bold is used to mark the lexically-specified external argument (Pge 102, his {62}).

[9]



We now have an account of the Purpose Clause as a construction which obligatorily undergoes an externalisation rule and may then randomly externalise any of its roles. The most serious problem for this view is the fact that adjuncts are subject to externalisation just as readily as arguments. He observes (Pge 112f) that the PP

argument of *put* allows an NP from inside its Locational PP to be externalised and argues that this is because the Locational preposition is invisible to the thematic rule. This is fine (although of course the passive does not apply to this role) but then the Location PP is an argument and not an adjunct. He also mentions cases such as (10).

[10] They gave me New York to fly to *e*.

Here the PP is not strictly subcategorised. However, as Jones (Pge 68) points out, citing Larson (1988), this type of adjunct is rather special given that it does not iterate.

[11] *John flew to Kennedy Airport to New York.

Larson takes these PPs to be implicit arguments of verbs of motion but Jones calls them constrained adjuncts. Given their intimate connection with the verb Jones proposes that they can be reanalysed so that the NP is an object of a [Verb + Preposition] constituent. However, both of these cases are irrelevant to the argument. The simple fact is that the object-gap Purpose Clause can occur with any adjunct.

[12] John bakes cakes in the kitchen.

The PP in (12) is a classic adjunct subject to iteration (*modulo* certain set/subset constraints).

[13] John bakes cakes in a corner in the kitchen in the house...

Any theory that treats the PP *in the kitchen* as an argument of some sort will be theory which assumes that there is no distinction between arguments and adjuncts, a position Jones is clearly keen to avoid. And yet just such adjuncts are compatible with OPC in a straightforward way.

[14] John built a kitchen to bake cakes in *e*.

It is hard to see how implicit argument structure or reanalysis could capture this convincingly.

There is however another, more subtle, problem with the analysis in (9). The pattern in (9) is intended to account for the fact that Purpose Clauses with both subject and object gaps occur which seem to behave similarly in the syntax. There is however a problem which is obscured by the use of *read*, a verb which is ambiguous between a transitive and an intransitive reading. In Williams' original proposal, adopted initially by Jones for OPC, the external theta-role becomes an implicit argument (i.e. in the verb's argument structure but unrealised) and the internal argument is projected. In this account, the marking on the external argument is erased-- which is not equivalent to internalising it as an implicit argument-- and then any argument in the argument grid can be externalised. The question is then what happens to the arguments which are not selected for externalisation. One might reply that they must be projected in VP, but clearly the formerly external role does not need to be projected, as we can see by the example with null marking in (9b). On the other hand, we cannot say that the arguments which remain can be implicit as a matter of course because where the originally external argument is itself selected as external argument, as in (9a), then **all** of the internal arguments **must** be projected. Notice that although Jones lists a Theme with an index in (9a) there is no object and in fact this is an occurrence of intransitive *read*. Notice that object of *read* in (9a) has the classic type of lexical restriction on its reference: the object must be stereotypical reading material, it cannot mean any object which Bill thinks that he can "read" such as tealeaves. This covert asymmetry becomes clear with a strictly transitive verb such as *hit*, as in (15-18).

[15] John brought Bill_j along [OPCfor Tomⁱ to hit]_j.
(Agⁱ, Th_j)

[16] John brought Bill_j along [OPCto hit]_j.
(Ag, Th_j)

[17] John brought Billⁱ along [SPCto hit Tom]_jⁱ.
(Agⁱ, Th_j)

[18] *John brought Billⁱ along [SPCto hit]ⁱ.
(Agⁱ, Th)

(15-18) represent the four possible outputs of (9). One role at least must be externalised by the Anti-Internalisation Principle and therefore one role at least must bear an index. It is presumably the case that the other role can also bear an index (i.e. it is syntactically realised): this is Jones' explicit position. It is clear from his treatment of the Agent in (9b), however, that the Agent is allowed to be implicit (i.e. syntactically unrealised but semantically interpreted): this is represented by a null index on a listed θ -role. This must also presumably be a possibility for the Theme. In (15) we have a realised Agent and a realised Theme with the Theme externalised (OPC); in (16) we have an implicit Agent with a realised Theme with the Theme externalised (OPC); in (17) we have a realised Agent and a realised Theme with the Agent externalised (SPC); and in (18) we have a realised Agent and an implicit Theme with the Agent externalised (SPC).

The fact that there must be an asymmetry between a subject gap in a double-gap structure and an object-gap is shown by the fact that (16) is well-formed but (18) is ill-formed⁶. The construction allows the Agent to be "implicit" in (16) but it does not allow the Theme to be implicit in (18). Only the lexeme *hit* itself can allow an implicit Theme and it does not do so. There is, however, no apparent reason for this asymmetry in Jones' account. Indeed the whole point of Jones' syntactic rule is that it removes all the distinctions between the internal and the external arguments: "with a flat argument structure, all arguments are on an equal basis with respect to external projection" (Pge 102). If Jones were to recognise that this asymmetry is actually present then his

⁶ Shalom Lappin has pointed out to me that (18) is in fact fine where we are dealing with games such as baseball, i.e. John brought Bill along so that Bill could act as batsman. Notice however that the interpretation of the implicit object is then not free in the way that the implicit subject is free in (16). In (16) the subject has the same interpretation as an overt subject, with free choice for controller; in (18), the object must be interpreted under strict conditions, that is, the Theme is something which is typically hit in the context of the game (i.e. a pitched ball). The Jones analysis blurs the distinction between a free implicit argument and the occurrence of an implicit canonical or stereotypical object.

analysis would cease to be "unified": his only reason for adopting this more complex approach in the first place. This confusion between implicit arguments and arguments which have simply been internalised makes Jones' discussion on this point extremely problematic. We will now look at Jones approach to the semantics of the constructions.

The semantics Jones (Pge 216ff) offers for the Purpose Clause (both SPC and OPC) is essentially that of Chierchia (1989), repeated here as (19), although he does not include the paranthetical extention of (19a), presumably as he does not think it relevant for the verbs under discussion.

- [19] (a) $E(\beta_T[\alpha]) (\wedge \theta(\beta)=x) \rightarrow E(\beta_T[\alpha/\alpha^*\theta(\beta)])$
 (b) where α is any function and θ is the highest θ -role on the scale in c such that $\theta(\langle r, x_1, \dots, x_n \rangle)$ is defined and $\alpha \neq \theta\beta$
 (c) Th > Go > Ag....
 (d) the parenthesized part may be selected by specific types of eventualities.

Jones points out, however, that this rule is too general. Chierchia assumes that the sorts of verbs which allow the Purpose Clause are those that take a Theme. However, there are some verbs which take a Theme which do not allow the Purpose Clause, as in (20) (cf Jones 1991: 209).

- [20] *John slapped Bill to read to the children.

Jones (1991: 216ff) claims, taking up an idea in Bach (1982), that the problem with sentences like (20) is that the Theme of the verb does not end up in a "resultant state" with the right sort of "latent thematic properties". Consider (21).

- [21] We brought John in to talk to.

The Theme of the verb *bring* ends up in a resultant state: the thing which is brought ends up in the location it is brought to. In this case, John ends up "in" some discourse-specified space. Jones' claim (Pge 220) is that the Purpose Clause is licensed only in so far as we judge John to be more likely to fulfill the Patient-like role of being talked to

when he is "in" than when he was "out". *Bring* has a deictic element which implies, in (21), that we are also "in"; if John ends up "in" then he will obviously be more easy for us to talk to. *Send* has the opposite deictic element and, as we would expect, *send* cannot be substituted for *bring* in (21).

[22] *We sent John out to talk to.

This is because if we are "in" and John ends up "out" then he will be harder not easier to talk to.

Jones therefore rewrites Chierchia's rule to that in (23) (Pge 223, his {35}).

[23] *PC Control as Thematic Matching*
 $E(\beta[P\theta]) \rightarrow E(\beta[P\theta/P\theta*(\mu\theta(\beta'))])$

He paraphrases this as saying that "a proposition $E(\beta)$ about an eventuality β that has as one of its constituents a predicate $P\theta$ that projects an agent/patient θ -role entails an interpretation in which that predicate $P\theta$ is predicated of the argument of β that has matching latent agent/patient connotations in β' , the resultant state of $\beta\dots$ ". He therefore accounts for the ill-formedness of examples such as (20) because the resultant state of a verb such as *slap* fails to have the appropriate agent/patient connotations.

This adaption of the Chierchia rule is, however, extremely problematic. First, there is the problem of defining the content of $\theta(\beta')$ in (23). If we say that the value of θ is *Agent* or *Patient*, are we using those terms in the standard way? The answer must be *yes* if we are not to reopen all the problems of θ -role definition that Chierchia has attempted to avoid in his systematic entailment analysis (an analysis which is already problematic, cf the discussion of Dowty (1989; 1991)). Jones initially seems to equate $\theta(\beta')$ with the established θ -roles; he comments (Pge 220): "we have arrived at this point by considering particular cases in which Theme arguments are acted upon in ways that enhance possible subsequent participation as agent or patient". Whatever "possible subsequent participation" might mean, the notions *Agent* and *Patient* in this passage

seem to be the standard ones. However, Jones continues throughout his subsequent discussion to refer to the roles, $\theta(\beta')$, as "agent/patient connotations". The term *connotation* implies that $\theta(\beta')$ defines a set of entailments which are very similar to the set of entailments which one gets with $Ag(\theta)$ or $Pa(\theta)$ but which are not the same. This slippage in Jones' treatment of the relation, $\theta(\beta')$, flows from a second element in his control rule in (23), the μ -operator.

The μ -operator represents the second major problem with the rule in (23). Jones states (Pge 223) that the μ -operator will "indicate the mediation of "latency" in the agent/patient connotations", a definition which is essentially obscure. He attempts to give some content to this definition by a discussion of the notion of *latency*. Consider the sentence in (24) (Pge 219, his {28}).

[24] John put the glass on the edge of the table.

The putting of the glass on the edge of the table has the resultant state of the glass being on the edge of the table, as shown in (26)⁷.

[26] John put the glass on the edge of the table

The glass is on the edge of the table

It is in this resultant state that the relevant notion of latency occurs. Jones comments (Pge 219) that "among the things we know about situations like the one in (24) is the potential for the glass to fall... this kind of property is not a property of the glass itself, nevertheless it seems to be something we know about the glass in (24)... the property of being liable to fall is the kind of "latent" property I have in mind". Notice that if this

⁷ Note, incidentally, that this is not a resultant state as defined by Bach (1982), which would require the definition in (25).

[25] The glass is not on the edge of the table
The glass is on the edge of the table

Jones does not discuss this technical problem and I set it aside here.

is the case then the notion of latency must concern some sort of modal relation between some particular state and the events which might follow it. Consider (27).

[27] [The glass is on the edge of the table The glass falls to the floor]

We might paraphrase (27) as "it is possible that the glass being on the edge of the table will lead to the glass falling to the floor". If this is what Jones intends, then we have a further problem, as there are of course many possible outcomes of the state in question. It is possible that the glass will be picked up and wrapped as a present for someone, that it will be left there undisturbed for centuries, that it will be smashed by the singing of the resident Russian soprano, etc. These possible outcomes are not the ones which interest us. What seems to be needed is some notion of a "most probable outcome": the glass is more likely to fall when it is on the edge of the table than it is if it is at the centre (a fact on which Jones explicitly comments, Pge 219). But a notion of "modal probability" is likely to be even more difficult to define than notion of "modal possibility": are we, for instance, to define modal probability by asking whether more possible worlds have the glass falling off the table as a subsequent event than any other outcome?

The difficulty is not helped by Jones' ambivalence over the content of the μ -operator. As we have discussed it here, it is the relation between a state (in this case a *resultant* state of *put*) and an event which is the "outcome", in some sense, of that state. Jones, however, continues to characterise the relation purely in terms of the resultant state itself (and its relation to the main event whose resultant state it is). He comments (Pge 219) that "this property of the glass, its potential to fall, arises directly as a result of the *put* action; it is a property of the glass in the resultant state of this particular instance of a *put* relation". But it is not of course a property of the *put*-relation itself; rather it is a property of the resultant state which *put* specifies. By discussing the μ -operator purely in terms of the resultant state and the verbal relation which specifies it,

Jones allows himself to introduce discussion of Agentive intentions, which are in fact strictly irrelevant to the notion of "latency". Consider the sentence in (28).

[28] John put the glass on the edge of the table for the dog to knock *e* off.

As we have seen, the resultant state of *put* is the glass being on the edge of the table. This resultant state is related by some notion of "modal probability" to a subsequent event, namely, the glass falling off the table. John's intentions can be described precisely in the light of the modal relation between the resultant state of *put* and the "probable subsequent event": John acts as he does to achieve some aim (the dog knocking the glass off the table), his choice of action determined by the nature of the probable subsequent events of the resultant state of his action. However, Jones avoids discussion of probable subsequent events (presumably because they will be rather difficult to define); as we saw above, he attempts to claim that the properties of resultant states which he discusses, and the intentions that are related to them in the Purpose Clause, as simply properties of the main verbal relation itself.

The crucial point as discussed in Section 5.1.1 seems to be that the Purpose Clause must apply to a state which is entailed to exist by the verb and that that state must have causal efficacy. Attempting to formulate causal efficacy in terms of latent properties of subsequent states to resultant states of events (where the properties are to be understood as thematic properties) seems to say too much. In this respect I follow Bach in assuming that how we understand what properties the objects have in the states and how they are causally efficacious falls outside of linguistic theory proper and belongs to natural language metaphysics.

Jones' view leads to a peculiarity in his exposition of how the resultant state analysis discounts examples such as (20) above, repeated here as (29), a peculiarity which obscures a real problem with the notion of *resultant state* itself.

[29] *John slapped Bill to read to the children.

Jones comments (Pge 221) that "slapping [Bill] and ignoring him are not typically actions that have as their goal an enhancement of [Bill's] subsequent possible agentivity". Jones therefore explains the ill-formedness of (29) by saying that Agents cannot have intentions of the appropriate type towards them, namely, they cannot intend that by slapping the Theme entity they will increase the likelihood of Agent-like or Patient-like properties in that entity. This simply isn't true: I might think it a very efficient means of making Bill Agentive. "Verbs of violence" are in fact very likely to have the effect on the Theme which the Agent desires, as in (30).

[30] John beat Bill into opening the safe.

Beating Bill might be considered a very effective means of getting him to open the safe. Yet the verb, *beat*, does not allow the Purpose Clause construction.

[31] *John beat Bill to open the safe.

The confusion only arises if one focuses on the intentions of Agents in their actions, rather than on the nature of the resultant states involved. The problem with (29) and (31) in fact seems to be that the main verbs of these sentences do not have resultant states of the appropriate type at all. It is clear that these events do have resultant states of some sort: Bill will for one thing be very bruised and emotionally shaken as a result of the slapping or beating he has taken. The problem lies in defining what a linguistically relevant "resultant state" actually is: for instance, in neither (29) nor (31) does Bill end up in a location lexically specified by the verb. The real problem with explaining the ill-formedness of sentences containing "verbs of violence" lies in defining how those verbs fail to have resultant states of a relevant type. This question is in fact the most basic one that needs to be addressed in any analysis that uses the notion of a "resultant state". By raising the problem of modal relations between states and subsequent events and by then attempting to turn that into a discussion of Agent's intentions, Jones side-steps what seems to be the central problem.

CHAPTER 3: The External Syntax of Infinitives of Result

Section 3.1: The tests themselves

The question that is addressed in the external syntax of a construction is at which point the phrase or construction must be generated in the phrase structure tree; the basic orientation point for answering such a question is the VP: is the constituent VP-internal, VP-adjoined, VP-external, or entirely promiscuous in this respect? The standard means of answering this question involves the use of various tests which distinguish between VP-internal elements (all subcategorised material as well as object-oriented modifiers), VP-adjoined elements (certain adverbials, usually subject/Agent/event-oriented), and VP-external elements (other adverbials). These tests fall into two groups: those involving substitution or anaphora (*do so*, pseudoclefting) and those involving movement (VP-fronting, *though*-movement). In the section which follows I will discuss the nature of these tests and point out particular features which will be relevant in our discussion of infinitives of result.

It has standardly been observed that the phrase *do so* must replace not only the verb but also the elements for which it subcategorises.

- [1] *Ruth **gave** an article to David on Monday and Kerstin **did so** a monograph to Jo on Tuesday.
- [2] *Ruth **gave an article** to David on Monday and Kerstin **did so** to Jo on Tuesday.
- [3] Ruth **gave an article to David** on Monday and Kerstin **did so** on Tuesday.
- [4] Ruth **gave an article to David on Monday** and Kerstin **did so** TOO.

Bold font is used to indicate the elements whose interpretation is included in the interpretation of *do so*. In (1), *do so* is anaphoric only to the verb *give*, excluding the direct object, the indirect object, and the adverb of time: the sentence is ill-formed. In (2), *do so* is anaphoric to the verb and its direct object, but not to the indirect object or

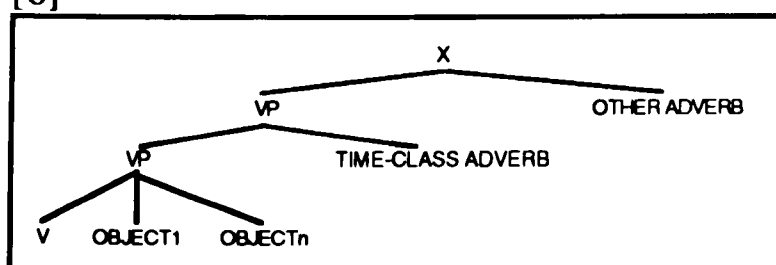
the adverb of time: the sentence is again ill-formed. In (3), *do so* is anaphoric to the verb and both its objects, but not to the adverb: this sentence is well-formed. Notice that the adverb here takes a contrastive reading: all other aspects of the event were the same; they differed solely with respect to time of occurrence. In (4), *do so* is anaphoric to the verb, both its objects, and the adverb of time: the sentence is still well-formed. Notice that the interpretation of the adverb really is present, i.e. Kerstin also gave David the article on Monday. The strict identity of the event in which Ruth is Agent and the event in which Kerstin is Agent is marked by the presence of *too*. Notice that including *too* in (3), though marginally acceptable is extremely odd.

[5] ??Ruth gave an article to David on Monday and Kerstin did so TOO on Tuesday.

The problem is that *too* implies identity of the events in which each individual was Agent, but the inclusion of an adverb of time in the second conjunct asserts a difference between them. I therefore take it that where inclusion of *too* is unnatural the adverb is in the same class as adverbs of time, but that where inclusion of *too* improves the reading that the modifier in the second conjunct is less closely integrated with the verb.

These facts are standardly accounted for, and follow straightforwardly, if it is assumed (i) that the phrase *do so* is an anaphor which replaces VP; (ii) that all subcategorised phrases are included within the projection of the verb (i.e. there is no node, X, c-commanded by a subcategorised phrase where X=VP); (iii) that certain adverbs, including adverbs of time, Chomsky-adjoin to VP (i.e. have a sister and mother node which are both VPs); and (iv) that all other elements are excluded from VP (i.e. there is no node, X, dominating these other elements, where X=VP). This would give the skeletal phrase structure in (6).

[6]

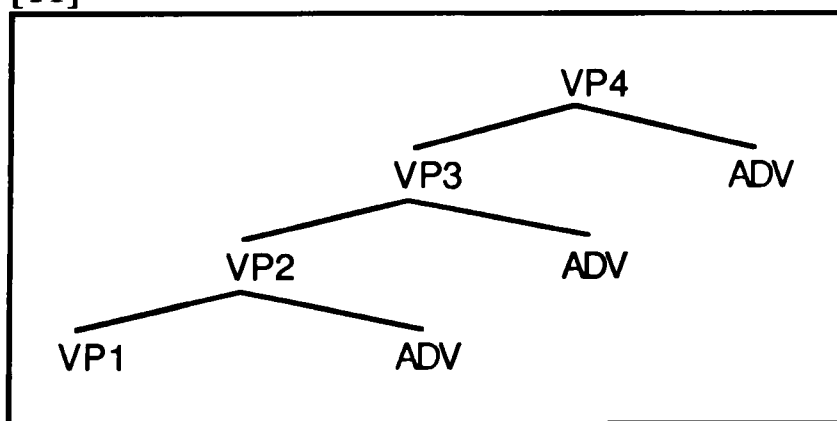


If *do so* replaces (or is anaphoric to) VP, then it will always replace the verb and its objects (which are always included in the minimal VP); it will never replace the higher adverb classes which are never included in a VP; and it will optionally replace the time-class of adverbs because it can either replace the sister VP or the mother VP. Where the sister VP is replaced, the time adverb takes a contrastive reading. Where the mother VP is replaced, there is an identity reading. Notice that *too* is only included naturally where all VP-material has been replaced.

- [7] Mrs White **attacked Rev. Green** in the drawing-room with the candlestick and Miss Scarlet **did so** in the kitchen with the dagger.
- [8] Mrs White **attacked Rev. Green in the drawing-room** with the candlestick and Miss Scarlet **did so** with the dagger.
- [9] ??Mrs White **attacked Rev. Green in the drawing-room** with the candlestick and Miss Scarlet **did so TOO** with the dagger.
- [10] Mrs White **attacked Rev. Green in the drawing-room with the candlestick** and Miss Scarlet **did so TOO**.

We can therefore assume that when *too* occurs naturally it indicates that the maximal VP has been replaced. In a structure such as (11), *too*-insertion will only occur in a natural reading where VP⁴ has been replaced.

[11]



Notice incidentally that *do so* really is replacing the lexical VP. It seems that it is not enough simply to be part of the extended projection of the verb. Consider the examples in (12-16).

- [12] John must have been shouting...
- [13] ...and Bill must have been doing so too.
- [14] *...and Bill must have done so too.
- [15] *...and Bill must do so too.
- [16] *...and Bill does so too.

In (13), *do so* has replaced the lexical verb *shouting*. In (14), we must try to interpret *do so* as having replaced both the lexical verb and the Progressive. This is impossible. The sentence is only well-formed on a reading where Bill's action is interpreted purely as a Perfective: i.e. the Progressive is not included in the interpretation of *do so*, it has simply dropped out. Similarly with (15), the sentence is only interpreted as well-formed where the Perfective and Progressive have dropped out: *do so* does not include any aspectual meaning at all. And similarly with (16), the modal meaning has dropped out completely. This means that *do so* is purely an anaphor of the lexical VP: it cannot replace whatever functional phrases mediate aspectual and modal interpretation of the verb. In the crude phrase structure shown in (17), *do so* will replace only the VP.

[17]



The same can be said of the pseudocleft construction.

- [18] What John must have been doing was reading.
- [19] *What John must have was been reading.
- [20] *What John must was have been reading.

VP-anaphora tests are therefore restricted to the lexical VP.

Within the lexical VP, the pseudo-cleft construction isolates the same elements as *do so*. *What* in (21) is a *wh*-VP.

[21] **What John did *t* was leave.**

In this construction, a *wh*-clause which is subject of copular *be* isolates some constituent whose value is given by the Complement of the copular. The VP can be questioned using *what*, triggering *do*-support, as in (21). The trace marks the position of VP; and the value of VP is established by the copular Complement, [*VP*leave].

As we would expect, the *wh*-element must replace not only the verb but also its subcategorised Complements. The judgements are in fact much stronger than for *do so*.

[22] ***What Ruth did *t* an article to David on Sunday was give.**

[23] ***What Ruth did *t* to David on Sunday was give an article.**

[24] **What Ruth did *t* on Sunday was give an article to David.**

[25] **What Ruth did *t* was give an article to David on Sunday.**

In (22) *what* has replaced only the verb and the sentence is ill-formed. In (23) *what* has replaced the verb and its direct object, but not the indirect object, and the sentence is ill-formed. In (24), *what* has replaced the verb and both its objects, stranding the adverb, and the sentence is well-formed. The interpretation of (25), however, requires caution. As expected, association of the time adverb with the subcategorised VP constituents is well-formed. It seems, however, that we cannot deduce from this that the adverb is actually a part of VP itself.

There are adverbials which we clearly do not want to include in VP itself. Consider the interpretation of *with any luck* in (26).

[26] Ruth gave David the article, with any luck.

The phrase *with any luck* is what is traditionally known as a disjunct and what is sometimes known in the formal literature as a pragmatic adverb: it offers a personal assessment, evaluation, or comment on the content of the sentence which precedes it. Notice that it is marked off by comma intonation. As expected, the disjunct can appear

in the first part of a pseudocleft construction although heavy comma intonation is required.

[27] What Ruth did *t*, with any luck, was give David the article.

However, it can also appear in final position, as in (28).

[28] What Ruth did *t* was give David the article, with any luck.

This implies that **any** adverbial can appear in final position in the pseudocleft construction. We cannot deduce from (28) that the disjunct is part of the VP, as in (29), but must allow the possibility that it is an additional comment as in (30).

[29] **What Ruth did *t* was give David the article, with any luck.**

[30] **What Ruth did *t* was give David the article, with any luck.**

This implies that the only reliable contribution that the pseudocleft construction can make to constituency testing is in what elements are allowed within the cleft itself, rather than what can appear after the copular.

Consider also the behaviour of this disjunct in the *do so*-construction.

[31] Ruth gave David the article, with any luck, and Kerstin did so too.

There are several points of interest to note here. First, the speaker implies that it is a lucky thing that Ruth gave David the article; however, no evaluation is expressed concerning Kerstin's action. The speaker may consider that also to be a lucky thing but they may also have an entirely neutral attitude to it. That means that the VP-anaphor *do so* does not carry over the interpretation of the disjunct, despite the fact that it is stranded outside of the VP in the first conjunct; even the presence of *too*, the maximal identity marker, does not force us to interpret the speaker as committing themselves to an identical evaluation of the second conjunct.

It is difficult to set up any sort of contrast between the disjunct in the first conjunct and some other disjunct in the second conjunct. (32) is a possible example.

[32] ?Ruth gave David her article, with any luck, but Kerstin might have done so too, unfortunately.

Notice, however, that *too* is still here, marking maximal identity between the two VPs: *with any luck* and *unfortunately* cannot therefore represent a contrast between the two VPs but between the two sentences. Disjuncts therefore pose a general problem for the VP-anaphora tests: they are more or less acceptable in the relevant distributions but they have nothing to do with construction itself. These tests must therefore be treated with caution. These issues will necessarily be raised again during a discussion of the external syntax of the Telic Clause.

The *do so* and VP-pseudocleft constructions test for VP constituency by substitution or co-reference. There are however other rules which are sensitive to VP constituency: VP-fronting and *though*-movement. Both of these rules involve topicalisation of a bare VP, in the case of VP-fronting, out of a root sentence, and in the case of *though*-movement, out of a (concessive) subordinate clause governed by *though*. It is assumed that phrases which can topicalise with the VP form part of the VP structure and those which do not, do not. It seems, however, that this test is only consistent with VP-anaphora if it is assumed that the maximal VP alone can topicalise.

Consider first the cases of VP-fronting, applied to the base sentences in (33).

[33] (a) Ruth gave David the code at the conference.
(b) Ruth gave the code to David at the conference.

[34] *Give, Ruth may David the code at the conference, but...

[35] *Give David, Ruth may the code at the conference, but...

[36] *Give the code, Ruth may to David at the conference, but...

[37] ???Give David the code, Ruth may at the conference, but...

[38] ?Give David the code at the conference, Ruth may, but...

One of the problems with this test is that the preposed elements degrade quickly on the basis of stylistic factors concerning weight (I have therefore used the double object construction for topicalisation in (35) rather than the heavier prepositional object version). It is clear, however, that it is quite ungrammatical to topicalise the verb independently of its objects, as in (34-36). Topicalising the verb, its objects, and time/place adverbs, seems to be acceptable, if stylistically heavy, as in (38). Surprisingly, however, stranding of the VP-adverbs, as in (37) seems to me ill-formed. Intuitively these topicalisation constructions place great weight on the action performed by the Agent and it seems that all aspects of that event must be treated as important for the construction to work. We cannot therefore use VP-topicalisation as a test for Chomsky-adjunction, only for VP-internal constituency. Notice that, as we would expect, disjuncts occur naturally in untopicalised position.

[39] ?Give David the code Ruth may, with any luck, but...

However, it can appear in pre-subject position also (if more marginally).

[40] ??Give David the code, with any luck, Ruth may, but...

Again, this is an ambivalent piece of evidence, though, as disjuncts can generally appear in sentence initial position as it is.

[41] With any luck, Ruth may give David the code at the conference.

The general rule with disjuncts is therefore caution.

Though-movement is generally parallel to VP-fronting.

[42] *Give, though Ruth may David the code at the conference...

[43] *Give David, though Ruth may the code at the conference...

[44] *Give the code, though Ruth may to David at the conference...

[45] ??Give David the code, though Ruth may at the conference...

[46] Give David the code at the conference, though Ruth may...

As expected, the verb and its objects must be topicalised out of the *though*-clause, otherwise the sentence will be ill-formed, as in (42-43). Where the verb, its object, and the relevant adverbs are topicalised, the result is well-formed, as in (46). It seems though that in this construction the adverbs can be stranded, as in (45), without being too marginal. In this case though the adverb takes a sort of after-thought reading. It is interesting to note that disjuncts to not seem to occur particularly naturally in these contexts in any position.

- [47] *Give David the code, with any luck, though Ruth may...
[48] ?*Give David the code, though Ruth may, with any luck,...

Perhaps evaluative modifiers do not occur naturally in concessive contexts.

One point should also be made here concerning object-oriented modifiers, such as the AP, *cold*, in (49).

- [49] The waiter served the soup cold.

Syntactic tests place this modifier unambiguously within VP: the modifier may not be separated from VP by pseudoclefting, as shown in (50), or by preposing, as shown in (51):

- [50] *What the waiter did cold was serve the soup.
[51] *Serving the soup he may have been cold...

However, the AP is clearly acting as a modifier and other modifiers may be added iteratively, just as we have seen for the VP-adjuncts.

- [52] The waiter served the soup [cold] [with cream] [in a wooden bowl].

This suggests that there must be a position within VP available for recursive adjunction, a position not offered by the traditional VP-rule in (53).

[53] $VP \rightarrow V XP^*$

Within X' -theory there is of course the position V' , and I take object-oriented modifiers to be evidence for an X' -account of VP. Notice that this is strictly independent of the issue of binary branching (cf Kayne 1983). I will therefore assume that the traditional account of VP is inadequate for an analysis of object-modifiers including the Purpose Clause, preferring theories incorporating X' -structure.

Section 3.2: The Purpose Clause

One of the striking properties of the Purpose Clause is its incompatibility with the *wh*-clause of a pseudocleft construction (cf Faraci (1974), Kirkpatrick (1982), Jones (1985; 1991), an incompatibility which holds for both the subject-gap Purpose Clause and the object-gap Purpose Clause, as shown in (1-2). I have marked the phrase which acts as antecedent to *what* in bold font and I take this to be a VP.

- [1] ***What** Sven did to put in the fridge was take the ice cream into the kitchen.
[2] ***What** Sven did to put the ice cream in the fridge was send Sigrun into the kitchen.

The sentence in (1) is simply ill-formed: it has a gap in object position which must be controlled by *the ice cream* and *the ice cream* is inaccessible as a controller. In (2), the sentence will only be well-formed on a Rationale Clause reading where Sven is going to put the ice cream in the fridge (in context an extremely odd reading); the subject-gap Purpose Clause reading in which Sigrun is to put the ice cream in the fridge is unavailable. This restriction will be accounted for straightforwardly if the Purpose Clause must be a part of the VP. Notice that where the Purpose Clause forms part of the copular Complement, as in (3-4), or where the object itself (independently of the VP) is the focus of the pseudocleft, as in (5-6), the sentences are well-formed as expected.

- [3] What Sven did was take the ice cream into the kitchen to put in the fridge.
[4] What Sven did was send Sigrun into the kitchen to put the ice cream in the fridge.
[5] What Sven took into the kitchen to put in the fridge was the ice cream.
[6] (The person) who Sven sent into the kitchen to put the ice cream in the fridge was Sigrun.

Judgements are the same, if less robust, with *do so* anaphora (cf data from Jones (1991: 61) on VP-deletion).

- [7] *Sven took his yoghurt into the kitchen to eat and Sigrun did so to put in the fridge.

- [8] *Sigrun sent Sven into the kitchen to find her a yoghurt and Anna **did so** to cook her breakfast.

The sentences become well-formed when the Purpose Clause is dropped from the second conjunct.

- [9] Sven took his yoghurt into the kitchen to eat and Sigrun **did so** too.
[10] Sigrun sent Sven into the kitchen to find her a yoghurt and Anna **did so** too.

Notice, however, that the interpretation of the Purpose Clause in the first conjunct is included in the interpretation of *do so*, as indicated by the bold font: the identity of the action performed by *Sven* and *Sigrun* in (9) and *Sigrun* and *Anna* in (10) (modulo the sloppy identity of pronouns) is marked by the use of *too* clause-finally.

The tests used above to indicate the VP-internal status of the Purpose Clause involve substitution, but it seems that movement rules are also sensitive to this, although the test is less effective because the constructions which result are stylistically marked anyway. First there is straightforward VP-preposing in which the bare VP is fronted (cf Jones 1985). In this case it seems that the Purpose Clause must be fronted with the VP.

- [11] ...and [bring it along to drink] he did *t*.
[12] ...and [bring him along to drink the wine] he did *t*.
[13] *...and [bring it along] he did *t* to drink.
[14] *...and [bring him along] he did *t* to drink the wine.

In (11) we have an object-gap Purpose Clause which is fronted with the VP; the sentence is well-formed. In (13) we have the same sentence, with the Purpose Clause stranded outside the VP (whose base position is marked by a trace); the sentence is ill-formed. In (12) we have a subject-gap Purpose Clause which is fronted with the VP; the sentence is again well-formed. In (14) the Purpose Clause is stranded outside the VP, and the sentence is ill-formed.

Similar judgements occur when a VP is preposed outside of a subordinate clause headed by *though* (*though*-movement).

- [15] [Bring it along to drink] though he may...
- [16] [Bring him along to drink the wine] though he may...
- [17] *[Bring it along] though he may to drink...
- [18] ?*[Bring him along] though he may to drink the wine...

In (15) we have a VP and object-gap Purpose Clause fronted out of a *though*-clause and the result is well-formed. In (17), the Purpose Clause has been stranded inside the *though*-clause and the result is ill-formed. In (16) we have a VP and subject-gap Purpose Clause fronted out of a *though*-clause and the result is well-formed. In (18) the Purpose Clause has again been stranded and the result is ill-formed. It does seem however that the subject-gap Purpose Clauses are slightly more acceptable.

Evidence from VP-rules of various types therefore provides fairly strong evidence that the Purpose Clause forms a part of the minimal VP. Another set of facts support this view of intimate association with the verb. It seems that the Purpose Clause always falls within the same scope as the verb in negative contexts (cf Jones 1991). Consider a sentence such as (19).

- [19] Nick didn't bake the cake to serve to Ute.

This should be ambiguous between two readings, represented schematically as in (20-21).

- [20] [Nick bake the cake] [NOT[to serve to Ute]]
- [21] *[NOT[Nick bake the cake]] [to serve to Ute]

In (20), Nick does bake the cake but it was not his purpose in doing so to serve it to Ute. In (21), Nick does not bake the cake and his intention in doing so is to serve it to Ute. (21) is obviously not a possible reading of (19) which is unambiguous. These are the standard scope facts. I take them to be generally accurate with two provisos. First,

the acceptable reading of (19) is not strictly as in (20). (20) asserts that Nick baked a cake and denies that the purpose of the cake was to serve to Ute (i.e. it is focus negation). In fact, (19) merely asserts that it was not the case that Nick baked a cake to serve to Ute. Whether he did or did not bake the cake is indeterminate, i.e. negation here is true wide-scope sentential negation, as in (22).

[22] [NOT [[Nick bake the cake] [to serve to Ute]]]

The excluded reading is however as shown in (21). Unfortunately this is a potentially unhelpful example. The intuitive reason that (21) is ill-formed is that if Nick did not bake a cake then he doesn't have a cake to serve to Ute, i.e. the reading is excluded on semantic grounds which derive from notions of resultant states. Most examples of Purpose Clauses in fact fall under this explanation and an analysis will need to capture this fact. However, it is possible to come up with examples where verb-negation is at least plausible, as in (23).

[23] Nick didn't cook the salmon to serve to Ute.

Here we have the standard reading, as in (24), namely that it was not the case that Nick cooked the salmon to serve to Ute. However, we now have plausible alternative reading, as in (25): imagine that Ute is a wild fan of sushi but that Nick's other friends are not; he might cook the salmon for other guests at his dinner party, but leave it uncooked for Ute.

[24] [NOT[[Nick cook the salmon] [to serve to Ute]]]

[25] ?*[NOT [Nick cook the salmon]] [to serve to Ute]]

I have to admit that I find this reading very strained; given the pragmatic plausibility of the reading I therefore take it that what acceptability it has, it has by virtue of contextual support, and that this scope is in fact grammatically impossible. This provides much

better evidence than the non-ambiguity of (19) derives from a scope restriction imposed by the syntax rather than some more general semantic problem.

