THE ACQUISITION OF SYNTACTIC STRUCTURE

This book explains a well-known puzzle that helped catalyze the establishment of generative syntax: how children tease apart the different syntactic structures associated with sentences such as "John is easy/eager to please." The answer lies in animacy: taking the premise that subjects are animate, the book argues that children can exploit the occurrence of an inanimate subject as a cue to a non-canonical structure, in which that subject is displaced (The book is easy/*eager to read). The author uses evidence from a range of linguistic subfields, including syntactic theory, typology, language processing, conceptual development, language acquisition, and computational modeling, exposing readers to these different kinds of data in an accessible way. The theoretical claims of the book expand the well-known hypotheses of Syntactic and Semantic Bootstrapping, resulting in greater coverage of the core principles of language acquisition. This is a must-read for researchers in language acquisition, syntax, psycholinguistics, and computational linguistics.

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THE ACQUISITION OF SYNTACTIC STRUCTURE

ANIMACY AND THEMATIC ALIGNMENT

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1 *Introduction*

How do children take a string of speech sounds, chop it up into discrete units (words), and then assign to that chopped up string of sounds a particular meaning? In many sentences, perhaps most, words that are semantically related to one another are also near to each other in the sentence. For example, a verb and its arguments – the nouns or other phrases that the verb selects – are usually in close proximity to each other (at least, they are generally clausemates): in a simple main clause sentence like *The student read a book*, the verb *read* selects a subject and a direct object noun phrase (NP), and these NPs are positioned right next to the verb that selects them. This is so regardless of the particular language's basic word order or even the degree of rigidity of word order. Many theories of language acquisition exploit this fact to explain (part of) how children begin to tackle the challenge of integrating form and meaning in their language.

But arguments need not be proximal to their selecting predicate, and adjacent or proximal words need not stand in a semantic, selectional relation to one another. This is because human language allows for the semantic relations between words to span long distances – in principle, infinite distances. This book is about how children begin to figure out how to interpret sentences in which the proximity of words belies their semantic relations – how children determine the underlying syntactic structure of sentences in which semantic relations are long-distance, and how knowing the syntactic structure helps children interpret those semantic relations.

I argue that children recruit cues from the conceptual domain, particularly animacy, in solving this puzzle. One very important insight about language acquisition stems from the observation that subjects of basic, canonical sentences are often animate, or more animate than other nouns in the sentence, and that children can exploit this fact to home in on basic sentence structure (Pinker, 1984): find the most animate noun and it will be the subject. My question is how children go beyond these canonical sentences in which subjects are agents or experiencers, and objects are patients or themes, to figure out the

structures of more complex configurations. The answer I offer is that because children expect subjects to be animate in canonical structures, they can exploit deviations from this expectation, in particular encountering an *inanimate subject*, to learn that in just these kinds of sentences the underlying structure is non-canonical and complex. A predicate that allows its subject to be inanimate does not bear the same type of semantic relationship to its subject as a predicate that requires its subject to be animate; and the non-canonical semantic relation between subject and predicate translates into a non-canonical syntactic structure: one in which the subject is derived, or displaced.

The particular type of non-canonical structure I will focus on involves what I'll call "displacing predicates." These are predicates that fail to select an external argument (a semantic subject) – that is, there is no "do-er" or experiencer of the predicate's action or state. An example of such a predicate is the verb *seem*. When we say *John seems to like French fries* it doesn't make sense to say that John is a "seemer" of anything. Instead, the subject is semantically related only to the lower predicate, and thus we can say it is "displaced" (or derived) in the sentence with respect to the locus of its semantic role. The question I seek to answer is how children figure this out – how they identify just the sentences of their language in which the subject is in fact displaced, which in turn allows them to categorize particular predicates as being "displacing" predicates.

One might think that this is such a small corner of the grammar – displacing predicates are such a tiny piece of what needs to be learned about language, and they have a rather peripheral feel to them. Surely what matters most in advancing the study of language and its acquisition is to explain how children acquire the canonical parts of grammar, the most well-behaved and earliest learned predicates, so that the exceptional ones can then be accounted for, precisely, as exceptions. How is the study of these unusual predicates relevant in the larger scheme of things? There are two related answers to this question. One is that these very predicates and their non-canonical structures represent one of the core properties of human language itself: the ability to have non-local dependencies. That words can bear structural relations to other words over an (in principle) infinite distance is one of the hallmarks of human language. In this sense, displacing predicates are profoundly non-peripheral.

The second and related answer is that these predicates have formed part of the argument for generative grammar from the very beginning. Not only does the learning puzzle addressed in this book involve determining that a given sentence has a displaced subject, but also the learner must distinguish those sentences with displaced subjects from superficially identical sentences whose subject is *not* displaced, but rather is the semantic subject of the main

predicate (e.g. in *John claims to like French fries* John is the "claimer"). This aspect of the question is old and deep, and it forms one of the pillars on which generative grammar was built. What Chomsky (1957) called "constructional homonymity" (*John seems/claims to like French fries*) was exposed as a fatal flaw in a theory of grammar that did not combine both phrase structure rules and transformational rules. Even though these subclasses of verbs can be distinguished by their distribution in other types of sentences (*It seems/*claims that John likes tomatoes*; *What John claims/*seems is to be the strongest*), the fact of their distributional overlap in even one sentence type requires that learners have a means of teasing them apart. It was suggested in Chomsky (1964, 1965) that the challenge presented by constructional homonyms in terms of language acquisition pointed to the need for an account of language learning within the rationalist tradition of epistemology (Chomsky, 1965, p. 25). That is, they bore directly on arguments for innate knowledge of language.

During this era, Carol Chomsky (1969) took up the puzzle these constructional homonyms posed in an empirical study of children's language. She posed the question of how children handle situations in which

> [t]he true grammatical relations which hold among the words in a sentence are not expressed directly in its surface structure. (Chomsky, 1969, p. 6)

That is, how do children parse a particular word string that is potentially associable with multiple underlying structures? Chomsky focused on sentences of the form in (1).

(1) The doll is daxy to see.

Without knowing what the adjective *daxy* means, the sentence could have (at least) either of the following interpretations, the first corresponding to the so-called *tough*-construction (2a) and the second to the control adjective construction (2b), as disambiguated by the familiar English adjectives.

(2) a. The doll is easy to see.
(= it is easy for someone else to see the doll)

b. The doll is eager to see.
(= the doll is eager to see someone else)

The difference between (2a) and (2b) is clearly semantic, but it is also syntactic. Syntax is about not just the ordering of words, but also the logical relations among them: the fact that the relation between *the doll* and *easy* is profoundly different from that between *the doll* and *eager* is linked to a

difference in how the structures of these two sentences are represented. The nature of these structural differences will be explained in detail in Chapter 2. For the moment what is significant is that the semantic role of the subject NP is utterly different in sentences (2a) and (2b), and therefore its syntactic relationship to the main predicate is different. While the main clause subject in (2a) is understood as the semantic object (patient) of the embedded clause, in (2b) the main clause subject is interpreted as the semantic subject (agent/experiencer) of the embedded verb. Assuming that the semantic difference between (2a) and (2b) corresponds to an underlying syntactic difference between them, in the terms being used here the subject in (2a) is displaced, but the subject in (2b) is not. The parallel to the earlier *seem* example is that neither *easy* nor *seem* takes an agentive (or experiencer) subject. For both of these predicates, the subject's semantic ties are to another predicate altogether; in this sense, both *seem* and *easy* are displacing predicates.

(3) The girl is daxy to see.
   a. The girl$_i$ is easy [PRO$_{arb}$ to see t_i.] (*tough*-adjective)
   b. The girl$_i$ is eager [PRO$_i$ to see.] (control adjective)

(4) Mary gorped to be strong.
   a. Mary$_i$ seemed [t_i to be strong.] (raising verb)
   b. Mary$_i$ claimed [PRO$_i$ to be strong.] (control verb)

The semantic difference between the (a) and (b) pairs in (4) is a little subtler than that in (3). In both (4a) and (4b) *Mary* is the semantic subject of the lower predicate *to be strong*. The difference has to do with its semantic relation to the main predicate, *seem* vs. *claim*: as noted above, there really is no semantic relationship between *Mary* and *seem*, but there is between *Mary* and *claim* (she is the "claimer"). Again, this semantic asymmetry corresponds to a syntactic one: the subject is displaced in (4a) but not (4b).

So the problem for language learners is to figure out that the subject of *seem* or *easy* is not the semantic subject of these predicates, but rather bears a long-distance semantic relationship to another part of the sentence, even though a construal of the strings in (3) and (4) involving a local semantic relationship is possible given the constructional homonyms with *claim* and *eager*.[1]

[1] The same surface ambiguity arises in raising-to-object (also called Exceptional Case Marking) and object control, as in *Sue wanted/asked Gordon [to cut the grass]*. Since the main focus here is on constructions with derived *subjects* I will not have a lot to say about these constructions, but they will be discussed briefly in Sections 2.1.3 and 5.3.1.

This was precisely the question that Carol Chomsky posed. But it was not the question she answered in her empirical work. Rather, her experiments addressed the question of *what* children know about predicates like *easy* and *when* they know it. In fact, nearly all of the literature on children's acquisition of *tough*-adjectives and raising verbs has focused on this aspect of the problem, and so in the decades since Chomsky's seminal work, the deeper question of *how* children disentangle the respective constructions has not been tackled directly.

The purpose of this book is to tackle that *how* question. The answer I propose is that hearing an inanimate subject in a sentence like (3) or (4) provides a cue that the subject is displaced, and therefore that the main predicate of the sentence is a displacing predicate. This cue is informative in these cases because an *inanimate* subject is possible with the structure that involves displacement, but not with the other structure:

(5) a. The rock is easy to lift.
b. # The rock is eager to lift/fall.

(6) a. The rock seems to be heavy.
b. # The rock claims to be heavy.

Lest readers be concerned that I have missed a more obvious answer to this puzzle, namely displacing predicates' ability to occur with expletive subjects (*it*, *there*), I should state that I do think predicates' occurrence with expletives is a valuable cue in this learning process, and I have reasons for focusing on inanimate referential subjects instead. These reasons are laid out in detail in Section 2.5 below.

The main focus in this book will be on the two constructions in (3/5) and (4/6), those involving *tough*-adjectives and raising-to-subject verbs. However, there are other constructions that involve subject displacement, such as the passive, and there are other (non-passive) predicates that can be classified as displacing predicates, such as unaccusative verbs. Unaccusative verbs are a type of intransitive verb which, unlike unergative intransitives, select only an internal argument and no external argument. Thus, the subject of an unaccusative verb has been displaced from an underlying object position. But given a surface string containing only a subject and a verb, it is not immediately obvious whether the underlying structure involves an external argument (as in (7b)) or an internal one (as in (7a)).

(7) John pilked.
   a. John$_i$ arrived t_i. (unaccusative)
   b. John danced. (unergative)

The asymmetry in (7a–b) is even more subtle than in (4a–b), and fairly unintuitive for English speakers. We will see in Section 2.3 that many languages exhibit more obvious distinctions between unaccusative and unergative verbs, and the distinction between these types of verbs is well supported cross-linguistically. The spirit of the distinction is that in (7a) John is the theme of the verb (in a sense, John "undergoes" the arriving event; he does not have an agentive role), while in (7b) John is the agent of *dance*: he "enacts" the dancing event. Thus, while *arrive* and *dance* are both intransitive verbs, the underlying relationship between the verb and its lone argument is different in each case. Once again, these distinctions map onto structural differences that the language learner must be able to identify in order to be said to have adult-like competence in her language. And similar to the first two constructions, the string in (7) can be associated with the displacing structure in (7a) if the subject of the sentence is inanimate.

(8) a. The package arrived.
   b. # The package danced.

My proposal is primarily about how children solve the mapping and categorization problems: I take the view that predicates, with some important exceptions, are fundamentally either displacing or non-displacing. So encountering an inanimate subject tells the child that the sentence involves a structure with a displaced subject, which in turn tells the child that the main predicate is a displacing predicate. Although I do not try to explain how children figure out exactly what these abstract predicates mean, I suspect that the categorization of a predicate as displacing (or non-displacing) in turn provides a clue to the set of possible meanings the predicate might have. That is, displacing predicates will be largely limited to auxiliary-like meanings – meanings having to do with modality, happenstance, appearance, ease/difficulty, possibility, and likelihood (and non-volitional events, in the case of unaccusative verbs). Non-displacing predicates, on the other hand, will have a volitional, intentional, or emotive aspect to their meaning.

As we have seen, sentence strings like (3), (4), and (7) are associable with multiple syntactic structures if the subject is animate and the predicate's meaning is not known. I will refer to these sentence strings as "opaque"

sentences rather than use the term "ambiguous." The reason is that the structural indeterminacy of these sentences is different from the more typical type of structural ambiguity presented by, for example, Prepositional Phrase (PP) attachment.

(9) a. Put the frog on the napkin in the box.
b. I saw the man with binoculars.

The string in (9a) is locally ambiguous at the first PP [on the napkin] because this phrase could indicate either a description of where the frog is, or it could indicate the location where the frog should be put (and the string is disambiguated by the second PP). The processing of this type of construction has been explored extensively in both children and adults (Trueswell *et al.*, 1999, i.a.). But the decision about where to attach the first PP does not have an effect on the lexical meaning of the main predicate *put* – *put* means the same thing, whether the PP is attached to the NP or the VP. Similarly in the globally ambiguous example in (9b), the meaning of *see* does not depend on which structure one applies to this string. If a learner encountered an unknown verb in this string (*I gorped the man with binoculars*) the meaning of *gorp* would not necessarily depend on whether the PP was attached to the NP or the VP node. (And, correspondingly, knowing the meaning of *gorp* would not help resolve the attachment puzzle, and so the sentence is truly ambiguous.) In the kinds of constructions under consideration here, on the other hand, the meaning of the main predicate is fundamentally different according to whether the subject is displaced or not. Not only are the verbs *seem* and *claim* different verbs (and this extends to the other pairs of predicates we've seen: *easy/eager*, *arrive/dance*), but if we encounter a novel predicate in a string like (4) the meaning of this predicate *will* depend on how the string is parsed.

On the surface, this might appear to make the learning problem easier. If you know the meaning of the predicate (*seem*, *claim*, etc.) you can choose the right structure: if you know that the main verb means 'seem' then you know the subject is displaced, and if you know the main verb means 'claim' then you know the subject is not displaced. Thus, the sentence *Mary seems to be strong* is not ambiguous – once you know the lexical properties of *seem* the underlying structure of the sentence follows. However, this does not solve the learning problem for children, for two reasons. First, most of the verbs and adjectives that participate in these structures have abstract lexical meanings that are not straightforwardly discernable directly from observation of the non-linguistic world (*eager* and *easy* are both different from *red* in this respect; and *seem* and *claim* are different from *eat* similarly). Secondly, a wealth of empirical studies,

forming the literature surrounding the Syntactic Bootstrapping hypothesis, tell us that children learn the meanings of predicates, in particular abstract ones, in large part *via* the sentence structure they occur in rather than the other way around (Gleitman, 1990, and considerable work following this).

Thus, learners need to rely on the underlying structure of sentences like (4) in order to figure out whether the main verb means something like 'seem' or something like 'claim,' but how do they first figure out the underlying structure? It is in this sense that the sentence strings in (3), (4), and (7) are syntactically opaque. I define syntactic opacity as follows.

(10) A string is *syntactically opaque* if the underlying syntactic structure that generates the string cannot be determined unequivocally on the basis of the string and knowing only the grammatical categories of the words, without at least some lexical semantic knowledge of the main predicate.

Strictly speaking, all strings are opaque in this sense, until the lexical semantics of the main predicate is known. Even a string like that in (11) could be associated with various structures including, but not limited to, those in (11a–c).

(11) NP V NP

a. [NP_{subj} [VP [V_{trans} NP_{obj}]]]

b. [NP_{subj} [VP [$V_{intrans}$] NP_{loc}]]

c. [NP_{subj} [VP [$V_{ditrans}$ NP_{obj}] $\emptyset_{ind.obj}$]]

However, much previous work on children's learning of verb argument structure has revealed that children are prone to making assumptions about these strings: a verb with one NP is assumed to be intransitive, a verb with two NPs transitive, and a verb with three NPs ditransitive (see Gleitman *et al.* 2005 for a good overview of this literature; though see Tomasello and Brooks (1998); Tomasello (2000) for a different view). This is precisely because, as noted at the beginning of this introduction, proximal words are typically semantically related – and related in particular ways.

But the constructions under consideration here are special, and especially opaque, because the adjacent NPs are not semantically related to the predicate in the usual way. And so the assumptions learners might make about the underlying structures of sentences like (11) will not apply straightforwardly to constructions with displacing predicates.

In addition to *tough*-constructions, raising verbs, and unaccusatives I will discuss the passive, which, unlike some of the other constructions

considered here, has been studied fairly extensively in the acquisition literature (Slobin, 1966; Maratsos *et al.*, 1979; Borer and Wexler, 1987; Crain *et al.*, 1987; Lempert, 1989; Fox and Grodzinsky, 1998, i.a.). I include the passive for two reasons. One is that passives involve a displaced subject: the syntactic subject is understood as the semantic object, or patient of the verb's action. The second is that in English certain passives are ambiguous between a verbal and an adjectival reading, a fact which Borer and Wexler exploited in their account of children's interpretation of the passive. Thus, a short passive, as in (12b), is structurally ambiguous.

(12) a. John was kicked by Sam. (verbal passive)

b. The door was closed. (verbal or adjectival)

Nevertheless, important differences between the passive construction and the others considered here will explain why the solution I propose for raising verbs, *tough*-constructions, and unaccusatives actually does not extend to the passive. Most pointedly, like in the example of PP-attachment above, the meaning of the main predicate does not change radically depending on whether the sentence has a passive or an active voice. *Kick* and *be kicked by* both denote a kicking event. Thus, discovering the structure of a passive sentence requires understanding that the subject is displaced, but it does not involve the task of categorizing the main predicate as an inherently displacing predicate – that is, the passive verb should not be assumed to have an auxiliary-like semantics. While the passive will be discussed in Chapters 2 and 5 this construction will not occupy a focal point in the overall discussion.

All of the constructions outlined above that involve a displaced subject, with the exception of unaccusative verbs, have been argued to be difficult for children to acquire (though see Babyonyshev *et al.* (2001) for claims that young children represent unaccusatives as unergatives). Chomsky (1969) and Cromer (1970), among others, argued this for *tough*-constructions, Hirsch and Wexler (2007) have argued the same for raising-to-subject verbs, and Borer and Wexler (1987), among many others, argued this for passives. To the extent that children *can* correctly interpret such structures, for example non-reversible passives, they are said to do so by relying on "real world knowledge" rather than syntax. For example, Slobin (1966) showed that children responded more quickly to non-reversible passives (*The flower is being watered by the girl*) than reversible passives (*The cat is being chased by the dog*), presumably because either dogs or cats can chase or be chased, but flowers do not water girls. What I argue in this book is that children *do* use "real world knowledge," not as a

means of avoiding complex syntax, but rather as a means of *discovering* the complex syntax itself. The evidence comes from experiments of novel word learning, in which children use subject animacy to draw inferences about the argument structure properties of novel predicates.