It seems that this pattern also holds for negated verbs of destruction, although the judgements are rather delicate. As Bach (1982) observed, the Purpose Clause is generally only possible with verbs that have a resultant state which is in some sense positive, as in (26), rather than negative, as in (27) (a view we will discuss in some detail in Section 5.1.1).

- [26] Nick set up the files to show to Jo.
[27] *Nick destroyed the files to show to Jo.

Once again, the restriction in (27) has an obvious intuitive reason: if Nick destroys the files then he doesn't have anything left to show to Jo. The negation of (27), on this line of thought, has a perfectly plausible interpretation.

- [28] ?*Nick didn't destroy the files to show to Jo.

Nick didn't destroy the files, i.e. he still has them, and that allows him to show them to Jo. Once again I find this reading extremely strained (a sort of resumptive reading where we supply a pronoun for the gap). This implies that the Purpose Clause cannot fall outside of the scope of negation. It also implies that the Purpose Clause does not modify any constituent which can include negation and in fact that it is sensitive to **lexically specified** properties of the verb's event structure.

It is trivially obvious that the Purpose Clause also falls within the scope of interrogation.

- [29] Did Nick cook the salmon to serve to his guests?

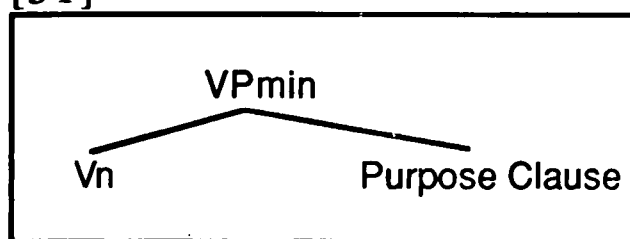
The Purpose Clause in (29) forms a part of the question. Notice also, however, that it can form the focus of the question quite naturally.

[30] Did Nick cook the salmon to serve to his guests or to have for himself?

Infinitives of result seem in general to allow this, although the Telic Clause is rather marginal (see Section 3.4).

These tests provide strong evidence that the Purpose Clause must be contained within the minimal VP (i.e. there must be no other VP within the c-domain of the Purpose Clause). This suggests a structure as in (31).

[31]



As we will see in the following sections no other infinitive of result can occur within this configuration. There is however another type of infinitival modifier which can occur within VP^{min} , the Infinitival Relative (cf discussion in Faraci (1974) and Jones (1985; 1991) amongst others). Where the Purpose Clause is a modifier of the verb, the Infinitival Relative is a modifier of the noun. An infinitive which takes the nominal in object position as its antecedent will usually be ambiguous between the two readings. Consider the sentence in (32).

[32] Sven took the video *e* to show *e* to his mother.

In the Infinitival Relative reading the infinitive tells us something else about the video; it is in fact a restrictive relative and therefore implies that there is some set of videos and that this is the one which Sven intends to show to his mother. This infinitive therefore occurs naturally with the N'-anaphor *one* in a contrastive reading.

[33] Sven took the video *e* to show *e* to his mother but not the one *e* to show *e* to his father.

It does not occur with the pro-NP *it* which replaces the whole noun phrase containing the infinitive.

[34] *Sven took it *e* to show *e* to his mother but not the one *e* to show *e* to his father.

Similar effects occur with the passive. The Infinitival Relative must move with the noun it modifies, as in (35).

[35] The video *e* to show *e* to his mother was taken by Sven.

The pro-NP *it* must replace the whole [nominal + infinitive] string otherwise there is ill-formedness, as in (36).

[36] *It *e* to show *e* to his mother was taken by Sven.

The Purpose Clause shows the inverse behaviour: it modifies the verb and is entirely independent of the NP. In (37) we have two different purposes of the event of not taking the video.

[37] Sven took the video *e* to show *e* to his mother but not *e* to show *e* to his father.

There is one video in (37) and two purposes, not two videos each with a distinct purpose, as in (33). (37) is perfectly compatible with the pro-NP construction.

[38] Sven took it *e* to show *e* to his mother but not *e* to show *e* to his father.

In the passive, the Purpose Clause must be left clause-finally, as in (39).

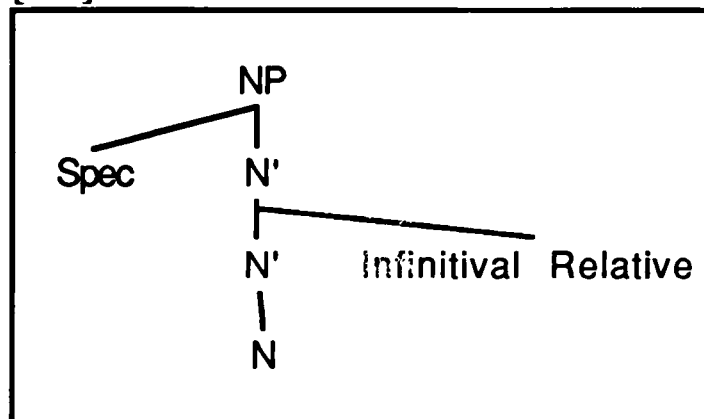
[39] The video was taken by Sven *e* to show *e* to his mother.

This construction is then perfectly compatible with pro-NP as expected.

[40] It was taken by Sven *e* to show *e* to his mother.

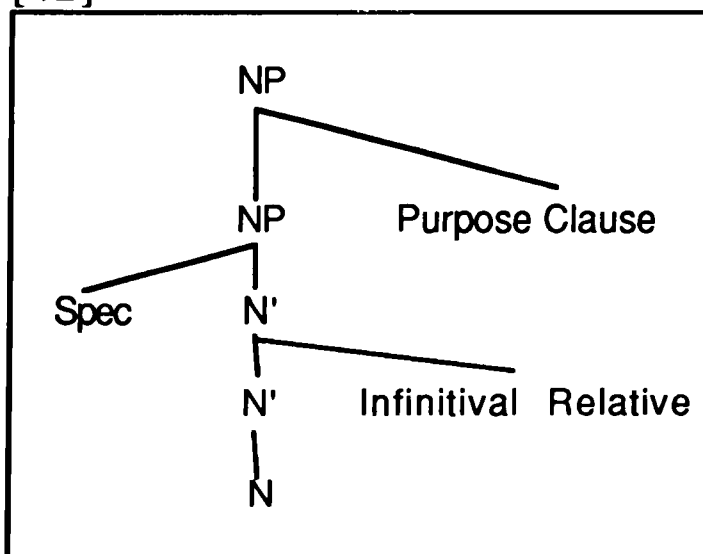
From these observations it follows that the Infinitival Relative occurs within NP, as in (41).

[41]



We already know that the Purpose Clause must occur within the minimal VP. The above observations show that it must occur outside of the direct object NP. One possibility would be to suggest that the Purpose Clause adjoins to the NP rather than being included within it, as in (42).

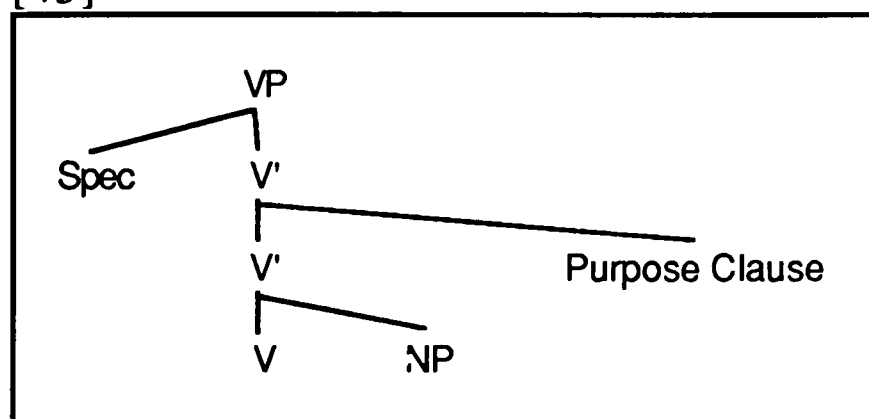
[42]



This would capture the fact that the Purpose Clause can occur outside of the NP (as it has an NP sister). However, it also suggests that that Purpose Clause can ambiguously appear inside and outside of pro-NP, which as we have seen is not the case. Notice in particular that if (42) were the structure, we would expect (37) to imply the presence of

two videos. In fact it merely implies two purposes for the main event. This strongly suggests that the Purpose Clause is not a nominal modifier of any sort. Given that the Purpose Clause must occur within the minimal VP but that it cannot be associated with a direct object NP, and given binary branching, this naturally suggests adjunction to V', as in (43).

[43]



Section 3.3: The Rationale Clause

The Rationale Clause shows the classic properties of a VP-adjunct, namely that rules of substitution and movement which apply to the VP apply to the Rationale Clause optionally, a fact which would follow under Chomsky-adjunction because the rules could apply either to the VP to which the Rationale Clause adjoins or to the VP mother of the Rationale Clause, created by the adjunction rule itself.

In cases of substitution this means that the Rationale Clause can either be replaced by the VP-anaphor or left "outside" the substitution. For instance, consider the cases of pseudo-clefting in (1-2).

- [1] **What Ute did *t* to please her friends was cook a salmon dinner.**
[2] **What Ute did *t* was cook a salmon dinner to please her friends.**

In (1), the Rationale Clause is left outside of the *wh*-VP, whose antecedent is Complement of the copular, a simple VP; I follow Kirkpatrick (1982) and Jones (1991) in assuming that (1) is well-formed, *pace* Faraci (1974). In (2), the Rationale Clause forms part of the antecedent VP itself.

Similar judgements occur with *do so*-anaphora (again compare with data in Jones (1991: 61) on VP-deletion).

- [3] Ute cooked dinner to please her friends and Sigrun did so too.
[4] Ute cooked dinner to please her friends and Sven did so to get out of the washing-up.

In (3), *do so* takes as its antecedent the entire [VP + Rationale Clause] string: notice that (3) asserts that Sigrun also cooked dinner with the intention of pleasing her friends (again, sloppy identity). Unless *do so* is ambiguous in the antecedents it allows, this implies that the [VP + Rationale Clause] string form a VP constituent. As expected, however, the modified VP can itself be replaced by *do so*, excluding the Rationale

Clause, to give the well-formed (4). It therefore appears that the Rationale Clause is Chomsky-adjoined to VP, forming a split VP.

Movement rules which apply to VP also seem to respect this segmentation (although as suggested above, these tests are less effective given the stylistic weight). Consider the case of straightforward VP-preposing (cf Jones 1985).

- [5] ...and [get wildly drunk to offend the guests] John did.
[6] ...and [get wildly drunk] John did, to offend the guests.

It seems to be possible to prepose the [VP + Rationale Clause] as in (5) or to leave the Rationale Clause *in situ* and prepose just the minimal VP segment, as in (6). There is a problem here, however. The force of the Rationale Clause is different in (5-6). In (5) the Rationale Clause is taken to be part and parcel of what John did: the whole point about what happened was that he acted as he did with the express intention of offending the guests. In (6) on the other hand, all that John did was get wildly drunk: it happens also to be true that in doing so he intended to offend the guests, but that piece of information is an afterthought. This is not inconsistent with the analysis. The syntactic rule simply makes two forms of topicalisation available; the truth-conditional semantics guarantees an intentional reading of the infinitive; and then it may be that the pragmatics of topicalisation and weight of information units takes over. However, I suggest that his data should be treated with some care; a point which will become more important in our discussion of the behaviour of the Telic Clause in these constructions (in Section 3.4). The same intuitions (with the same proviso) occur in the *though*-movement examples, as in (7-8).

- [7] [Get wildly drunk to offend the guests] though John may...
[8] [Get wildly drunk] though John may, to offend the guests,...

The Rationale Clause may be preposed with the VP, as in (7), or left *in situ* as in (8), although (8) has the flavour of an aftercomment.

Interestingly, exactly the same ambiguity occurs with negation, which is strictly a scopal phenomenon (cf Jones (1991) for an alternative view of these facts). Consider (9).

[9] Jo didn't make a pass at the guy to impress us.

This sentence is ambiguous, as in (10-11).

[10] [NOT [[Jo make a pass at the guy] [to impress us]]

[11] [NOT [Jo make a pass at the guy]] [to impress us]

In (10) we have the reading where it simply isn't the case that Jo made a pass at the guy with the intention of impressing us. In (11) we have the reading where Jo does not make a pass at the guy and not doing so is intended to impress us. There are two possible solutions to this problem. It might be the case that the Rationale Clause moves in and out of the scope of negation, as proposed by Jones (1991). However, this will not fit in well with our discussion of the distribution of the Telic Clause which must clearly be structurally superior to the Rationale Clause: if the Rationale Clause adjoins ambiguously to VP or IP then the Telic Clause will be forced to adjoin too high in the tree. The other solution takes up the parallel that clearly emerges between negation and modification as discussed so far. It may in fact be the case that negation adjoins to VP, hence taking ambiguous scope over the Rationale Clause, and is then raised to NegP at LF for checking.

As with the Purpose Clause, the Rationale Clause is unambiguously in the scope of interrogation, as in (12).

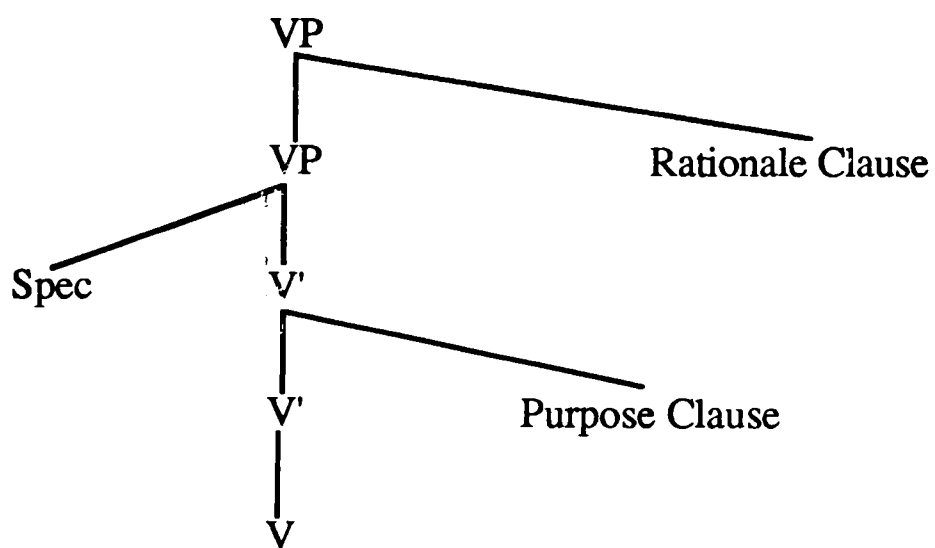
[12] Did Jo make a pass at the guy to impress us?

The nature of Jo's intention is a part of what is questioned in (12). The Rationale Clause also naturally forms part of the focus of interrogation, as in (13).

[13] Did Jo make a pass at the guy to impress us or to offend them?

It therefore seems that the Rationale Clause is a standard VP-adjunct which is ambiguous with respect to VP-rules but unambiguously within the scope of sentential operators. This suggests the structure in (14) for the infinitives of result considered so far.

[14]



Section 3.4: The Telic Clause

As was suggested in Section 3.1, the evidence from VP-anaphora and movement for the distribution of higher level modifiers is often ambivalent. Some of the best evidence in fact comes from scope effects, though the judgements are still delicate. Consider the interaction of the Telic Clause with negative scope. It seems that the Telic Clause is marginal within the scope of sentential negation.

- [1] ???A sitting Prime Minister hasn't ever resigned as leader of the party before, to be re-elected with an even bigger majority.

As before we would expect two possible scopes, with pragmatic factors in (1) favouring the scope in (2).

- [2] [NOT [[a PM resign] [to be re-elected]]]
[3] [NOT [a PM resign]] [to be re-elected]

(2) simply denies that it is the case that a sitting Prime Minister has resigned and then been re-elected; (3) asserts that a sitting Prime Minister did not resign and was re-elected. The natural interpretation is the one in (2), yet this reading does not seem to be available, i.e. the Telic Clause lies outside of the scope of negation.

Notice that the interpretation is a perfectly plausible one which becomes available under negative topicalisation.

- [4] Never before has a sitting Prime Minister resigned as leader of the party, to be re-elected with an even bigger majority.

The sentence in (4) is perfectly well-formed with the interpretation intended for (1). Notice that the well-formedness of (4) has two important implications. First, the Telic Clause must form part of the syntactic computation which generates the sentence it modifies: it is tempting, given the comma intonation and intuitive sense that this infinitive is a sort of comment on the whole sentence, to hypothesise that it is a sort of

non-restrictive relative clause whose value is computed independently of the matrix; given the interpretation of (4), which is effectively as in (2), this simply cannot be the case. The Telic Clause is integrated into the sentence in the normal way and its interpretation is integrated with the interpretation of the sentence it modifies.

The second implication of the well-formedness of (4) is that the Telic Clause can be adjoined no higher than C', assuming that in the construction of negative topicalisation, the negative raises to CP-Spec and the auxiliary to C⁰. The question is then whether the adjunction is as high as the projection of C⁰. There is evidence to think that it is not. It seems that the Telic Clause also falls within the scope of subject negation, as in (5).

[5] No sitting Prime Minister has ever resigned as leader of the party before, to be re-elected with an even bigger majority.

Again, this sentence is perfectly well-formed, effectively with the interpretation in (2). This means, however, that the Telic Clause must be within the scope of the subject in IP-Spec. The natural assumption, therefore, is that the Telic Clause is adjoined to I'.

The data, however, is not entirely consistent. Although it seems that the Telic Clause can be interpreted in the scope of a negative subject and of topicalised negation, it seems that negative polarity items are not licensed naturally in these positions.

[6]
(a) No Prime Minister has ever demanded the support of his party, to be challenged by someone in his own cabinet.
(b) *No Prime Minister has ever demanded the support of his party, to be challenged by anyone in his own cabinet.

[7]
(a) Never has a Prime Minister demanded the support of his party, to be challenged by someone in his own cabinet.
(b) *Never has a Prime Minister demanded the support of his party, to be challenged by anyone in his own cabinet.

The examples degrade considerably when *only* is included.

- [8] *No Prime Minister has ever demanded the support of his party, only to be challenged by anyone in his own cabinet.
 [9] *Never has a Prime Minister demanded the support of his party, only to be challenged by anyone in his own cabinet.

Given the clear well-formedness of examples such as (4-5), however, it is possible that the restriction on negative polarity items is unrelated to scope and linked to some other aspect of the Telic Clause's interpretation. As Shalom Lappin has pointed out to me, all weak NPs block the licensing of negative polarity items, even within the immediate scope of a negative, as in (10-11).

- [10] Never have books with any inappropriate pictures been given to the children.
 [11] *Never have the/five books with any inappropriate pictures been given to the children.

In (10) the complex NP, [NPbooks with any inappropriate pictures], falls within the scope of a topicalised negative item; *any* is licensed in a negative polarity reading. The simple addition to the NP of the definite determiner *the* or of the numeral *five*, as in (11), blocks this reading. It is therefore clear that negative polarity licensing is sensitive to factors other than scope and that the interpretation of the Telic Clause may interfere with this licensing just as weak NPs do. It will, however, become apparent as the discussion progresses that consideration of the distribution of the Telic Clause provides evidence pulling strongly in both directions: towards closer integration with the verb and towards extreme peripheral attachment. The negative polarity evidence suggests a peripheral attachment, although negative scope in general suggests that that attachment cannot be too high.

Similar data comes from interrogative scope. It seems that the Telic Clause must be adjoined below the complementiser position for the correct interpretation of certain types of subordinate clause.

- [12] John wondered whether the Prime Minister would resign, to be challenged by a member of his own Cabinet.

Here the "object of wonderment" is not just whether or not the Prime Minister would resign (John might be quite certain of that in advance); the question is whether that resignation will lead to a challenge from within the Cabinet. For this interpretation to follow the Telic Clause must be integrated into the interpretation of IP, as would be the case for an I'-adjunction. The situation in root sentences is however less clear. It is clear that the Telic Clause can appear as part of a question.

[13] Will the Prime Minister resign, to be challenged by a member of his own Cabinet?

(13) is well-formed as a standard question. As in the subordinate case discussed above, what is questioned is not just the Prime Minister's resignation, but the resignation and consequence sequence. However, it seems that (13) is less acceptable where the Telic Clause is intended as the **focus** of the question, as in (14).

[14] ??Will the Prime Minister resign, to be challenged by a member of his own Cabinet or to sail through the first round unopposed?

Nevertheless, (14) is still more acceptable than traditional content disjuncts in these contexts.

[15] *Will the Prime Minister resign, with any luck?

[16] *Will the Prime Minister resign, with any luck or unfortunately?

The evaluative disjunct, *with any luck*, is bad even in a simple question, as in (15); but as the focus of a question, as in (16), it is ludicrous. Once again therefore, it is clear that the Telic Clause is more peripheral than the Purpose and Rationale Clauses with regard to question-focus. However, we cannot assume that it is maximally peripheral, as it does not behave like a true disjunct.

The evidence we have discussed so far has suggested a relatively high point of adjunction for the Telic Clause. It is worth noting a couple of constructions which again suggest that this infinitive cannot be adjoined too high in the tree: reduced clause

structures. Consider first the construction in (17) which Williams, after Jespersen, calls a "nexus of deprecation".

[17] Me get the chance to visit Hollywood, only to turn it down because I'm working-- you must be kidding!!!

This is a classic small clause construction which is assumed to lack the properties of a full clause. It is nevertheless possible for a Telic Clause to occur here. This suggests that the Telic Clause does not require adjunction to a fully sentential projection. In our discussion of the semantics of Telic Clause in Section 5.3, I will argue that this is exactly what we would expect of an I' adjunct, as I will take I' to denote an event. A similar observation can be made of perceptual sentences.

[18] Jody saw Maverick win \$1 million on the first hand, only to lose it on the second.

Syntactically, the complement of *see* is some sort of small clause structure, denoting an event. The Telic Clause is not only syntactically acceptable here, it actually constitutes a part of the event perceived (see Section 5.3 for a more detailed discussion). Constructions such as (17) and (18) indicate that caution is required in suggesting a peripheral point of adjunction for the Telic Clause.

The delicacy of the judgements which the Telic Clause produces are nowhere clearer than in constructions involving VP-sensitive rules (a problem anticipated in Section 3.1). We will now turn to these constructions. First, consider the case of pseudoclefting in (19).

[19] **What Ute did *t*, only to discover that Reuben was vegetarian, was cook squid pasta.**

In (19), the Telic Clause is excluded from the raised *wh*-VP which takes the bare VP, *cook squid pasta*, as its antecedent. The sentence is well-formed (although stylistically heavy, requiring a strong intonation break around the infinitive). This suggests that the

Telic Clause can occur outside of a VP segment. The Telic Clause can also appear sentence-finally in a pseudo-cleft construction, as in (20).

[20] What Ute did *t* was cook squid pasta, only to discover that Reuben was vegetarian.

However, as was observed in Section 3.1, this does not give any reliable evidence that the Telic Clause can appear within the VP. In fact, sentence final position seems available for any type of adverbial, however wide its scope. (19) suggests that the Telic Clause can appear external to VP; there is no evidence however that it appears within VP.

The interaction with *do so* is also rather problematic, in part because the examples are so stylistically awkward.

[21] ??Ute **cooked beef for the dinner party**, only to realise that her guests were vegetarian, and Nick **did so**, only to realise that that they were Hindu.

The sentence in (21) is odd but perfectly interpretable: Ute and Nick both performed the same actions but their actions had different unfortunate outcomes. It seems intuitively clear that the reason for the oddness is that the Telic Clause is an aftercomment on the event rather than an integral part of it, which suggests that despite its oddness (21) can still be taken as evidence that the Telic Clause falls outside of VP. Strictly however this is rather weak evidence. There is however one interesting fact which supports this view. I find (21) more acceptable where the identity of Ute and Nick's actions is stressed as well as the contrast in the outcome of those actions. This is achieved by the inclusion of *too*, as in (22).

[22] ?Ute **cooked beef for the dinner party**, only to realise that her guests were vegetarian, and Nick **did so TOO**, only to realise that that they were Hindu.

The inclusion of *too* stresses identity of action. But of course it is only inserted where the reference of the two maximal VPs is identical. This will only be the case if the Telic Clause does not form part of the VP itself.

Now consider the case where *do so* putatively replaces the whole [VP + Telic Clause] string.

[23] ??Ute cooked beef for the dinner party, only to realise that her guests were vegetarian, and Nick did so too.

Again, this is an odd construction but perfectly interpretable. Notice that the crucial point here is that the interpretation of the Telic Clause be included in the reference of *do so*, i.e. it is not enough for Nick simply to have cooked beef for his dinner party; that must also have had the unfortunate outcome that the guests turned out to be vegetarian. It is clear that we can understand this to be the point: but do we get to that interpretation by charitable interpretation of a disjointed construction or by the semantic rules making it a part of the truth conditions? My suspicion is that here we have an instance of pragmatic compensation salvaging an anomalous construction. VP-external elements are only allowed in the first conjunct if they are balanced by some other VP-external element in the second conjunct. Given that there is no balancing element we assume identity. The problem is that a Telic Clause is not in any sense related to the action performed (by an Agent) but to the event which occurs as a whole. Notice that the Telic Clause is compatible with the *happen* construction which is anomalous with the Rationale and Purpose Clauses.

[24] Ute cooked beef for the dinner party, only to realise that her guests were vegetarian, and that happened to Nick too.

[25] *Ute cooked salmon to please her friends and that happened to Nick too.

[26] *Sven took the ice cream into the kitchen to put in the fridge and that happened to Nick too.

I will set the questions concerning VP-anaphora aside here.

Fortunately movement rules produce clearer judgements. Consider a context such as given in (27a) and a continuation as in (27b).

[27]

(a) Chrissie told Ute that she would fly to Oxford if Ute prepared salmon for her;...

(b) ...so, Ute cooked her some salmon, only to realise that she wanted it raw.

Now consider the effects of VP-preposing, as in (28-29), where the Telic Clause is unaffected by the preposing rule in (28) but is carried along by it in (29).

[28] ...and cook her some salmon Ute did, only to realise that she wanted it raw.

[29] *...and cook her some salmon only to realise that she wanted it raw, Ute did.

The example in (28) is perfectly well-formed; indeed unlike the examples of stranded Rationale Clauses given above, the Telic Clause is quite natural in this position. However, the sentence in (29) is ill-formed, in stark contrast to the Rationale and Purpose Clauses: notice that if (29) is to be interpreted at all we must assume that the realisation is in some sense a part of what Ute did and perhaps therefore that she intended the realisation. This is of course quite impossible.

The Telic Clause seems entirely incompatible with *though*-movement, presumably because it does not naturally form part of a concession.

[30] *Cook Chrissie salmon though Ute may, only to realise that she wants it raw, she will not come to Oxford.

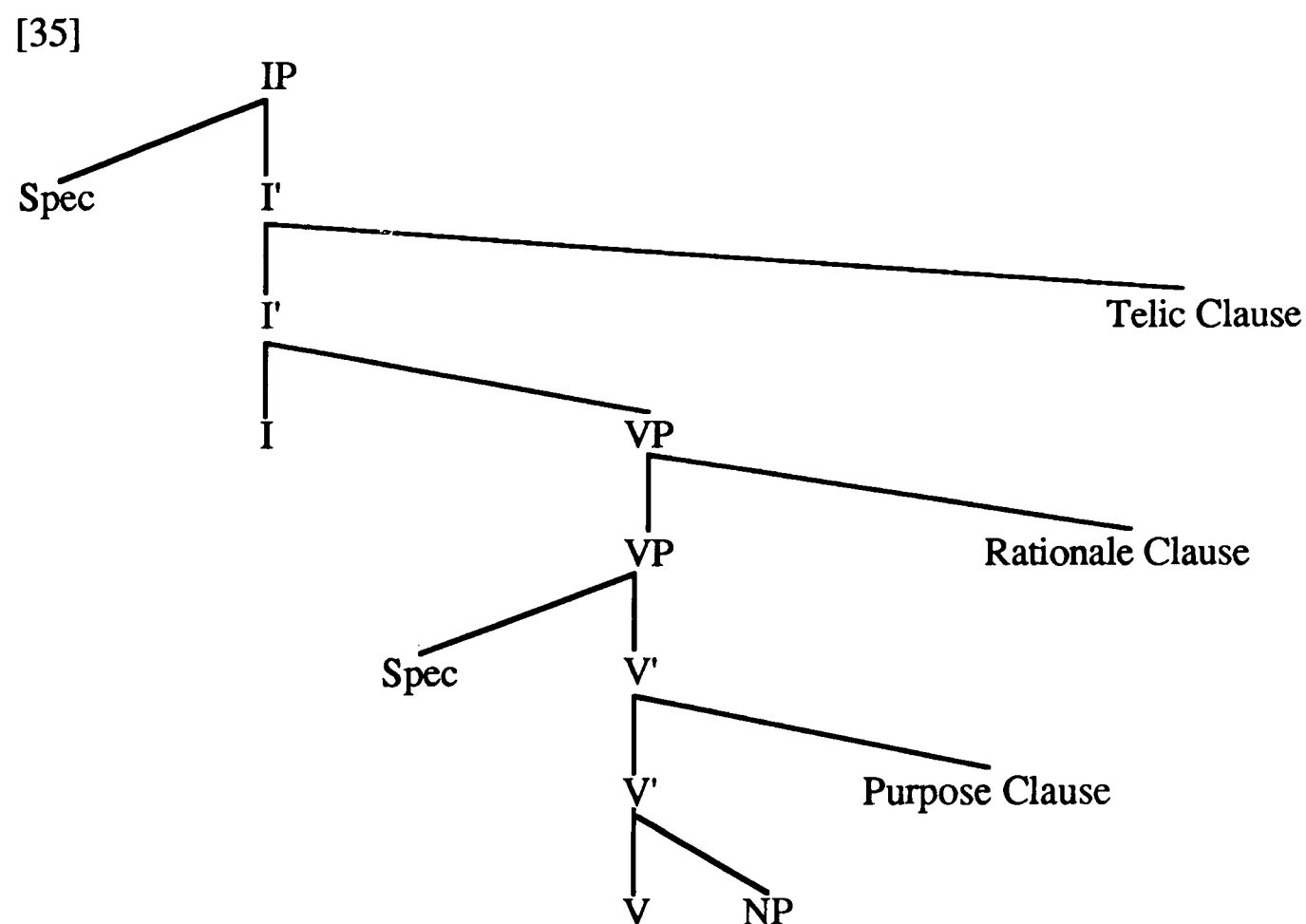
[31] *Cook Chrissie salmon only to realise that she wants it raw though Ute may, she will not come to Oxford.

Both (30) and (31) are bad. Notice, however, that in (31) the Telic Clause is read as a part of Ute's intended action, which is anomalous.

There is one further fact which suggests that the Telic Clause is in the class of disjuncts, distinct from Purpose and Rationale Clauses, although the reason for the restriction is unclear. It appears that the Telic Clause, unlike the Rationale and Purpose Clauses, cannot appear in a simple cleft construction.

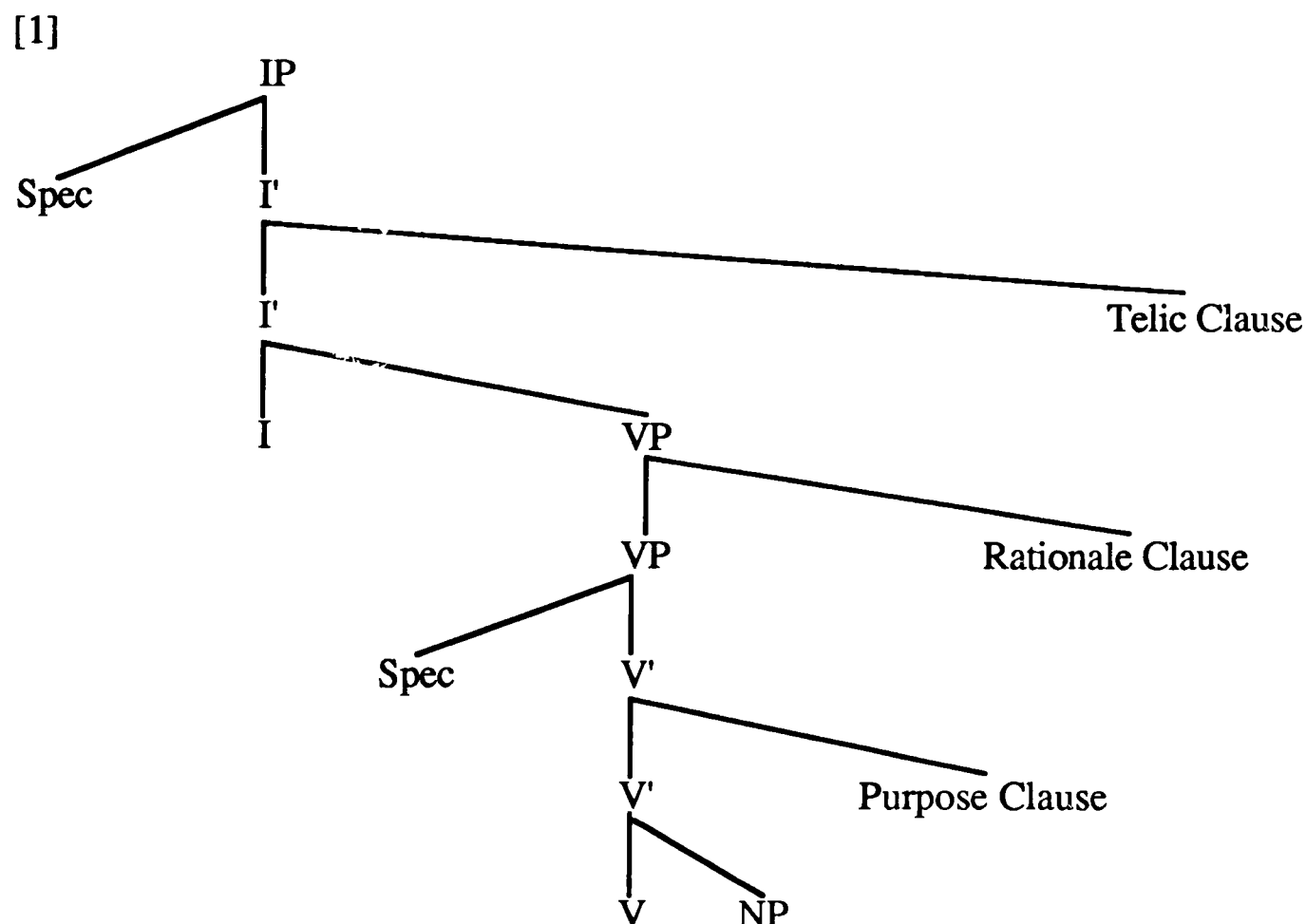
- [32] *It was only to realise that Chrissie wanted it raw that Ute cooked the salmon.
- [33] It was to please Chrissie that Ute cooked the salmon.
- [34] It was to enjoy the excellent salmon that Ute took Chrissie to the sushi bar.

Although the data is rather complex it seems that there is good evidence, particularly from negative scope, that the Telic Clause is, on the one hand, external to VP, and on the other, internal to the sentence. I therefore suggest that it adjoins to I'. This gives us a basic structure for the constructions as in (35).



Section 3.5: Some other observations

So, the evidence discussed in Sections 3.1-4 suggests an external syntax for the infinitives along the line of (1).



Notice that this constituency straightforwardly predicts another striking fact about the external syntax of infinitives of result: the constructions can co-occur but where they do so, strict linear precedence restrictions apply (both Faraci (1974) and Jones (1991) use linear precedence as an argument for relative hierarchical position; Jones attributes the argument to Williams (1974)). The Purpose Clause must be closest to the verb, followed by the Rationale Clause, followed by the Telic Clause.

[2] Sven brought Armistead along to the meeting [PC to discuss his books] [RatC to impress his friends] [TC only to discover that they had already met him].

Of the six logically possible orderings for the three infinitives, this is the only one which is acceptable.

The analysis might also allow an explanation for another curious fact about the constructions. Of the three infinitives, only the Rationale Clause can be preposed.

[3] *[PC To discuss his books], Sven brought Armistead along to the meeting.

[4] [RatC To impress his friends], Sven brought Armistead along to the meeting.

[5] *[TC Only to discover that his friends had already met him], Sven brought Armistead along to the meeting.

Faraci (1974) follows Chomsky (1965) in assuming that complements of the verb do not prepose naturally (although Higginbotham (p.c.) informs me that the general assumption is that definites do not prepose).

[6] ???The book, John bought.

This for me is literary/rhetorical rather than ungrammatical; however, it is clearly marked in comparison with the preposing of an adjunct.

[7] On Monday, John bought a book.