In this book I revisit Carol Chomsky's original question through the lens of the advances that have been made in the fields of linguistic theory, psychology, language development, and computational modeling, with the goal of integrating cross-linguistic constraints and preferences on argument structure mapping into a theory of how structures involving displaced subjects are acquired. Chapter 2 provides an overview of some formal accounts of the opaque constructions under consideration here, including a description of how these constructions are analyzed under Minimalist approaches. The vocabulary of the Minimalist Program gives us a unified way of talking about raising, unaccusative, and passive constructions: these are predicates whose vP is considered "defective," allowing an NP argument to move out of their "weak" phase into the main clause. (The spirit of this unification is no different from previous incarnations of the theory, but the language of it is different.) One mechanism that has been proposed within Minimalism to account for passives and subject raising, namely "smuggling," has also been invoked in an account of *tough*-constructions (Hicks, 2009). My thesis is not contingent on any particular syntactic framework or formalism, but *some* kind of formalism is required in order to see why the acquisition question I'm addressing is a matter of acquiring syntax.

Chapter 3 then looks at how animacy is realized in grammar along a number of dimensions: how animacy is grammaticalized in various languages, how it relates to thematic roles, and how, in turn, thematic roles relate to argument structure. The emphasis in this chapter is on typological patterns; that is, how animacy surfaces in the world's languages, and how displacing predicates work in different languages as well. Across genetically diverse languages we can observe two rather clear and consistent patterns. One is that languages tend to organize animacy distinctions between more animate and less animate entities according to a hierarchy, according to which humans are the "most animate," followed by non-human animals, followed by inanimates. Though there is diversity in the number of distinctions made in the hierarchy, and where dividing lines are drawn, the hierarchy itself is robust: we do not find languages, for example, which treat humans and inanimates alike to the exclusion of animals.

The second consistent pattern is that languages prefer non-displaced (i.e. canonical) subjects to be animate but rather liberally allow displaced

subjects to be inanimate. Relatedly, where we find displacing predicates in other languages (such as several Polynesian languages), these predicates, but not their non-displacing counterparts, permit inanimate subjects. Some of the work reviewed here is old and widely familiar, such as Comrie's (1989) work on the Animacy Hierarchy and Keenan's (1976) work on the universal properties of subjects. What is novel is the use of this work in defining a learning strategy for children's acquisition of displacing predicates.

The typology of human languages is important to bear in mind especially in studies of language acquisition because children have to be able to acquire any human language they happen to grow up hearing, and so their learning strategies must be suited to the broad scope of these grammatical patterns. Furthermore, both linguistic typology and child language have the potential to inform us about deep universals of human language: typology because broadly robust patterns are likely to be components of Universal Grammar (UG), and child language because if all children share the same sorts of stages of development, strategies for learning, and types of errors, then these are also likely to be deeply human traits. Animacy is something that is both universally marked in adult languages and salient in children's developing cognition and grammar, and as such, it appears to be a most fundamental component of human language.

We then turn, in Chapter 4, to psycholinguistic studies of how animacy affects language processing in adults. Studies of adult language processing can be highly informative for understanding children's language development. One reason is that such studies allow us to identify the target state that children are progressing toward in their development, and so we can measure children's degree of deviance (if any) from the target state. Another is that what leads to processing difficulty in adults is likely to also lead to processing difficulty in children. If children then exhibit problems producing or comprehending the very types of constructions adults are known to have trouble with (for example, object relative clauses with animate relativized NPs), then children's problems could be due to the difficulty of processing those constructions rather than grammatical deficits due to immaturity. Conversely, if some manipulation leads to *better* processing outcomes for adults (for example, an *inanimate* patient subject, as opposed to an animate patient subject), then to the extent that children experience facilitation in the same manipulation, their better outcome could be due to the same kind of facilitation that adults experienced, and not because they used an alternative, non-syntactic mechanism for parsing the construction. Finally, we can expose adult speakers to novel predicates in different kinds of linguistic contexts and measure how adults categorize and

interpret these novel predicates. This approach provides a means of simulating the learning process in adult participants. One of the studies reviewed in this chapter points to a strong effect of inanimate subjects leading to adults' categorization of novel verbs as raising verbs.

Chapter 5 turns to children's language. The first part of the chapter looks at children's cognitive development of the concept of animacy. Here I cover a broad swath of the psychology literature with the aim of establishing that by the time children are acquiring sentence structure, and certainly before they acquire complex biclausal constructions like raising-to-subject or *tough*-constructions, children have a well-defined concept of animacy. The purpose of this long exegesis on a distinctly non-linguistic aspect of child development is twofold: one is to support the view that the animacy distinction in general can be recruited in the acquisition of basic sentence structure, as argued by the Semantic Bootstrapping hypothesis (Pinker, 1984); the second is to make the case for children being non-animistic. In spite of a vast amount of research showing children's rather sophisticated and adult-like conception of animate entities having intentions and goal-directed actions but inanimate entities having none of these properties, the view persists that preschoolers "think everything is alive." It is important to dispel this myth so that we can correctly interpret children's responses in some of the linguistic tasks that manipulate animacy.

In the second part of Chapter 5, I review the important insights of both the Semantic and Syntactic Bootstrapping hypotheses about language learning, showing how both of them go a long way toward explaining how children acquire argument structure. But I also show that neither of them straightforwardly applies to constructions involving displacing predicates. Thus, another innovation of this work is that I extend both of these approaches so as to increase their empirical coverage and explanatory power by suggesting a way to use inanimate subjects to acquire these non-canonical predicates and the opaque structures they occur in.

The third part of the chapter reviews experimental work on children's acquisition of displacing predicates, and evidence pointing to the important role of inanimate subjects in this categorization process. It is interesting that, with the exception of the passive, these constructions have only rarely been studied with respect to language acquisition. Thus, part of this book's contribution is an expansion of the acquisition literature to include them.

Chapter 6 extends the study of children's acquisition of displacing predicates into the realm of computational modeling. Recent advances in computational modeling techniques have led to new ways of theorizing about what

information is useful to learners and how they use this information. I will illustrate some ways of using computational models such as Bayesian learners that can exploit statistical patterns of predicates' occurrence with animate vs. inanimate subjects in child-directed speech in order to learn which predicates are displacing and which are not. As we will see, our models require prior hypotheses about a predicate's degree of "selectivity" about its subject, and about subject animacy, in order to perform the categorization task.

The final chapter, Chapter 7, concludes by addressing questions about innateness: which of the ingredients in my account (knowledge of animacy; preference for subjects to be animate; knowledge of displacing predicates) can be said to constitute innate knowledge on the part of the learner? What does it mean to say that any of these things are innate? In addition, I lay out what I see as the primary open questions left unresolved by the work presented here.

The components of this book span a number of distinct subdomains and theoretical debates within linguistics: formal syntactic analyses of sentence structures involving argument displacement, typological studies of the role of animacy in language, psycholinguistic and developmental studies, and computational modeling. Each of them has alone generated considerable literature and debate. For instance, much ink has been spilled over the syntactic analysis of *tough*-constructions and the correct definition of Agent. And though the field of Bayesian learning models in studies of language acquisition is relatively new, it has been quick to generate a great deal of active research. Necessarily, many details of these analyses and observations will receive only cursory mention or may not be mentioned at all. This book is intended for a generally linguistically-informed audience, and in the interest of accessibility I have attempted to convey the relevant issues without too much technical detail. Experts in each subfield may therefore take issue with my presentation or choice of omissions. Nevertheless, in order to touch on each of the necessary ingredients (formal theory, typology, psycholinguistics, and modeling), some brevity is required.

The purpose of this book is to bring together all of these different domains to show how sentences which violate children's expectations about canonical sentences can help children attain the correct syntactic parse for non-canonical, opaque sentences – that is, sentences in which the subject is displaced. Although a variety of cues are available for language learners to disambiguate these troublesome strings, and learners undoubtedly do make use of multiple cues in the input, one cue that learners should, and do, pay particular attention to is that these predicates uniformly and easily occur with inanimate subjects.

2 *The syntax of displacing and non-displacing predicates*

This chapter presents formal analyses of the constructions of interest in this book: raising-to-subject, *tough*-movement, and unaccusative constructions. In each of these constructions the main clause subject is displaced with respect to its thematic position, and the main predicate is therefore a displacing predicate. Each of these displacing constructions will be contrasted with a surface-similar construction that does not involve displacement, as discussed in Chapter 1. And in each case, the cue of subject animacy can distinguish the two constructions: only the displacing predicates permit inanimate subjects in an unrestricted fashion. We'll also discuss the passive, which works like these other displacing constructions in certain respects, but behaves differently in other respects.

For each displacing construction I will give a descriptive overview of the construction and some empirical diagnostics for it. I will then present what I take to be standard contemporary accounts of the construction's underlying structure and derivation, with some references to older accounts or different frameworks as relevance dictates. All of the constructions under consideration here have provoked lively debates over the past several decades, resulting in numerous analyses in the syntax literature. It is beyond the scope of this book to give a complete history of the analyses of each construction. Rather, my goal here is to highlight some of the classic and contemporary treatments of these structures. The accounts I present will lean heavily towards movement-based frameworks, though in fact the main thesis of this book does not hinge on a movement-based treatment of these constructions. In movement- and non-movement-based frameworks alike, displacing predicates lack a semantic relationship to their subject, unlike non-displacing predicates. I use this framework merely as a convenience, since movement-based accounts are the ones I am most familiar with. By the end of this chapter it should be clear in what sense subjects of displacing predicates are syntactically displaced, why each of the constructions discussed here presents a learning puzzle, and how inanimate subjects can offer learners a cue to discover the structure of an opaque string.

In some cases it will be useful to look back at some of the early accounts of these structures, for example from the Standard and Extended Standard Theory, because many of the analyses of that era were stated in terms of intuitive relations between surface word orders and "deep" semantic relations. These deep semantic relations will be useful for understanding how children might parse and acquire these structures. While the intuitions behind these early analyses sometimes remain, quietly, in modern analyses (such as the "smuggling" approach to passive, raising, and *tough*-movement, Collins (2005b,a); Hicks (2009)), their more explicit forebears can sometimes provide a clearer picture of the target surface parse of these opaque constructions.