One might argue therefore that it is not just arguments of the verb, but VP-internal elements (internal arguments plus a restricted set of object-oriented modifiers) which cannot prepose. This argument is rather weak given the contrast between the unacceptability of (6) and (3). However, it clearly cannot be more than an ancillary factor here because the Telic Clause exhibits exactly the same restriction and the Telic Clause is clearly not a VP internal element. Either therefore we have two separate explanations (one of which is already weak) or we find a more general explanation. In the phrase structure in (1) the possibility of more general explanation arises if an assumption of Chomsky (1994) is adopted. Chomsky proposes that only heads and maximal projections are visible to the computational component: a phrase can be adjoined to an intermediate projection, but once there is becomes invisible. I am

assuming that preposing is a topicalisation rule of some sort⁸. If Chomsky's hypothesis is correct then the facts on preposing follow directly: the Purpose and Telic Clauses are X' adjuncts which are invisible to the computational component and cannot therefore be moved; the Rationale Clause is a VP-adjunct and can therefore be affected by movement and topicalisation rules⁹.

It is tempting to see this distinction at work in another distinction between the Rationale Clause and the Purpose Clause: recursion. As Jones (1991) observes, the Rationale Clause allows recursive adjunction where the Purpose Clause does not. The point, however, requires clarification as I believe that Jones' discussion is misleading on this point.

Jones (1991: 52ff) claims that the Rationale Clause, which is simply a CP, is subject to free adjunction to either VP or IP; where the Purpose Clause, which is a bare VP, must, because of its special character, adjoin within the matrix VP, presumably to V'. The evidence which Jones uses to support this claim is the contrast in acceptability between the Rationale Clause in (8) and the Purpose Clause in (9).

- [8] Fred started a food co-op in order to save on his grocery bills in order to pay his phone bills in order to be able to call his girlfriend from his home.
[9] *They brought John to talk to them to show them the way.

⁸ As Shalom Lappin has pointed out to me, this view relies on the assumption that topicalisation of this sort is a rule of core grammar, as movement for stylistic purposes is taken to fall outside of the constraints on core movement. One piece of evidence favours this view. Contrast (a) and (b).

- (a) John can't have been buying drugs to impress anyone.
(b) *Buying himself drugs to impress anyone, John can't have been.

The illformedness here seems to follow because the negative polarity item, anyone, is moved outside of the scope of negation. This is only possible, however, if movement of the VP to the front of the sentence is an instance of core movement: if the VP were moved later under "stylistic movement" we would not expect the negative polarity violation.

⁹ Jones (1991: 56) mentions some examples pointed out to him by Barbara Partee which suggest that topicalisation of the Rationale Clause is not subject to reconstruction.

- (a) *To impress anyone, John didn't buy a car.

In cases where topicalised Purpose Clauses are allowed they show reconstruction effects.

- (b) ???and to impress anyone with I wouldn't bring that.

Now it seems immediately apparent to me that these examples are quite different from each other. In (8), as Jones himself points out, the Rationale Clauses do not represent a string of random reasons for Fred's starting a food co-op: Fred did not start his co-op to save on grocery bills and to pay his phone bills and to be able to call his girlfriend from his home. Rather, he started his food co-op to save on grocery bills. He wanted to save on grocery bills to pay his phone bill. He wanted to pay his phone bill to be able to call his girlfriend from home. Admittedly, his ultimate aim in starting the food co-op is to be able to call his girlfriend from home, but (8) requires us to think of this ultimate aim in terms of a chain of motivations, each dependent on the preceding one.

This, of course, is quite unlike (9), which really does represent a list of random motivations. John was brought along (i) that he might talk to them, and (ii) that he might show them the way. As soon as one constructs genuinely parallel examples for the two types of clause the contrast disappears. Consider (10-15).

[10] *They brought John to talk to them to show them the way to help them with the language.

(10) is ill-formed because it contains a string of Purpose Clauses which are unrelated to each other. (12), containing Rationale Clauses, is also ill-formed, however, for the same reason.

[12] *Fred went home to have a rest to see his mother to record some music to visit his grandparents to look after the garden.

(12), which contains Rationale Clauses, is, however, well-formed for the reasons given above; but so is (15), which contains a sequence of Purpose Clauses.

[14] Fred started a food co-op [to save on his grocery bills [to pay his phone bills [to be able to call his girlfriend from his home]]].

[15] They brought the general along [e to send the soldier into town [e to find a priest [e to marry the couple]]].

The Purpose Clauses in (15) are all related to each other in the same way as the Rationale Clauses in (13): they brought the general along because they wanted him to send a soldier into town; they wanted him to send a soldier into town to find a priest; they wanted him to find a priest to marry the couple. The marriage is the ultimate aim, but is mediated by a sequence of subsidiary aims. Notice that the Telic Clause is also iterable, as in (16).

[16] John began typing his final chapter, only to be disturbed by a knock at the door, only to discover that it was his girlfriend, only to get into a fight with her, only to be reconciled and spend the evening by the fire.

Notice once again that each Telic Clause represents an unexpected outcome to the immediately preceding event.

So the *to*-infinitive is trivially iterable in each of the constructions, in what Jones (1991: 54) calls a "cascade of dependencies" construction. With regard to the examples he gives there is no reason to posit any fundamental difference between the constructions. Thus, although I agree with his distinction between the Rationale and Purpose Clauses (which can be extended to the Telic Clause), I find his evidence spurious. The Rationale Clause differs from the other infinitives not in the examples that Jones gives (which I will call internal adjunction) but in allowing a rather special type of recursion which I will call external adjunction.

External adjunction involves recursive adjunction to a single node, where the antecedent of each Rationale Clause is the entire complex of elements which precedes it. Consider the Rationale Clauses in (17).

[17] Catholics {[have sex] [solely) to procreate]} [to conform with the Church's teaching]

Here we are not saying that Catholics procreate to conform with the Church's teaching. Rather we are saying that Catholics have sex solely for the purpose of procreation and the reason for THAT complex event is that they might conform with the Church's

teaching. The construction is marked and relies on our understanding of complex actions being the object of an Agent's intention. This construction does not occur naturally with the other infinitives.

It is tempting to search for a way of deriving this restriction from the invisibility of X'-nodes to the computational component. However, this seems inadvisable. It seems that recursive adjunction to X'-nodes is allowed as long as the modifiers are of different types.

[18] John served beef [raw] [with a tomato sauce] [in a large dish] [for the guests to try as an appetizer].

This is of course a possibility predicted by X'-theory as standardly understood (the adjunct rule is recursive). If there is a restriction on multiple Purpose and Telic Clauses it seems that that must have something to do with their meaning. This view is supported by the intuition that Rationale Clauses are allowed to undergo external recursion because they involve intentions: the Rationale Clauses build up increasingly complex, internally-dependent intentions for particular actions.

However, although the other infinitives of result do not allow interpretations of quite the sort which occur with Rationale Clauses which externally adjoin, it does seem that it is possible to construct examples at least of Purpose Clauses which allow external adjunction of some sort. Consider (18).

[19] I set the computer up [*e* to operate at 100MHz] [for my son to enjoy *e*].

Notice in this case that we must have an external adjunction of Purpose Clauses: the first infinitive is a subject-gap Purpose Clause (it is the computer which is operating at 100MHz not me) and the verb *operate* does not take an object. The second infinitive, which is an object-gap Purpose Clause, cannot therefore be modifying the subject-gap Purpose Clause, because there is no direct object or Theme to control the gap. Notice that (20) is ill-formed.

[20] *The computer operated at 100MHz for my son to enjoy *e*.

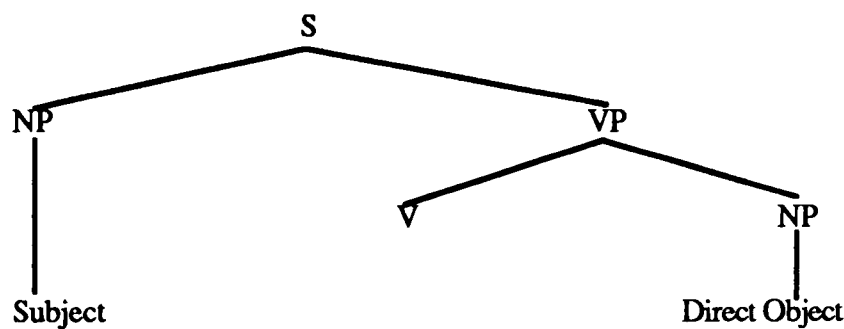
The second infinitive is also therefore modifying the Theme of *set up*, requiring recursive adjunction to the same node (the V' projected by the matrix verb). Notice further that it is not enough in (19) for me to set up the computer for my son to enjoy: it is implied that my son's enjoyment of the computer is reliant on the fact that it is set up to operate at 100MHz. It therefore seems that external recursion of some sort is available for the Purpose Clause.

The link with Agentive intention remains a tempting one: it seems that Telic Clauses simply do not allow external recursion. I found it impossible to construct ill-formed examples, simply because it is unclear what they would mean; in both the Purpose and the Telic Clauses it is the nature of complex intention which seems to support the construction. I leave this point here.

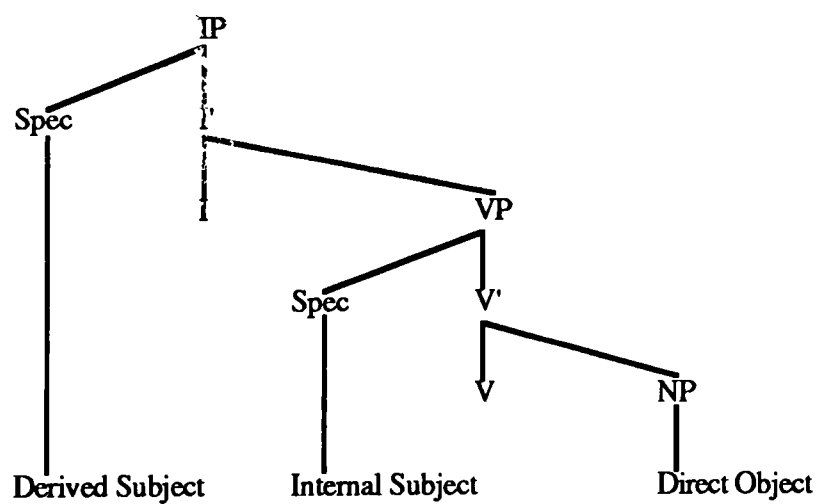
Section 3.6: Further observations: external syntax and conditions on argument projection

Given the questions that will be raised during the course of this thesis, it is important to clarify a number of assumptions concerning phrase structure representations. I take it that there are three basic types of phrase structure which will be of interest.

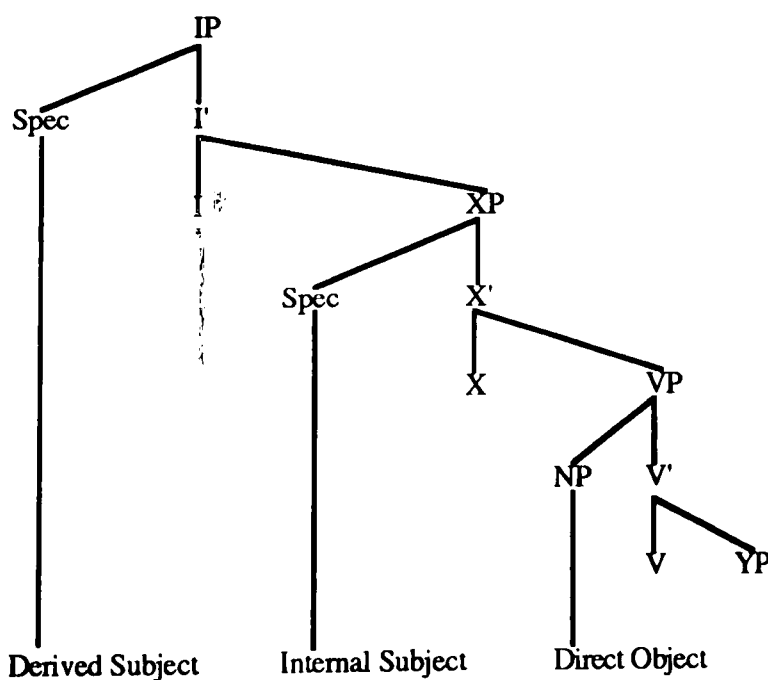
[1]



[2]



[3]



(1) is a traditional phrase structure in which the internal structure of all phrases is individually specified by rewrite rule, allowing, for instance, phrases without heads (there is no head for S). (2) is the canonical structure for the sentence within the Government and Binding tradition after the adoption of the internal subject hypothesis (cf Kuroda (1988)). Each phrase (lexical and functional) conforms to a general structural schema which places strict constraints on permissible phrasal projections. A phrase structure along the lines of (3) is proposed by Larson (1988; 1991) and by Bowers (1993) amongst others. Bowers argues that the direct object is a sort of secondary subject, dominating all other internal arguments. For our purposes, (2-3) are clearly preferable to (1) as they provide a position for the recursive adjunction of object-oriented modifiers (see the end of Section 3.1). They also offer a considerably more restrictive theory of phrase structure. Given the more articulated structure offered by X'-theory and following Minimalist assumptions, I will also assume binary branching (cf Kayne 1983).

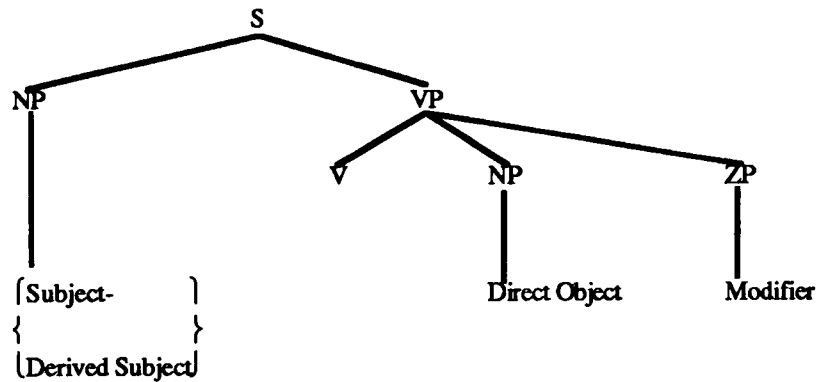
What are important for our purposes, however, are the implications for theories of argument projection of adopting these structures. Consider the case of the Purpose Clause. It is standardly assumed the modifiers like the Purpose Clause act as one place predicates in some sense (although what is meant by that term differs widely, see Section 4.1.2.2). It is assumed that they discharge their argument by predication and that predication only occurs under the strictly local conditions, specifically, mutual c-command. As Williams (1994: 29) puts it:

The structural locality of the "argument of" relation is the tightest of all grammatical relations. It is essentially as tight as it can get-- that is, immediate sister nodes may enter in the relation, and nothing else.

It is important to note that the term "sisters" refers to phrases which c-command each other. This is important as we do not wish predicates to assign their theta-roles to phrases considerably further up or further down the tree than they are (say across clause

boundaries in either direction). This requirement is met straightforwardly in (4), where the modifier simply acts as another sister of the verb.

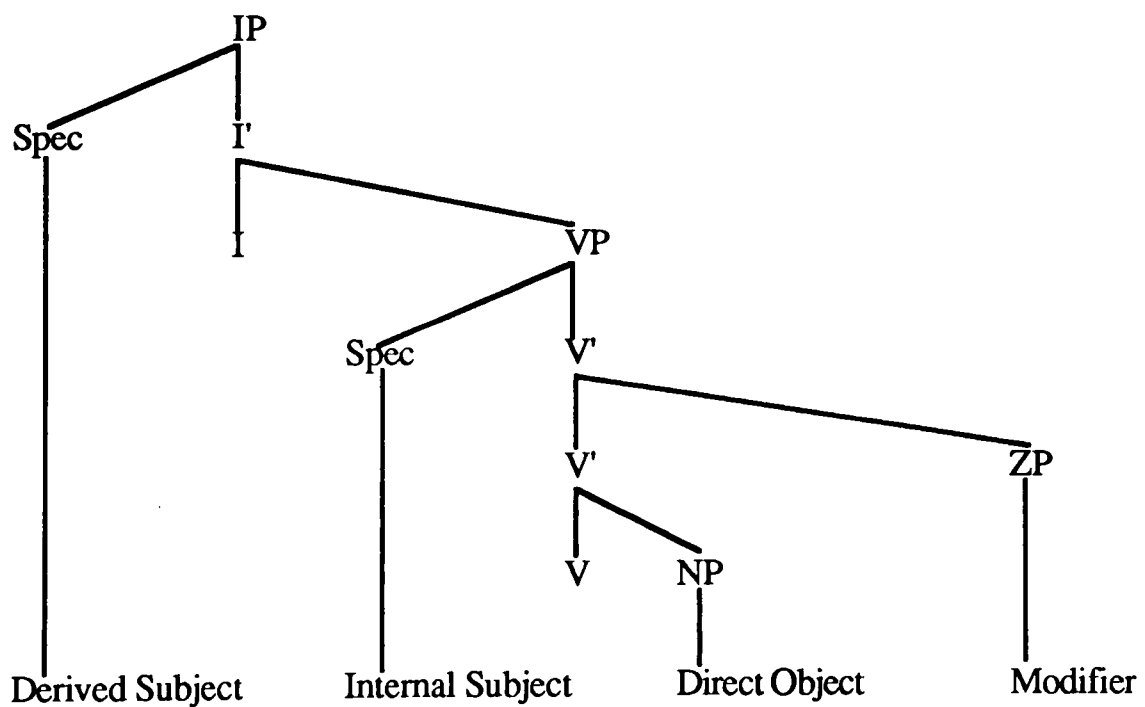
[4]



However, the structure in (4) does not allow for iteration of object-oriented modifiers and fails to distinguish them from true arguments of the verb.

X'-theory provides V' as a node for recursive adjunction within VP, giving the modifier structure in (5).

[5]



Here the modifier c-commands the direct object, but the direct object of which the modifier is predicated does not c-command the predicate. If we assume Williams' view that predication is merely a case of coindexing, the structure in (5) can be maintained if

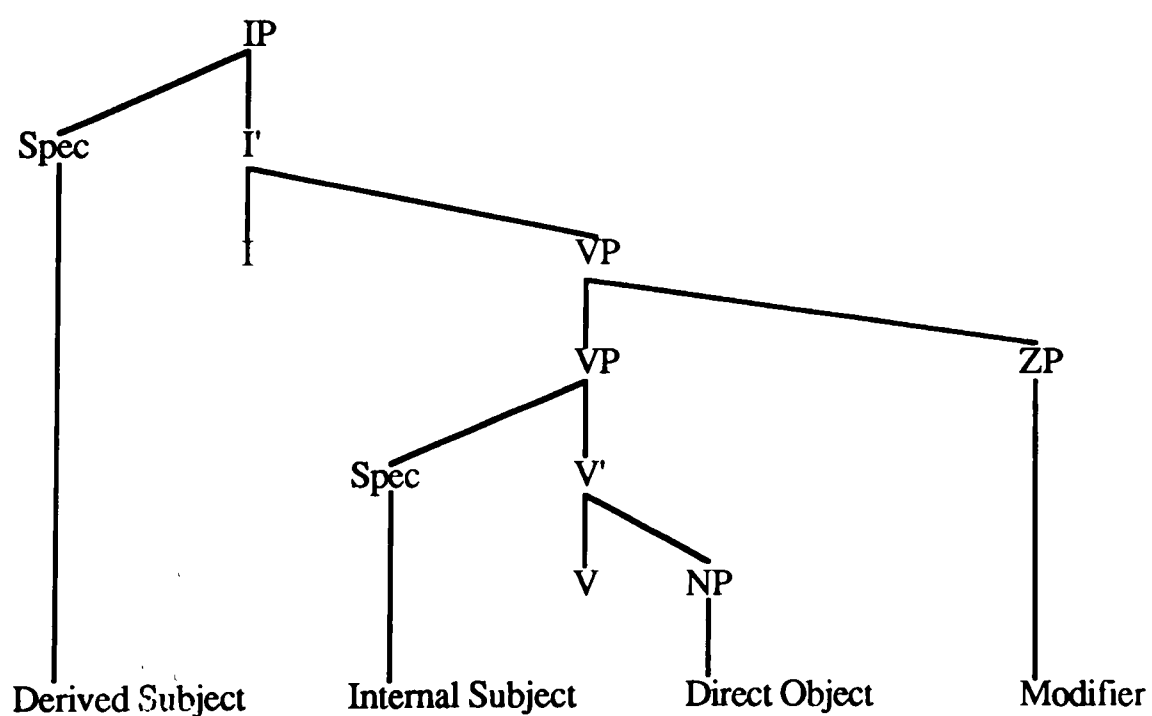
the conditions under which predication is allowed are weakened. Williams (1994; 1995) in fact assumes a definition of m-command, in which all phrases are sisters which are dominated by the same maximal projection: the modifier and the direct object in (5) are of course dominated by the same maximal projection (VP) and therefore m-command holds. Coindexation/predication can occur. Notice that this is a considerable weakening of our definition of "strict locality". It will mean that all of the phrases in VP down to the complement of the verb itself will be mutually c-commanding: yet predication requires only that the complement of the verb c-command a V'-adjunct.

Even assuming this definition of "c-command", it is not weak enough. Consider the problem posed by VP-adjuncts. There is good evidence that subject-oriented modifiers such as the small clause in (6) are in fact adjoined to VP, given that they can be preposed with the VP as in (7) and stranded outside of the VP in the pseudocleft construction as in (8).

- [6] Sven is serving our dinner nude.
- [7] Serving our dinner nude, Sven may be, but...
- [8] What Sven was doing nude was serving our dinner.

In the structure offered by (2), this would give (9).

[9]



Assume for a moment, following Williams, that the subject of the sentence is actually base-generated in IP-Spec. We then require mutual "c-command" between the modifier, ZP, and the subject in IP-Spec. Under our present definition this is impossible, because ZP is dominated by VP and IP-Spec is dominated only by IP. They are therefore not contained in the same maximal projection: IP-Spec (strictly) c-commands ZP, but ZP does not even m-command IP-Spec. Shalom Lappin has pointed out to me that the definition of c-command offered in May (1985) will in fact allow the mutual c-command required.

May (Pge 34, his <9>) begins with a standard definition of c-command as m-command:

- [10] α c-commands β =_{df} every maximal projection dominating α dominates β , and α does not dominate β .

The key to his theory is his definition (Pge 57) of the notion of maximal projection itself.

Let us... assume instead that [the nodes arising as a structural effect of Chomsky-adjunction] do not constitute distinct categorial projections, now understanding the occurrence of a *projection* (at a given bar level) to be made up of a set of occurrences of nodes that are featurally non-distinct. It is these nodes, taken collectively, that constitute the membership of a projection.

What this means is that to be dominated by a maximal projection, one must be dominated by every segment of that projection. Consider the tree diagram in (9) again. Notice that V, NP and VP-Spec are contained within every segment of VP: VP is therefore the first maximal projection dominating all of them. IP-Spec, I, and VP are contained within every segment of IP, and so IP is the first maximal projection dominating all of them. Now consider the VP-adjunct, ZP. ZP is dominated only by one segment of VP, not by every segment; therefore ZP is not contained in the maximal projection, VP, which is the collectivity of VP-segments. The lowest full phrase, every

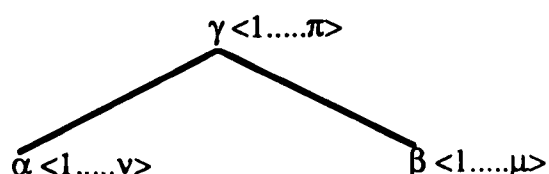
segment of which dominates ZP, is IP. Therefore ZP c-commands everything in IP. Mutual c-command therefore holds between IP-Spec and ZP in May's view.

Notice, however, that our definition of "strictly local" c-command is now even weaker. Under strict c-command mutual c-command only holds between α and β if α and β are immediately dominated by the same node (whatever it is); under standard m-command mutual c-command holds between α and β if α and β are immediately dominated by the same maximal projection, so that a head c-commands and is c-commanded by its complement, its specifier, and all X'-adjuncts. Under May's definition of c-command, mutual c-command holds between α and β if α and β are immediately dominated by the same complete set of maximal projection segments: this means that a head c-commands and is c-commanded by, not only its complement, its specifier, and all X'-adjuncts, but also all phrases adjoined to the head's complement (and presumably those adjoined to its specifier or adjoined to its X'-adjuncts).

Despite this considerable weakening of c-command, May's definition does not allow predication of a θ -role by a VP-adjunct to a VP-internal subject. Recall that by his definition, the c-domain of VP-Spec is VP, because VP-Spec is contained in every segment of VP. VP-Spec does not therefore c-command ZP in (9), as required for predication. Mutual c-command will hold in this case only if we take the standard definition of m-command and assume that the term *maximal projection* refers only to the maximal maximal projection.

It appears that this approach to argument projection, operating even over the structure in (2), is insufficiently restrictive. Consider for a moment the highly restrictive theory of argument projection developed in Higginbotham (1985; 1989). Higginbotham's theory is formulated in terms of the systematic projection of argument structure from daughters to mother, as in (11).

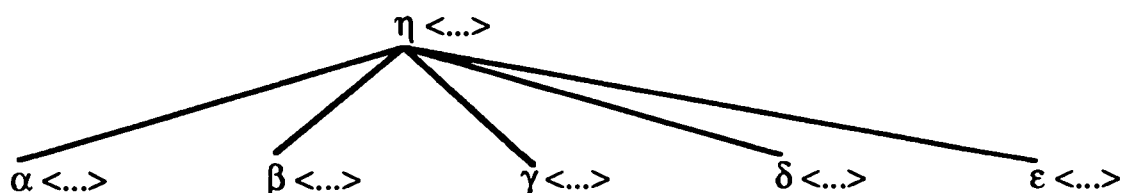
[11]



The question that is addressed is how we can derive the argument grid of γ , given the argument grids of α and β . Higginbotham defines four possible "thematic transactions" which specify a particular type of mapping from $\{\alpha, \beta\}$ to $\{\gamma\}$. One of those "transactions" or principles of argument discharge is *theta identification*, where an open position in β is assigned the value of an open position in α and then the grid of α filters up to γ . Notice that the argument relation here really is local and cannot be otherwise. In fact, this theory forms the basis for a view of argument projection in which syntax and semantics are built up in parallel during the course of computation, in keeping with the main thrust of the Minimalist program (cf Higginbotham, forthcoming).

As one would expect given the restrictiveness of this theory, the phrase structure in (4) is problematic because it offers a multiple branching structure for interpretation. If we have a multiple branching structure, such as that in (12), then defining a set of projection principles will be extremely difficult.

[12]



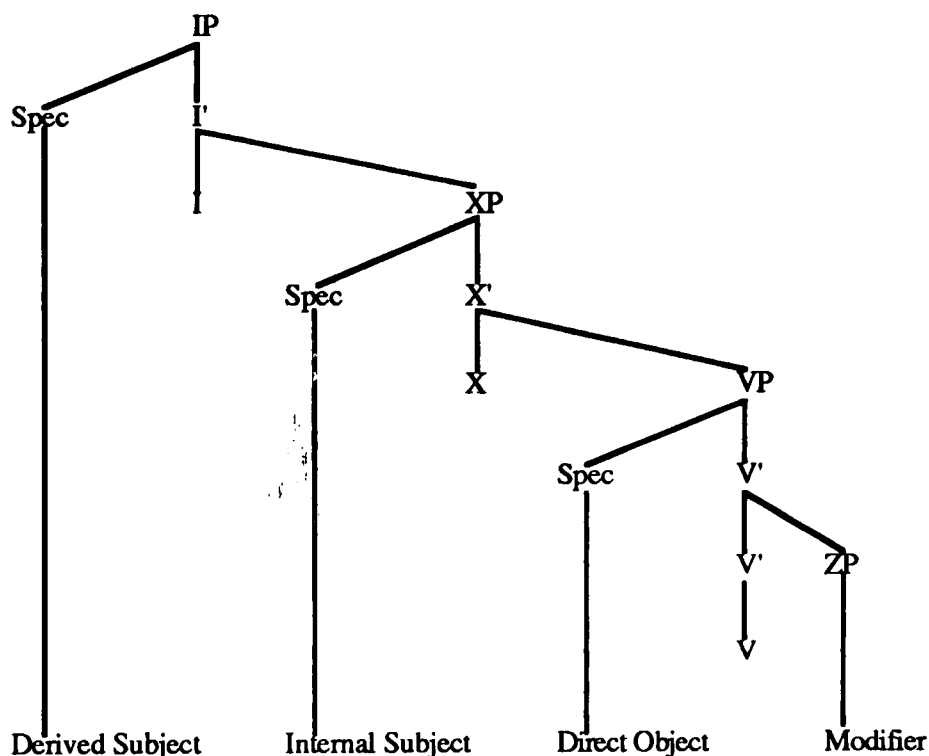
The mapping of argument structures of any open-ended set of nodes to a mother will be complex and unconstrained. To maintain this view of the syntax-semantics interface a more restricted input is required.

Now consider the theory of phrase structure in (5). The modifier adjoins to V' ; we assume that the modifier discharges its argument by theta identification. Theta identification requires that there be an open argument position in α which will discharge the open position in β by identification. However, in (5), the open position associated with the direct object has already been closed because the direct object was directly theta-marked by V in V' . Theta-identification will fail. In this case we cannot naturally

resort to m-command as an explanation because m-command will make all phrases in VP available, including the internal subject: this will effectively reduplicate the multiple projection problem in (12).

The problem is solved straightforwardly in the theory outlined in (3), which would have a modifier structure such as that in (13).

[13]



Here the Purpose Clause would adjoin to V' as in (2). Now, however, the modifier is in the c-domain of the direct object rather than vice versa; the verb has not directly theta-marked the object within V' and therefore V' has an open argument position for the direct object which will subsequently be closed by it. Identification will proceed as expected. The restrictive theory of phrase structure in (13) therefore accommodates naturally the theory of argument projection developed by Higginbotham, maintaining strict locality and a simple mapping from daughters to mother. The structure allows for object-oriented modification naturally, unlike (4), and requires no weakening of definitions of c-command, as required for (5).

Given the structure in (13) one can continue to assume that the Telic Clause adjoins to I'. The question is then where the Rationale Clause adjoins. If the arguments in Section 3.5 are correct then we must assume adjunction to a maximal projection and

therefore presumably adjunction to VP. However, it would be possible simply to reinterpret all the data from VP-tests as tests for X' in (13) and take the adjunction point of the Rationale Clause as X' (Pred' in a Bower's phrase structure). This would allow us to state that infinitives of result are modifiers of X' and to see them as maximally symmetrical in their distribution. However, this would require a rejection of the suggestions concerning restrictions on preposing in Section 3.5. I will leave the question open, but will continue to refer to the Rationale Clause as a VP-adjunct for expository convenience.

CHAPTER 4: The Internal Syntax of Infinitives of Result

Section 4.1: The distribution of gaps

Section 4.1.1: The Rationale and Telic Clauses

In the Rationale Clause the distribution of gaps is straightforward. A gap may only occur in subject position, as shown in (1-3); and that subject gap alternates straightforwardly with a lexical NP, as in (4) (I will assume that *for* appears purely for Case-marking purposes).

- [1] Mary slapped Bill (in order) *e* to hurt him.
- [2] *Mary slapped Bill (in order) *e* to hurt *e*.
- [3] *Mary hit Bill with a hammer (in order) *e* to hurt him with *e*.
- [4] Mary slapped Bill (in order) *for* Tom to get annoyed.

The distribution of gaps in the Telic Clause is exactly parallel to that in the Rationale Clause, namely, a gap may only appear in subject position, as in (5), and a subject gap alternates straightforwardly with a lexical NP, as in (6).

- [5] Mary bought the house on Monday only *e* to notice on Tuesday that it had rising damp.
- [6] Mary bought the house on Monday only *for* her partner to notice on Tuesday that it had rising damp.

The natural assumption, therefore, is that the Rationale Clause and Telic Clause may have an empty pronominal in subject position (PRO). Subject position is the only position in English which licenses PRO. As a pronominal, PRO alternates with normal referential lexical expressions (except that it does not require the presence of a Case-assigner). The internal structure of the Rationale and Telic Clauses is therefore as in (7-8).

- [7] Telic Clause: [CP[IPPRO to VP]]
 [CP for[IP NP to VP]]
- [8] Rationale Clause: [CP[IPPRO to VP]]
 [CP for[IP NP to VP]]

The question is then how the reference of PRO is determined. It seems that in the case of the Telic Clause the assignment of reference is passive sensitive (but see Section 5.3).

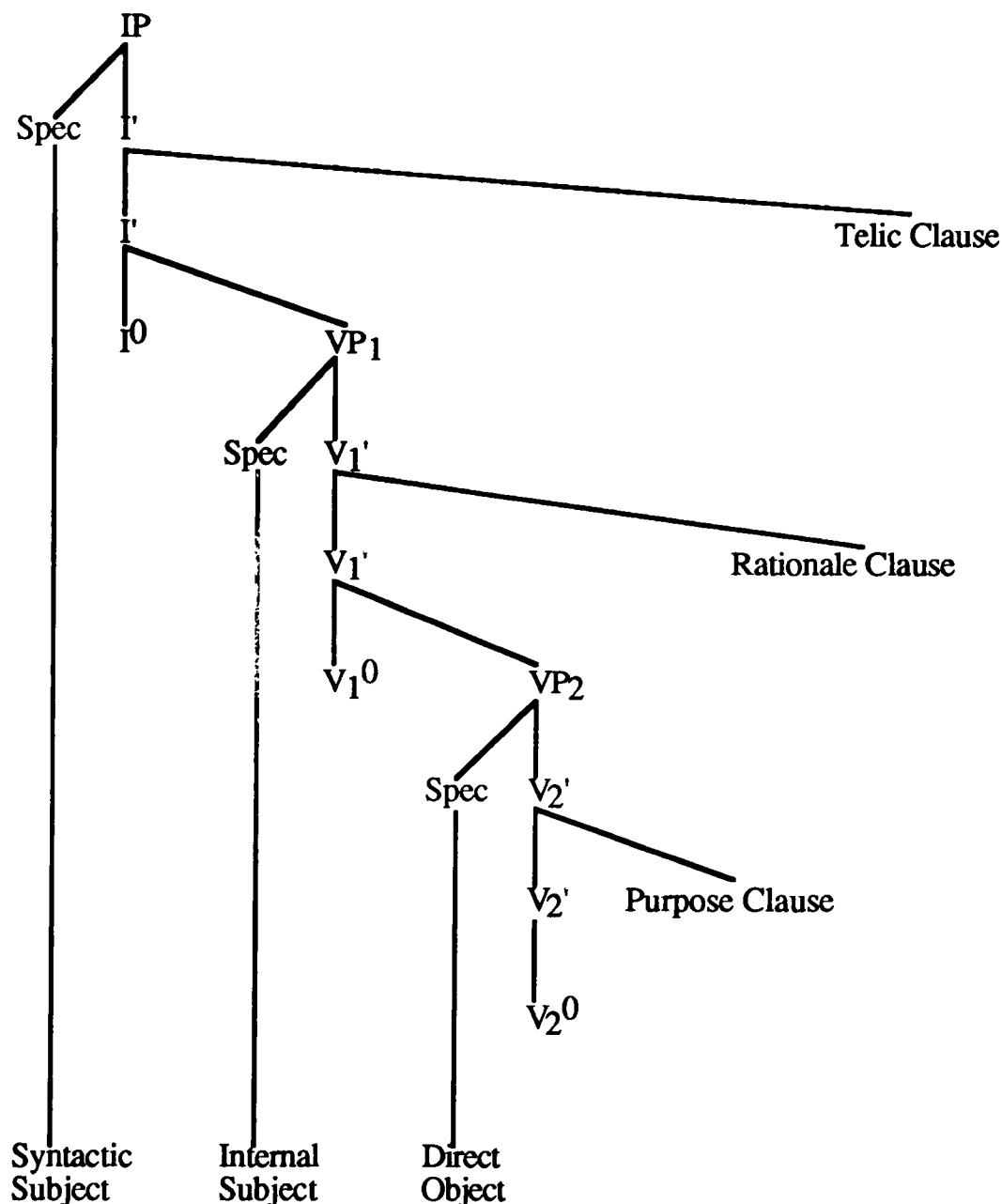
- [9] Goliathⁱ defeated an entire army^j, only PROⁱ to be overcome by a shepherd boy.
 [10] !!An entire army^j was defeated by Goliathⁱ, only PRO^j to be overcome by a shepherd boy.

(10) is well-formed but only in a different reading to (9). The active and passive differ with respect to which argument of the verb takes the privileged position of subject of the sentence and in theories which accept some version of the Internal Subject Hypothesis (cf Kuroda (1988) or, more recently, Bowers (1993)) this is represented structurally: the arguments of the verb are projected within the c-domain of I⁰ and the syntactic subject raises to IP-Spec. A natural suggestion, in the spirit of Rosenbaum (1970), is then that PRO is controlled under a Principle of Minimal Distance, as in (11).

- [11] PRO is controlled by a minimally distant c-commanding NP.