What all of these constructions have in common is that the mapping between thematic role and surface position is non-canonical in some sense. In the language of Theta Theory, no external θ-role is assigned by the predicate. For some of these constructions (*tough*-constructions and raising) there is no thematic relationship at all between the main predicate and its adjacent subject NP, because the subject has raised from a lower clause. That is, these structures are biclausal, and the main (displacing) predicate and main clause subject belong, thematically speaking, to different clauses. For others (unaccusatives, passives) there is a thematic relation between the verb and subject (these constructions are monoclausal) but it is not the "typical" one: the subject is not an external argument (agent or experiencer) of the verb, but an internal argument. Moreover, each of these constructions (excepting the passive; but see discussion of the "adjectival passive" in Section 2.4.2) has a syntactic foil, what Chomsky called "constructional homonyms": a construction that appears identical on the surface but *does* have the canonical sort of thematic relation between the subject and predicate. The presence of these foils in the grammar makes the strings opaque and turns the learning of these non-canonical structures into a true puzzle: not only does the child have to determine that the relations between the words in these displacing constructions are not what they appear to be on the surface, but she must also discriminate the non-canonical structures from the nearly identical canonical ones.

We will first look at the biclausal constructions, namely, raising-to-subject and *tough*-movement. It is in these constructions that I think my argument for inanimate subjects signaling a derived subject is the most straightforward. Clausal complements are often selected by verbs whose lexical meaning attributes to the subject some mental attitude about the clausal complement (e.g. it expresses desire, effort, emotional preference or dispreference, or denotes a communicative act) and thus require a sentient subject. Sentient subjects are animate. Therefore, the lack of this crucial property – a non-sentient

or inanimate subject – should be unexpected, and thus provides a clue that the sentence is somehow different than one would normally expect. The mono-clausal constructions, unaccusatives and passives, do not work quite as neatly. Although the broad generalization holds (unaccusatives and passives easily allow inanimate subjects while unergatives and actives do not allow them as easily), there are several counterexamples among the intransitive verbs, and we will see that passives behave altogether differently from the other displacing predicates.[1]

2.1 Raising-to-subject and subject control: *seem* vs. *claim*

Raising-to-subject (or subject raising) is the name given to constructions in which the main verb selects a clausal complement (usually infinitive, but in some cases it can be finite) and no external argument; the main clause verb bears no thematic (semantic) relation to its adjacent subject, and the main clause subject is thematically related instead only to the predicate of the complement clause. A standard example from English is given in (1).

(1) John$_i$ seems [t_i to be a nice guy.]

In this sentence, *John* is semantically related only to the predicate *be a nice guy*; he is not an agent or experiencer (or theme) of "seeming." Evidence for the lack of a thematic relationship between *seem* and *John* comes from the fact that *seem* can host an expletive (semantically empty) subject, such as weather-*it* or existential *there*, and idioms can be split around raising verbs. (Idioms are thought to be treated in the syntax as if they were a single lexical item or "chunk," which is to say they are generated as one unit. The fact that they can be split around raising verbs is explained if their component parts do not each receive separate thematic assignments from other predicates in the sentence.)

(2) a. It seems to be snowing outside.
b. There seems to be a problem with your analysis.
c. The cat seems to be out of the bag. (= the secret is out)

[1] Please note that I will restrict attention to constructions involving main predicates. I will not deal with copular constructions, which quite easily permit inanimate subjects; e.g. *This is a book* or *The book is heavy*. The reason for abstracting away from these types of constructions is that I am interested in how children learn the selectional properties of main predicates, and copular constructions lack main predicates.

In these respects, raising verbs like *seem* contrast with control verbs, like *claim*. In (3), *John* is a thematic argument of *claim*, and it is also semantically related to the predicate in the complement clause.

(3) John$_i$ claims [PRO$_i$ to be a nice guy.]

Unlike raising verbs, control verbs cannot take expletive subjects or split idiom chunks, underscoring the fact that these verbs select a thematic subject.

(4) a. * It claims to be snowing outside.
b. * There claims to be a problem with your analysis.
c. ? The cat claims to be out of the bag. ($\neq$ the secret is out)

The reason the sentences in (4) are ill-formed is that the verb *claim* assigns a thematic role to its subject – it requires a "claimer" as its external argument. Expletive subjects cannot bear this (or any) thematic role, and if idiom chunks are generated as a single unit, they cannot have particular thematic roles assigned to subparts of the idiom. That is, in (4c) *claim* would assign an agent role to the subject *the cat*, separate from the lower predicate *be out of the bag*, and this is incompatible with the unitary nature of idioms.

Additional differences between raising and control structures were noted in the early literature (Rosenbaum, 1967; Postal, 1974). For example, when the complement clause of the raising or control verb is passivized the semantic relationship between the active and passive versions is different for control than for raising.

(5) a. John seemed to have cooked potatoes.
b. The potatoes seemed to have been cooked by John.

(6) a. John tried to invite Mary.
b. Mary tried to be invited by John.

(7) a. John tried to build a boat.
b. # The boat tried to be built by John.

Sentences (5a) and (5b) are truth-functionally equivalent; (6a) and (6b) are not. Moreover, as Davies and Dubinsky (2004) point out, when the embedded object under a control verb is inanimate, the passivized form is semantically ill-formed, as in (7b) (note: no restriction on animacy for raising, cf. (5b)).

Relatedly, a further diagnostic for distinguishing these constructions is the ability of the verb to occur with an inanimate subject. Control verbs select an

agent or experiencer, which (nearly always) must be animate.[2] Raising verbs place no selectional restrictions on their subject.

(8) a. John/The machine seemed to be helpful.
b. John/# The machine tried to be helpful.

In the case of raising verbs, the subject of the sentence is subject to the selectional restrictions of the lower predicate only (*The machine/#The rock seemed to be helpful*), while in the case of control verbs, the subject of the sentence is subject to the selectional restrictions of *both* the control verb and the lower clause predicate.

One final diagnostic I'll mention for distinguishing raising from control verbs involves an asymmetry of scopal effects. While raising predicates exhibit scope ambiguity, such that the matrix subject can take either wide scope or narrow scope with respect to the raising predicate, control predicates do not admit the narrow scope reading (May, 1977, 1985). (The following examples are based on Wurmbrand (2001, p. 192).)

(9) Someone from New York is likely to win the lottery.
a. = There is some person from New York who is likely to win the lottery. (wide scope)
b. = It is likely that the person who wins the lottery (whoever that is) will be from New York. (narrow scope)

(10) Someone from New York claimed to win the lottery.
a. = There is someone from New York who claimed to win the lottery. (wide scope)
b. $\neq$ It is claimed that the person who won the lottery (whoever that is) is from New York. (narrow scope)

The ability of raising predicates to support both scopal interpretations, and the corresponding failure of control predicates to support narrow scope interpretations, has been argued to provide evidence that the subject of a raising verb does not originate in its surface position, but rather raises to that position in the syntax. It can then reconstruct (through Quantifier Lowering) to its base position at the level of Logical Form (LF). Although this explanation is based upon the assumption of movement in syntax, such an assumption is neither necessary nor particularly relevant to the crucial property of

[2] A very small number of control verbs permit inanimate subjects. The only such verbs I am aware of are *serve* and *help*; see Rudanko (1989). We will return to the issue of inanimate subject arguments below in Section 2.3.1 and in more depth in Section 3.1.2.

interest here. The failure of raising predicates to select a thematic subject transcends theoretical frameworks (see Asudeh (2005) and Carpenter (1997) for treatments of these scopal effects without movement). For example, in Lexical-Functional Grammar raising verbs like *seem* are said to project an "athematic" subject argument, and the non-expletive subject of such a verb is instead the thematic argument of a different predicate in the structure. What is important for our purposes is that raising verbs, as a group, share the property of failing to select a thematic subject and thus placing no semantic restrictions on the kind of NP that appears there.

Verbs that function like *seem* include *appear*, *happen*, *tend*, *turn out*, *going (to)* (future), *used (to)* (past), the predicate adjectives *be likely* and *be certain*, and the preposition *be about (to)*. These predicates do not behave alike in all respects. For example, *seem* and *appear* can take a *that* complement (11a) and can occur in copy raising constructions (11b) while *tend*, for example, can do neither (12a–12b). The raising adjective *be likely* can take a clause in subject position while *seem* cannot (for discussion of *seem* vs. *be likely* see, for example, Olsen (1981)).

(11) a. It seems that/like Betty stole the cheese.
b. Betty seems like she stole the cheese.

(12) a. * It tends that/like Betty steals cheese.
b. * Betty tends like she stole the cheese.

(13) a. That Betty will steal cheese again is likely.
b. * That Betty stole cheese again seems.

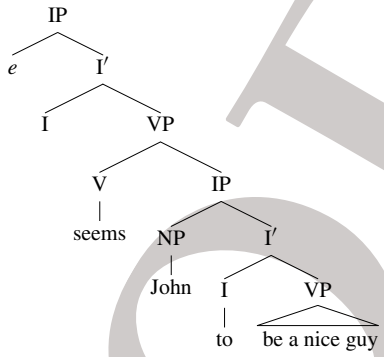
Nevertheless, these predicates all arguably fail to bear a thematic relationship to their subject, hence the patterns in (2). Verbs that function like *claim* include *want*, *try*, *decide*, *love*, and *hate*, and many others. These verbs also display a certain degree of variability (see Section 3.3.1.1), but none of them can take an expletive subject or split an idiom; that is, they behave like *claim* in the constructions in (4).

2.1.1 The structure of raising

To account for the lack of a semantic relationship between raising verbs and their adjacent raised subjects, derivational syntactic theories have employed a mechanism of NP-movement (Chomsky and Lasnik, 1977). The subject NP is generated in the lower infinitive clause at the level of D-structure (which encodes thematic relations), as shown in (14). The main clause subject position

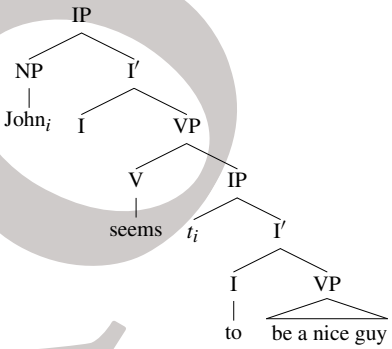
is underlyingly empty (indicated by *e*), reflecting the fact that the main verb (*seem*) does not select an external argument.

(14)



At the level of S-structure, which represents other syntactic properties such as Case assigment, the subject of the infinitive raises to the (previously empty) main clause subject position, shown in (15), and leaves behind a trace of movement (*t*) in its original position.

(15)



Within Government-Binding (GB) theory this type of movement (known as A-movement, movement into an argument position, as opposed to A′-movement, which includes *wh*-movement) was motivated in the following way. NPs are required to bear Case at S-structure according to the Case Filter (Chomsky, 1980). Case was argued to be assigned in a particular structural configuration (called government) by the tensed Infl node (node I in the tree, for Inflection), but not by untensed Infl (for example, the I of an infinitive clause). Since the infinitive is untensed, the subject of the infinitive (*John* in

the D-structure representation in (14)) lacks Case; it does, however, have a theta (θ) role, having been assigned its θ-role at D-structure by the embedded predicate. Furthermore, the main clause subject position is empty, there being no external argument of the raising verb, and so the NP *John* is free to move into that position, where it can now get Case from the tensed Infl of the main clause (and would not get any additional θ-role, since *seem* does not assign an external θ-role to begin with).[3]

Thus, both Case Theory (which pertains to the licensing of overt NPs in particular structural positions – NPs that are not assigned Case in their D-structure position must move to get it at S-structure) and Theta Theory (which governs the assignment of θ-roles to NPs and includes the restriction that each NP may be assigned, at D-structure, one and only one θ-role) are central to this account of raising constructions. A further component of GB that is particularly relevant to our discussion of raising and control constructions is the Projection Principle. The Projection Principle requires that the subcategorization requirements of predicates be projected at all levels of structure (D-structure, S-structure, and LF). In other words, if a verb selects a subject argument, that argument is present at all levels of structure (though it may move out of subject position, or it may be unpronounced, etc.). If a verb fails to select a subject argument, it will not have a subject argument at any level of structure, though an NP may move into its subject position at S-structure. In this case, that (surface) subject is still not an *argument* of the verb, since it was not selected by the verb at D-structure.[4]

The final (and related) crucial piece of the puzzle is the Extended Projection Principle: the requirement that all clauses have a subject (though it may not be pronounced). This requirement stems from the observation that "not all subjects result from the lexical requirements of verbs" (Davies and Dubinsky, 2004, p. 182). That is, weather predicates and existentials require a subject (*it, there*), but this pleonastic subject is not really a thematic argument of that predicate.

Although Minimalist syntax has moved away from the three-level model of the GB era (D-structure, S-structure, LF), raising structures have a similar treatment within this framework as they did under GB. The raising verb is merged with an infinitive predicate and the subject of that infinitive raises

[3] The construction known as copy raising (*Richard seems like he is in trouble*) must be accounted for in a different way, since both the matrix subject and the pronominal copy are in Case positions. For more on copy raising, see Section 3.3.1.

[4] Chomsky (1980) also discusses the discrepancy between the syntactic and semantic notions of "subject."

by movement into the main clause. However, the introduction of phase theory (Chomsky, 2001) led to a revision in the formal distinction between predicates that fail to project an external argument (raising predicates, unaccusative verbs, and passives – these predicates are "defective") and predicates that do project an external argument (active transitives and unergatives – these are non-defective) that was not as explicitly present in earlier versions of the theory.[5]

More specifically, the distinction between non-defective and defective phases splits those predicates that assign an external argument role from those that do not. The intuition behind phases is that phases are "propositional," that is, they are complete packages of the arguments required by a predicate. Non-defective phases are said to be ϕ-complete; that is, their argument roles are saturated and their agreement features are valued ("checked" in previous terminology). However,

> if the light verb v is ϕ-incomplete (passive), then V is defective, as is T_v selected by V (in raising/ECM constructions) ... T_v is raising Tense, which is assumed to be defective in having only a person feature, as opposed to finite Tense, which has full ϕ-features. (Chomsky, 2001, p. 9)

In other words, because unaccusative/passive/raising predicates do not select an external argument (subject), they lack full ϕ-features, and therefore their vP is a "defective" phase. Therefore, higher projections can be merged to vP before material is sent to Spell-Out. This results in movement being allowed out of this lower clause into the matrix clause.

One problem for an analysis of raising within Minimalism is how to raise the subject past an overt experiencer argument, as in (16):

(16) John seems [to Mary] to be a great guy.

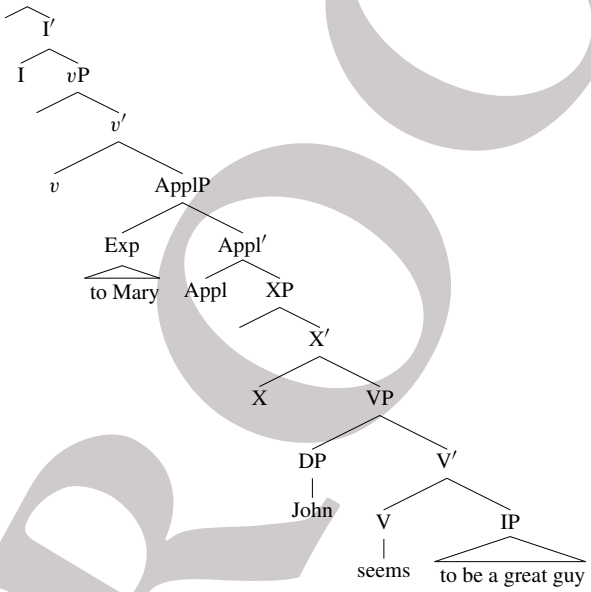
The Minimal Link Condition (Chomsky, 1995, p. 264) (similarly Rizzi's (2001) Relativized Minimality) limits all types of syntactic movement to the "shortest move," such that movement over an intervening structural position of the same type is blocked (filled intervening A-positions block A-movement, filled intervening A′-positions block A′-movement). In the case of (16) that intervening position is occupied by the experiencer DP (*to Mary*), which should block movement of the subject *John*. Collins (2005a) suggests a solution to this problem by invoking a mechanism he terms "smuggling." The idea behind smuggling is that if a phrase that needs to move (e.g. an NP/DP) is

[5] Chomsky (2001) does not discuss *tough*-movement.

contained inside a larger phrase of a different type (e.g. a VP, which is not an argument and therefore does not undergo A-movement), it can be "smuggled" past a barrier to movement (the experiencer) by moving within the larger phrase as a whole. In the case at hand, the whole VP moves, carrying with it the NP/DP argument.[6]

Applying this approach to raising constructions, we have the following series of structures in the derivation, adapted from Collins (2005a, p. 295). Collins proposes that following the application of Merge, we have the structure in (17). ApplP stands for Applicative Phrase, a projection typically associated with benefactives or indirect objects, and Collins argues the experiencer of a raising verb is this sort of argument (for discussion of applicatives see Pylkkänen (2008)).

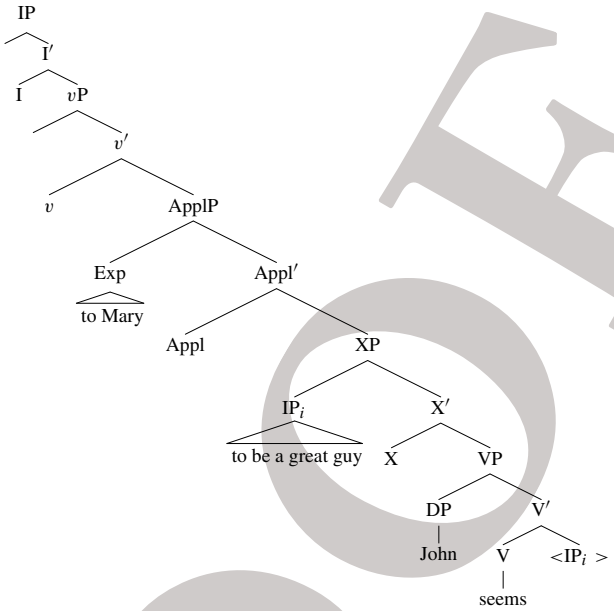
(17)



Collins designates the XP above the embedded VP as a functional projection that is needed in order to host the lower IP, which is extraposed into the SpecXP position. This is shown in (18).

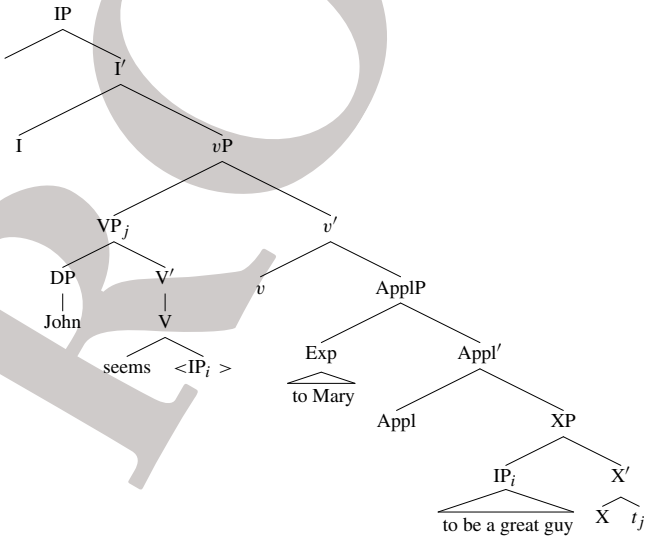
[6] I use the label DP in the trees below, following Collins, but I do not intend any meaningful distinction between the labels DP and NP.