The Rationale Clause is however controlled by the subject only if it is Agent-like (but see Section 5.2 for qualifications). We have already suggested, however, that it is more deeply embedded in the tree. We might therefore take it that the minimally c-commanding NP for the Rationale Clause is the internal subject. Control would then follow by the principle in (11) applying to the tree in (12).

[12]



A problem is then posed by the passive: the Agent is not realised lexically as the internal subject and therefore the minimally distant NP will be in IP-Spec. Control by the raised NP will be excluded on interpretational grounds (see Section 5.2) and so the sentence will be ill-formed. But of course the Rationale Clause standardly allows passivisation.

[13] The lights were turned off to conserve electricity.

However, as I argue in some detail, following a suggestion by Williams (1974; 1987b), it seems that passivisation is restricted to those Rationale Clauses allowing event control. Following Hegarty (1989) it would then be possible to argue that the Rationale Clause is in fact controlled by the event, through I^0 . We might then suggest that the principle of minimal distance be formulated along the lines of (14).

[14] PRO is controlled by a minimally distant nominal, where

- (i) nominals = NP or I⁰;
- (ii) nominals in the same projection are equidistant with respect to control.

The fact that the Rationale Clause and Telic Clause must still be hierarchically distinct follows from the fact that the Rationale Clause seems to be sensitive to the insertion of an Agentive *by*-phrase even when event control is unavailable, where the Telic Clause is not.

[15]

- (a) John printed out the file to give himself a better idea of the layout.
- (b) *The file was printed out to give himself a better idea of the layout.
- (c) The file was printed out by John to give himself a better idea of the layout.

[16]

- (a) John printed out the file only to realise that the layout was wrong.
- (b) *The file was printed out only to realise that the layout was wrong.
- (c) ?*The file was printed out by John only to realise that the layout was wrong.

Given that the Telic Clause imposes no interpretational constraints on its antecedent, we would expect it readily to take the *by*-phrase as an antecedent if that phrase were structurally accessible. However, the *by*-phrase appears to be inaccessible to the Telic Clause. On the other hand, the Rationale Clause, which is ill-formed in the passive, becomes well-formed when the agentive *by*-phrase is inserted, implying that it is structurally accessible. Although it is not clear how this sensitivity is to be captured, it is clear that some sort of structural distinction will be important.

Section 4.1.2: The internal syntax of the Purpose Clause

Section 4.1.2.1: Gaps in the Purpose Clause

Questions which are relevant to the internal syntax of the Purpose Clause might be the following.

- [1] What gaps can occur in the Purpose Clause and why?
- [2] Given that the gap is obligatorily controlled by an argument of the matrix verb, how is the link between the gap and the controller mediated?
- [3] How does the form of the infinitive relate to its interpretation?
- [4] In a *wh*-movement analysis, why must the *wh*-element be an empty operator rather than an overt *wh*-word?

In the section which follows I will suggest following Chomsky (1977), Browning (1987), and Wilder (1989) that the Purpose Clause contains *wh*-movement and that the distribution of the gaps is what one would expect of *wh*-extraction. I will argue that the "link" between the gap and the matrix "controller" is established by an independent predicate which heads the Purpose Clause; in fact this is an example of true predication and does not involve control-style coindexing. The infinitive takes the form that it does because it is required by the Purpose predicate to denote a property. The *wh*-element must be an empty operator and not an overt *wh*-element because only the empty operator is interpreted as a pure lambda abstractor creating a one-place property rather than as some sort of operator.

The Purpose Clause will allow a gap to appear in any of three positions: subject position, as in (5); object position, as in (6); or adjunct position, as in (7).

- [5] John brought the tiger along *e* to frighten Bill.
- [6] John brought the tiger along for Tom to frighten *e*.
- [7] John brought the tiger along for Tom to frighten Bill with *e*.

In each of these cases the gap is obligatory and obligatorily controlled by the matrix Theme. Where the gaps are filled, the result is a Rationale Clause allowing *in order* insertion (the result is sometimes marginal).

- [8] John brought the tiger along (in order) for Tom/it to frighten Bill.
- [9] John brought the tiger along (in order) for Tom to frighten Bill/it.
- [10] John brought the tiger along (in order) for Tom to frighten Bill with it.

The Purpose Clause may contain two gaps, with the strict requirement that one of the gaps be in subject position.

- [11] John brought the tiger along *e* to frighten *e*.¹⁰
- [12] *John brought the tiger along for Tom to frighten *e* with *e*.

The Purpose Clause, however, may never contain three gaps, a fact which is presumably reducible to a restriction that only one non-subject gap is allowed.

- [13] *John brought the tiger along *e* to frighten *e* with *e*.

Notice also that in (11) there is an asymmetry between the subject and the object gap. The object gap acts exactly like the single gaps in (5-7), i.e. its reference is strictly controlled by the matrix Theme. The subject-gap is freer. In (11) it seems to be controlled by the Agent. Where we have a benefactive construction, as in (14)¹¹, it seems to be controlled by the Goal/Beneficiary.

- [14] John brought Mary a tiger *e* to frighten *e*.

¹⁰ Some readers might find the context here peculiar. Compare with examples such as those in (a-b).

- (a) John brought a cake along *e* to eat *e*.
- (b) John brought a video home *e* to watch *e*.

¹¹ Once again, the reader might find the context here peculiar. Compare with the examples in (a-b).

- (a) John brought Mary a cake along *e* to eat *e*.
- (b) John brought Mary a video home *e* to watch *e*.

It seems, however, that the reference of a subject-gap in a double-gap infinitive can be entirely free of the matrix, as in (15).

- [15] John brought some wine *e* to drink *e* with dinner, which was very good of him given that he's teetotal.

In (15), John has made a general contribution: whoever wants the wine may drink it.

I will assume following Chomsky (1977) that the object-gap Purpose Clause contains *wh*-movement of an empty operator and following Wilder (1989) that the subject-gap Purpose Clause also contains covert *wh*-movement. Jones (1991) has suggested that gapping in the Purpose Clauses is an instance of free projection of an external argument from an undifferentiated list of verbal arguments. I favour the A'-analysis of Chomsky (1977) over the A-analysis of Jones because the distribution of gaps patterns straightforwardly with the distribution of *wh*-trace rather than NP-trace. As Jones himself points out, gaps can occur in the Purpose Clause anywhere that *wh*-extraction is allowed where A-movement such as the passive (reanalysed as external projection of an internal argument after Williams (1981)) is more restrictive.

- [16]
(a) Sven brought the CD along to play *e*.
(b) What did Sven play *e*?
(c) The CD was played *e*.

- [17]
(a) Sven brought the bag along to hide the money in *e*.
(b) What did Sven hide the money in *e*?
(c) *The bag was hidden the money in *e*.

- [18]
(a) Sven brought Sigrun along *e* to sing some traditional songs.
(b) Who *e* sang some traditional songs?
(c) **E* was sung some traditional songs.

Applying the diagnostics for *wh*-movement suggested by Chomsky (1977: 86) is rather difficult with this data, but some evidence supports this analysis. We have already seen that the construction contains an obligatory gap. In (19), we have an apparent violation of the Propositional Island Constraint in the presence of a bridge

verb; in (20), we have a violation of the *Wh*-Island Constraint; and in (21), we have a violation of the Complex NP Constraint.

- [19] John brought some medicine along for us to tell/order Bill to take.
 [20] *John brought some medicine along for us to tell Bill why to take.
 [21] *John brought some medicine along for us to give Bill the order to take.

Notice also that the object-gap constructions license parasitic gaps where the subject-gap constructions do not: an asymmetry paralleled in overt *wh*-movement.

- [22]
 (a) Sven put the letter in the tray *Op e* to file *t* without reading *t*.
 (b) What did Sven file *t* without reading *t*?
 (c) *The letter was filed without reading *t*.

- [23]
 (a) ?Sven opened the draw *Op e* to put the letter in *t* without reading *t*.
 (b) ?What did Sven put the letter in *t* without reading *t*?
 (c) *The letter was put *t* in the draw without reading *t*?

- [24]
 (a) *The manager brought in a secretary *Op t* to do the work without rewarding *t*.
 (b) *Who did the work without rewarding *t*?
 (c) *The work was done *t* without rewarding *t*.

The internal structure for the infinitives is then as in (25-27).

- [25] Purpose Clause: [CPO [IP_t to [VP[V'[V' V NP]][PP P NP]]]
 [26] Purpose Clause: [CPO [IP_{PRO} to [VP[V'[V' V t]][PP P NP]]]
 [27] Purpose Clause: [CPO [IP_{PRO} to [VP[V'[V' V NP]][PP P t]]]

I am thus adopting an analysis in which the subject-gap Purpose Clause is formed, like the object-gap Purpose Clause, by *wh*-movement of an operator to CP-Spec. This symmetrical approach to the derivation of the subject- and object-gap Purpose Clauses goes back to the original analysis in Chomsky and Lasnik (1977), which is developed in more detail in Wilder (1989). Specifically, Wilder argues against the departure from the symmetrical analysis introduced by Williams (1980), in which

the subject-gap Purpose Clause is assumed (like the Rationale Clause) to have a PRO subject. This split analysis is pursued by Browning (1987) for the subject-gap Purpose Clause and Jones (1985) for the related subject-gap Infinitival Relative (although of course Jones (1991) argues for a symmetrical analysis, if radically different from Wilder's).

As Wilder observes (1989: 214), Williams' (1980) departure from the symmetrical analysis is based on problems posed for the version of Case Theory he adopts (as in Chomsky (1980)), problems arising because extraction from the subject position of an infinitive will require a caseless *wh*-trace. Wilder (1989) argues that this position is in fact not a Caseless position, but rather that it is Case-marked by the Complementiser, *for*, which deletes on the way to Phonological Form. This analysis therefore parallels the standard analysis of the infinitival complement of *want*, which Chomsky (1981: 69) assumes to be a CP whose Complementiser, *for*, deletes when next to the verb.

- [28] John wants very much for Bill to leave as soon as possible.
- [29] *John wants very much Bill to leave as soon as possible.
- [30] John wants (??for) Bill to leave as soon as possible.

In some dialects, *for* is standard in sentences such as (30). Wilder observes that when the subject of the infinitive is extracted, deletion of *for* is obligatory, even in contexts where it is usually required.

- [31] *Who does John want very much for *t* to leave as soon as possible?
- [32] Who does John want very much *t* to leave as soon as possible?
- [33] Who does John want *t* to leave as soon as possible?

Wilder goes on to argue that the reason that English licenses subject-gap Purpose Clauses and Infinitival Relatives is precisely that the Complementiser is a Case-assigner; Wilder claims that languages such as Dutch, French, and Swedish which do not have Case-assigning Complementisers also do not license *wh*-extraction from the

subject of the infinitive. I will assume that an analysis along the lines of Wilder (1989) is in fact correct.

The symmetrical analysis of these constructions also allows us to follow up a possible link between the argument structure of the Purpose predicate and the internal syntax of the Purpose Clause. Recall that in Section 1.2 I argued that the Purpose predicate which heads this construction denoted a relation between an entity, an event, and a property, such that the entity's participation in the event was for the sake of the entity having the property. Assume then that the translation of the empty operator is as a lambda abstractor, which creates a one-place property. We can now explain the occurrence of *wh*-movement because the predicate requires it if the infinitive is to be theta-marked as the property argument. The reason we understand a particular argument of the main verb as being the subject of predication is because the Purpose predicate is itself a relation between an entity and a property, where the infinitival CP denotes the property (and is directly theta-marked) and the direct object of the main verb is coreferential with the entity argument by theta-identification. I therefore differ from previous views of the empty operator in not seeing it as an operator whose value must be fixed by an antecedent, requiring a theory of *wh*-predication such as that of Browning (1987) (see Section 4.1.2.2): there is no theory of predication and coindexing. Rather the operator receives a translation as a lambda abstractor creating a one-place property; the purpose predicate theta-marks this property and then attributes it to its external entity argument, according to general principles of argument discharge.

This then suggests an answer to the problem raised by Hegarty concerning why, if the Purpose Clause contains *wh*-movement, there is no alternation with overt *wh*-words. Overt *wh*-words are excluded from Purpose Clause contexts, as in (28-30); and the empty operator is excluded from overt *wh*-contexts, as in (37-38), although this cannot be shown for the subject-gap Purpose Clause because of homophony with a sentence containing PRO.

[34] *Sven brought Sigrun along who *t* to perform some traditional music.

[35] *Sven brought Sigrun along who *e* to introduce *t* to his friends.

[36] *Sven brought Sigrun along who *e* to sit next to *t* at the dinner.

[37]

(a) *Sven asked Sigrun *Op e* to do *t*.

(b) Sven asked Sigrun what *e* to do *t*.

[38]

(a) *Sven asked Sigrun *Op e* to give it to *t*.

(b) Sven asked Sigrun who *e* to give it to *t*.

The answer may be that overt *wh*-words are not interpreted as lambda abstractors, but rather as quantifiers of some sort. We might paraphrase the interpretation for (37b) by the intuitive (39).

[39] Sven asked Sigrun [[for which *x*] *e* did *x*].

The interpretation of (37a) containing the empty operator on the other hand would receive the paraphrase in (40).

[40] Sven asked Sigrun [the property of being an *x* such that *e* did *x*].

In this view you can ask someone to identify an answer from a set of propositions; you cannot ask them a property.

Thus the questions under (1-4) are answered as in (41-44).

[41] Gaps can occur in any position from which *wh*-extraction is allowed because the Purpose Clause contains *wh*-movement; the presence of an additional subject gap is optional because PRO can always be present as subject.

[42] There is no direct link via coindexing between the *wh*-trace and the NP argument of the modified verb with which it is coreferential: the two are linked because of the relation specified by the purpose predicate, namely that the individual (argument of main verb) have the property denoted by the infinitive.

[43] The infinitive has the form which it has because it must denote a property.

[44] The infinitive contains movement of an empty operator because the empty operator receives a translation as a lambda operator; overt *wh*-words are excluded because they are not translated as lambda operators but as quantifiers of some sort.

Section 4.1.2.2: The Purpose Clause and predication

In general, theories of syntactic predication have addressed the problem of coreference between an overt argument of a matrix verb and a non-overt (usually non-subject) argument of a subordinate verb, as in (1).

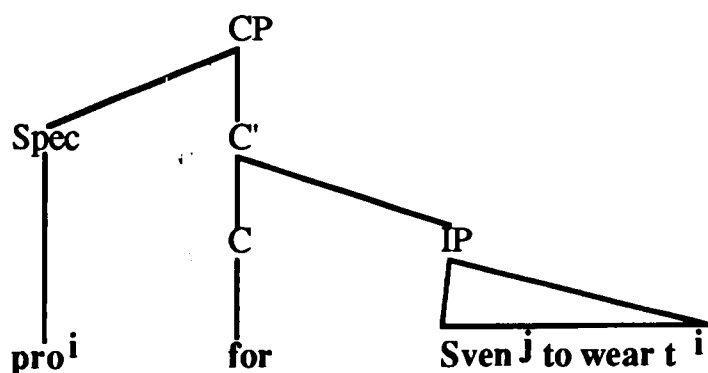
[1] Sigrun brought a jumperⁱ along for Sven to wear *eⁱ* at the firework display.

The verb *wear* has an object argument which is not overtly realised. We must interpret this object as referring to some individual denoted by *a jumper*. *A jumper* is the object of the matrix verb *bring*. Some theories conceive of the problem of "predication" in purely these terms: the linking of an argument position of one verb with the argument of another verb, where the dependent position is clearly embedded at some distance from its antecedent. Solutions to this problem have taken two forms. There is the A'-solution (cf Browning (1987) and Wilder (1989)) in which a non-overt syntactic phrase mediates the formation of a syntactic chain by which the gapped position is coindexed with the antecedent position; and there is the the A-solution, adopted by Jones (1991) following Williams (1980; 1981; 1987a,b; 1989), in which the principles of argument projection (the Theta Calculus) allow the index associated with a particular argument position to be assigned directly by a series of local steps over the required distance. The important point to notice in these analyses is that the theory of predication is set up solely to mediate coreference between two argument structures: it is not clear what sort of independent contribution to the interpretation of the sentence the modifier is supposed to make. Hegarty (1989) views this as problematic and argues that the purpose modifier has the interpretation which it does because it is headed by a predicate in the traditional sense, i.e. a relation between individuals. In his view the complementiser, *for*, denotes a relation between an individual and an irrealis event and it is this predicate which mediates the coindexing relation in (1), while contributing its

own independent element of interpretation. In the analysis I will propose, the relation between the infinitive in (1) and the clause it modifies will be seen as a relation of predication purely in the traditional sense, where the infinitive acts as an argument of the purpose predicate and the interpretation of the infinitive with regard to the modified clause, as well as the "coindexing" relations, follow as reflexes of the interpretation of the predicate itself.

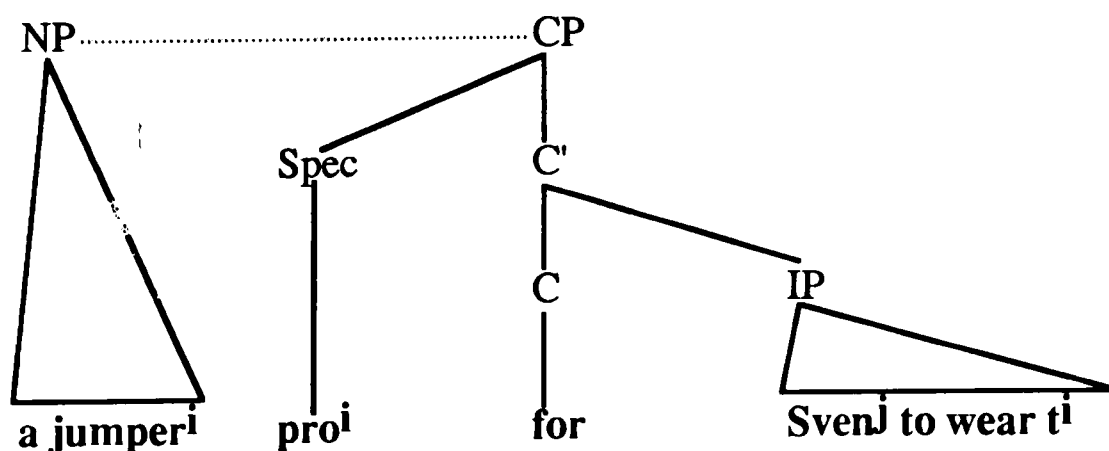
Consider first the analysis of Browning (1987). Browning assumes, following Chomsky (1977), that the gap in the Purpose Clause is created by *wh*-movement of an empty operator to the Specifier position of C^0 . Under standard assumptions the trace is coindexed with its antecedent as in (2).

[2]



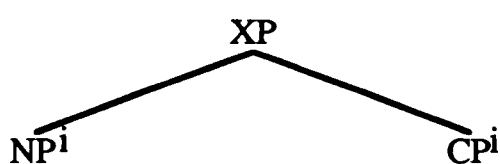
Assuming that the infinitive adjoins to a position which makes the relevant NP an accessible, c-commanding antecedent we must then explain how *pro* mediates coindexation between the *wh*-trace and the NP as in (3).

[3]



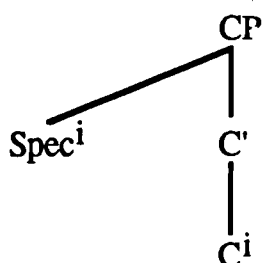
Browning notes that *pro* is standardly assumed to require identification, usually by the person features of I^0 , under certain morphological conditions. This is clearly not possible in (3). She argues that *pro* is identified in this construction by coindexing with a referential NP antecedent: hence the predication relation is motivated by a requirement on the empty category itself. Assume that predication itself involves the coindexing of two phrases under the condition of c-command (or m-command). This will allow the structure in (4).

[4]



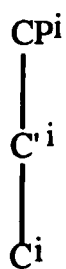
The assumption that heads agree with their specifiers has been standard since Chomsky (1986b), giving the coindexation in (5),

[5]



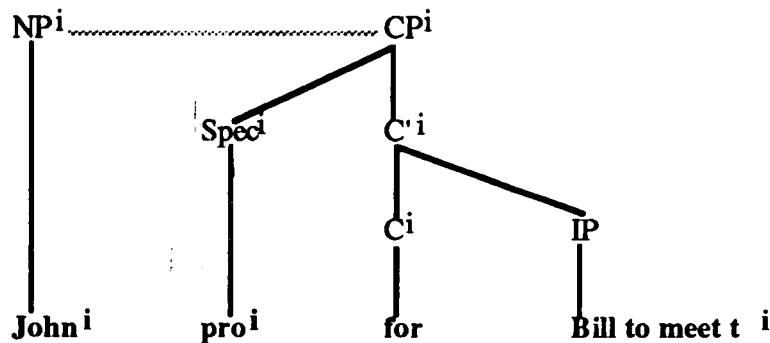
as is the assumption that maximal projections agree with their heads, giving the coindexation in (6).

[6]



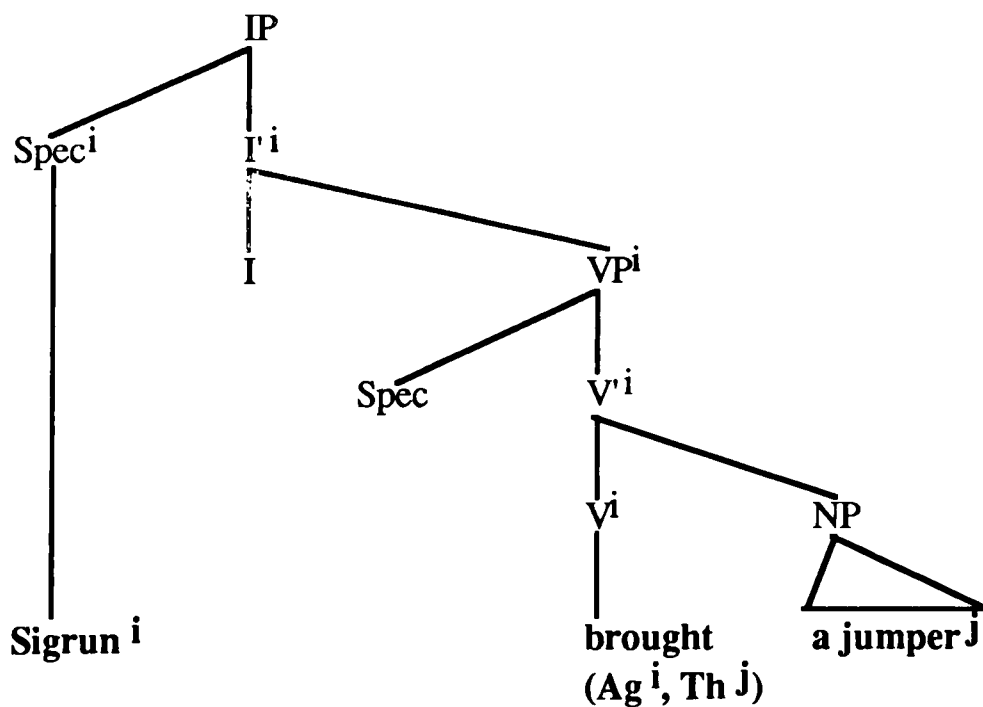
Between these three agreement relations (predication, Head-Spec, X^0 - X^{\max}), a chain is formed which links *pro* in CP-Spec, and hence the *wh*-trace, with its antecedent, as in (7): {NP, CP, C^0 , *pro*, *t*}.

[7]



Jones (1991) argues that viewing predication in this context as involving A'-movement introduces an asymmetry into the theory of predication given that it is standardly used to mediate the assignment of external theta-roles, as in (8).

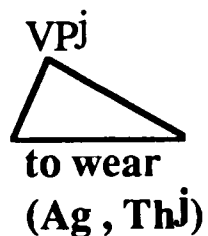
[8]



Here the external theta-role of the verb *bring* is the Agent role. Following the theory of Williams, the index associated with this external role is transmitted up the tree to I' which is then predicated of the subject by coindexation. The principles which allow for the transmission and assignment of theta roles Williams calls the Theta Calculus. Jones

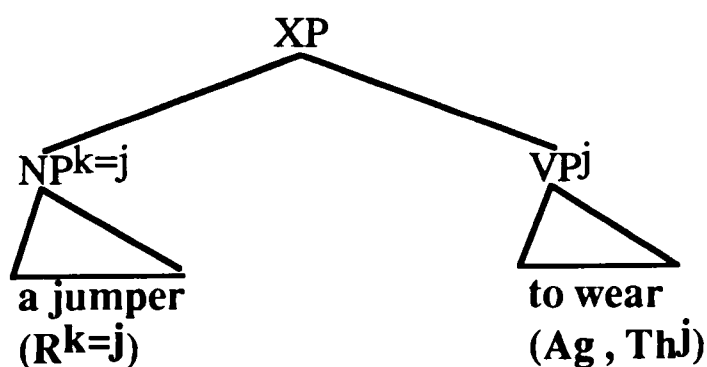
suggests that the theory of predication naturally falls within the domain of A-rules rather than A'-rules. He assumes that there is a syntactic rule which allows the VP to projection any argument externally: if the Agent is not projected it simply becomes an implicit argument. In the case of (1) therefore, the infinitival verb could project the Theme argument as its external argument, as in (9).

[9]



The infinitive is taken to be a bare VP: this bare VP predicate will then adjoin and directly assign its external theta-role to its antecedent, as in (10).

[10]



As noted above, the accounts of both Browning and Jones share the assumption that the problem is merely one of assigning co-reference between an non-overt, dependent argument of a subordinate verb and the overt, antecedent argument of the matrix verb under appropriately local conditions. The question of why the construction receives the interpretation that it does is left open. Hegarty assumes that this is inadequate and argues that the interpretation is introduced by an independent predicate, realised by complementiser *for*. He assumes that *for* is a two-place relation between an

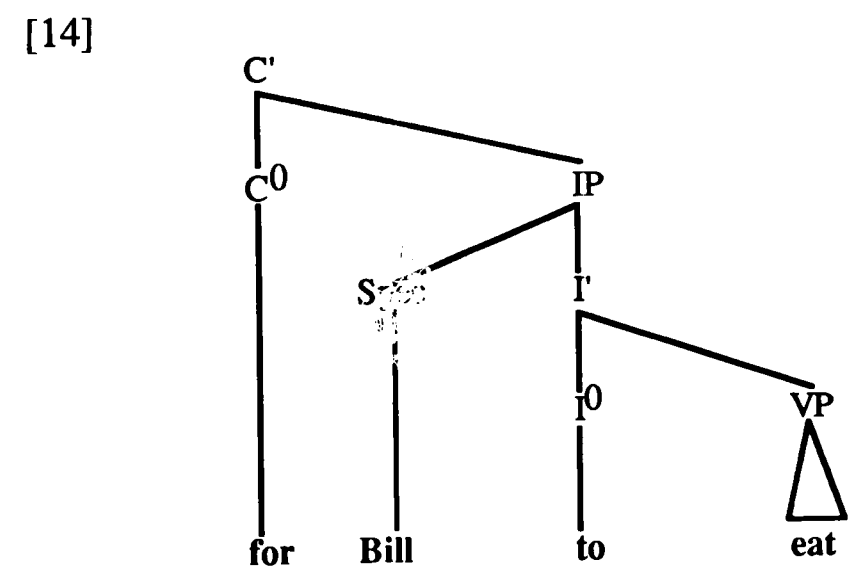
entity and an irrealis event (for the Purpose Clause, as in (11)) or an event and an irrealis event (for the Rationale Clause, as in (12)).

- [11] for (x, ^e)
- [12] for (e, ^e)

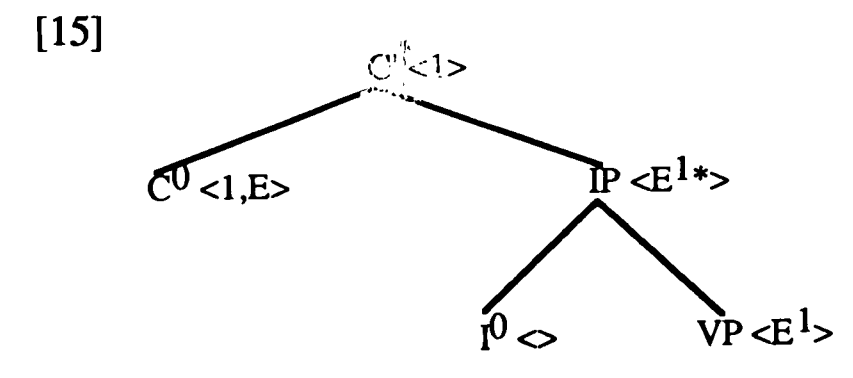
He assumes that *for* is the head of a CP (although his arguments are intended to extend straightforwardly to the heads of PPs). Consider the sentence in (13).

- [13] John brought some chicken home for Bill to eat.

Part of the internal structure for the Purpose Clause in (13) is given in (14).



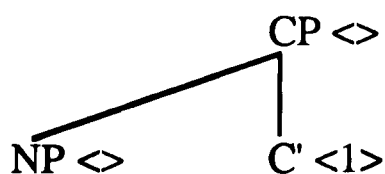
He assumes that an IP headed by *to* denotes an "irrealis event"; *for* can therefore directly theta-mark its IP complement through its second argument position, closing that position off. The projection of argument structure for (14) will therefore be as in (15).



As is clear from sentence (13), however, *for* clearly also has a purely syntactic relation to its IP complement in that overt NPs are allowed to occur in IP-Spec and must therefore presumably be Case-marked. Hegarty follows the standard assumption that *for* Case-marks the NP in IP-Spec by exceptional case marking. However, he takes this Case-marking property of *for* to be exceptionless (and of course must assume that *for* is present in *all* infinitives because it is the construction's head). This means that IP-Spec in all infinitives is a governed position and hence that PRO cannot occur in that position. He therefore also assumes that PRO is base-generated in VP-Spec and does not raise. This means that in his view infinitives contain an empty IP-Spec (in violation of the extended projection principle) which is redundantly assigned case.

For therefore both theta- and Case-governs its complement. Following a suggestion by Harry Leder, based on Burzio's Generalisation, Hegarty suggests that if a head assigns Case to an internal argument then it *must* assign a theta-role to an NP subject. This means that *for* must directly theta-mark an NP in CP-Spec through its first argument position, as in (16).

[16]



The question now arises as to the nature of the category to which the theta-role is being assigned.

Hegarty introduces his discussion on this topic by commenting (Page 22):

This external argument refers to the entity (object or event) of which the adjunct is predicated. Since this entity is introduced in an argument position within the matrix clause, it shouldn't be introduced again with an independently referring R-expression in the external argument position of [*for*]. Therefore, the external argument of [*for*] should not be an overt lexical NP, but rather a null NP, PRO or pro, which gets its reference from the matrix NP.

Hegarty's assumption that "an independently referring R-expression" excludes overt NPs begs a number of important questions (why for instance will an overt *wh*-word not serve the necessary purpose?). This is further complicated by his straightforward assumption that NP in CP-Spec must be PRO or *pro*, given that he later rejects the view that PRO and *pro* are the only base-generated empty categories and that both NP-trace and *wh*-trace are derived from applications of Move Alpha, by introducing a base-generated empty anaphor. It seems in fact entirely possible that the category in CP-Spec could be an anaphor if an appropriate definition of government is assumed. The NP in CP-Spec is referentially dependent on a c-commanding NP. That c-commanding NP will always be within the XP to which the CP has adjoined (the object in VP, the subject in IP); given VP-internal subjects, that XP will always also contain a SUBJECT (the external argument of the verb in VP or the syntactic subject/AGR in IP). The anaphor will therefore be bound in its governing category.

The choice between *pro* and PRO is not central to Hegarty's basic analysis. As he observes (Page 22):

Either empty category can be chosen as the basis of a theory of secondary predication: which we choose depends on background assumptions about the directionality of government.

In the end he argues that the choice of *pro* poses less difficulties for the binding theory and proposes that Rizzi's (1986) licencing schema for *pro* be extended to complementiser *for*, as under (17), (Page 26, his {30}).

[17]

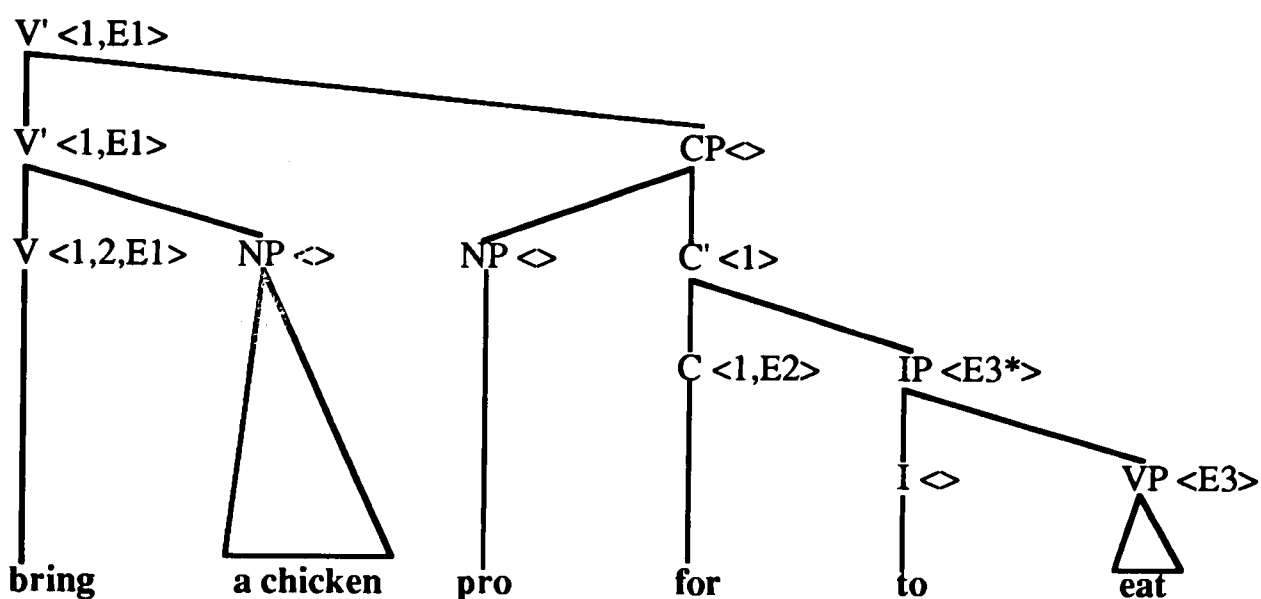
- (a) *pro* is governed by P⁰
- (b) *pro* is not assigned case by P⁰

Pro in CP-Spec will then be bound by a minimally c-commanding nominal (which may include AGR in INFL): this coindexing Hegarty calls "secondary predication". The

semantic effect of such coindexing seems to have essentially the same semantic properties as direct theta-marking in that all variables to which *pro* assigns a value are given the value of the controller. Hegarty does not discuss the coindexing in these terms, nor does he comment on the way this type of argument discharge interacts with the theory of argument discharge developed in Higginbotham (1985), which he adopts as his theory of argument projection.

We now have a syntax and semantics for the predicate *for*, as in (18).

[18]



The main verb is *bring* which directly theta-marks its direct object through its second argument position, producing a V' with an argument position for the Agent of *bring* and an event position. The infinitival verb is *eat*. The VP containing *eat* has an open event position. This is theta-bound by *to* in INFL, producing an "irrealis event". IP is directly theta-marked by *for* through its event argument position, producing a C' with one open position. *for* directly theta-marks *pro* in CP-Spec through its first argument position. Therefore CP is a closed structure, which adjoins to V', producing an identical node. The relation between the infinitive and the main clause is therefore exclusively mediated by the anaphoric binding relation between *pro* and the direct object: there is some *x* which is both a chicken which John brings and a thing which is for Bill's eating. One of the aims of Hegarty's paper is to reduce complex facts concerning the interpretation of these infinitives to particular features of the representation. In a simple coindexing

account, no semantic relation of any sort is specified and semantic relations must be stipulated on a construction by construction basis. By assuming a predicate as the head of the construction, the richness of the interpretation can be reduced to the interpretation of that head. It seems however that Hegarty's view of the argument structure of the head is insufficiently rich: it is not merely the case that John brings along a chicken and that the chicken is for him to eat, but that it is precisely by virtue of his bringing it along that the chicken is to become available for eating. It seems that the interpretation of the Purpose Clause requires us to understand that the matrix event plays a significant role in the agent's intention to bring about the "irrealis event". This is not clear in the representation, not even in the coindexing relation, and it is not clear how it could be made clear except by a construction specific rule. In the basic account developed in Section 1.2, this follows straightforwardly (for the very reasons that Hegarty has argued) because the Purpose predicate relates not only an entity and a property, but an entity, an event, and a property such that the entity's involvement in that very event is efficacious with respect to it having the property. The principle (theta identification) which tells us that the entity is the same entity as the matrix Theme will also tell us that the event in question is in fact the matrix event. Hegarty cannot however simply include an event position because it would then have to be projected as an empty category but there is no position to which it could be projected. I therefore follow Williams (1983) in assuming that argument projection is not necessarily mediated by empty categories and that general principles of argument projection can link argument positions of predicates independently of phrasal realisation. However, in this case, I also run contrary to Williams' general assumption that there can be only one external argument: it precisely this restriction, in syntactic form, which makes Hegarty's analysis of the link between the purpose predicate and the matrix predicate too weak.