(18)



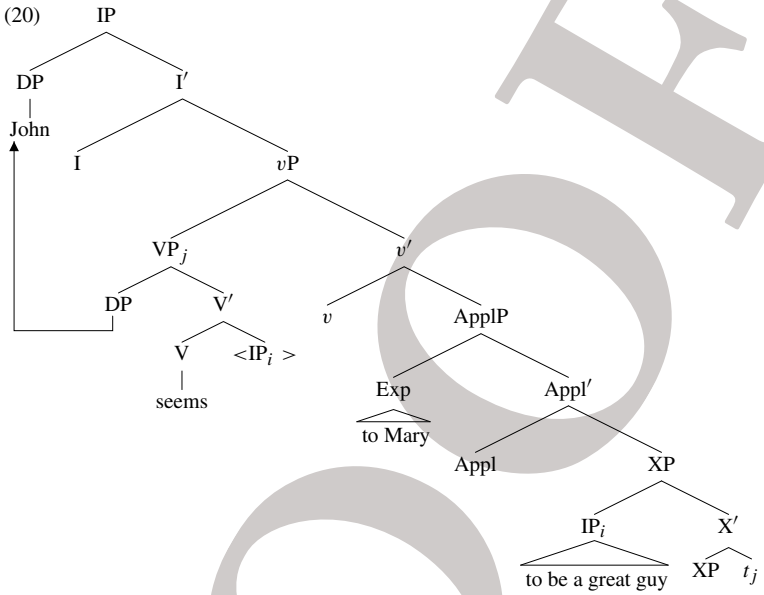
Next the whole VP containing *John* and *seems* is raised into Spec*v*P.

(19)



In the final step, the DP *John*, which has been smuggled out of the embedded clause, can raise into the matrix subject position.

(20)



We will see this mechanism employed for Minimalist treatments of *tough*-constructions (Hicks (2009); Section 2.2.1) and passive (Collins (2005b); Section 2.4.1).

While the theory needs a way of allowing raising past experiencers to account for the grammaticality of (16) in languages like English, there is a sense in which the theory should not make these structures "too easy." There are languages, like Icelandic, which allow raising but not over experiencers, and as we will see in Chapter 5 (Section 5.3.1) this type of raising is difficult for children, while raising without an experiencer is not.

2.1.2 The structure of control

The syntactic structure of subject control constructions has been relatively straightforward and stable across the various changes seen by syntactic theory over the decades. Previously known as Equi(valent)-NP Deletion (Rosenbaum,

1967), the Extended Standard Theory brought in the projection of the null pronoun PRO as the subject of the infinitive clause, replacing the Equi-NP Deletion rule. This analysis of subject control remained the standard one through the Government-Binding era.

(21) John$_i$ tried [PRO$_i$ to win the election.]

Here the main clause subject, *John*, is said to "control" the reference of PRO, as indicated by coindexation. However, both *John* and PRO are generated independently, each selected by a different predicate (*John* by *try* and PRO by *win the election*) and each assigned its own θ-role by that predicate. Thus, *John* is generated in the main clause and there is no A-movement. PRO is generally interpreted as coreferent with ("controlled by") a c-commanding referring expression (*John* in (21)), but it can also have arbitrary reference (e.g. *PRO$_{arb}$ to sell the house now would be a mistake*).

Some of the Minimalist literature on control has explored the question of whether there is in fact a syntactic difference between raising and control structures. For example, Hornstein (1999) analyzed control, like raising, as resulting from movement. One of the main differences between PRO and NP-trace (the trace of an NP that has undergone A-movement, as in raising) is that PRO receives its own θ-role from the embedded predicate, separate from the θ-role of PRO's controller, while NP-trace and the raised NP share a θ-role.

Hornstein argued, however, that the requirement that there be a strict one-to-one mapping between arguments and θ-roles (i.e. each argument gets only one θ-role and each θ-role is mapped to only one argument), as was assumed in the Theta Theory of GB, is not a theoretical necessity. (Jackendoff (1972, 1990) also rejected the biunique mapping between thematic roles and NPs, though for different reasons; see discussion in Section 3.2.2.) Instead, if a single argument is allowed to bear more than one θ-role it is no problem for the controller of PRO to be derived by movement:

(22) a. John$_{1,2}$ tried$_1$ [to leave$_2$.]
b. John$_1$ seemed [to leave$_1$.]

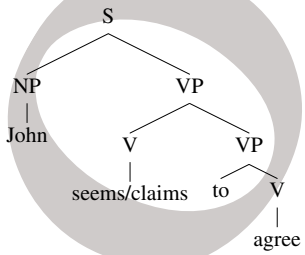
On Hornstein's account the difference between (22a) and (22b) is that in (22a) the subject *John* receives two θ-roles, while the subject of (22b) receives only one (from the lower predicate).[7] Importantly, though, Hornstein's

[7] See arguments by Culicover and Jackendoff (2001), and different ones by Landau (2003), against Hornstein's account.

argument is orthogonal to the claims I am making. The crucial difference between raising and control predicates, as far as I am concerned, is that control predicates select their subject while raising verbs do not, and this asymmetry is maintained in Hornstein's analysis of these predicates. Thus, whether both predicates involve movement of the subject, or only raising predicates do, the asymmetry between these sorts of predicates in terms of the semantic relationship they bear to their surface-adjacent subject remains.

Just as Hornstein's unification of raising and control constructions as involving movement is compatible with the claims made here, syntactic frameworks that do not employ movement at all are likewise compatible with my story. In Lexical-Functional Grammar (LFG), which is non-transformational, raising and control constructions do differ in their syntax despite the lack of movement in either one of them. In particular, while LFG posits identical c(onstituent)-structures for both types of sentences, shown unannotated in (23), the two types of predicates are associated with different a(rgument)- and f(unctional)-structures; the respective a-structures are illustrated in (24) (Bresnan, 1982b, 2001).

(23)



(24) a. seem <(XCOMP)> (SUBJ)

b. claim <(SUBJ)(XCOMP)>

The difference between the a-structures in (24) is that the subject of *seem* is outside of the angled brackets, indicating an athematic relation between it and the verb *seem*; the only component selected by *seem* is the propositional complement (XCOMP) (*seem* can also take an oblique argument if there is an overt experiencer or perceiver of the complement clause – seems to X; Bresnan (1982a)). For *claim*, on the other hand, both the subject and the propositional complement are thematically related to (selected by) the predicate. This asymmetry is reflected also in the f-structure representations for these

types of predicates. Thus, a syntactic asymmetry between raising and control is maintained, in spite of the lack of movement.

2.1.3 Raising-to-object and object control: expect *vs.* persuade

Raising-to-object verbs are verbs that take both a direct object and an infinitive complement, as in (25), but they do not assign a θ-role to their direct object.

(25) Murdoch expected Parliament to interrogate him.

Other verbs that behave like *expect* include *want*, *believe*, and *need*. They have in common that, although they do not select a direct object (*Parliament* is not the thematic patient of *expect* in (25) above), an NP appears between the verb and its infinitive complement. Historically, the theoretical debate around these constructions has centered on resolving the question of whether that "object" is truly a syntactic object (i.e. a complement of the V head in the main clause; this is the raising-to-object analysis) or whether it is a syntactic "subject" inside the infinitive clause (this is the Exceptional Case Marking analysis). What is agreed upon, however, is that these verbs do not select a direct object underlyingly.

In this, raising-to-object verbs contrast with object control verbs, which do select a thematic object. *Persuade* is such a verb.

(26) Murdoch persuaded Parliament to leave him alone.

Verbs that behave like *persuade* in this regard include *tell*, *ask*, *convince*, *allow*, and *force*.

The main criterial distinction between raising-to-object and object control parallels the distinction between raising-to-subject and subject control: in both cases the distinction turns on whether there is a thematic relationship between the verb and the subject/object of the main clause. In the case of raising-to-object, the matrix verb does not assign a θ-role to the object position underlyingly; rather, the surface object raises to that position from the subject of the infinitive.[8] In object control the matrix verb does θ-mark its object, which (in the normal case) controls the reference of PRO, the subject of the infinitive.[9]

[8] In the ECM analysis there is no direct object at all, only an infinitive clause complement with an exceptionally case-marked overt subject.

[9] Some languages, like English, have control verbs that take a direct object argument, but the *subject* controls the reference of PRO in the embedded clause. Such a verb is *promise* (*John$_i$ promised Bill$_j$ [PRO$_{i/*j}$ to cut the grass]*).

Some diagnostics for distinguishing the two constructions are given below. All of them follow from the basic thematic difference between the two types of verbs mentioned above.

(27) a. John expected it [t to rain]. (raising-to-object)
b. * John persuaded it [PRO to rain]. (object control)

(28) a. John expected there [t to be a solution].
b. * John persuaded there [PRO to be a solution].

(29) a. John expected Mary$_i$ [t_i to photograph Bill].
b. John expected Bill$_i$ [t_i to be photographed t_i by Mary]. (=29a)

(30) a. John persuaded Mary$_i$ [PRO$_i$ to photograph Bill].
b. John persuaded Bill$_i$ [PRO$_i$ to be photographed t$_i$ by Mary]. ($\neq$30a)

(31) a. John expected the shit to hit the fan.
b. # John persuaded the shit to hit the fan.

In (27)–(28) a pleonastic argument is permitted in the object position of *expect* since no θ-role is assigned by the verb to that position; *persuade* does assign a θ-role to its object so pleonastic arguments are banned. In (29) the embedded passive is truth-functionally equivalent to the embedded active version of the sentence. This is not true for the object control pair in (30). Finally, like raising-to-subject, raising-to-object constructions allow idioms to be split, while control constructions disallow this (see (31)).

A vast literature exists on these constructions, and debates over their correct structural characterization have been contentious. A lucid and detailed summary of this debate is to be found in Davies and Dubinsky (2004), and the reader is referred to that work for a thorough explanation. Although raising-to-object involves the displacement of an argument in the syntax, as well as surface opacity with respect to the underlying structure (due to the constructional homonym of object control), I will not focus on these constructions in this book.

The main reason for abstracting away from them is that the position into which the displaced argument is moved is an *internal* position (complement of the verb) rather than an *external* position (subject). In this, raising-to-object is distinctly different from all of the other constructions under consideration

here. Since the internal argument position is prototypically associated with an inanimate (or less animate) NP, in contrast to the external argument position, the effect of encountering an inanimate NP in this position is less easy to predict.