There remains, of course, one of the key problems in accounting for the internal syntax of purpose constructions: the distribution of gaps in the infinitival VP itself. The structure offered in (18) is in fact a misleading abbreviation of the structure of the infinitival VP. The *eat* which heads the VP is in fact transitive: there is something which

Bill is intended to eat (in fact, the chicken). This means that there must be an empty category in object position which is interpreted as co-referential with both *pro* and the NP, *the chicken*. In fact, this chain, {NP, *pro*, *e*}, would mimick the chain in a standard "empty operator" analysis (Chomsky (1977)), {NP, Op, *wh-t*}. Consider Hegarty's analysis of the VP-internal gap and the way in which it is bound by *pro*.

In the empty operator analysis of the Purpose Clause, the empty operator is base generated in the relevant argument position of the infinitival verb and is then raised to CP-Spec, leaving a *wh-t* in the base generated position. *Wh-t* is theta-marked and case-marked and is free in its governing category (IP); it is bound by the operator which is in an A'-position. The relationship between the trace and the operator obeys island constraints. Hegarty cannot however adopt this analysis because CP-Spec is an argument position for the predicate *for* which is independent of the argument structure of the infinitival verb. The gap in the VP must therefore be independently base generated and bound due to some other mechanism than chain formation (and Move Alpha).

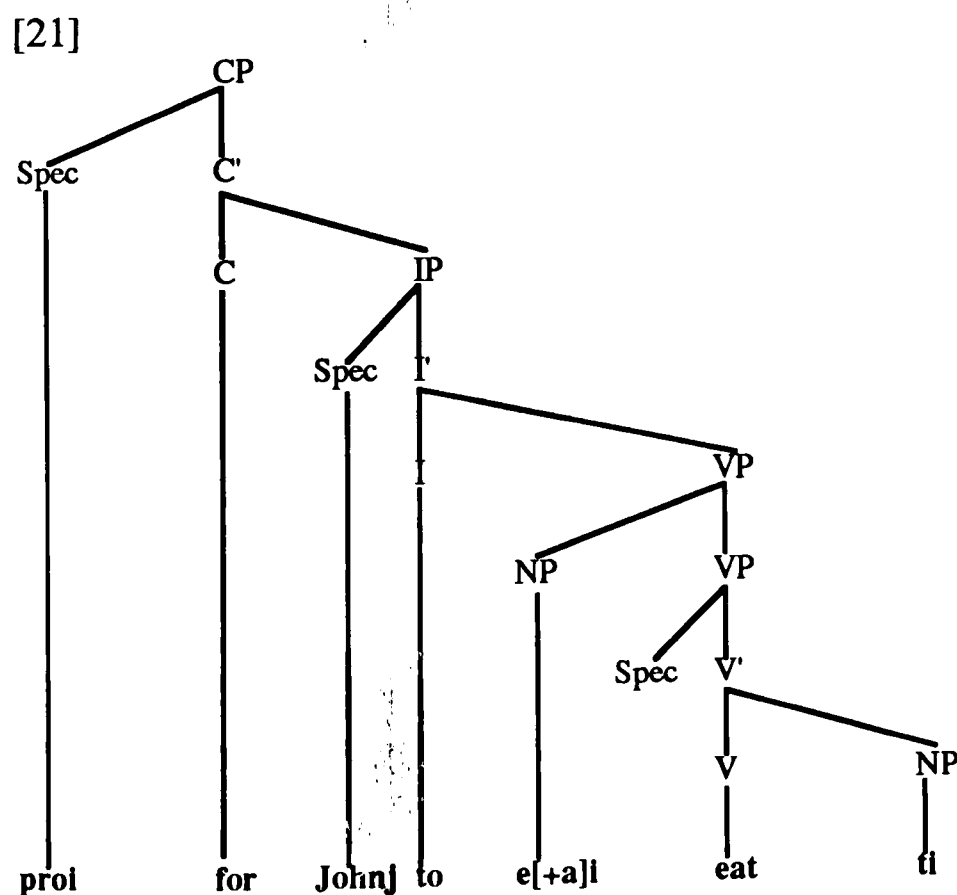
Hegarty argues (Page 51) that *e* cannot be a variable (i.e. *wh-t*) because it is A-bound by *pro* which he counts as a violation of Binding Condition C. Nor can it be PRO as it is governed by the verb. It cannot be *pro* as V is not a licenser in English. Therefore he argues that it must be an empty anaphor, [+anaphor, -pronominal]. Remember, however, that in discussing the nature of the empty category in CP-Spec, Hegarty assumed that the category could only be *pro* or PRO because it was base generated in an argument position. He must either revise this assumption and consider the possibility that the empty category in CP-Spec is an empty anaphor, or he must dismiss the possibility of *e* in VP being [+a,-p]. Let us assume for a moment that such a base-generated empty anaphor is available. Another question then arises. The only empty anaphor standardly available is NP-t, but Hegarty never discusses *e* as an instance of base-generated NP-t (a possibility which Chomsky recognises but dismisses). If he really is suggesting that *e* is NP-t, then he must account for why

sentences such as the one in (19) are ill-formed, given the well-formedness of parallel sentences with lexical anaphors, as in (20).

- [19] John killed NP-t.
 [20] John killed himself.

If he argues that *e* is an empty anaphor but not NP-t (and hence exempt from principles restricting the distribution of NP-t, although falling under Binding Condition A), then he must introduce a new empty category into the typology (exclusively for these constructions) which has the same features as NP-t but is distinguished from it (i.e. the label NP-t would then be more than a label for the features [+a,-p], having real content).

Even assuming that *e* is an empty anaphor, distinct from NP-t, which is base-generated, *pro* is still outside of its governing category (which is standardly considered to be IP). Hegarty therefore assumes that an *e* base generated in object position can raise to adjoin to VP, where it is governed by *for* (I being a defective governor), and hence has CP as its governing category, as in (21).



In this case of course, the empty anaphor will leave a real NP-t which will be bound by it, so that the argument chain for a sentence like (21) will be, {NP, *pro*, *e*, NP-t}. It is not clear why the empty anaphor will not take *John* as its antecedent. It is also unclear how such a chain could be made to mimic island constraints (as Hegarty assumes it does, Page 51f).

[22] John brought some medicine along *pro* for us to tell Bill PRO to tell Mary PRO to take *e*.

In (22) *e* must be bound by *pro*: this would involve it adjoining to the lowest VP, raising over the lowest CP to adjoining to the lowest VP headed by *tell*, raising over the next CP to adjoin to the next VP headed by *tell*, where it will be governed by *pro*. If such a chain is allowed, then it must be allowed independently of principles of Subjacency which would allow *wh*-words to move up successive cyclically in (22). In the empty operator analysis, the operator is assimilated to the *wh*-class and therefore falls under the same explanations. Hegarty's analysis of the internal gap therefore seems to run into problems at each turn of the argument.

One of the principle reasons Hegarty gives for adopting this analysis is to explain the non-interchangibility of overt and covert *wh*-elements in the Purpose Clause, which the empty operator analysis, by assimilating the two categories, implies should occur.

[23] I brought it along to eat.

[24] *I brought it along what to eat.

Hegarty argues (Page 53) that his theory accounts for this asymmetry because CP-Spec is filled by *pro* and cannot therefore be filled by a lexical *wh*-word. The implication is that *wh*-elements are base-generated as arguments of the infinitival verb. It is not clear, however, that that need by the case (Hegarty has made free use of base-generated traces already). If a *wh*-word was base-generated in CP-Spec it could presumably bind an empty anaphor of the type described by Hegarty in the same way as *pro* without any

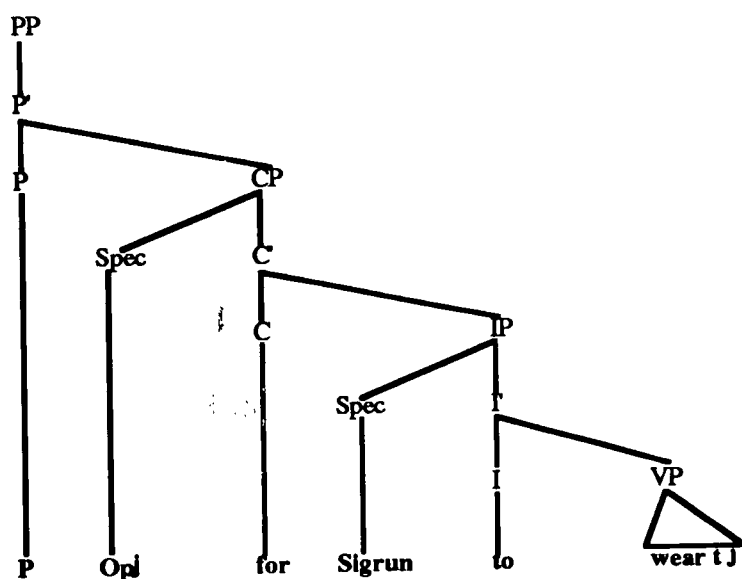
problem. The only conceivable restriction is that an overt lexical *wh*-word requires case, where *pro* (under the licencing scheme above) does not (in the empty operator analysis the *wh*-words are licenced by heading a case-marked chain).

Although extremely different in many details, Hegarty's account is similar in spirit to the position defended in this thesis; I assume, however, that a number of problems can be avoided with slightly different approach. In particular, argument structure is seen as not necessarily mediated by empty categories but may be organised by general principles of argument projection, leaving CP-Spec free; the covert *wh*-movement can therefore be movement of a standard sort to CP-Spec; the particular interpretation of the Purpose Clause and the non-alternation with an infinitive containing overt *wh*-movement follows from translating the operator not as some sort of quantifier, but as a lambda abstractor. These assumptions do however raise some interesting questions concerning the most appropriate realisations for the predicates heading infinitives of result, a question to which I now turn.

Section 4.2: Internal syntax and conditions on argument projection

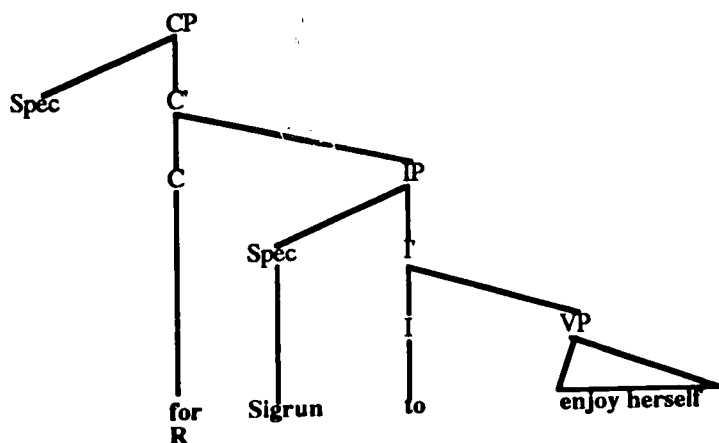
Notice that if one takes each predicate individually, the question of what category would most naturally occur as complement (and hence which lexical item if any most naturally lexicalises the predicate) receives a different answer. The Purpose Clause takes a property argument derived by abstract *wh*-movement. The natural complement is therefore CP.

[1]



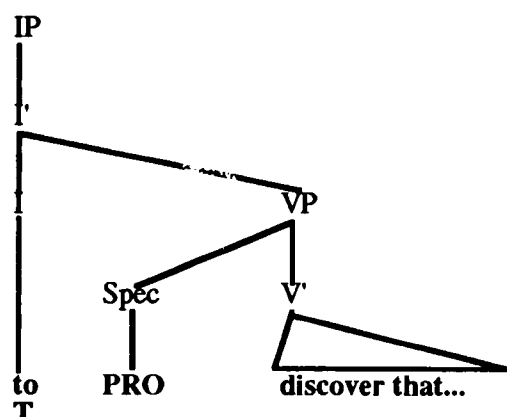
The purpose predicate would be an abstract preposition without overt realisation. The Rationale Clause takes a propositional argument, resulting from existential closure of the event variable. The natural complement is therefore IP.

[2]



The Rationale Clause might therefore be lexicalised by *for*. The Telic Clause takes an event argument, resulting from theta-binding of the event position. The natural complement is therefore VP.

[3]



The Telic Clause might therefore be lexicalised by *to*. This multiple approach is rather unattractive. Apart from anything else, if the three predicates are not in complementary distribution one would expect them to co-occur which does not appear to be the case (although of course our understanding of this is linked to interpretation). I assume that the relevant predicate is *to* for two reasons. *To* is obligatorily present with this infinitive: when it does not occur we have a bare infinitive which has a different distribution and interpretation; *for* never occurs with a bare infinitive independently of *to*. Further, the construction is derived historically from a preposition + verbal noun construction: the preposition which governed the case of the verbal noun was *to*. It is perfectly true that *to* has the distribution of a modal auxiliary and it may therefore be the case that the standard position (cf Bach (1982) and Hegarty (1989)) is correct that *to* is merely a modal operator and that the predicates are lexicalised by Complementiser/Prepositional *for*. It may also be the case that all of the predicates are abstract prepositions taking CP complements: the occurrence of *for* will then follow from Complement selection, and the occurrence of *to* will follow from that.

Whatever the case, the arguments must be motivated by facts concerning the argument structure of the predicates and the most natural way of discharging those arguments. I do not find convincing the traditional appeal (following Faraci (1974)) to

the fact that a class of *for* + NP constructions share similar properties to these predicates. This follows in part from perfectly general facts concerning modifier distribution. Where there really does seem to be a lexical correspondence it is wider than the traditional position suggests.

The decision to associate each of the result predicates with the lexeme, *to*, brings out clearly an important feature of this analysis, namely that it is what I will call a *radical polysemy analysis*. The assumption is that the lexeme, *to*, will be associated in its lexical entry with a number of alternative predicates. In this thesis I have offered a detailed discussion of three of these predicates. There will, however, presumably be others, for instance the predicate which heads the Infinitival Relative construction. Making such a move raises two important questions: (i) is the assumption of radical polysemy in itself valid?; (ii) what does this imply for the study of modifier typology?

In answer to the first question, a comment in Larson & Segal (1995 :487) on the significance of polysemous uses of thematic roles such as Agent seems relevant.

Worries like these have led some researchers to be skeptical about thematic roles altogether. For our part, we do not find their arguments decisive. For example, it seems to us that the fragmentation problem noted with the notion of Agent arises with equal force in the definition of many predicates of natural language. Any detailed dictionary will give entries for prepositions like *to*, *by*, and *with* that show equal fragmentation into subentries, with divergence in meaning at least as great...

They then offer an entry from *Webster's Ninth New Collegiate Dictionary* for *to* (ironically enough). This entry has eight major headings and upto eighteen subheadings. One might object that the polysemy which is being discussed here is genuinely lexical, that is, that it is variation in the interpretation of the predicate which is marked in the conditions on the reference of the predicate, not that it is syntactic or formally semantic, involving variation in the argument structure itself. But this simply is not true. The variation in lexical meaning will be reflected in variation in the complementation of the predicate in several cases (subcategorisation for NP and VP in different uses, at the least) and sometimes for specific word classes, as in its time use,

five to ten.. The lexicon will by its nature be fragmentary and a central problem in organising the lexicon is to limit the range of this fragmentation. To turn the argument for rejecting a polysemy analysis on its head, it seems that where ambiguity is necessary it is best isolated in the lexicon, with the rules of syntactic and semantic composition being maximally general. This is the case in the analysis which I have adopted. The Inflectional head, *to*, is polysemous in that it has (at least) three lexical subentries; but those subentries represent well-motivated independent aspects of *to*'s meaning; and the principles by which those argument structures are projected into the syntax are maximally general. Worries over polysemy do not therefore seem to me to be a strong objection to this approach.

More interesting is the objection that a polysemy analysis obscures generalisations in the behaviour of different classes of modifier. This objection seems to me also, however, to be backwards, for the assignment of coherent and well-motivated argument structures to modifiers is surely the best way to begin the investigation of modifier typology in the first place. It is presumably of little value to assign modifiers to particular semantic classes on the basis of their syntactic distribution without some clear notion of their semantic interpretation. It may prove to be the case, for instance, that VP-internal modifiers often relate properties to individuals in (substates of) an event. But this must surely flow from an investigation of the argument structure of the modifier in question: indeed it may be that specific features of argument structure by which groups of modifiers are classed only become apparent when a proper elucidation of the meaning of those modifiers (in the sense of Higginbotham (1989)) has been offered. Should such generalisations emerge they will presumably offer real insights into the nature of the relation between syntactic and semantic representations as mediated by argument structure. I therefore take it that this polysemy approach, far from obscuring an investigation of modifier typology, in fact facilitates it and provides the basis for the relevant generalisations.

Section 4.3: Gaps, pronouns, and binding

One important question which is not systematically addressed in the literature concerns the types of binding relations that are licensed in the infinitives of result and in particular the nature of the alternation between pronouns and gaps. It is an important question given that sentences such as (1) are standardly cited as examples of Rationale Clauses and statements concerning the distribution of Rationale Clauses are made on the basis of such examples.

[1] Johnⁱ brought Bill^j along PROⁱ to talk to him^j.

The problem is that such sentences are clearly minimally distinct from Purpose Clauses: the gap in the Purpose Clause is replaced by a pronoun in the Rationale Clause. I will therefore call the infinitive in (1) a "resumptive infinitive".

[2] Johnⁱ brought Bill^j along PROⁱ to talk to *e*^j.

The resumptive infinitive in (1) does not behave like a standard Rationale Clause, for instance, resisting preposing.

[3] *PROⁱ to talk to him^j, Johnⁱ brought Bill^j along.

The question is then whether this unusual behaviour occurs because of some unnoticed restriction on Rationale Clauses or whether the pronoun in (1) is in fact a resumptive pronoun of some sort, giving the derived infinitive mixed properties. In the following sections I will discuss some of the properties of each infinitive of result with regard to binding in an attempt to define the parameters of the argument. I will begin with the Rationale and Telic Clauses whose behaviour in this respect is more straightforward than that of the Purpose Clause.

Section 4.3.1: Pronominal binding in the Rationale Clause

I will use the verb *introduce* as the matrix verb in the examples which follow to cut down interference from the subject-gap Purpose Clause in relevant examples. I assume that the verb *introduce* does not license Purpose Clauses as shown in (1).

[1] ???Jose introduced Bill to Gudrun *e* to show *e* around.

(1) is extremely marginal and it is not clear what the control relations are supposed to be (who is showing around whom). To make the Purpose Clause reading even more inaccessible I will preface the examples with an optional *in order*.

[2] Joseⁱ introduced Sven^j to Gudrun^k in order PROⁱ to show her^k that students at Oxford could be interesting.

[3] Joseⁱ introduced Sven^j to Gudrun^k in order PROⁱ to show him^j that students at Oxford could be interesting.

The infinitives in (2-3) are both Rationale Clauses and therefore PRO is obligatorily controlled by the Agent subject (*Jose*). Either the direct object, as in (3) or the indirect object, as in (2), may bind a pronoun in the infinitive. Consider the effect of *wh*-extracting the direct object.

[4] Who^j did Joseⁱ introduce *t_j* to Gudrun^k in order PROⁱ to show her^k that students at Oxford could be interesting?

[5] *Who^j did Joseⁱ introduce *t_j* to Gudrun^k in order PROⁱ to show him^j that students at Oxford could be interesting?

(4), where the pronoun is bound by the indirect object, is well-formed when the direct object is *wh*-extracted, but (5), where the pronoun is bound by the extracted direct object itself, is not. Now consider extraction of the indirect object.

[6] *Who^k did Joseⁱ introduce Sven^j to *t_k* in order PROⁱ to show her^k that students at Oxford could be interesting?

[7] Who did Joseⁱ introduce Sven^j to *t_k* in order PROⁱ to show him^j that students at Oxford could be interesting?

(7), where the pronoun is bound by the direct object, is well-formed when the indirect object is *wh*-extracted, but (6), where the pronoun is bound by the extracted indirect object itself, is not. Both (2-3) are fine when the syntactic subject is extracted, as shown in (8-9).

- [8] Whoⁱ *t*ⁱ introduced Sven^j to Gudrun^k in order PROⁱ to show her^k that students at Oxford could be interesting?
- [9] Whoⁱ *t*ⁱ introduced Sven^j to Gudrun^k in order PROⁱ to show him^j that students at Oxford could be interesting?

This suggests the perfectly straightforward restriction in (10).

- [10] Condition on pronominal binding (Rationale Clause)
A pronoun in a Rationale Clause cannot be bound by a *wh*-extracted element in the matrix.

It also suggests that PRO in a Rationale Clause can be so bound (i.e. *wh*-extraction does not interfere with control).

One further interesting fact which supports (10) (and which offers further interesting data for the semantics of "event" control, see Section 5.2) comes from sentences such as (11).

- [11] Joseⁱ introduced Sven^j to Gudrun^k in order PROⁱ to give him^{i/j} the chance to meet her friend, Ute.

Notice that the Rationale Clause in (11) will allow "event control" as suggested in the paraphrase in (12).

- [12] Jose's introducing Sven to Gudrun gave him the chance to meet her friend, Ute.

This seems to allow the Agent subject (*Jose*) to bind the pronoun (contrary to expectation): the introduction might allow Sven to meet Ute, or it could be an excuse to

allow Jose to meet Ute while Sven and Gudrun chat. Notice now that if the subject is *wh*-extracted it may not act as an antecedent, in accordance with the restriction in (10).

- [13] Whoⁱ *t*ⁱ introduced Sven^j to Gudrun^k in order PROⁱ to give him^{*i/j} the chance to meet her friend, Ute?

Now consider the effects of passivising (2-3), as shown in (14-15).

- [14] Sven^j was introduced to Gudrun^k in order PROⁱ to show her^k that students at Oxford could be interesting.
[15] Sven^j was introduced to Gudrun^k in order PROⁱ to show him^j that students at Oxford could be interesting.

It seems that passivisation does not effect the binding of a pronominal in a Rationale Clause. In fact, the condition on passivisation does seem to be based exclusively on an "event paraphrase" constraint (see Section 5.2). Where the infinitival verb is a verb such as *explain* which does not allow an event subject, passivisation is excluded.

- [16] Joseⁱ showed Gudrun^j the diagrams^k in order PROⁱ to explain them^k to her^j before the interview.
[17] *Gudrun^j was shown the diagrams^k in order PROⁱ to explain them^k to her^j before the interview.
[18] *The diagrams^k were shown to Gudrun^j in order PROⁱ to explain them^k to her^j before the interview.

The question is then whether an implicit Agent can bind a pronominal in a Rationale Clause which does allow the event paraphrase; consider the passivisation of (11) in (19).

- [19] Sven^j was introduced to Gudrun^k (by Jose) in order PRO^e to give him^{?i/j} the chance to meet her friend, Ute.

It is clear that *Sven* can bind the pronoun *him* straightforwardly; judgements on binding by the implicit Agent are more delicate. It seems however that the Agent realised in a

by-phrase can bind the pronoun marginally and the reading improves considerably when stress is placed on the pronoun.

[20] Sven^j was introduced to Gudrun^k (by Jose) in order PRO^e to give himⁱ the chance to meet her friend, Ute.

In this case it appears that pronominal binding in the Rationale Clause is entirely insensitive to the passive. The sole restriction is therefore the one in (10).

Section 4.3.2: Pronominal binding in the Telic Clause

The situation in the Telic Clause would appear to be even more straightforward.

Consider the case of a standard Telic Clause as in (1).

- [1] Johnⁱ won Mary^j a car^k on the first spin of the wheel, only PROⁱ to lose it^k for her^j on the second.

Now consider the effect of *wh*-extraction.

- [2] What^k did Johnⁱ win for Mary^j *t*^k on the first spin of the wheel, only PROⁱ to lose it^k for her^j on the second?
[3] Who^j did Johnⁱ win a car^k for *t*^j on the first spin of the wheel, only PROⁱ to lose it^k for her^j on the second?
[4] Whoⁱ *t*ⁱ won Mary^j a car^k on the first spin of the wheel, only PROⁱ to lose it^k for her^j on the second.

All of the sentences in (2-4) are well-formed. This suggests that *wh*-extraction does not affect the binding of pronouns whose antecedents are internal arguments (as in (2-3)). It also suggests that the binding of PRO is unaffected by *wh*-extraction. The question remains whether the subject of the matrix can bind a pronoun in the Telic Clause and if so, whether this binding relation is affected by *wh*-extraction. Fortunately the Telic Clause, like the Rationale Clause, allows "event control", as in (5).

- [5] Derbyⁱ beat Bolton^j decisively PRO^e to give themⁱ a shot at the championship.

Event control is suggested by the well-formed paraphrase in (6).

- [6] [Derby's beating Bolton decisively] gave them a shot at the championship.

Now consider the effect of *wh*-extracting the object, as in (7), and the subject, as in (8).

- [7] Who^j did Derbyⁱ beat *t*^j decisively PRO^e to give themⁱ a shot at the championship?

[8] *Whoⁱ *t*ⁱ beat Bolton_J decisively PRO^e to give themⁱ a shot at the championship?

(7) is well-formed as we would expect, suggesting that the base sentence in (6) is perfectly compatible with *wh*-extraction. However, the extraction of a subject, which binds the pronominal in the Telic Clause, here produces ill-formedness. It therefore appears that pronouns in the Telic Clause are sensitive to *wh*-extraction of the subject alone (where pronouns in the Rationale Clause were sensitive to all *wh*-extraction). The relevant condition is stated under (9).

[9] Condition on pronominal binding (Telic Clause)
A pronoun in a Telic Clause cannot be bound by a *wh*-extracted subject in the matrix.

This restriction clearly covers a subset of the cases covered by the condition on pronominal binding in the Rationale Clause in Section 4.3.1. It also adds to the weight of evidence that the Telic Clause is less integrated with the modified verb than the Rationale Clause: pronouns in the Rationale Clause are sensitive to *wh*-extraction of all arguments; pronouns in the Telic Clause are sensitive only to *wh*-extraction of the subject.

Section 4.3.3: Pronominal binding in the Purpose Clause

The situation in the Purpose Clause is considerably more complicated, particularly given that the relatively free binding possibilities for the PRO subject seem to affect well-formedness.

- [1] Davidⁱ brought Ruth^j some articles^k PRO^j to explain *t*^k to himⁱ.
- [2] Davidⁱ brought Ruth^j some articles^k for the professor to explain *t*^k to himⁱ.
- [3] Davidⁱ brought Ruth^j some articles^k PROⁱ to explain *t*^k to her^j.
- [4] Davidⁱ brought Ruth^j some articles^k for the professor to explain *t*^k to her^j.

The infinitives in (1-4) are all Purpose Clauses and the gap in object position is obligatorily controlled by the matrix Theme (*the articles*). This aside, the referential possibilities are fairly free. (2) and (4) show the expected alternation between PRO and a lexical subject; I will assume that ill-formedness which occurs because of a control violation will disappear where a lexical subject is used and that ill-formedness which results irrespective of the alternation between PRO and a lexical subject is an instance of illicit binding of the pronominal.

In (1), the pronominal is bound by the matrix subject and PRO by the matrix Goal: David brings some articles along to Ruth so that she can explain these articles to him. In (3) we have the inverse, the pronominal is bound by the matrix Goal and PRO is bound by the matrix subject: David brings some articles along to Ruth so that he can explain the articles to her. The Purpose Clause in (1) is of the type standardly cited, with the PRO subject controlled by the Goal when present. The well-formedness of (3) is however significant. It is a counterexample to the control rule of Chierchia which already has difficulties with implicit Goal/Beneficiaries (see Section 2.2.3); it also suggests that fixing the control of PRO on any sort of thematic hierarchy will not work unless the Agent and Goal are ranked equally (in which case the notion of hierarchy is weakened). It does appear to be the case, however, that the control exhibited in (3) is

non-standard and the infinitive is much more restricted in its binding possibilities than the standard (1), as we will see.

Consider now what happens when the Goal is *wh*-extracted in (5-6) (I will include a stranded preposition as this seems easier to parse).

- [5] Who_j did Davidⁱ bring some articles^k to *t*_j, PRO_i to explain *t*^k to himⁱ?
 [6] Who_j did Davidⁱ bring some articles^k to *t*_j, for the professor to explain *t*^k to himⁱ?

Both sentences are well-formed: the pronoun is bound by *David* and PRO takes the *wh*-trace as its antecedent. Now consider *wh*-extraction of the Goal in (7-8).

- [7] *Who_j did Davidⁱ bring some articles^k to *t*_j, PRO_i to explain *t*^k to her_j?
 [8] *Who_j did Davidⁱ bring some articles^k to *t*_j, for the professor to explain *t*^k to her_j?

Both sentences here are ill-formed¹². Notice that replacing the PRO (controlled by the syntactic subject, *David*) with an independently referential phrase does not affect the well-formedness of (7); as stated above, I take this to indicate that the problem here is with the binding of the pronominal by the *wh*-extracted element, rather than with the control of PRO.

Now consider what happens when the subject is *wh*-extracted from (1-2).

- [9] Whoⁱ *t*_i brought Ruth_j some articles^k PRO_j to explain *t*^k to himⁱ?
 [10] Whoⁱ *t*_i brought Ruth_j some articles^k for the professor to explain *t*^k to himⁱ?

Both sentences are well-formed with PRO controlled by *Ruth* and the pronoun bound by the *wh*-extracted subject. This suggests that there cannot be a general restriction on

¹² Given that parsing strategies are not as politically correct as one might wish, it could be the case that these sentences are bad because the *wh*-element is binding the "marked" feminine pronoun. This cannot, however, be the case, because reversing the matrix participants makes no difference.

- (a) *Who_j did Ruthⁱ bring some articles^k to *t*_j, PRO_i to explain *t*^k to him_j?
 (b) *Who_j did Ruthⁱ bring some articles^k to *t*_j, for the professor to explain *t*^k to him_j?

the binding of pronouns in the Purpose Clause by *wh*-extracted elements. The situation becomes particularly intriguing when the subject in (3-4) is *wh*-extracted.

- [11] *Whoⁱ *t*ⁱ brought Ruth^j some articles^k PROⁱ to explain *t*^k to her^j?
 [12] Whoⁱ *t*ⁱ brought Ruth^j some articles^k for the professor to explain *t*^k to her^j?

There is an asymmetry here. It seems that the ill-formedness of (11) cannot be attributed to the binding of the pronoun, because (12) is well-formed. The minimal difference between these two sentences is the replacement in (12) of PRO by a full referential NP, i.e. it seems that (11) is ill-formed because of a control violation: PRO cannot be controlled in (11) by the extracted *wh*-phrase. All of the Purpose Clauses, however, seem to be perfectly compatible with extraction of the matrix Theme.

- [13] What^k did Davidⁱ bring *t*^k to Ruth^j PRO^j to explain *t*^k to himⁱ?
 [14] What^k did Davidⁱ bring *t*^k to Ruth^j for the professor to explain *t*^k to himⁱ?
 [15] What^k did Davidⁱ bring *t*^k to Ruth^j PROⁱ to explain *t*^k to her^j?
 [16] What^k did Davidⁱ bring *t*^k to Ruth^j for the professor to explain *t*^k to her^j?

The behaviour in the passive is more intriguing.

- [17] Ruth^j was brought some articles^k PRO^j to explain *t*^k to himⁱ.
 [18] Ruth^j was brought some articles^k for the professor to explain *t*^k to himⁱ.
 [19] *Ruth^j was brought some articles^k PROⁱ to explain *t*^k to her^j.
 [20] Ruth^j was brought some articles^k for the professor to explain *t*^k to her^j.

Where *Ruth* is not binding a pronoun in the infinitive (examples (17-18)), passivisation is fine. Where *Ruth* is binding a pronoun, extraction is only allowed where there is a full lexical NP subject for the infinitive. This suggests that in this case the Purpose Clause is in fact passive-sensitive as far as the control of a PRO subject is concerned and hence will select *Ruth* as controller in (19), giving a Binding Condition B violation in the infinitive.

At first glance it appears that passivisation of the Theme itself interferes with pronominal binding.

- [21] *Some articles^k were brought to Ruth_j PRO_j to explain *t*^k to himⁱ.
- [22] *Some articles^k were brought to Ruth_j for the professor to explain *t*^k to himⁱ.
- [23] *Some articles^k were brought to Ruth_j PROⁱ to explain *t*^k to her_j.
- [24] Some articles^k were brought to Ruth_j for the professor to explain *t*^k to her_j.

Notice, however, that the only example which is well-formed contains no binding by the implicit Agent. (21-22) become well-formed when the pronoun is understood as non-coreferential with the Agent.

- [25] Some articles^k were brought to Ruth_j PRO_j to explain *t*^k to the class/them.
- [26] Some articles^k were brought to Ruth_j for the professor to explain *t*^k to the class/them.

(23) cannot be saved in this way because the controller is naturally understood to be the Agent. The ill-formedness of (21-23) therefore seems to be linked to binding by an implicit Agent. Why this restriction should hold for passivisation of the Theme but not of the Goal is unclear.

The data on Purpose Clauses is therefore extremely complicated, particularly in comparison to the other infinitives of result: this is perhaps what we would expect given that the Purpose Clause contains abstract *wh*-movement where the other two infinitives do not. In general the standard Purpose Clause in (1) seems to be relatively free, being insensitive to *wh*-extractions of all types. The only restriction seems to occur with passivisation and that seems to be linked to a restriction concerning control by an implicit Agent.

Section 4.3.4: Classifying the "resumptive infinitive"

Let us now return to the general problem of establishing the correct classification for what I have called "resumptive infinitives" which are identical to Purpose Clauses except that they have a pronoun in place of the obligatory gap.

- [1] Davidⁱ brought Ruth^j some articles^k PROⁱ to explain them^k to her^j.
- [2] Davidⁱ brought Ruth^j some articles^k for the professor to explain them^k to her^j.

Consider the effect of *wh*-extracting the Goal phrase in (1-2), as shown in (3-4).

- [3] *Who^j did Davidⁱ bring some articles^k to *t*^j, PROⁱ to explain them^k to her^j?
- [4] *Who^j did Davidⁱ bring some articles^k to *t*^j, for the professor to explain them^k to her^j?

Both (3-4) are ill-formed, with the *wh*-extracted NP binding the pronoun, *her*. This is would be expected if these were Rationale Clauses because of the principle in Section 4.3.2 which excludes binding of a pronominal in the Rationale Clause by a *wh*-extracted element.

Now consider the effect of extracting the Agent subject, *David*, as shown in (5-6).

- [5] *Whoⁱ *t*ⁱ brought Ruth^j some articles^k PROⁱ to explain them^k to her^j?
- [6] Whoⁱ *t*ⁱ brought Ruth^j some articles^k for the professor to explain them^k to her^j?

(5-6) is unexpected if these are Rationale Clauses. In our discussion above we saw that Rationale Clauses allow PRO to be controlled by a *wh*-extracted element straightforwardly, as in (7-8).

- [7] Whoⁱ *t*ⁱ introduced Sven^j to Gemma^k PROⁱ to show her^k that students at Oxford could be interesting?
- [8] Whoⁱ *t*ⁱ introduced Sven^j to Gemma^k PROⁱ to show him^j that students at Oxford could be interesting?

This problem really does seem to be related to the nature of these "derived Rationale Clauses" which are directly related to Purpose Clauses. Notice that true Rationale Clauses will allow the binding of pronominal in the infinitive by a matrix Theme and control of PRO by a *wh*-extracted subject, as in (9-10).

- [9] Whoⁱ *t*ⁱ introduced the twins^k to Gemma^j before dinner PROⁱ to discuss them^k with her^j afterwards?
 [10] Whoⁱ *t*ⁱ introduced the twins^k to Gemma^j before dinner for her partner to discuss them^k with her^j afterwards?

Notice that the infinitives in (9-10) must be Rationale Clauses because the matrix verb, *introduce* is incompatible with Purpose Clauses and therefore there is no pronoun-gap alternation, as shown in (11).

- [11] *Hugh introduced the twins to Gemma before dinner PRO to discuss *e* with her afterwards.

In this respect then, the sentences in (5-6) behave exactly like their Purpose Clause equivalents in (14-13).

- [12] *Whoⁱ *t*ⁱ brought Ruth^j some articles^k PROⁱ to explain them^k to her^j?
 [13] *Whoⁱ *t*ⁱ brought Ruth^j some articles^k PROⁱ to explain *t*^k to her^j?
 [14] Whoⁱ *t*ⁱ brought Ruth^j some articles^k for the professor to explain them^k to her^j?
 [15] Whoⁱ *t*ⁱ brought Ruth^j some articles^k for the professor to explain *t*^k to her^j?

However, this seems to be a fairly limited exception to the general pattern.

Notice the striking effect of *wh*-extracting the Theme phrase (*the articles*).

- [16] *What^k did Davidⁱ bring *t*^k to Ruth^j PROⁱ to explain them^k to her^j?
 [17] *What^k did Davidⁱ bring *t*^k to Ruth^j for the professor to explain them^k to her^j?

This is exactly the behaviour one finds in related Rationale Clauses, as in (18-19).

- [18] *Who^k did Hughⁱ introduce t^k to Gemma^j before dinner PROⁱ to discuss them^k with her^j afterwards?
 [19] *Who^k did Hughⁱ introduce t^k to Gemma^j before dinner for her partner to discuss them^k with her^j afterwards?

The related Purpose Clauses (with a gap instead of a pronoun) are all perfectly well-formed with the matrix Theme *wh*-extracted. Once again this follows the prediction that Rationale Clauses resist binding of pronouns by matrix phrases which have been *wh*-extracted where Purpose Clauses do not.

Assume for a moment that the "resumptive infinitive" really is a Rationale Clause. We would then expect to find examples of event control which license passivisation and preposing. The example we have been discussing above does not passivise when PRO is present.

- [20] *Some articles^k were brought to Ruth^j PROⁱ to explain them^k to her^j.
 [21] Some articles^k were brought to Ruth^j for the professor to explain them^k to her^j.

This parallels the case with the Rationale Clause.

- [22] *The twins^k were introduced to Gemma^j before dinner PROⁱ to discuss them^k with her^j afterwards.
 [23] The twins^k were introduced to Gemma^j before dinner for her partner to discuss them^k with her^j afterwards.

However, we saw that event control allows passivisation. It appears that the infinitive under discussion also allows event control and that that event control licenses passivisation and preposing.

- [24] Sigrunⁱ showed Sven^j the snakes^k PROⁱ to make them^k seem less frightening to him^j.
 [25] The snakes^k were shown to Sven^j PROⁱ to make them^k seem less frightening to him^j.
 [26] PROⁱ to make them^k seem less frightening to him^j, Sigrunⁱ showed Sven^j the snakes^k.
 [27] Whoⁱ tⁱ showed Sven^j the snakes^k PROⁱ to make them^k seem less frightening to him^j?

Given the cluster of facts in (24-27) it seems reasonable to assume that the "resumptive infinitive" really is a Rationale Clause: the unusual behaviour of some such infinitives in passivisation and preposing contexts seems to be related to more general types of restriction on the Rationale Clause, correlated to event control.

CHAPTER 5: Argument Structure and Control

Section 5.1: The Purpose Clause: objects, Themes, and resultant states

Section 5.1.1: Conditions on Purpose Clause antecedence

I have already argued in some detail that there are syntactic conditions on Purpose Clause antecedence. It was argued in Section 3.2 that there is strong evidence that the Purpose Clause adjoins within VP and is subject to all rules which affect the immediate phrasal projection of the verb, and this seems to be linked to conditions on the theta-marking of the direct object by the modified verb. Adopting the view that the Purpose Clause has an argument structure which includes a position ultimately associated with the direct object and that that argument position must be discharged within a binary branching structure under strictly local conditions, as specified in the theory of Higginbotham (1985), has already forced us to adopt a particular view of the internal structure of the VP and the projection of arguments within it, namely that the object is a "secondary subject" in the sense of Bowers, realised in the Specifier position of the verb's immediate projection (see Section 3.6). It appears, however, that some sort of semantic restriction is also necessary, independently of these syntactic constraints.

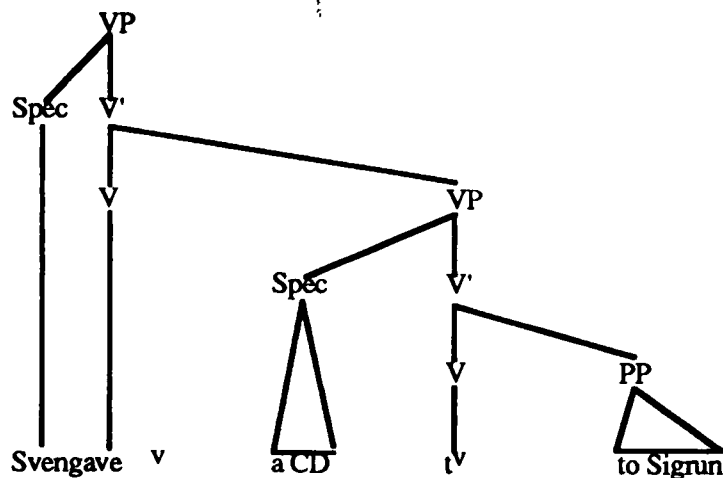
First, current transformational analyses of the dative alternation are incompatible with data from the Purpose Clause construction. Antecedence for the Purpose Clause is unaffected by the dative alternation, just as it is unaffected by the passive.

- [1] Sven gave a corkscrew to Jose *e* to open the wine with *e*.
- [2] Sven gave Jose a corkscrew *e* to open the wine with *e*.
- [3] Sven gave an executive assistant to Jose *e* to type his letters for him.
- [4] Sven gave Jose an executive assistant *e* to type his letters for him.

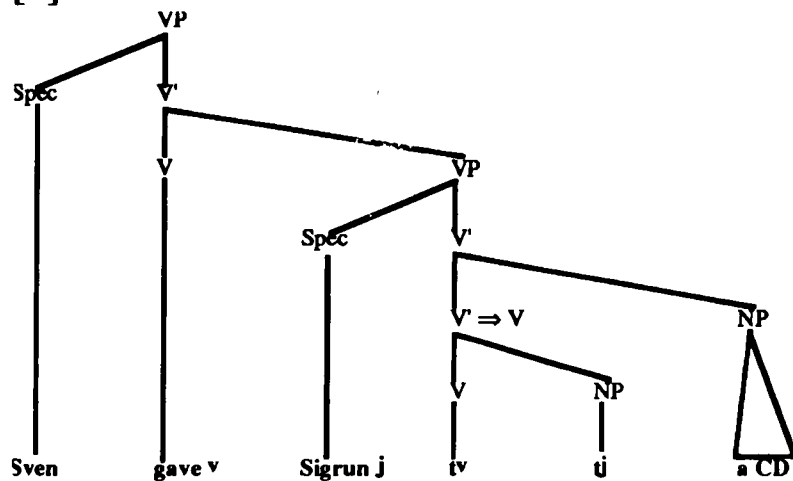
Neither the account of Larson (1988) nor the account of Bowers (1993) predicts that the Purpose Clause will be insensitive to dative movement.

Consider first the two structures offered by Larson (1988).

[5]



[6]

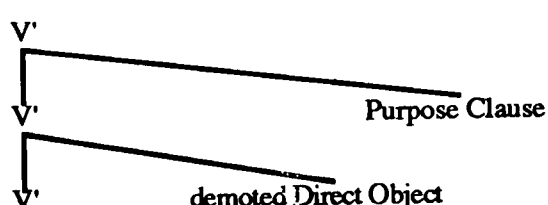


In Larson's view the dative alternation is analogous the passive alternation, in that a subject gets demoted (in the passive the primary subject, in the dative alternation the secondary subject or object) and Case is absorbed (structural Accusative Case in the passive, inherent dative Case, realised by prepositional *to*, in the dative alternation): the Caseless internal argument then raises to the Case-marked Specifier position to receive Case (Nominative Case in the passive; Accusative Case in the dative alternation). Of course in the passive, the demoted argument is realised only optionally and when it is realised is realised in a prepositional phrase (headed by *by*). In the dative alternation the demoted argument is realised obligatorily and is realised as a bare NP. It therefore

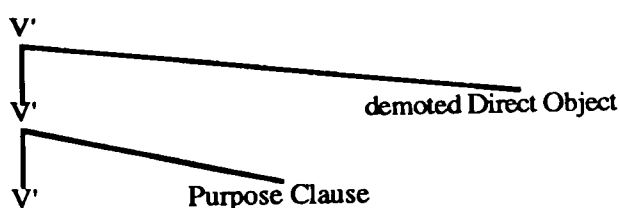
requires Case. Larson argues that the V' is reanalysed as V, which may then of course assign Accusative Case.

The structure in (5) correctly predicts that the Purpose Clause will take as an antecedent the Theme argument which is directly theta-marked in VP-Spec. The predictions of (6) are less clear. The Purpose Clause cannot identify with anything in VP-Spec which is now a θ' -position. This is correct in so far as the Goal is not selected as the subject of the Purpose Clause's predication. If the Purpose Clause adjoins to V' then one might assume that it will be realised ambiguously inside or outside of the c-domain of the demoted direct object, as in (7-8).

[7]



[8]



If the Purpose Clause adjoins outside the c-domain of the demoted object, as in (7), then there will be no open position in the verb's argument structure for the Purpose Clause to theta-identify. If we decide to weaken the theory and admit m-command (with all the concomitant problems set out in Section 3.6), then presumably the Purpose Clause could also predicate itself of the Goal argument by which it is m-commanded. The structure in (8) gets out of this problem straightforwardly: the Purpose Clause can theta-identify with the direct object position in the verb's argument structure before the direct object is theta-marked. The structure in (8) however is even more problematic than the structure in (7). First there is the simple fact that the Purpose Clause and

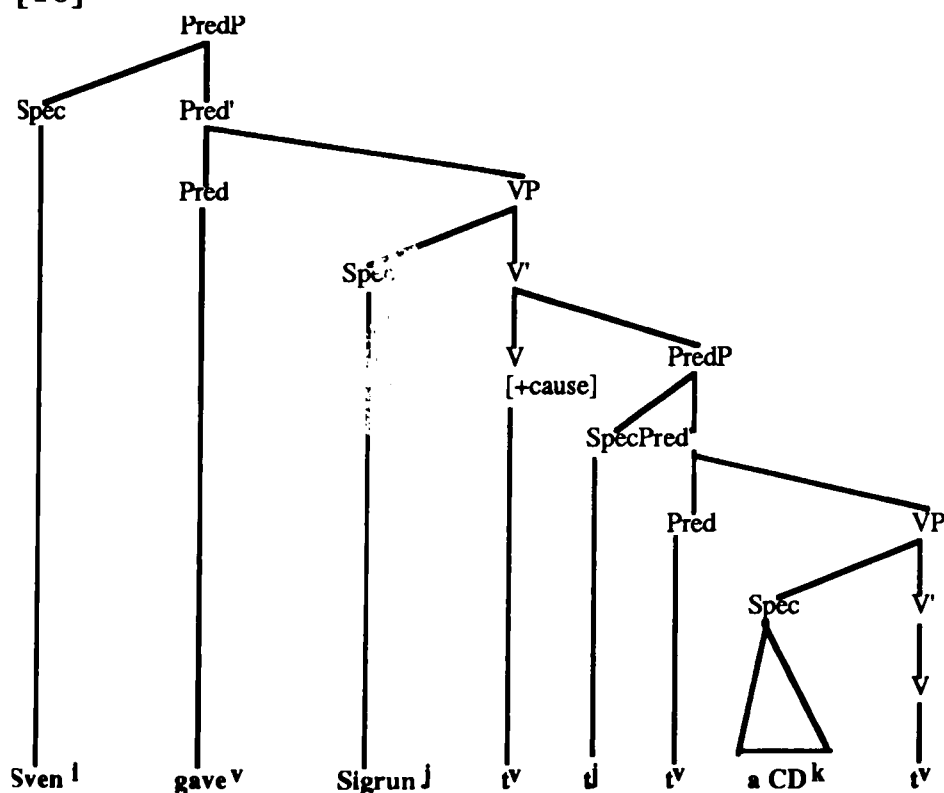
demoted object are in the wrong linear order and therefore, in addition to the assumptions already made, it would need to be assumed that the Purpose Clause was obligatorily extraposed. This still will not save the structure, however. Notice that the object requires Case! Larson has argued that it gains Case by its sister V' being reanalysed as V. However, this would require the Purpose Clause to become a part of the verb. Not only is this strongly counterintuitive but there seem to be no cases of structures such as (9) which would be predicted by the reanalysis.

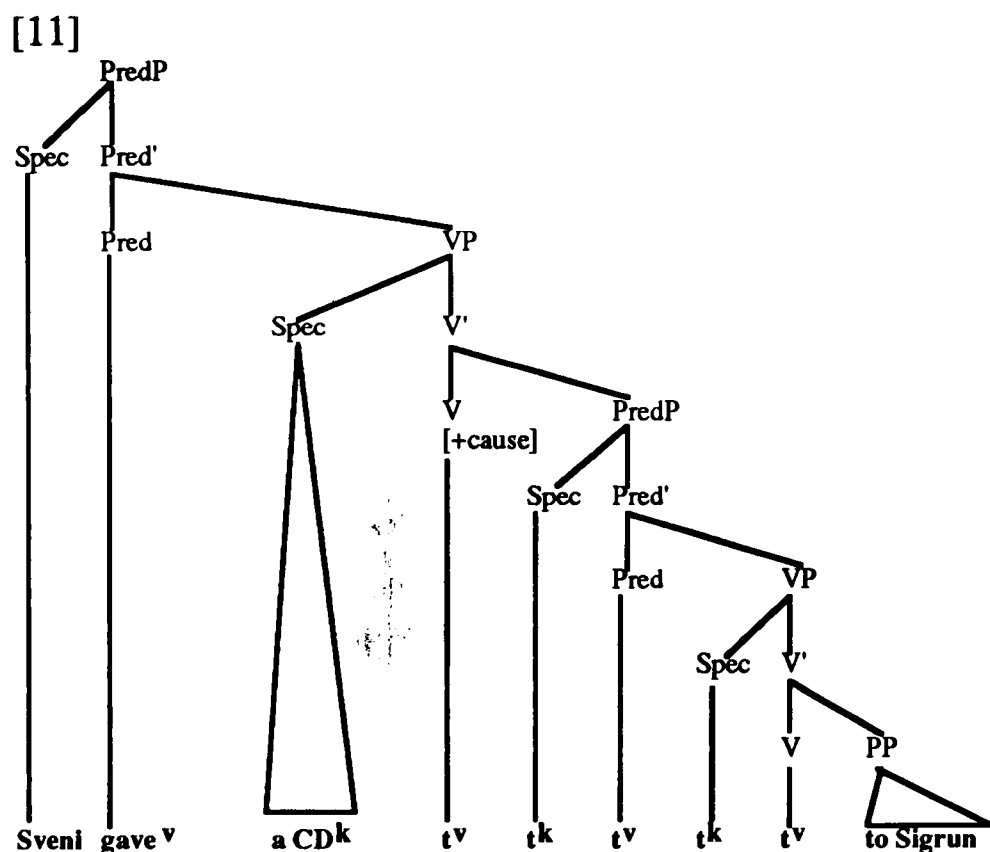
[9] *Sven [gave to listen to] Sigrun a CD.

The structure in (6) is therefore entirely incompatible with the data from Purpose Clause modification. The problem though is the general one noted at the outset: dative alternation has no effect whatsoever on Purpose Clause modification, so any theory which requires quite different sets of assumptions to get the right antecedence in each case is suspect. A similar problem faces Bowers.

Consider the two structures suggested by Bowers (1993) for the dative alternation.

[10]





Bowers views these constructions as causative constructions in which the upper VP is headed by a causative feature. The alternation is then supposed to correlate with the paraphrase in (12-13) for (10-11) respectively.

- [12] Sven caused [Sigrun have a CD]
 [13] Sven caused [a CD belong to Sigrun]

Bowers argues for these structures from a range of evidence, in particular data on quantifier stranding. Consider how this analysis applies to infinitives of result.

Assume again that the Purpose Clause adjoins to V'. We then have a choice. If we adopt a predication analysis of these constructions of the sort already discussed then we will only be concerned with instances of V' which are "thematically active", i.e. those whose Specifier position is a θ -position. This will be the case for the lower, but not for the upper, VP in both cases. If we adopt the view that the Purpose Clause's antecedence is fixed by minimal distance, or if we mimic derivation by the vertical binding of argument indices, then antecedence by an argument in the Specifier of the upper VP will become available. This is clearly undesirable because the dative shifted

version in (26) has the Goal argument in the Spec of the upper VP. I will therefore take it that this is further evidence of the advantage of a theory of argument structure as necessarily local as that of Higginbotham (1985).

This analysis fares better than that of Larson (1988). If the Purpose Clause adjoins to the lower V' , then it will in both structures be able to theta-identify with the position of the Theme argument which is base-generated in (lower) VP-Spec. However, in the shifted structure in (10), the Goal argument is directly theta-marked external to the lower VP: its position in the argument structure will therefore also be available in this construction (although not in the unshifted version, in (11)). This problem would be removed if the Purpose predicate imposed thematic restrictions on its antecedent: of the Theme-NP and the Goal-NP made available in the structure in (10), only the Theme-NP would be compatible with Purpose Clause interpretation. We must already, in fact, assume such a restriction to prevent the Purpose predicate identifying with the Agent position of the verb in standard structures.

When we consider the distribution of the Rationale Clause, the problems become more serious. We must assume that the Rationale Clause adjoins to either VP or Pred' to account for the "VP-adjunction" data discussed in Section 3.3. However, if it can adjoin to any VP or Pred' then it will be able to adjoin to the lower VP or the lower Pred' : this will allow it to theta-identify with the Goal-NP in (10). Even worse, just as the Rationale Clause may adjoin to the lower VP or Pred' , so the Purpose Clause may adjoin to the upper V' ; if both occur simultaneously then the Purpose Clause will hierarchically dominate the Rationale Clause, contrary to all evidence. Thematic restrictions will of course force the Purpose Clause to adjoin within the lower VP and the Rationale Clause to adjoin within the upper PredP , as required.

The analysis of Larson (1988) is therefore incompatible with facts concerning the Purpose Clause and the analysis of Bowers (1993) is consistent only in so far as thematic restrictions are also available. Some sort of "argument" restriction will therefore be necessary under current syntactic accounts.

A second reason for assuming argument constraints of some sort comes from the Purpose Clause's insensitivity to alternations such as the locative alternation: it appears that the Purpose Clause will always take the Theme argument of a predicate as its antecedent, regardless of its realisation as direct object or oblique (PP) argument.

[14] Jose had a surplus of turnips, so he loaded his cart with them *e* to sell *e* at the market.

The third reason for assuming that the Purpose Clause imposes some sort of argument restriction on the VP in which it occurs is that only verbs denoting certain types of event are compatible with Purpose Clause modification (a restriction on the event-type of a verb is clearly an argument restriction, entirely unrelated to the grammatical functions of particular NPs). As Bach (1982) has pointed out, there is a class of verbs excluded from modification by the Purpose Clause which are robustly transitive (i.e. they have direct objects) and which have often been classified with Theme internal arguments.

[15] *Ruth slapped Katherine *e* to open the safe.

[16] *Ruth tickled Katherine *e* to tell the secret.

The ill-formedness of (15-16) argues against a purely syntactic analysis because verbs of this class (*slap*, *tickle*, *hit*, *beat*) strictly subcategorise for a direct object, as shown by the ill-formedness of (17), and yet are almost uninterpretable with the relevant reading in (15-16).

[17] *Ruth slapped.

*Ruth tickled.

*Ruth hit.

*Ruth beat.

Nevertheless the reading required is a perfectly reasonable one; (16) might be paraphrased by the gerundive construction in (18).

[18] Ruth tickled Katherine into telling the secret.

The problem, as Bach observed, is to do with the lexical entailments of these verbs: these verbs do not entail a change of state in their object, unlike the verbs *bring* or *give*. If I bring something to a place then that object must end up in that location having been elsewhere; if I give something to someone, then that object must come to be in that person's possession or control having not been in their possession or control before. For the verbs *slap*, *tickle*, *hit*, *beat* this is not so. If Ruth slaps Katherine she might be upset, hurt, or offended, but the verb does not entail that any of these things be the case; it does not even entail that Katherine notice that she has been slapped (a change of mental state). Similarly, if Ruth tickles Katherine, she might be angry, amused, or enthusiastic but the verb itself does not entail that there be any reaction at all. We may feel that slapping, hitting, or tickling are extremely effective tortures for making people serve the purposes which we intend for them; they may be assessed in terms of our world knowledge as being particularly effective ways of making people do things; but it seems that linguistically that simply is not enough. If the verb does not entail a change of state in the object then it will not allow modification by a Purpose Clause because the Purpose Clause tells us what purpose an object serves by virtue of its change of state¹³.

One note of caution should be sounded here. It was pointed out to me by James Higginbotham that there is a state with respect to which all predicates entail a change: the perfective state. That is, if some verb *V* is true of an object NP, then it will be true in consequence that the NP is in the state of having been *V*-ed: if I bend a coathanger at some point in time, t^1 , then it will be true of the coathanger at every subsequent point in time, t^1+n , that the coathanger will be in the state of having been bent. Clearly, we want to rule out the perfective state from the set of states that are relevant to Purpose Clause modification (otherwise all verbs would be compatible with modification by the

¹³ I set aside here the problem of unrealised or incomplete objects and assume that for both *build* and *design* there is an "object" to which we can refer.

Purpose Clause). It seems that what is required is a notion of causal efficacy: the state in question must be causally efficacious with respect to the object having the property in question. If I repeatedly bend a coathanger it may well end up in a brittle state; that present state will be causally efficacious with respect to a breaking of the coathanger. The event of bending may itself be causally efficacious with respect to the state of brittleness. But the perfective state of having been bent is not causally efficacious in the sense that there is no possible causal consequence of the coathanger's having been bent which is not reducible to the causal efficacy of the initial event of bending and the states to which it leads. James Higginbotham has observed to me that this is reminiscent of a debate in the natural sciences concerning the formulation of natural laws. Can we formulate laws in terms of perfective states? Can we say for instance that if I have bent a coathanger repeatedly, it will break? It seems that the answer is no. The law must be formulated in terms of present events and their causal consequences: if I bend a coathanger repeatedly then it may come to be in a certain state; that state may be such that some other event may occur.

We can therefore maintain our position that the Purpose Clause is related to a change of state in the object where the object comes to have a property by virtue of ending up in a particular state. Notice however that the Purpose Clause seems to have access only to information lexically provided by the verb concerning the nature of the modified event, i.e. the Purpose Clause can make reference only to the verb's lexical entailments in evaluating whether a change of state of the relevant sort has occurred. Notice that (19) is ill-formed.

[19] *Nick bent the coathanger *e* to break *e*.

Although an event of bending a coathanger might in actual fact be causally efficacious with respect to a state of brittleness which is itself causally efficacious with respect to an event of breaking, that is not entailed by the verb *bend*: say that the coathanger is made of an imperishable alloy, then the bending will have no consequence. Notice that where

the purpose served by the coathanger relates to a change of shape then the Purpose Clause becomes acceptable.

[20] Nick bent the coathanger *e* to fit around the doorknob.

An event of bending entails a change of shape in the object: an event of bending is causally efficacious with respect to the state of the object being in some (different) shape and the verb *bend* cannot be true unless the bending does in fact have that consequence. The conditions imposed by the Purpose Clause are therefore met: the modified verb lexically entails a change of state in its object and it is in that very state that the object has the property. The reason that verbs such as *slap*, *tickle*, *beat* and *hit* may not be modified by a Purpose Clause is that they entail no change of state in their object with respect to which the object comes to have a property, just as the verb *bend* is incompatible with a Purpose Clause when the property in question is not one which the object has in the lexically entailed resultant state.

This analysis also allows us to explain a rather curious restriction on the internal structure of the Purpose Clause. Jones (1991) argues that the Purpose Clause cannot occur in the perfective, a fact which follows necessarily from his view that the Purpose Clause is a bare VP. It seems, however, that Purpose Clauses can occur in the perfective in certain contexts.

[21] He set up the security system to have closed the gate before electrifying the fence.

Two points should be noticed about such examples. First, the infinitival verb does occur in the perfective and therefore a syntactic position must be available for it: this favours the view of Purpose Clauses as fully clausal structures. Second, the perfectivity of the infinitival verb is internally oriented: the closing of the gate is assessed as being in the past with respect to the electrifying of the fence not with regard to the setting up of the security system. We might link this restriction to our observation concerning

causal efficacy. The resultant state of an event cannot by definition be causally efficacious with respect to an event which has already occurred. In terms of the attribution of properties, a resultant state can only be causally efficacious in attributing properties which are direct consequences of its own properties. Thus in (7) the setting up could not be causally efficacious with respect to a having closed the gate. It could however be efficacious with respect to a closing of the gate which is such that it will always precede an electrifying of the fence.

Our account therefore predicts the two crucial properties of the Purpose Clause in (21). The Purpose Clause is a fully clausal structure and therefore allows auxiliaries such as the perfective. It will only however allow its complement to denote properties with respect to which the resultant state of the main verb can be causally efficacious and therefore the interpretation of perfectivity in the Purpose Clause must be bound within the scope of the lambda abstractor itself.

We have therefore linked the Purpose Clause to the notion of a change of state, constrained by the notion of causal efficacy. It seems however that the Purpose Clause is compatible with any verb which involves, as a necessary part of its meaning, a state of some sort (as long as it is causally efficacious). There are in fact four types of event with which the Purpose Clause is compatible.

- [22] a telic event
- [23] an atelic event
- [24] a continuance of state
- [25] a state

Examples of these, with the Purpose Clause modification, as given in (26-29).

- [26] Sven pushed the cart into the arena for the crowds to see *e*.
- [27] Sven pushed the cart along the road for the crowds to see *e*.
- [28] Sven kept the cart in the arena for the crowds to see *e*.
- [29] The cart was in the arena for the crowds to see *e*.

Bach's (1982) notion of *resultant state* is clearly directed at cases such as (26); it does not however take in (27-28), although Bach does mention change and continuance of

state as suitable for Purpose Clause modification. (29) is not generally mentioned as an instance of Purpose Clause modification, although its status as such an infinitive, parallel to (26-28) is I think clear. I assume that what (26-28) all have in common is that each is understood with respect to states. If something is pushed into the arena then it comes to be in the state of being in the arena; if something is pushed along the road it comes to be in a state of motion (and in fact to pass through a series of states of being at points along the trajectory); if something is kept in the arena then, through the agency of some individual, the object is maintained in a particular state, namely being in the arena; and of course if something is in the arena then it is by definition in the state of being in the arena. Let us then say that there is a function S from events to the states which are lexically specified as parts of those events. S applied to a telic pushing will give the final state; S applied to an atelic pushing will give the state of motion; S applied to verbs such as *keep* will give the state of enduring in some state; and S applied to states is identity. We then have the argument grid for the Purpose predicate in (30),

[30] $P(x,e,\lambda z (\exists e^1) \Phi(z,e^1))$

and the conditions on reference in (31).

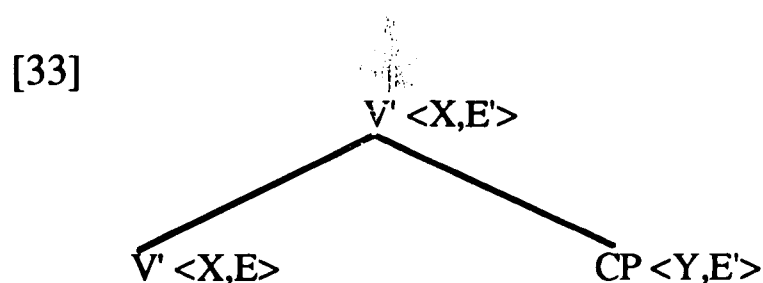
[31] e is a state of x and e is to be causally efficacious in bringing it about that x has the property of being a z such that $(\exists e^1) \Phi(z,e^1)$

The question is then how these two are to be related. Notice that under the present analysis the e -position in the argument grid of P is theta-identified with the event position of the modified verb: but if e is a pushing into the arena then e is not itself a state of x in which the crowds can see x ; rather it is the state of being in the arena which gives x that property, i.e. it is $S(e)$ not e itself.

We then have two options. The first is to say that the event position in (30) is in fact identified with the matrix event but that the conditions on the predicate themselves make use of $S(e)$, as in (32).

[32] $P(x,e,\lambda z (\exists e^1) \Phi(z,e^1)) \leftrightarrow [\exists e': e'=S(e)] e' \text{ is a state of } x \text{ and } e' \text{ is to be causally efficacious in bringing it about that } x \text{ has the property of being a } z \text{ such that } (\exists e^1) \Phi(z,e^1)$

This formulation will bring out the relevant features of the Purpose Clause's interpretation, namely that it concerns the properties which objects are to have in particular states. However, there is a sense in which the result is achieved by sleight of hand. Our intuitions tell us strongly that x has the relevant property because it is in that state, i.e. P is a relation between an entity, a state, and property such that x is in that state for the sake of it having the relevant property; this is not what (18) says. (18) says that x is involved in an event for the sake of having a property and that interpretation is licensed by the fact that the event is related in the appropriate way to a state. Higginbotham has suggested to me that this provides evidence that theta identification might in fact be relativised to functions on events. When the Purpose Clause adjoins to V' we have a situation as in (33).



It may be that theta-identification of the event variables in (33) can be translated directly in terms of a function on e , as in (34).

[34] $push(x,e) \ \& \ P(x,S(e),\lambda z (\exists e^1) \Phi(z, e^1))$

Now the Purpose predicate directly relates an entity to a state, derived from the matrix event. The conditions on the reference of the predicate will then relate directly to the derived state, as in (35).

[35] $P(x, S(e), \lambda z (\exists e^1) \Phi(z, e^1)) \leftrightarrow$ S(e) is a state of x and S(e) is to be causally efficacious in bringing it about that x has the property of being a z such that $(\exists e^1) \Phi(z, e^1)$

Such a revision of the principle of theta identification would need to be justified on more general grounds. It appears however that reference to states which are lexically available parts of events is indeed generally available. Higginbotham has observed examples such as (36-37).

[36] Sven wrapped the present nicely.
 [37] Sven tossed the caber nicely.

Notice in (36) that it is not the wrapping which is nice or the present itself, but the present in the wrapped state. The verb *wrap* lexically specifies a resultant state of the object and it is the object in that state which is nice. Even more strikingly in (37), it is not the tossing of the caber as a whole event or the caber itself which is nice but presumably the trajectory which it follows (cf a nice shot in football is one which traverses an impressive trajectory even if it does not end up in the right place). It seems that S(e) is therefore generally available to this group of object modifiers.

This account predicts that where two appropriate states are available it will be ambiguous, as appears to be the case.

[38] Sven pushed the cart to the end of the street for the crowds to see *e*.

It may be that there is a crowd congregated at the end of the street and that the cart has the property that the crowds can see it by virtue of *push* having the resultant state of the cart being at the end of the street. Or it may be that the crowd is lining the entire street (although there is no one congregated at the end) and hence the cart has the property that the crowds can see it by virtue of *push* specifying a state of motion, namely it passing along the street. Notice that this view is compatible with either of two accounts of telic-atelic alternation which occurs with *push*. We might say that the verb *push* is

ambiguous between a verb *push* which takes an ordered pair of events, where one is a process and the other a telos, and a verb *push* which takes only a process; or we might say that the PP itself introduces either a process (as for *towards*) or a process and telos (as for *to*). In either case, V' will have associated with it argument grids which lexically specify the relevant types of event.

The view adopted here also suggests a solution to a complex set of data involving verbs of creation. Bach (1982) notes that only verbs with a "positive resultant state" are available for Purpose Clause modification, thus we have (39) but not (40).

- [39] John built the swing in the garden to annoy his neighbours with.
[40] *John destroyed the swing in the garden to annoy his neighbours with.

This contrast follows straightforwardly on this view: the result of building is that there is some object; the Purpose Clause gives us the purpose of the object's existence. The result of destroying, however, is that there is no object and hence the Purpose Clause cannot apply because it tells us the purpose for which objects are in particular states, but here there is no object to be in a state. The restriction here is rather more specific than the notion of "positive" or "negative" resultant states. Notice that there are some "negative" result state verbs which are perfectly compatible with Purpose Clause modification.

- [41] John broke up the wooden stool to put on the fire.
[42] John shredded the newspaper to stuff into the mattress.

Verbs such as *shred* and *break up* lexically specify a material result (and one which is clearly related to the disassembled object). The Purpose Clause tells us the purpose which these objects serve by being in this disassembled state. There is, however, one further class of verbs. A verb like *burn* will have a material result, namely ash, but it seems to pattern with *destroy*.

- [43] ?*John burnt the bulky newspapers to put in the special ash containers.

(43) might mean that the newspapers were too bulky to store, so John burned them so that, as ash, they could be put in the ash containers. Remember that the Purpose predicate must theta-identify with the object of the verb: it may be that certain types of material result are not considered to be instances of the original object. We might willingly describe a pile of shredded paper or a pile of wood as "the newspaper" or "the stool" of which they are parts. We may not willingly describe a pile of ash as an instance of the object from which it is derived. We must be careful here however, as examples such as (44) seem more acceptable.

[44] ?John burnt the newspapers to blacken his face with.

It may be that the purpose in (43) is not so much a purpose of the burnt newspapers as the purpose of the event of burning itself (we therefore do not have the right sort of antecedence for the property); in (44) it really is the burnt newspaper which is serving a purpose.

Whatever the solution to this problem, it appears that acceptability of the Purpose Clause is linked to the particular state of the object, which is provided by S(e). The crucial point is that S(e) makes reference only to lexical properties represented in the argument grids of the relevant predicates. Thus the "impact verbs" *slap, tickle* etc will be excluded because they are not lexically associated with a state of any sort (except the perfective state which is not causally efficacious); the "negative resultant state verbs" such as *destroy* will also be excluded because their state is not one in which the object has the relevant property as the Purpose Clause requires. This complex set of selectional restrictions fall out straightforwardly from the meaning of the Purpose predicate itself, integrated into the structure of the modified sentence by a generalised theta theory. Notice that the restriction to Theme antecedents, in so far as it is valid, is parasitic on the notion of event structure because Themes are usually taken to be the subject of states.

This will obviously raise the question of the nature of the function $S(e)$ itself. Thus far we have restricted the function, $S(e)$, to events and substates listed in the verb's lexical entry; and we have defined the function itself merely in terms of a list of possible outputs. Ultimately, we will need a precise definition of the semantic criteria which identify an event, e , as having a substate of the sort required by the function $S(e)$ (just as we need a precise definition of what it is that makes a Theme a Theme or an Agent an Agent). I take this to be a problem for further research.

Assuming this analysis of the semantic restriction imposed by the Purpose Clause, this then raises the interesting question of whether the Purpose Clause reading is available with unaccusative verbs such as *go* or *leave* which are standardly taken to have a Theme subject. According to the definition set out above they should be compatible with a Purpose Clause reading because they lexically specify a state (a state of motion). For the prediction to have weight the reading must be distinguishable from a possible Rationale Clause reading which will presumably appear the same in the linear string. Consider (45).

[45] John left to frighten Bill.

There do in fact seem to be two readings and those readings are distinguishable in the terms already adopted and seem to have the expected syntactic ramifications. Consider first a situation in which John and Bill are in a dark room and John sneaks out in the hope that Bill, discovering his absence will panic. (45) might reasonably be asserted of such a situation. This reading is compatible with the insertion of *in order*.

[46] John left in order to frighten Bill.

It is also compatible with an infinitive that does not contain a gap. Let us say that Bill is extremely confident when John is around; Bill is frightened of Fred in general but John makes him feel safe. We might then imagine a situation where John maliciously

abandons Bill to the company of Fred, knowing that this will give Fred the chance to threaten Bill. (47) might be asserted of this rather bizarre scenario.

[47] John left (in order) for Fred to frighten Bill.

In both cases, the infinitive specifies some general intention that the Agent hopes to have fulfilled as a result of performing the action. The intention is held with respect to leaving in general: i.e. it has some property or other that the Agent believes will facilitate the fulfilment of his intention.

(45) is however compatible with another, more specific reading. Consider a situation in which John has been hired to threaten Bill; he is setting off to fulfil his contract. That is, he is at some location (at home maybe) and he leaves so as to get to some other location where he will perform the relevant task. He needs to leave the place he is at because he cannot perform the task there; it is by being at some other place that he is enabled to act in the required way. This is of course precisely the reading we would expect of a Purpose Clause. Some object changes state and because of that change of state it acquires some property. The Purpose reading is licensed by the change of state and the object is taken only to acquire the relevant property because its state has changed in the relevant manner. Notice that in this reading we cannot have *in order* insertion as in (46). Nor does it make sense to have a lexical subject (as in (47)) because the whole point of this reading is that the Agent intends to perform some action by getting **him** to a particular location. Further, if one has a sentence containing two infinitives, one having the general intention reading and one having the resultant state reading, the ordering restrictions are as expected.

[48] John left to talk to Bill to irritate Tom.

Take (48) to mean that John left his present location to go to some other location at which he intended to talk to Bill (Purpose Clause reading) and that he did so with the general intention that this "leaving to talk to Bill" irritate Tom (Rationale Clause

reading). If we construe the two infinitives in this way then we cannot reverse their order, as expected.

[49] *John left to irritate Tom to talk to Bill.

Note also that if we take both infinitives to be Purpose Clauses (i.e. to denote what John intends to do when he gets to his destination) then the sentence is ill-formed any way: we cannot take the two infinitives simply to be two purposes of the same sort. This is of course again what we would expect because we know that Purpose Clauses do not naturally iterate in "external adjunction". Preposing has the effect of entirely disambiguating the sentence.