Nevertheless, we do see an asymmetry in object animacy between raising-to-object and object control similar to what we have seen with respect to subject animacy between raising-to-subject and subject control. Raising-to-object predicates always allow an inanimate NP in their object position, while object control predicates do not.

(32) a. John expected the book to be boring.
b. # John persuaded the book to be boring.

The occurrence of an inanimate NP in object position is nothing unexpected or non-canonical. Instead, what is perhaps unexpected is that object control verbs generally require an animate (sentient) object (cf. (32b)). Thus, although the precise means by which animacy distinguishes raising-to-object from object control predicates is not exactly the one found in the other constructions discussed in this book, it is of a piece with the more general learning strategy advocated here. Patterns of NP animacy are highly informative of predicate subclass, and so learners do well to pay attention to these patterns. For some predicates the restriction will be on the subject NP, for others it will be on the object NP.

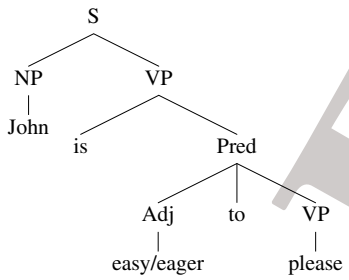
2.2 *Tough*-constructions: *easy* vs. *eager*

One of the early observations made within modern linguistic theory was that in order for the theory to be truly comprehensive (that is, to be both descriptively and explanatorily adequate) the theory would have to account for how two sentences that were nearly identical on the surface could differ so radically in meaning. Lees (1960) illustrated with the example of the "multiply ambiguous adjectival construction":

(33) a. John is easy to please.
b. John is eager to please.

Both Lees (1960) and Chomsky (1964) used these examples to illustrate the inadequacy of surface-oriented structures such as (34).

(34)



The problem with (34) is that this type of structure does not account for the different interpretations or transformational properties of these sentences:

(35) *tough*-adjective construction
  a. John is easy to please.
  b. It is easy to please John.

(36) control adjective construction[10]
  a. John is eager to please.
  b. * It is eager to please John.

The set of *tough*-adjectives is quite small: it is limited (at least in English) to the adjectives *hard*, *easy*, *simple*, *difficult*, and *impossible* (Anderson, 2005). Control adjectives include emotive adjectives like *happy*, *excited*, *glad*, *willing*, and *afraid*. One of the empirical diagnostics for distinguishing *tough*-adjectives from control adjectives is that the former, but not the latter, permit an expletive *it* subject as in (35b). Parallel to the raising-to-subject construction already discussed, *tough*-constructions also permit an inanimate referential subject, while control adjectives do not. As Lees (1960) noted, control adjectives are generally "confined to those which occur as predicates to *animate subjects*" (emphasis mine).

(37) a. John is easy to see.
  b. The mountain is easy to see.

(38) a. John is eager to see.
  b. # The mountain is eager to see.

[10] I place a '*' for ungrammaticality next to (36b) because the *it* subject is meant to be an expletive subject. If *it* is interpreted as a referential pronoun the sentence is still ill-formed, but semantically so.

Tough-adjectives also permit a gerundive or infinitive clause subject (which itself contains an arbitrary PRO subject), and no infinitive complement.

(39) [Seeing the mountain/To see the mountain] is easy.

(40) * [Seeing the mountain/To see the mountain] is eager.

In contrast, control adjectives permit a simple referential (animate) NP subject and no infinitive predicate (41), while *tough*-adjectives do not (42). At least, *tough*-adjectives cannot occur in this simple matrix construction on the basic meaning of the adjective – other connotations of the adjectives, such as sexual or behavioral connotations, are called to mind in these cases (e.g. *Mary is easy* 'easy to get into bed'; *That child is difficult* 'behaves badly'). Interestingly, certain simple referential inanimate subjects are acceptable with *tough*-adjectives without an infinitive complement; in many of these cases there is an implied event that is easy or hard, such as that in (43), which could be paraphrased as *Taking that test was easy/hard/difficult*.[11]

(41) John is eager/happy/anxious/excited.

(42) # John is easy/hard/difficult.

(43) That test was easy/hard/difficult.

2.2.1 Structure of tough*-constructions*

Early accounts of *tough*-constructions, such as Lees' (1960) and Rosenbaum's (1967), built on the intuition that the surface subject belonged, semantically, to the lower verb (see also Bresnan, 1971; Postal, 1971; Partee, 1977) and therefore started out in that position in the syntax. Rosenbaum's analysis of this construction posited the subject being base-generated as the object of the embedded verb (*please* in (44)) and raising up to the subject position of the main clause. The transformation took place in a couple of steps.

(44) a. [to please John] is tough
Extra-position of the infinitive and expletive insertion →
b. It is tough [to please John].
Object-to-subject raising →
c. John$_i$ is tough [to please t$_i$].

[11] Certain referential animate NPs can take a *tough*-adjective with no embedded complement (e.g *That teacher is hard/easy*), where the implication is that the teacher gives hard/easy work.

This kind of account preserves our intuition about the thematic relationship between the lower predicate and the surface subject (that *John* is the semantic object of *please*), but as syntactic theory developed more explicit constraints on the movement of arguments in the course of a derivation a number of problems with this analysis came to light. In particular, NPs are assigned Case under government, so if *John* originates as the complement of the verb it would get Accusative case there, making its raising to subject position unmotivated (recall that, normally, the purpose of NP-movement is to get Case), and it would leave its bearing Nominative case (rather than Accusative) unexplained. In addition, an NP-trace must be locally bound by its antecedent. Therefore, while (45a) was unproblematic, (45b) presented several problems for the theory:

(45) a. It is tough to please John.
b. John$_i$ is tough to please t_i.

(45a) satisfies both Theta Theory and Case Theory since *please* assigns both its θ-role and Case to *John* under government. There is no movement, so NP-trace is not present, and an expletive subject is inserted at S-structure. However, in (45b), *John* would not need to raise to get Case, since it could get Case in its D-structure position. Moreover, if it did raise to subject position its trace would not be locally bound. The solution presented in Chomsky (1977) avoided these pitfalls by base-generating *John* in the matrix subject position and postulating a null *wh*-operator that moved from the complement of *please* to a topic position within that lower clause (movement to a topic position constitutes an instance of A′-movement).

(46) John is tough [wh$_i$ [PRO to please t_i]].

While there is some independent evidence for the A′-movement account (from island effects; Chomsky (1977)), this analysis is odd in that it generates the subject in a position where it clearly does not get its semantic interpretation (see also Lasnik and Uriagereka (1994) for additional critiques of this analysis).

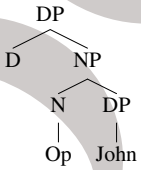
Throughout the 1980s Chomsky's (1977) analysis of *tough*-movement was largely retained, in spite of its problematic nature. Other attempts to analyze this construction, such as the movement account by Brody (1993) and the deletion analysis of Lasnik and Fiengo (1974), had their own problems.[12]

[12] Brody's analysis required A′-movement followed by A-movement, known as "improper movement" (Chomsky, 1981), and the deletion account rests on questionable data, such as that

As Holmberg (2000) noted, the construction was in principle "unexplainable" in the Government-Binding framework of that time. In fact, the A′-movement treatment of *tough*-constructions was so problematic that it served as one of the catalysts for abandoning D-Structure entirely in early Minimalist work (Chomsky, 1995, p. 188). Removing D-Structure from the formalism may have removed some of the technical reasons why the previous analysis failed, but it did not immediately produce a better analysis.

Hicks (2009) has made the most recent attempt at resolving both the problem of why the underlying object does not get Case and how movement is motivated, while still invoking movement as opposed to deletion or surface insertion. Hicks exploits the notion of "smuggling" (Collins, 2005a,b) and argues for a more complex structure for null operators. He returns to the notion that it is a null operator that is raising in the lower clause, but with a crucial difference. Hicks proposes that the null operator is actually a predicate within a complex DP that bears a *wh*-feature and takes a simple DP (e.g. *John*) as its single argument. The configuration of the complex DP looks like this (omitting feature notation):

(47)

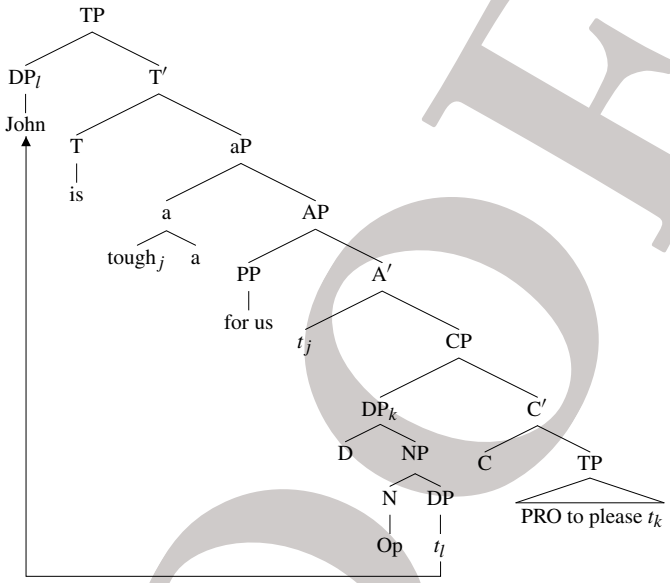


The DP *John* does not check its case feature in this configuration because it is not "visible" to V. This complex DP then undergoes A′-movement to the SpecCP of the embedded clause (by virtue of its *wh*-feature). Now that *John* has been "smuggled" out of the lower *v*P to SpecCP (the edge of a phase), the simple DP *John* can raise (via A-movement) to SpecTP of the matrix clause where it gets Nominative case. Thus, Hicks essentially invokes A′-movement followed by A-movement but avoids an Improper Movement violation by claiming that it is two different DPs undergoing the respective movements: the complex DP of the operator undergoes A′-movement, but only the simple DP *John* undergoes A-movement.

involving idioms. For example, the deletion account is argued to be supported by the fact that idiom chunks are not uniformly acceptable in *tough*-constructions. Lasnik and Fiengo (1974) find the sentence *Headway is easy to make on problems like these* marginal and *Tabs were easy to keep on Mary* ungrammatical, but I find the first perfectly fine and the second only slightly degraded.