[50] To frighten Bill, John left.

This can only mean that John intended his leaving to frighten Bill, it cannot mean that he went somewhere where he intended to frighten Bill.

It therefore appears that the selectional restriction suggested for the Purpose Clause correctly predicts its compatibility with a range of constructions including telic predicates involving a resultant state, atelic predicates involving a change of state, verbs such as *keep* and *remain* involving a continuance of state, states proper, and unaccusatives, while excluding the "impact verbs".

Section 5.1.2: Some problems

There are a number of cases which stand as clear counterexamples to the restriction of Purpose Clause control to the Theme of the sentence and which are incompatible with the specific theory suggested so far, although some notion of "resultant state" is clearly necessary. It appears that the subject gap Purpose Clause (and only the subject-gap Purpose Clause) can be controlled by non-Theme internal arguments of the verb. Consider for instance the case in (1).

[1] Lobbyists gave MPsⁱ £1,000 each *eⁱ* to ask questions in Parliament.

Like a standard Purpose Clause, this sentence can be passivised, as in (2), and like a standard Purpose Clause it cannot be preposed, as in (3).

[2] MPs were given £1,000 each to ask questions in Parliament.

[3] *To ask questions in Parliament, lobbyists gave MPs £1,000 each.

Notice that this cannot be linked to the fact that in the double object construction, the Goal acts as the direct object of the verb, because the PP version of (2) is also acceptable.

[4] Lobbyists gave £1,000 to each MPⁱ *eⁱ* to ask questions in Parliament.

It therefore seems possible to have control of a subject-gap Purpose Clause by the Goal or Location argument, irrespective of its realisation. Notice that the event analysis cannot be used as a means of avoiding this conclusion in this case.

[5] *Giving MPs £1,000 each asked questions in Parliament.

Notice that this construction is indeed only compatible with the subject-gap Purpose Clauses.

- [6] *Lobbyists gave MPsⁱ £1,000 each for their backers to be able to ask *eⁱ* questions.
- [7] *Lobbyists gave MPsⁱ £1,000 each for their backers to be able to talk to *eⁱ* privately.

The ill-formedness here is purely syntactic: replacement of the gaps with pronouns produces well-formed sentences.

- [8] The lobbyist gave MPsⁱ £1,000 each in order for his backer to be able to ask them questions.
- [9] The lobbyist gave MPsⁱ £1,000 each in order for his backer to be able to talk to them privately.

We therefore have a robust example where the Goal of the main verb controls the obligatory gap in the Purpose Clause, not the Theme. However, it would be possible to argue that this is not precisely the case: *£1,000* is in fact what Jackendoff calls a secondary Theme. Notice that secondary Themes are often distinguished from Themes proper in the syntax, for instance in (10) which is the same as (1) except that the infinitive here is an implicit argument.

- [10] Lobbyists offered the MPs £1,000 to ask questions in Parliament.

Here again it is the Goal which controls the subject gap, and again the control relation is insensitive to the dative alternation, as in (11).

- [11] Lobbyists offered £1,000 to the MPs to ask questions in Parliament.

There is also however a version of (10) with a Goal subject, as in (12).

- [12] The MPs offered to ask questions in Parliament for £1,000.

Notice that the *for*-phrase belongs with the main verb not the infinitive.

[13] The MPs offered, for £1,000, to ask questions in Parliament.

The preposition *for* is a standard marker of a secondary Theme with transactional verbs. We might therefore seek to argue that secondary Themes are quite distinct from Themes proper when it comes to control. However, it appears that secondary Themes behave exactly like Themes proper in other examples.

[14] Lobbyists gave MPs £1,000 to spend on holiday.

Thus, no theory which tries to explain this anomaly by taking the secondary Theme to be inaccessible as a controller in general (or placing it low on the Thematic Hierarchy) will work: for any object-gap Purpose Clause it behaves exactly like an ordinary Theme. In fact the assumption that the subject-gap Purpose Clause is controlled by the Goal irrespective of syntactic realisation captures the broader distribution of the construction, as shown in (15-18).

[15] The MPs got £1,000 (*in order) to ask questions in Parliament.

[16] The MPs got £1,000 (*in order) to spend on holiday.

[17] £1,000 went to each MP (*in order) to ask questions in Parliament.

[18] £1,000 went to each MP (*in order) to spend on holiday.

Another counterexample to the Theme-only analysis of subject-gap Purpose Clauses was first pointed out to me by James Higginbotham.

[19] Johnⁱ put the photos^j under the spotlight^k *e* to illuminate them^j for himⁱ.

Notice that the gap in (19) cannot be controlled by *John* which already binds the pronoun, *him*; this is confirmed by the ill-formedness of (20).

[20] *Johnⁱ illuminated them for himⁱ.

Nor can it be controlled by *the photos* which control the pronoun, *them*; this is confirmed by the ill-formedness of (21).

[21] *The photos^j illuminated them^j for him.

Control by *the spotlight* would however be possible, as shown by (22).

[22] The spotlight^k illuminated them^j for himⁱ.

This however runs against standard analyses in two ways. First the c-command constraint is violated because the NP is governed by a pronoun. In a theory such as that of Williams which makes a distinction between subcategorised, semantically empty prepositions, and contentful prepositions this problem is resolved relatively straightforwardly, as the external index of the NP will be realised on the PP. Second, *spotlight* bears the role of Location not of Theme. It clearly forms part of the "resultant state" in some way, but not in the way expected.

Notice two points further, however. First it is hard to construct similar examples where the controlled gap is VP-internal.

[23] *Johnⁱ put the photos^j under the spotlight^k e^i to illuminate them in e^k .

Further, the Location cannot act as the subject-controller in an object-gap Purpose Clause.

[24] *Johnⁱ put the photos^j under the spotlight^k e^k to illuminate e^j for him.

The sentence in (19) therefore seems to be strictly limited to a Location-controlled subject-gap infinitive. The question is then whether (19) is in fact a Purpose Clause at all. It is possible that it is in fact a Rationale Clause with event control (see Section 5.2).

This would give the paraphrase in (25).

[25] Putting the photos under the spotlight illuminated them for him.

Unfortunately assessing the plausibility of (25) is complicated by the fact that Rationale Clauses containing bound pronouns do not exhibit the full range of behaviour (see Section 4.3.1). They do not prepose, as (19) does not.

[26] *To illuminate them for him, John put the photos in the spotlight.

They do not allow passivisation, as (19) does not.

[27] *The photos were put in the spotlight to illuminate them for him.

The only diagnostic which can be interestingly applied is *in order* insertion which seems to come out marginally against the interpretation of (19) as a Rationale Clause.

[28] *John put the photos in the spotlight in order to illuminate them for him.

This evidence becomes stronger when one considers that the same sentence in which the pronoun is omitted or in which it is replaced with a reflexive is perfectly acceptable.

[29] John put the photos in the spotlight in order to illuminate them (for himself).

This suggests that the event control analysis, though plausible, is in fact untenable. It therefore seems that (19) really is a (subject-gap) Purpose Clause with Location control.

It is clear that both the examples with *give* and the examples with *put* obey the general constraint that the verb must lexically specify a state in which some individual has a property. It is not clear however why control by the non-Theme is acceptable in these cases but not in other standard cases of dative alternation, such as those discussed in Section 5.1.1. It is also obscure why the possibility is available only to subject-gap Purpose Clauses. I leave the question here.

Section 5.2: The Rationale Clause: intentions and control

The Rationale Clause cannot be controlled by an internal argument of the matrix verb: sentences ambiguous between a subject-gap Purpose Clause and a Rationale Clause are easily distinguished by inserting the phrase *in order*.

[1]

- (a) Sven brought Armistead to the party to impress the guests.
- (b) Sven brought Armistead to the party in order to impress the guests.

In (1a) we have two readings: either it is Sven who is impressing the guests by bringing along Armistead; or it is Armistead impressing the guests (which is why Sven brought him along). The first is a Rationale reading and the second is a Purpose reading. In (1b) we have only the Rationale reading (i.e. Sven is doing the impressing).

In general, Rationale Clauses are only compatible with the Agent of the sentence (i.e. the Rationale Clause will not tolerate any subject of any role). If we assume some sort of "internal subject", then the Rationale Clause selects an internal subject which is an Agent.

- [2] The police blocked the road to stop the convoy from coming through.
- [3] The road was blocked by the police to stop the convoy from coming through.

In both (2) and (3), *the police* bears the role Agent with respect to the verb *stop* (it is the police who are doing the stopping). In (2), *the police* is the Subject; in (3), it is an Adjunct, governed by *by*. Nevertheless, *the police* remains the controller of the infinitive, regardless of this change of Grammatical Function. However, it appears that restricting controller selection to the role of Agent is too strong. First, it seems that the Rationale Clause is compatible with other roles as long as they are susceptible to an intentional reading. The verb *receive* has a Goal as subject and need not receive an intentional reading, as in (4).

- [4] John received a death threat.

However, it can occur with a Rationale Clause, but in this case the subject is construed as acting with active intention, as in (5).

[5] The Queen received the ambassador to placate the offended prince.

Further, it seems that the Rationale Clause is perfectly compatible with copular predication where the attribution of the property to the subject is seen to be one which is under the subject's control.

[6] John is a member of CND to offend his father (not out of any sense of commitment).

Where the property is conceived of as inalienable the Rationale reading fails.

[7] *John is tall to get onto the basketball team.

The facts follow straightforwardly in the analysis suggested because the predicate is a relation between an individual, an event, and an intention such that the individual participates in the event with the intention in mind: in this case the event must be the sort of event that an individual can manipulate with a particular intention (hence being a member of an organisation is fine but being a certain height is not); the subject need not be an Agent but whatever role it plays in the event it must play with active intention (as in (5)); and of course for verbs which do have an Agent it is the Agent which is necessarily read as the intender of action, so the restriction to Agent in standard cases is predicted. We might therefore have the conditions on reference in (8).

[8] $R(x,e,\wedge p) \leftrightarrow x$ acts in e with the intention that p

One problem with this analysis is posed by the passive as it appears that the Rationale Clause can appear without any lexically realised Agent.

[9] The lights were turned off to conserve electricity.

On the basis of such examples Jones suggests that the Rationale Clause be taken as an instance of discourse control. However, this seems far too weak (as Jones himself implies by recognising that where the Agent is lexically realised, it must control). If the Rationale Clause simply supplied an intention which someone had with respect to the matrix event, and the attribution of that intention was left to general principles of discourse, it would presumably be possible for a salient "discourse Agent" to control the Rationale Clause. This seems not to be the case. Consider (10).

[10] John and Bill trashed their table to attract the attention of the police.

Consider (10) asserted in the following situation: a barman wishes to summon the police because of a troublemaker in the bar, but he does not want the troublemaker to realise that he is intentionally summoning the police; he therefore asks two friends, John and Bill, to cause a disturbance which will attract a passing policeman's attention. In this situation, the intention to attract the attention of the police is clearly the barman's and the initiation of the table-trashing is at the barman's instigation. The use of a Rationale Clause is perfectly fine in (10), despite the fact that the barman is not himself referred to lexically (or lexically implicit) in the sentence.

This argument seems to me equally spurious. The predicate I have suggested requires the syntactic Agent to intend the proposition, it does not prevent anyone else having intentions of the same sort, even, perhaps, stronger intentions. And notice that the syntactic Agent must be interpreted as being at least complicitous in the intention to summon the police. This seems to me intuitively clear, but to bring it out, notice that one cannot attribute to John and Bill a lack of knowledge about what they are doing.

[11] *John and Bill (unwittingly) trashed their table (unwittingly), to attract the attention of the police.

So the syntactic Agent must be at least complicitous in the relevant intention; other entities may or may not have such intentions and to any degree of intensity.

It is clear then that a simple theory of discourse control is unacceptable because the relation involved in Rationale Clause modification is strictly local. Of course, Jones himself observes that where there is an Agent lexically present it will be the controller. If however discourse control is too weak in general then motivating it using the passive seems rather weak evidence. Two quite separate sets of facts argue against using the passive as a motivation for discourse control. First there is the extremely robust contrast with the middle construction, as in (12-13).

[12] The ship was sunk to collect the insurance.

[13] *The ship sank to collect the insurance.

It seems that the Agent is syntactically available in (12) even though it is not realised by an overt lexical phrase: it may be that the theta grid of passive *sunk* contains a position for the Agent which is in some way saturated by the passive morphology itself, where the theta grid for middle sink contains no position for the Agent at all. Clearly the Rationale Clause in (12) describes the Agent's intentions (the sinker intends the collection). Returning to the discussion of (10) above, it seems to me that a passivisation of (10) makes the same point: whatever x trashes the tables also intends to alert the police.

[14] The table was trashed to attract the attention of the police.

Notice again that the inclusion of *unwittingly* is anomalous.

[15] *The table was trashed unwittingly to attract the attention of the police.

If the passive (unlike the active) really did allow discourse control then one might expect that the property of unwittingness might be predicated of the table-trashers who were being manipulated by the discourse Agent whose intentions are being described by

the Rationale Clause. This seems to me to be quite impossible: we may not know who trashed the tables but we know that Agency in the trashing of the tables and intention with respect to that trashing are linked. Notice that this still allows a certain vagueness in the interpretation of Agency which might be either lexically specified or quite general in the passive. Consider (16).

[16] The Mafia sank the ship to collect the insurance.

In (16) we do not assume that every member of the Mafia was physically involved in the sinking of the ship; nevertheless (16) is true even where one individual sinks the ship as long as that individual is appropriately related to the Mafia and acts in the sinking of the ship purely as part of that relationship (rather than through private motives). Similarly we may assume that the individual who sinks the ship does not have an intention to collect the insurance but we must assume that "the Mafia" (however that institution is to be understood) does have that intention. The same point may be made when the Rationale Clause modifies a passive sentence: the Agent of the action and the intender of the proposition must be "the same individual" in some relevant sense.

The above examples therefore suggest that the attribution of intention by the Rationale Clause is strictly local (*modulo* vague readings as discussed). Another set of examples also argues against using the passive to support a discourse control analysis: what Williams (1974; 1987b) calls event control.

[17] John turned off the lights to save money.

[18] Turning off the lights saved money.

Jones (1991: 37, fn 1) mentions this observation and cites an anonymous reviewer as arguing against Williams' analysis with examples such as the one in (19).

[19] Maryⁱ brought John^j along in order *e*ⁱ to talk to him^j.

It seems however that the Rationale Clause should not be taken to have only event control or only individual control, but (as Hegarty (1989) suggests in a similar case) to allow both. This seems to be related to an important constraint on passivisation with the Rationale Clause, which I believe has not been mentioned before. Consider the effect of inserting a reflexive into (17) and passivising as in (20-21).

- [20] The lights were turned off to save money.
 [21] *The lights were turned off to save himself some money.

Suppose that Rationale Clauses are controlled in two ways: either by the subject of the matrix clause, if the subject bears the relevant role with respect to the matrix event; or by the matrix event itself if there is an x which bears that role with respect to it. Consider how this would work with regard to the examples discussed so far.

- [22]
 (a) John turned off the lights to save money.
 (b) Johnⁱ e_j turned off the lights^k [PRO^{i/j/*k} to save money].
 (c) John saved money.
 (d) Turning off the lights saved money.

- [23]
 (a) The lights were turned off to save money.
 (b) The lights^k e_j were turned off [PRO^{*k/j} to save money].
 (c) *The lights saved money.
 (d) Turning off the lights saved money.

- [24]
 (a) John turned off the lights to save himself some money.
 (b) Johnⁱ e_j turned off the lights^k [PRO^{i/*j/*k} to save himselfⁱ some money].
 (c) John saved himself some money.
 (d) *Turning off the lights saved himself money.

- [25]
 (a) *The lights were turned off to save himself some money.
 (b) *The lights^k e_j were turned off [PRO^{*k/*j} to save himselfⁱ some money].
 (c) *The lights saved himself some money.
 (d) *Turning off the lights saved himself some money.

A standard example of a Rationale Clause is given in (22a). The relevant co-indexing relations are shown in (22b). Notice that according to the generalisation stated

above, PRO can be controlled by the subject, which is the Agent of the matrix event; or by the event itself (which has John as an Agent); but not by the object, which fulfils neither criterion. Control by *John* will give the paraphrase (22c) for the interpretation of the Rationale Clause. Control by the event will give the paraphrase in (22d). Both paraphrases are well-formed and the sentence is also well-formed.

The passive equivalent of (22a) is given in (23a). The coindexing possibilities are given in (23b). As before, PRO can be controlled by the matrix event (which still has John as an Agent). We therefore have the well-formed paraphrase in (23d). However, PRO cannot be controlled by the subject because the subject is the Theme of *turn off* not the Agent: we hence have the ill-formed paraphrase in (23c). Nor can PRO be controlled by John, who is no longer the subject.

The situation becomes particularly interesting when a reflexive is introduced as in (24a). Consider the coindexing possibilities in (24b). As for (22b), PRO can be controlled by the subject which is the Agent of the matrix event, but not by the object. However, PRO cannot be controlled by the event, as it was in (22b). This because the PRO in (24b) binds the anaphor, *himself*, and must therefore denote a human male. *John* is therefore the only possible antecedent of PRO in (24b). This is shown by the well-formedness of the paraphrase in (24c) and the ill-formedness of the paraphrase in (24d).

The passive equivalent of (24a) is given in (25a), which is the equivalent of (23a), except that it includes a reflexive. Notice in (25b) that there are no possible antecedents for PRO. As in (23b), the subject in (25b) is not a possible antecedent because it is the Theme and not the Agent of the matrix event. Now, however, the event cannot control PRO for the same reasons that it could not in the active equivalent in (24b), namely, that reflexive, *himself*, requires a human antecedent.

This analysis does, however, face a number of problems. On the one hand, there seem to be examples in which there is no event paraphrase but passivisation is possible. This is shown in (26).

[26]

- (a) John sank the ship to collect the insurance.
- (b) The ship was sunk to collect the insurance.
- (c) *John's sinking the ship collected the insurance.

(26a) is a well-formed active sentence; (26b) is a well-formed passive sentence; but passivisation cannot here be licensed by event control because the event paraphrase in (26c) is ill-formed.

On the other hand, there are sentences in which there is a plausible event paraphrase, but passivisation is not allowed, as in (27).

[27]

- (a) John saved the cat to get into the local newspapers.
- (b) *The cat was saved to get into the local newspapers.
- (c) John's saving the cat got into the local newspapers.

(27a) is a well-formed active sentence; its passive equivalent in (27b) is ill-formed, despite having a plausible event paraphrase, as in (27c). The examples in (27), however, suggest that we should handle the notion of an "event paraphrase" with care. What we mean when we say that a sentence has an event paraphrase is that event control accurately captures the interpretation of the infinitive. In (27c) this is not the case. If John saved the cat to get into the local newspapers, then it is John's intention that he get into the local newspapers; we naturally assume that he manages to do so by the story of the rescue itself appearing, but it may be that you have a chance of getting mentioned if you have done several good deeds. That is, John may want to be mentioned in some context or other himself and doing a good deed is one means en route to this end; the actual saving of the cat may not itself appear in the paper at all. (27c) assumes that the object of intention is that the saving itself be reported. It may therefore be that passivisation is only allowed where there is the right sort of relation between the matrix event and the infinitival event. This would mean that there is a constraint that the Rationale Clause places on the events with which it occurs, in terms of which the constraints on the entity arguments themselves are understood. The situation would directly parallel the case of the Purpose Clause where the constraint

requiring a "Theme" argument was reduced to a constraint involving objects related in particular ways to states.

However these problems are to be addressed, it seems that the notion of event control is extremely useful in accounting for the behaviour of both the Rationale and Telic Clauses. Although this makes it more difficult to use controller selection as a further piece of evidence for adjunction point in the syntax, linear precedence, VP-anaphor, and negation facts still argue strongly for the distributional non-equivalence of these infinitives. Further evidence for this is provided when we address a distinction between the two constructions which has been raised earlier: the Rationale Clauses which do not allow event control will in fact allow passivisation of the matrix if the Agent is lexically realised but similar Telic Clauses will not.

[28]

- (a) John printed out the file to give himself a better idea of the layout.
- (b) *The file was printed out to give himself a better idea of the layout.
- (c) The file was printed out by John to give himself a better idea of the layout.

[29]

- (a) John printed out the file only to realise that the layout was wrong.
- (b) *The file was printed out only to realise that the layout was wrong.
- (c) ?*The file was printed out by John only to realise that the layout was wrong.

However the contrast in (28-29) is to be represented, it is clear that the Telic Clause has access only to the syntactic subject. We know already that the Telic Clause will happily take an antecedent with any thematic role: if the Agent *by*-phrase was structurally accessible to it it would be ambiguous between control by the syntactic subject and control by the Agent. However, the syntactic subject is the only possible controller. The Rationale Clause on the other hand must have the *by*-phrase structurally available, otherwise it would not matter whether there was an overt Agent or not. Although it is not clear how these facts are to be accounted for, the implication that the Telic Clause is structurally less integrated with the verb than the Rationale Clause comes through.

The above discussion however stresses the distinction between control of PRO (establishing the reference of the empty subject of the infinitive) and attribution of intention via predication. Consider the sentence in (30).

[30] John drove his family to the church [for his wife to join the ladies' group] [for their children to gain access to the children's facilities].

The sentence in (30) describes three basic events: John drives to church; his wife joins a group; their children gain access to some facilities. These events are linked in terms of intended consequence. If John drives to church, his wife can join the group; if his wife joins the group, his children will gain access to the facilities. If the intention described by the Rationale Clause is attributed to the local Agent, then we would expect it to be necessary for the wife to intend that the children gain access to the facilities as a consequence of her joining the group, as well as it being necessary for John to intend his wife to join the ladies' group. In other words a Rationale Clause would be evaluated with regard only to its local Agent. This seems not to be the case. Imagine a case in which John decides that the children using the facilities is a good thing and knows that the only way for this to happen is for his wife to join the ladies' group. He does not consult his wife or children but drives them to the church where he makes his wife join the group. (30) could truly describe such a situation because there is no reason for the wife or the children to act with any intentions whatsoever (certainly not with the intentions expressed in the Rationale Clause). Admittedly they must perform the actions in question and can therefore be seen as Agentive in those individual actions. But it seems spurious to attribute active intention to them of the sort required. The point is all the more important as it excludes an iteration in the interpretation which is not present.

This becomes clear when you consider the way we are forced to understand John's intentions. We can imagine a scenario in which the wife decides that the children using the facilities is a good idea, but knows that her husband hates church activities. She asks to be driven to church so that she can sort out some business, and only there does she make it clear what she intends. (30) cannot be truthfully asserted of such a

scene, because John at least must intend his wife to join and intend the children to use the facilities. As with the table-trashing example in (10-11), other Agents in the sentence and in the discourse can have whatever sort of intentions they like but the Agent of the root event **must** have the relevant intentions.

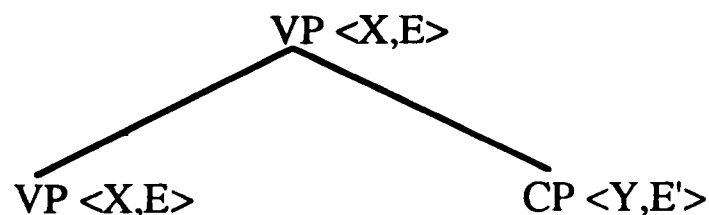
Notice then that we have an asymmetry between the control of PRO where it is present and the control of the infinitive as a whole by an intending agent. Consider (31).

[31] John drove to town [for Mary to register at the club] [PRO to get *himself/him/herself a pass to the squash courts].

Here PRO must be controlled by Mary but it is John that must intend the whole series of events.

This suggests that contrary to our original suggestion, the Rationale Clause cannot have the intending individual as an argument in its argument grid because the strict locality of this relation will force selection of the immediate Agent, which we have already argued would be an undesirable result.

[32]



We could therefore remove the individual argument from the argument grid of R and take the Agent to be introduced as a condition on the reference of the predicate, as in (33).

[33] $R(e, \wedge p) \leftrightarrow \dots \ \& \ \text{intend}(x, \wedge p)$

However, this gives us the original problem, namely that the selection of an intender is clearly not discourse free but is necessarily linked to the syntax. This will not follow

from (33) because the attribution of intention is a condition on the interpretation of the predicate which is entirely unrelated to its syntactic realisation. The fact of the matter is that the intention is attributed to the "agent" of the root event (i.e. the "agent" of the first event which assigned deictic temporal reference): with iterated Rationale Clauses, PRO is controlled strictly locally but intention is assigned to this "root agent". I have no solution to this problem.

Section 5.3: The Telic Clause: evaluating the consequences

It was said in Section 1.2 that the Telic Clause was headed by a predicate denoting a relation between two events, where the second was the inevitable conclusion of the first. As is clear from the phrase structure suggested in Section 3.4, the Telic Clause adjoins outside of the domain of argument projection. It is therefore no surprise to find that the Telic Clause places no selectional restrictions on the argument structure of the verb it modifies (it does not select for Theme-like or Agent-like antecedents); nor does it select for particular aspectual or event-internal structure (it does not select for resultant states or events which are "manipulable"). We have seen already that the Telic Clause is passive sensitive in that it will select whatever NP is syntactic subject as its controller, regardless of thematic role or (base) grammatical function.

- [1] Svenⁱ gave Sigrun^j the CD^k, only e^i to realise that she already had it.
- [2] Sigrun^j was given the CD^k by Svenⁱ, only e^j to realise that he wanted it for himself.
- [3] The CD^k was given to Sigrun^j by Sven^k, only e^k to get damaged before she had a chance to play it.

In (1) the Agent subject of *give* is understood as the subject of *realise*; in (2) the Goal subject of passive *give* is understood as the subject of *realise*; and in (3) the Theme subject of passive *give* is understood as the subject of *get*.

Similarly, it seems to be insensitive to standard aspectual categories and whatever event substructure those categories might be associated with. It is quite clear that the Telic Clause marks some sort of transition between events: it can mark the culmination of a process, as in (4).

- [4] Leaves rolled along the pavement to settle in the gutter at the end of the street.

In Vendlerian terms, *roll along* denotes an Activity (an open-ended process); *settle* denotes an Achievement: in (4) the settling is taken to be the culmination of the rolling.

When the Telic Clause occurs with *only* it marks a strong sense of disruption between events, as in (5).

[5] The ball sailed towards the goal only to be blown off course by the wind.

Here the trajectory described by *sail towards the goal* is disrupted by another event, the blowing of the wind. We might therefore expect that the Telic Clause would select for events which mark transitions of some sort (Achievements or Accomplishments) or that it might select for pairs of events which build up a transition (Activity + Achievement). However, this is not the case. It appears that the Telic Clause places no aspectual restrictions on the events with which it occurs; in fact, it is perfectly compatible the least dynamic of all event-types: the State. It can be used straightforwardly to relate two states, as in (6).

[6] Sven was out in town for most of the day, only to be home when Sigrun arrived.

The Telic Clause in (6) requires us to assume that Sven's being at home when Sigrun arrives is undesirable: the State of Sven being in town would have avoided this but the culminating event is (in contrast) the State of Sven being at home. It therefore seems that what is necessary for the occurrence of the Telic Clause is that the **external** relation between events be of an appropriate type, not that they have aspect or argument structures (which I take to be "internal" in some sense) of a particular class.

The external relation is obviously the one introduced by the Telic Clause itself (rather than a property of the modified verbs which is selected); the question is then what the nature of this relation is. A crucial element is that it is in some sense evaluative: that is, the Telic Clause predicates relations between events which we judge to be natural or appropriate, or contrastive and adversative. The discussion of (4-5) above implied that the Telic Clause merely built up larger aspectual structures, so that the Activity of rolling culminated (naturally) in the Achievement of settling or the Activity

of sailing culminated (unexpectedly) in the Achievement of blowing off course, a pattern which suggests the substructure of the Accomplishment: process + telos. However, the relation predicated by the Telic Clause is much broader than this. Notice that in (6) it is not the case that the State of Sven's being in town "culminates" in his being at home, rather there is a generally adversative reading: Sven's being at home is what ends up happening despite his being in town most of the day, and that culmination is unexpected/ unplanned/ undesirable etc. The two events must still be related (the being at home is what ends up happening in spite of the being in town), but the notion of telos here is a fairly broad one. The notion of "ending up" must bear a lot of weight here, as it is presumably that element which triggers the evaluative reading which I take to involve some general form of pragmatic inference. It is not enough for one event simply to happen after another or for the two events simply to be in some coherent sequence, but the second event must be seen to terminate the general situation in which the first event is involved. It seems that we must therefore judge that termination to be particularly appropriate and fitting or particularly contrary to expectation for the relation to hold. The reading which one gets when the two events are opposed as inconsistent or contrary to expectation I will call an *adversative* reading, and it appears to be the easiest to construct. The reading where one event is judged as an appropriate and fitting outcome I take to be a *resolutive* reading. These are more difficult to construct because they rely on a sense of stereotypical sequence: relations between events which are judged to be teleologically natural in some sense (here perhaps is another source of analogy between the Telic Clause and Purpose Clause, which also allows non-intended attribution of properties as long as they are "natural"). We might therefore have conditions on reference along the lines of (7).

[7] $T(\langle e^1, e^2 \rangle) \leftrightarrow e^1$ finds its conclusion in e^2

I have assumed throughout this discussion that the Telic Clause denotes a relation between events rather than between propositions. The question is clearly a

delicate one given the fact that the Telic Clause does not seem to relate to event-internal structure. However, I believe that striking evidence for this view is provided by the interpretation of the Telic Clause in perception contexts. Consider (8) and (9).

- [8] John saw Brutus stab Caesar.
 [9] John saw that Brutus stabbed Caesar.

There are a number of important distinctions between the interpretations of (8) and (9) (see Higginbotham (1983a) for a detailed discussion). Notice in particular that the complement of *see* in (8) is referentially transparent whereas the complement of *see* in (9) is referentially opaque. (8) must be asserted where John actually witnesses the stabbing of Caesar by Brutus, although he may not realise that this is what he saw (he might think that Brutus merely stumbled and bumped into Caesar; or he might believe that the incident he has witnessed actually involved two entirely different individuals). (9) carries no implication that John actually witnessed the stabbing of Caesar by Brutus, merely that he perceives it to be true that that is what has happened: it is necessary to the content of his perception that he understand the event is a stabbing and that Brutus is Brutus and Caesar is Caesar and so on. Higginbotham (1983a) argues in detail that these facts amongst others follow straightforwardly in a theory which includes both events and propositions as ontological primitives. In (8), John witnesses an event which is described in a particular way although we know nothing of his perception of that event; in (9) John perceives a proposition to be true, in which case the content of the proposition forms the content of his belief. In Higginbotham's theory, sentences such as (8-9) receive translations as in (10-11).

- [10] $(\exists e^1) [\exists e^2: \text{kill}(\text{Brutus}, \text{Caesar}, e^2)] \text{ see}(\text{John}, e^2, e^1)$
 [11] $(\exists e^1) \text{ see}(\text{John}, \wedge[(\exists e^2) \text{kill}(\text{Brutus}, \text{Caesar}, e^2)], e^1)$

Now consider the interpretation of a Telic Clause occurring in a perception context, as in (12).

[12] John saw Bill win one million pounds on the first spin of the wheel only to lose it all on the second.

It is clear that (12) has the properties associated with the event reading rather than the propositional reading. If John saw Bill win one million pounds on the first spin of the wheel only to lose it all on the second, then he actually witnesses those two events; he may be under the misapprehension that he is actually seeing Fred rather than Bill, but as long as it is actually Bill who is involved in the event, then (12) can be truthfully asserted. Significantly, Bill's losing the money does not constitute a part of John's beliefs about the situation. It therefore appears that the Telic Clause in (12) denotes an event (referentially transparent) which John can perceive in the way he can perceive any other event; it is not a proposition. It seems therefore that the correct translation for (12) is the one given in (13).

[13] $(\exists e^1) [(\exists e^2 e^3: T(\langle e^2, e^3 \rangle) \& \text{win}(e^2) \& \text{lose}(e^3))] \text{see}(\text{John}, \langle e^2, e^3 \rangle, e^1)$

This leaves us with the question of the control of PRO. It has been observed already that the empty category in the Telic Clause shows exactly the same properties as the empty category in the Rationale Clause, *modulo* a difference in controller selection which has been attributed to structural factors. However, PRO in the Rationale Clause allows event control as well as individual control and this alternation has been linked to restrictions on the passive. The question then arises whether the Telic Clause also allows event control and with what properties. It was observed above that the Telic Clause is passive-sensitive in that passivisation forces a shift in controller, as in (1-3). However, as for the Rationale Clause, there do seem to be instances of Telic Clauses which are able to passivise without changing the interpretation, as in (14-15).

[14] Derby won the match 6-2, to continue their phenomenal recovery this season.

[15] The match was won by Derby 6-2, to continue their phenomenal recovery this season.

In both (14) and (15) it is Derby who are continuing their phenomenal recovery. As for the examples with the Rationale Clause we could posit an ambiguity with respect to subject-vs-event control, as in (16-19).

[16]

- (a) John bought Bill a CD only to realise that he already had it.
- (b) Johnⁱ e_j bought Bill^k a CD only PRO^{i/*j/*k} to realise that he already had it.
- (c) John realised that he already had it.
- (d) *Buying Bill a CD realised that he already had it.

[17]

- (a) Bill was bought a CD only to realise that he already had it.
- (b) Bill^k e_j was bought a CD only PRO^{k/*j} to realise that he already had it.
- (c) Bill realised that he already had it.
- (d) *Buying a CD realised that he already had it.

[18]

- (a) Derby won the match 6-2, to continue their phenomenal recovery this season.
- (b) Derbyⁱ e_j won the match^k 6-2, PRO^{i/j/*k} to continue their phenomenal recovery this season.
- (c) Derby continued their phenomenal recovery this season.
- (d) Winning the match continued their phenomenal recovery this season.

[19]

- (a) The match was won by Derby 6-2, to continue their phenomenal recovery this season.
- (b) The match^k e_j was won by Derbyⁱ 6-2, PRO^{*i/j/k} to continue their phenomenal recovery this season.
- (c) The match continued their phenomenal recovery this season.
- (d) Winning the match continued their phenomenal recovery this season.

In (16b), we can see that the Telic Clause can be controlled by the matrix subject, *John*, giving the well-formed paraphrase in (16c); it cannot, however, be controlled by the event because of selectional restrictions imposed by the verb *realise* as illustrated in (16d); the first object, *Bill* is not accessible. With the passive, *Bill* becomes accessible and is a possible controller as shown by the well-formed paraphrase in (17c); however, the event cannot control the infinitive for the same reasons as in (16), as illustrated in (17d). In (18) the situation is the same as in (16) except that event control is now allowed because the verb *continue* allows event subjects, as illustrated in (18d). Under passive this control possibility remains constant, as shown in the co-indexing

possibilities in (19b) and the paraphrase in (19d). Subject control is available in the expected fashion, as in (19c).

The situation becomes particularly interesting when a reflexive/pronoun alternation is introduced.

- [20] Derby won the match 6-2, to give themselves a shot at the championship.
- [21] Derby won the match 6-2, to give them a shot at the championship.

Like the Rationale Clause, the Telic Clause allows the use of reflexives which are (indirectly) co-referential with the controlling subject. This means, incidentally, that (20) is ambiguous between a Rationale Clause reading in which Derby won the match (by that particular margin) with the intention that they have a shot at the championship; and a Telic Clause reading in which winning the match by that margin **does** give them a shot a championship (as a matter of course rather than intention): we are only interested in the Telic Clause reading here. Unlike the Rationale Clause, the Telic Clause also allows the use of a pronoun co-referential with the subject (making (21) unambiguous). As for the Rationale Clause, the Telic Clause with a reflexive will not allow the matrix to passivise, where the Telic without reflexive will.

- [22] *The match was won 6-2, to give themselves a shot at the championship.
- [23] The match was won 6-2, to give them a shot at the championship.

Notice that, unlike with the Rationale Clause, the inclusion of a lexical Agent makes no difference.

- [24] *The match was won by Derby 6-2, to give themselves a shot at the championship.
- [25] The match was won by Derby 6-2, to give them a shot at the championship.

Once again these facts will fall out of an analysis like the one offered above for the Rationale Clause.

[26]

- (a) Derby won the match 6-2, to give them a shot at the championship.
- (b) Derbyⁱ e_j won the match^k 6-2, PRO^{*i/j/*k} to give them a shot at the championship.
- (c) *Derby gave them a shot at the championship.
- (d) Winning the match gave them a shot at the championship.

[27]

- (a) The match was won 6-2, to give them a shot at the championship.
- (b) The match^k e_j was won 6-2, PRO^{k/j} to give them a shot at the championship.
- (c) The match gave them a shot at the championship.
- (d) Winning the match gave them a shot at the championship.

[28]

- (a) Derby won the match 6-2, to give themselves a shot at the championship.
- (b) Derbyⁱ e_j won the match^k 6-2, PRO^{i/*j/*k} to give themselves a shot at the championship.
- (c) Derby gave themselves a shot at the championship.
- (d) *Winning the match gave themselves a shot at the championship.

[29]

- (a) *The match was won 6-2, to give themselves a shot at the championship.
- (b) *The match^k e_j was won 6-2, PRO^{*k/*j} to give themselves a shot at the championship.
- (c) *The match gave themselves a shot at the championship.
- (d) *Winning the match gave themselves a shot at the championship.

In (26b), we see that the event can control PRO, as shown by the well-formed paraphrase in (26d); *the match* is structurally unavailable; *Derby* is structurally available but the presence of the pronoun in the infinitive prevents it from controlling PRO (which would give a Binding Condition B violation), as shown in the ill-formed paraphrase in (26c). When (26a) passivises we have the coindexing relations in (27b). *The match* is now structurally available and can control PRO as expected. The event control is also available, as shown in the paraphrase in (27d) and the sentence is well-formed.

Replacement of the pronoun in (26a) with a reflexive, as in (28a), gives the binding relations in (28b). As before, the object, *the match*, is structurally unavailable. The reflexive however reverses the remaining binding possibilities: the event is not a proper antecedent for the reflexive, as shown in the ill-formed paraphrase in (28d), but the subject is now available without any Binding Condition violations, as in (28c). As before, the reflexive forces subject control. When (28a) is passivised, giving (29a), we

therefore have the binding relations in (29b). Neither the subject nor the event are possible antecedents for the reflexive, as shown in (29c-d) and therefore the sentence is ill-formed.

The Telic Clause thus resembles the Rationale Clause in a number of respects. It is tempting to see the parallel alternation between subject and event control as indicating a more fundamental parallel. Evidence has already been offered, however, in Section 3.4 that the Telic Clause is in fact less deeply embedded than the Rationale Clause. Although we cannot take the orientation to Agent to be evidence that the Rationale Clause is minimally c-commanded by the "internal subject", there does seem to be evidence of some sort, not just that the Rationale Clause is semantically interpreted with regard to Agents, but that it is **syntactically** sensitive to the presence an Agent in a way that a Telic Clause is not. We have already seen that there is a difference with respect to pronominal binding. The Rationale Clauses which do not allow event control will in fact allow passivisation of the matrix if the Agent is lexically realised but similar Telic Clauses will not. Recall the contrast discussed in Section 5.2, repeated here.

[30]

- (a) John printed out the file to give himself a better idea of the layout.
- (b) *The file was printed out to give himself a better idea of the layout.
- (c) The file was printed out by John to give himself a better idea of the layout.

[31]

- (a) John printed out the file only to realise that the layout was wrong.
- (b) *The file was printed out only to realise that the layout was wrong.
- (c) ?*The file was printed out by John only to realise that the layout was wrong.

Given the Telic Clause is insensitive to thematic relation we would expect it readily to take the *by*-phrase as an antecedent if that phrase is structurally accessible, but it appears not to be. The Telic Clause does therefore seem to be structurally less embedded than the other infinitives of result and to modify the event irrespective of thematic or aspectual relations which it specifies: this is just what we expect from the general outcome reading.

The Telic Clause thus relates to the other infinitives of result in an extremely complex and interesting way: it is distributionally extremely loosely tied to the sentence

when one considers scope and its interpretation is the most abstract and the hardest to define. And yet it bears a clear relation to the Rationale Clause with respect to the event control alternation. It can clearly be closely integrated with verbs of perception where it is interpreted as straightforward event and where it seems to adjoin to at most a reduced clausal structure. I take it that as we understand the nature of the constraints on control of the Rationale Clause better in the syntax and gain a clearer idea of the sort of causation which are important in linguistic interpretation, the place of the Telic Clause will become clearer. I will leave the discussion here. Before concluding, however, I will offer an analysis of a sentence including each of the infinitives of result to refocus the general position taken in this paper, namely that the infinitives of result are headed constructions which discharge their arguments by general principles of argument discharge.

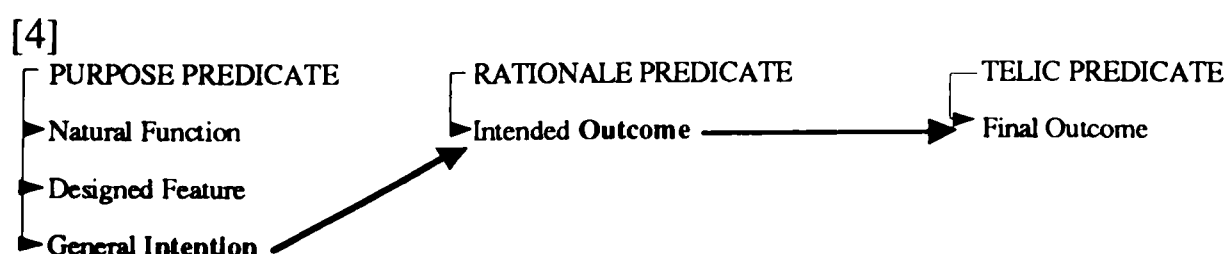
Section 5.4: The typology of Result Predicates and *in order* insertion

The typology suggested in this thesis for the infinitives of result implies both the independence of each construction from the other and a close link between them in syntax and semantics. Each infinitive has its own distinct internal syntax, argument composition, point of adjunction, and interpretation. On the other hand, each predicate is lexicalised by the Inflectional element, *to*, leading to the projection of a full CP clause structure, and each construction is an instance of simple event modification, integrated into the modified structure by the same general principles of argument discharge. Further, it appears that the meaning of the predicates is closely related and that this relation between the predicates can be viewed as a sort of metaphorical extension, where metaphorical extension is understood as the systematic weakening of constraints on the interpretation of a predicate.

I have argued that the Purpose Predicate is teleological in a general sense, that is, that it concerns the attribution of properties to objects, where the attribution may take the form of a natural function, a designed feature, or a general intention, as in (1-3) [repeated from (26-28a), Section 1.2].

- [1] Grass is green to photosynthesise more efficiently.
- [2] This car is contoured to accelerate more quickly.
- [3] John bought some cream cakes at the shop to eat with his grandmother.

The Rationale Clause focuses on the notion of intended outcome and excludes reference to objects and their properties. The Telic Clause focuses on the notion of outcome and excludes reference to intentions. The conceptual relations between the constructions might then be viewed as in (4).



Specific features of each construction are then related to the way these general notional relations are given formal realisation in the syntax and the semantics. The Purpose Predicate deals with the attribution of properties in a general sense and therefore the infinitive is required to be interpreted as a property in the semantics and hence to contain *wh*-movement of an empty operator in the syntax; as it concerns properties which objects gain by virtue of their participation in the event, the purpose predicate applies to stative subevents of the modified event, S(e), in which the object has the property in question, i.e. it selects for "resultant state" verbs.

The Rationale Clause on the other hand deals with intended outcomes of events. The infinitive must therefore be interpreted propositionally in the semantics, requiring a CP which contains no movement in the syntax. Further, the predicate now applies to the modified event itself, not its substates. The Telic Clause deals with actual outcomes of events and the infinitive must therefore be interpreted directly as an event in a transparent context. Once again the modified event is the event itself, not one of its subevents.

This typology of the constructions also allows us to raise the problem of *in order* insertion in a more fruitful context. As mentioned in Section 1.2, Jones (1991) treats the preface, *in order*, as a straightforward marker of the Rationale Clause, that is, all contexts in which *in order* insertion is possible, a simple Rationale Clause is possible; and all infinitives prefaced by *in order* are instances of Rationale Clauses. Neither of these assumptions appears to be the case.

First there is a construction in which Rationale Clauses appear to be at best marginal, but in which In Order infinitives are perfectly acceptable: the passive. It seems that Rationale Clauses resist passivisation: compare the passive (5a) with the active (5b). The contrast is minimal with the In Order infinitive.

- [5] (a) ?*Jo flattered the bouncer to be admitted to the club.
 (b) Jo flattered the bouncer to gain admittance to the club.

- [6] (a) Jo flattered the bouncer in order to be admitted to the club.

- (b) Jo flattered the bouncer in order to gain admittance to the club.

Second, the preface, *in order*, seems to be compatible with the Purpose Clause under certain extremely strict (but rather unsurprising) conditions. Recall that it was argued in Section 5.1.1 that there are four event types which are compatible with the Purpose Predicate.

- [7] John sent the troops into the hall [*e* to pacify the crowds].
[8] John sent troops along the hall [*e* to pacify the crowds].
[9] John left the troops in the hall [*e* to pacify the crowds].
[10] The troops were in the hall [*e* to pacify the crowds].

In (7), we have a telic event, in (8) an atelic event, in (9) a continuance of state, and in (10) a state. Developing Bach's (1982) resultant state analysis, I argued that the Purpose Predicate is only compatible with those verbs which contain a state in which the object has the property in question. The telic use of *send* includes a final or resultant state (by being in the hall the troops are able to pacify the crowds); the atelic use of *send* includes a state of motion (the troops are able to pacify the crowds by virtue of moving along the hall); the verb *leave* includes (once again) the state of the troops being in the hall; and of course in (10), the main sentential predication refers directly to the state of the troops being in the hall. Significantly, (10) is taken to contain a Purpose Clause because the main clause refers to the very state which acts as a resultant or continuant state in (7) and (9) respectively, and the interpretation of the troops with respect to the infinitive in (10) is presumably identical to the interpretation of the troops with respect to the infinitive in (7) and (9).

Despite the fact that (10) contains a Purpose Clause, however, *in order* insertion is possible, where it is not in (7-9).

- [11] *John sent the troops into the hall [in order *e* to pacify the crowds].
[12] *John sent troops along the hall [in order *e* to pacify the crowds].
[13] *John left the troops in the hall [in order *e* to pacify the crowds].
[14] The troops were in the hall [in order *e* to pacify the crowds].

This implies that the preface *in order* is not a marker for Rationale Clauses but rather that there are conditions on its insertion which makes *in order* always compatible with Rationale Clauses, though also potentially compatible with other infinitives. The relevant conditions seem to be three.

First, as the contrast between (11-13) and (14) shows, *in order* can only be inserted in front of an infinitive which modifies the main event itself (rather than a subevent). This is always true of Rationale Clauses. It is also true of the Purpose Clause in (14) because the function $S(e)$ will in this case simply provide the state, e , itself (no substate is required or available). It is not, however, true of (11-13), where the state in question is some substate of the main event. This effectively restricts the occurrence of *in order* with the Purpose Clause to cases where the modified sentence is an instance of copular predication.

Second, *in order* insertion is never compatible with object-gap Purpose Clauses, even when they are applied to sentences containing copular predication, as shown in (15-18).

- [15] *Sven pushed the cart into the arena in order for the crowds to see e .
- [16] *Sven pushed the cart along the road for the crowds to see e .
- [17] *Sven kept the cart in the arena in order for the crowds to see e .
- [18] *The cart was in the arena in order for the crowds to see e .

We must therefore assume that *in order* insertion is only available where both gaps occur in subject-position (being thus compatible with Rationale Clauses and subject-gap Purpose Clauses, but not object-gap Purpose Clauses).

Thirdly, *in order* insertion appears only to be allowed (unsurprisingly) where there is an intention reading. Once again, this is always the case with the Rationale Clause which has the notion of "intended outcome" built formally into its meaning. However, as shown in (4), the Purpose Clause, being teleological in a general sense, has an intentional reading as only one of the types of reading available. The example given above, (14), is a case of "general intention", i.e. John, by sending the troops into the hall has the general intention that they be able to pacify the crowds. It seems that

Purpose Clauses with a "designed feature" reading are also compatible with *in order* insertion, because the property, though in some sense inherent to the object, is present by an act of intentional creation.

[19] The car was designed with special contours in order to accelerate more quickly.

However, the generic use of the Purpose Clause I find incompatible with the use of *in order* even where other conditions are met.

[20] #Grass is green in order to photosynthesis more efficiently.

I have marked the sentence as semantically ill-formed because it is unacceptable on a particular reading. According to my intuitions, the insertion of *in order* in (20) forces us to assume that someone intentionally made grass green so that it would function as it does (presumably God); the statement is not merely a general statement about the teleological properties of grass itself. I therefore have a contrast between (20) and (21).

[21] Grass at driving ranges is red in order to show up golfballs more clearly.

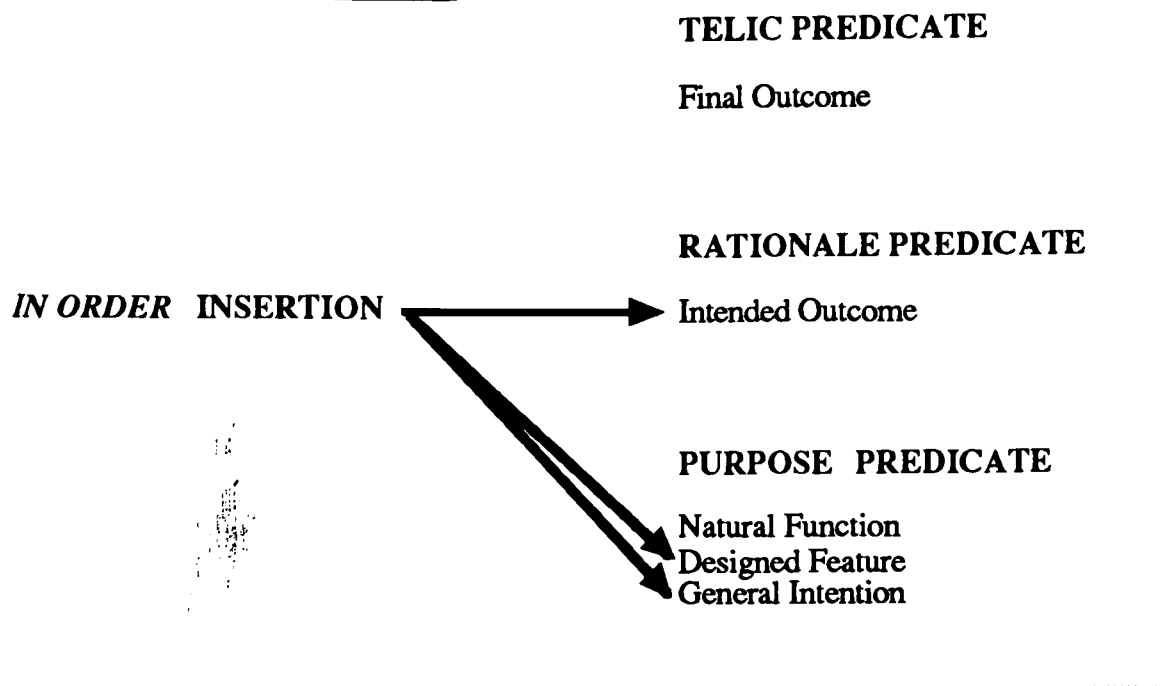
I find (21) perfectly acceptable on the assumption that the grass has been designed in a particular way. It seems therefore that *in order* insertion is incompatible with the true generic reading of a Purpose Clause and that this is so because it requires an intention reading. Needless to say, the restriction to intentional readings also excludes its occurrence with the Telic Clause.

To summarise, we can assume that *in order* insertion is generally available under three conditions, shown in (22-24).

(22) The infinitive must apply to the modified event itself, not to a subevent. This excludes all Purpose Clauses except those modifying copular predication structures.

- (23) A dependency relation must hold only between subject gaps. This excludes object-gap Purpose Clauses.
- (24) The interpretation of the infinitive must include reference to intention. This restricts insertion as follows:

The Intention Restriction on *in order* insertion



Section 5.5: A sample analysis

- [1] John designed a battery [PC to operate at high temperatures] [RatC to win a prize] [TC only to realise that he was not eligible to enter]

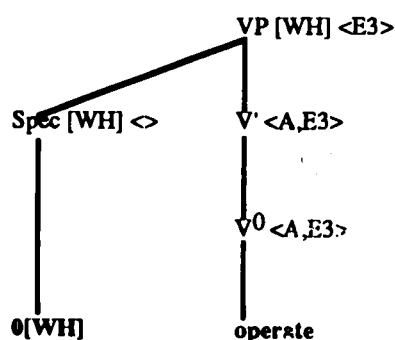
I will assume that the main predicates in this sentence are those in (2-8); I have distinguished all entity and event variables so that it is clear how the process of argument projection proceeds; for the sake of space, I have represented a property by π and a proposition by \bar{p} .

- [2] design (x,y,e¹)
- [3] to¹ (z,e², π)
- [4] operate (a,e³)
- [5] to² (b,e⁴, $\wedge p$)
- [6] win (c,d,e⁵)
- [7] to³ (<e⁶,e⁷>)
- [8] realise (g, $\wedge p$,e⁸)

As should be clear from this list, the projection of the arguments of all of these predicates into a unified sentence is no trivial matter: for instance, we have eight event variables and eight entity variables all differently associated. However, given the specific properties of each of these predicates, and the general principles of argument discharge suggested in Higginbotham (1985), the projection of argument structure in the complex sentence in (1) will proceed in a general and systematic fashion.

Let us begin with the internal argument structure of the three infinitives. In (1), the infinitival verb in the Purpose Clause is the verb *operate*. *Operate* will project the structure in (9).

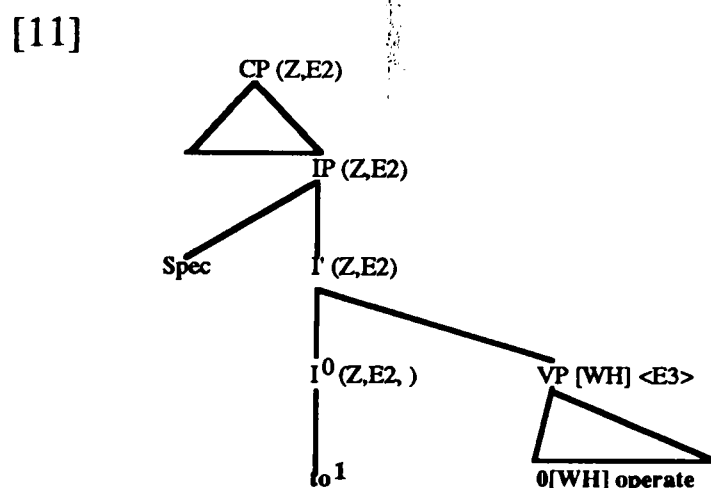
[9]



Being intransitive, *operate* has no complement and its argument grid filters up to V'. It directly θ -marks an NP (a closed expression) in VP-Spec, which will in fact be an empty operator (or its trace), as suggested. I will assume that the [WH] feature on the specifier will be visible on the VP by Agreement. This will give a translation as in (10).

[10] $\text{operate } (a, e^3)$

The VP headed by *operate* will now appear as the complement to I^0 , which dominates to^1 . We will then have the structure in (11).



I will now make two assumptions. First, to^1 triggers existential closure in its complement VP, giving the translation in (12).

[12] $\wedge(\exists e^3) \text{ operate } (a, e^3)$

Second, the presence of a WH-feature is interpreted as lambda abstraction over a variable represented by the operator (or rather its trace at LF).

[13] $\wedge\lambda a (\exists e^3) \text{ operate } (a, e^3)$

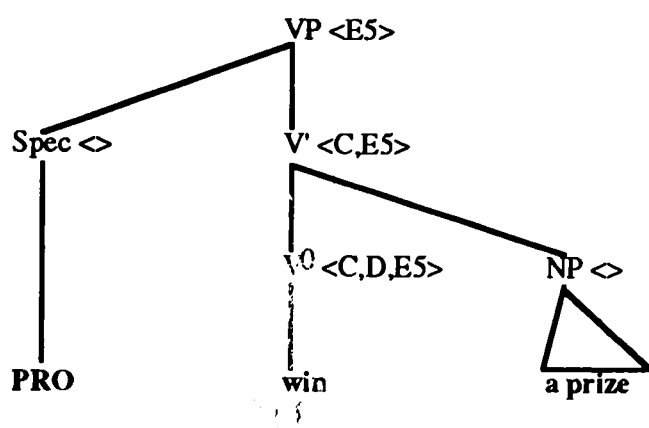
We now have a property. This fulfils the selectional restrictions imposed by to^1 on its third argument; to^1 therefore directly θ -marks VP. The first two arguments of to^1 now

filter up to the CP node, awaiting discharge. This gives the translation for the Purpose Clause infinitive in (14).

[14] $to^1(z, e^2, \lambda a (\exists e^3) \text{operate}(a, e^3))$

Now consider the Rationale Clause in (1). The infinitival verb in this infinitive is *win*, a transitive verb. It will project the structure in (15).

[15]

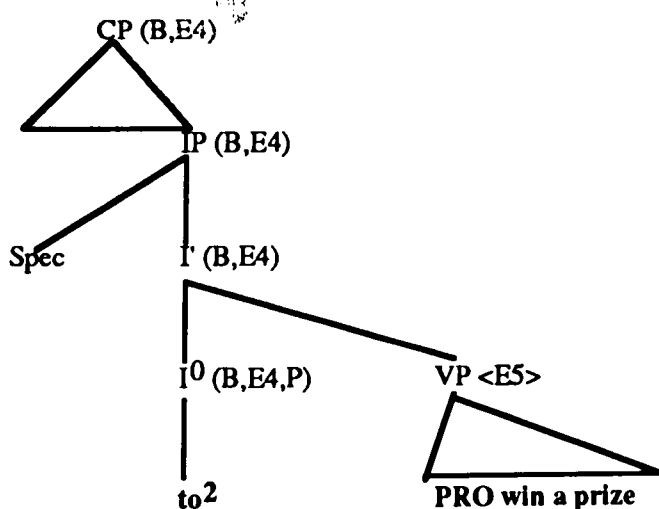


Win takes an NP complement (a closed expression) which it directly θ -marks, closing its second argument position. Its argument grid filters up to V'. It directly θ -marks an NP subject, closing its first argument position. The event position filters up to VP. This gives the translation in (16).

[16] $\text{win}(\text{PRO}, \text{a prize}, e^5)$

This VP appears as a complement of to^2 , giving the structure in (17).

[17]



Once again I will assume that to^2 triggers existential closure in its complement, giving the translation in (18).

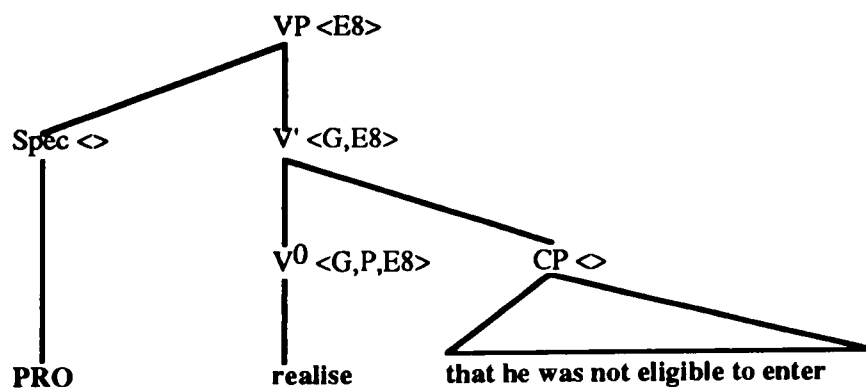
[18] $\wedge(\exists e^5) \text{ win}(\text{PRO}, \text{a prize}, e^5)$

Now, however, there is no WH-feature to trigger lambda abstraction; but of course a proposition is precisely what to^2 requires for its second argument. It therefore directly θ -marks VP through its third argument position (closing it) and the first two argument positions filter up to CP, awaiting discharge. The Rationale Clause will therefore have the translation in (19).

[19] $to^2(b, e^4, \wedge(\exists e^5) \text{ win}(\text{PRO}, \text{a prize}, e^5))$

Finally, we have the Telic Clause. The verb which heads this infinitive is *realise*, a transitive verb which will project the structure in (20).

[20]

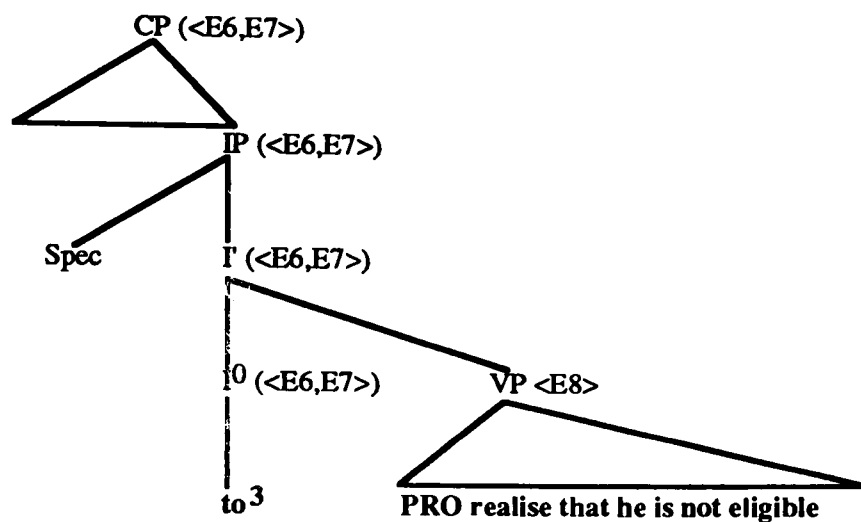


Realise takes a CP complement (a proposition, i.e. a closed expression) which it directly θ -marks, closing its second argument position. Its argument grid filters up to V'. It then directly θ -marks an NP subject, closing its first argument position. The event position filters up to VP. This gives the translation in (21).

[21] $\text{realise}(\text{PRO}, \wedge \text{he was not eligible to enter}, e^8)$

This VP appears as a complement of to^3 , giving the structure in (22).

[22]

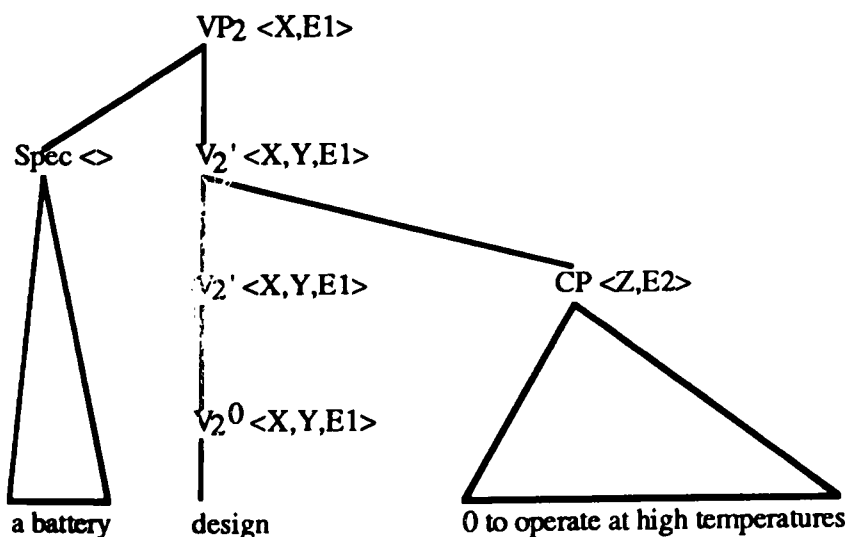


Unlike to^1 and to^2 , to^3 does not trigger existential closure in its complement VP (it is a pure relation between events). Rather its second argument position θ -identifies with the VP's event variable. Notice that this means that $e^8=e^7$. I will therefore now relabel the event variable of *realise* in (21) as e^7 . The whole argument grid of the head, I^0 , therefore filters up to CP. The translation for the Telic Clause is therefore as in (23).

[23] $to^3 \langle e^6, e^7 \rangle \& \text{realise} (\text{PRO}, \wedge \text{he was not eligible to enter}, e^7)$

We can now turn to the problem of integrating the infinitives into the argument structure of the main clause. The main verb in (1) is *design*, a transitive verb. The internal structure of the lower VP, headed by *design*, will be as in (24).

[24]



The direct object of *design* is base-generated in VP₂-Spec; there is nothing in "Complement" position, and therefore the argument grid of *design* filters up to V₂'. The Purpose Clause now adjoins to V₂'; it has an entity argument and an event argument to assign (as seen in (11)). The entity argument of the Purpose Clause θ -identifies with the second entity argument of *design*, i.e. $z=y$. The event argument of the Purpose Clause θ -identifies with the event argument of *design*, i.e. $e^2=e^1$. This will give the translation in (25) for the upper V₂'.

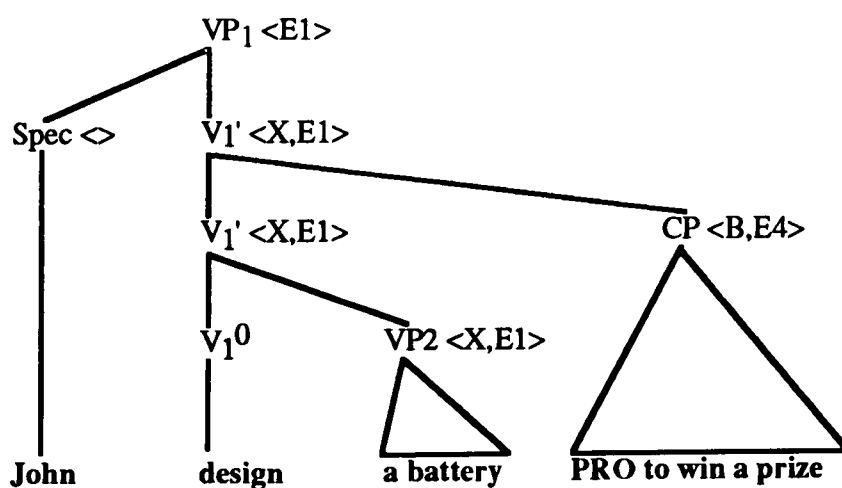
[25] $\text{design}(x, y, e^1) \ \& \ \text{to}^1(y, e^1, \wedge \lambda a (\exists e^3) \text{operate}(a, e^3))$

Now *design* directly θ -marks its direct object in VP₂-Spec, substituting the reference of *a battery* for all instances of the variable y . The translation for VP₂ will therefore be that given in (26).

[26] $\text{design}(x, \text{a battery}, e^1) \ \& \ \text{to}^1(\text{a battery}, e^1, \wedge \lambda a (\exists e^3) \text{operate}(a, e^3))$

VP₂ is the Complement of V₁⁰. The internal structure of VP₁ is that given in (27).

[27]



The argument grid of VP₂ filters up to V₁', to which the Rationale Clause adjoins, with two arguments to discharge (as shown in (17)). The entity argument of the Rationale Clause θ -identifies with the Agent argument of *design*, i.e. $b=x$; the event argument of

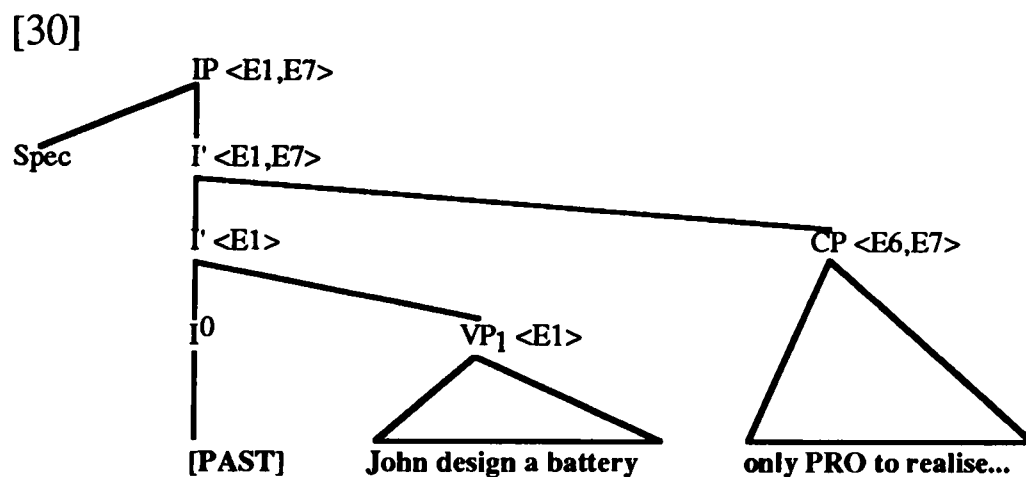
the Rationale Clause θ -identifies with the event argument of *design*, i.e. $e^4=e^1$. This will give the translation in (28) for the upper V_1' .

[28] $\text{design}(x, \text{a battery}, e^1) \ \& \ \text{to}^2(x, e^1, \wedge(\exists e^5) \text{win}(\text{PRO}, \text{a prize}, e^5))$

Design now directly θ -marks its subject in VP_1 -Spec, substituting *John* for all occurrences of the variable, x . This gives the translation in (29) for VP_1 .

[29] $\text{design}(\text{John}, \text{a battery}, e^1) \ \& \dots \ \& \ \text{to}^2(\text{John}, e^1, \wedge(\exists e^5) \text{win}(\text{PRO}, \text{a prize}, e^5))$

VP_1 is the Complement of I^0 . The internal structure of IP is given in (30).



The grid of VP_1 filters up to I' , to which the Telic Clause adjoins. The first event variable of the Telic Clause θ -identifies with the event variable of *design*, i.e. $e^6=e^1$. All free event variables then filter up to IP (i.e. the first event variable of to^3 which has been θ -identified with the event variable of the matrix verb as well as the second event variable of to^3 which has been θ -identified with the event variable of the infinitival verb: $e^6=e^1$; $e^8=e^7$). I will assume that at IP the remaining event variables receive default existential closure. This will give a translation for IP as in (31).

[31] $(\exists e^1) (\exists e^7) \text{design}(\text{John}, \text{a battery}, e^1) \ \& \dots \ \& \ \text{to}^3(\langle e^1, e^7 \rangle) \ \& \ \text{realise}(\text{PRO}, \wedge p, e^7)$

This will give a final full translation for the sentence in (1) as in (32).

[32] $(\exists e^1) (\exists e^7)$ design (John, a battery, e^1) & to¹ (a battery, e^1 , $\wedge \lambda a (\exists e^3)$ operate (a, e^3)) & to² (John, e^1 , $\wedge (\exists e^5)$ win (PRO, a prize, e^5)) & to³ ($\langle e^1, e^7 \rangle$) & realise (PRO, $\wedge p, e^7$)

CONCLUSION

In this thesis I have introduced an infinitival modifier which has not been recognised in the literature as an independent construction. I have argued on the basis of a range of different syntactic and semantic evidence that the Telic Clause is a distinct construction from the more familiar infinitival modifiers in the literature. Its interaction with VP-anaphora rules and scope indicate that it is adjoined at the sentence level where the Rationale and Purpose Clauses are associated with the VP. Its compatibility with perception verbs and its interpretation in those contexts suggests that it denotes an event, where the Rationale and Purpose Clauses denote propositions or propositional functions. I have attempted in this thesis to set out a general theory of infinitives of result which draws out the similarities and differences between them in a systematic fashion: in this respect my analysis approaches the task at a different angle from others in the literature, which have tended to focus on the "horizontal" relation between the Purpose Clause and other obligatorily gapped infinitives.

My principle focus of interest in these constructions has been the problems that they raise for a theory of modification: the infinitives of result clearly make distinctive contributions to the meaning of the sentences in which they occur and yet this is usually not expressed, particularly in theories of the Purpose Clause. These constructions provide good evidence for the view that the syntax and semantics of modification should be integrated into the general domain of argument projection. Each infinitive of result has a head which acts as a predicate, with an argument structure like any other predicate. The problem is then how that argument structure is integrated with the argument structure of the modified verb. Addressing this problem requires a flexible view of argument structure and its relation to the syntax, one which is not tied to the notion of thematic roles and privileged relation types.

I show that where a flexible view of argument structure is adopted, along with general principles of argument discharge, certain problems of interpretation are posed particularly sharply (for instance the problem of the attribution of intention by the

Rationale Clause) but unexpected types of solution to syntactic problems also become available: for instance the linking of gapping in the Purpose Clause to lambda abstraction in the semantics, or the striking compatibility of the Telic Clause with perception predicates relating directly to the fact that it denotes a relation between events rather than propositions. I take this rich interaction between the syntax and semantics to be one of the most interesting possibilities which is opened up when a flexible theory of argument structure is applied to constructions of the complexity of these infinitives of result.

From the syntax proper and the interface level of argument structure, the analysis has also pointed out to broader problems of interpretation, concerning relations between events and states, actors and intentions, and relations of causal efficacy of a general type. This I take to be part of the domain of inquiry which Bach (1982) calls *natural language metaphysics*. It seems that an adequate understanding of the "conceptual underpinnings" of language must go beyond the restricted notion of a thematic relation to a more general study of the properties of individuals and the relations between them.

The focus of interest in argument structure thus allows one to look both ways, at strict questions of form and more general questions of interpretation. The "vertical" approach to the study of infinitives of result encourages this, moving from the close integration of the Purpose Clause with the event structure of the verb to the more general interpretation of the Telic Clause. I therefore hope that, in offering a systematic account of this group of infinitives, this thesis will have contributed to an understanding of the complex relation between syntax and semantics in natural language.

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