A simplified structure for the sentence *John is tough for us to please*, based on that given in Hicks (2009, p. 551), is presented here:

(48)



The assignment of the θ-role to the subject potentially remains a problem on Hicks' account. He argues that the *tough*-construction subject gets its θ-role directly from the operator itself, not from the verb. On his account the θ-role cannot come directly from the verb for the same reason Case is not assigned by the verb: the subject argument is not "visible" to the verb when it enters the derivation as part of the null operator's complex DP. One possibility is that the verb's θ-role reaches the subject via "percolation," or some other "composite" mechanism between the verb and null operator. Hicks favors the view that the θ-role comes exclusively from the operator, based on evidence having to do with lack of variability in which θ-roles get assigned in this construction. That is, he claims that subjects of *tough*-constructions are uniformly themes, but there is some counter-evidence. In fact, *tough*-constructions allow stimulus subjects (*John is easy to see*), experiencers (*John is easy to frighten*), and benefactees (*John is easy to cook for*), among others.[13] Moreover, although one of the apparent advantages of the smuggling approach to *tough*-movement was a return to the intuition that the subject starts out in the object position

[13] I thank Ash Asudeh for pointing these out to me, and for discussion on this point.

of the lower clause, it is not clear how this particular analysis yields the right semantic relationship. That is, if the subject does not in fact get its θ-role from the embedded verb, what gives rise to our intuition that the syntactic subject is really the semantic object of that verb?[14]

Although the exact syntactic analysis of *tough*-constructions remains elusive, it will be sufficient for our purposes to note the semantic asymmetry between the relationship between the subject and main predicate in *tough*-constructions as compared to control adjective constructions, and to accept that this asymmetry translates into a structural difference between the two constructions. That is, children will have to distinguish the two underlying structures in spite of their surface similarity and will have to determine that the subject of *tough*-adjectives, but not that of control adjectives, is displaced.

2.2.2 Related constructions

There are a number of other constructions which resemble *tough*-constructions on the surface, but which involve somewhat different structural properties. For example, the sentences in (49) (examples from Lees (1960)) involve an adjectival predicate in the main clause and an embedded infinitive clause.

(49) a. He's free to go.
b. He's too old to send.
c. It's too hot to eat.

Lees (1960) noted that some of these constructions involve a subject gap (49a), others involve an object gap (49b), and still others are ambiguous (49c) (see also Bolinger (1961) and see Anderson (2005, ch. 2) for an overview of these constructions and their structural properties). Interestingly, in some cases ambiguity can be (partially) resolved by the animacy of the subject. Under normal circumstances (and barring cannibalism), (50a) will be an instance of an object gap, while (50b) will involve a subject gap. Likewise (51a) means that it was good to read this book, not that it was good of the book to read something else, and (51b), though ambiguous without an overt direct object, most naturally means that it was good of the man to help (someone).

(50) a. The sandwich$_i$ is ready [PRO$_{arb}$ to eat t_i.]
b. The girl$_i$ is ready [PRO$_i$ to eat e.]

(51) a. This book$_i$ was good [PRO$_{arb}$ to read t_i.]
b. The man$_i$ was good [PRO$_i$ to help (the old lady).]

[14] See Richards (2001) for a different Minimalist account of *tough*-movement.

Our intuitions are partially restricted, of course, by our expectations about the world: our non-cannibalistic culture in the case of (50) and our knowledge of what books and men are capable of doing in the case of (51). Given the right predicate and context an animate subject *can* have an object-gap reading.

(52) a. John$_i$ is ready [PRO$_i$ to push e].
b. John$_i$ is ready [PRO$_{arb}$ to push t].

My own reading is that (52a) is the preferred reading, but that (52b) is also possible. In contrast, an inanimate subject, even when used with a semantically neutral lower verb, still allows only the object-gap reading.

(53) a. * The ball$_i$ is ready [PRO$_i$ to roll].
b. The ball$_i$ is ready [PRO$_{arb}$ to roll t_i].

The semantic difference is subtle, but (53a) gives a distinctly unergative feel, as if the ball is ready in a psychological sense, whereas (53b) means only that things are all set for the ball to be rolled by someone. On the other hand, the distinction is dependent not only on animacy but also on the semantics of the lower predicate, and in particular the likelihood of the inanimate NP to be capable of self-propelled motion. I find vehicles quite natural with a subject-gap interpretation.

(54) The bus is ready to leave.

It seems to me that (54) is actually ambiguous, since it could mean that the bus is ready for us to leave it (i.e. an object-gap reading), but I find the subject-gap reading more natural. As we will see in Chapter 6 *ready* is most frequently used with a subject-gap meaning in input to children.

Crucially, *ready* is not a true *tough* adjective, as it does not allow an expletive subject.

(55) * It/there is ready to roll the ball.

Why *ready* allows both a subject- and an object-gap reading, but does not allow an expletive, is an interesting puzzle. If it does not allow an expletive subject, that should mean that it selects an external argument. But if it takes an external argument, how can a lower object raise into its subject position? This position would need to be empty in order for the object to move into it. Note that *ready* also differs from *tough*-adjectives in that it easily permits passivization of the internal argument, whereas *tough*-adjectives do not.

(56) The ball is ready to be rolled.

(57) * The ball is easy to be rolled.

I will not propose a syntactic analysis of *ready* constructions, but let it suffice to say that *ready* and other adjectives like it (*good*, *nice*) form a separate subclass from the *tough*-adjectives. It seems to me that subject animacy could still be a useful cue in guiding learners towards an object-gap or subject-gap reading of sentences containing these adjectives (inanimate subject → more likely object gap; animate subject → more likely subject gap), but it will not necessarily be useful in discriminating this separate subclass of adjectives from either the *tough* or the control class.

As noted above, degree constructions (e.g. *too hot*) are ambiguous, and here the role of animacy is not so clear. Rothstein (1991a,b) observes that degree constructions allow either a control structure (58a) or a *tough*-construction type structure (58b) (examples cited in Anderson (2005)).

(58) a. Theresa$_i$ is too intelligent [PRO$_i$ to make that kind of mistake].

b. Theresa$_i$ is too intelligent [Op$_i$ [PRO$_{arb}$ to select t_i for guard duty]].

Again, though, degree constructions differ from true *tough*-constructions in that they disallow an expletive subject (**It is too intelligent to select Theresa*).

A further type of adjective that is sometimes grouped together with *tough*-adjectives is *pretty*, as in *Birds are pretty to look at*, since only the object-gap reading is possible (this is the object deletion construction; cf. Lasnik and Fiengo (1974)). However, Anderson (2005) cautions against this grouping, since the matrix subject is the thematic subject of the main predicate (*Birds are pretty*) and thus not underlyingly an empty position. In the syntactic framework in which Lasnik and Fiengo were working the matrix subject of *tough*-constructions was also argued to be base-generated in that position (see Section 2.2.1), and in fact Lasnik and Fiengo argued that both *tough*-adjectives and adjectives like *pretty* involved object deletion. However, since I am adopting the view that *tough*-adjectives do not select an external argument, this would constitute an important difference between *tough* and *pretty*.

Based on these considerations it would seem that expletives are the crucial cue for distinguishing the predicates of interest (*tough*-adjectives) rather than inanimate subjects. It is true that expletives distinguish *tough*-adjectives from other adjectives that participate in object-gap constructions. But inanimate subjects are broadly suggestive of an object gap in all of these cases. Therefore, while a string like (59) will not unambiguously signal a *tough*-adjective per se,

it will indicate to the learner that the string is very likely to be an object gap construction and very unlikely to be a subject control construction.

(59) $NP_{inanimate}$ is Adjective [to Predicate]
$\neq NP_i$ is Adjective [PRO_i to Predicate]

Once this split has been made, further evidence of an adjective occurring with an expletive subject can narrow down the possible categories of the adjective: if it occurs with an expletive subject, then it is a *tough*-adjective. In Section 2.5 we will come back to the general reasons for focusing on inanimate rather than expletive subjects in this book.

2.2.3 Structure of control adjective constructions

Turning now to the *tough*-construction's constructional homonym, sentences with adjectives like *eager* have been fairly straightforwardly analyzed as involving subject control. Just as with subject control verbs, since Chomsky (1981) subject control adjectives involve a base-generated subject "controlling" the reference of PRO, the (ungoverned) empty subject of the embedded clause.

(60) $John_i$ is eager [PRO_i to please *e*].

Since *John* receives its θ-role from *eager* and Case from finite T there is no movement. The only thing left to explain is the null object of *please*, which presumably is understood with arbitrary reference, the same way the object of a verb like *eat* can be phonologically null but understood to mean "something," just as *John ate* means John ate something. In other words, this is not an issue peculiar to control constructions.

2.3 Unaccusatives and unergatives: *arrive* vs. *dance*

Having discussed the syntax of two biclausal displacing predicates, raising-to-subject verbs and *tough*-adjectives, let's now turn to monoclausal constructions. First we will focus on intransitive verbs.

Unaccusative verbs are intransitive verbs that select, underlyingly, a direct object rather than a subject. An example of an unaccusative verb is *fall*.

(61) The girl fell.

The following section presents empirical evidence to justify this claim, which is perhaps not very intuitive for English speakers. Other unaccusative

verbs include *arrive*, *go*, *come*, *break*, and *open* (the latter two can also be transitive, as will be discussed below). Unaccusative verbs contrast with other intransitive verbs whose lone argument is an underlying subject, such as *laugh*. These verbs are called "unergatives."

(62) The girl laughed.

Examples of other unergative verbs are *dance*, *sleep*, and *jump*. Unlike the previous sections of this chapter, I will discuss accounts of unaccusative and unergative constructions side-by-side, first focusing on the semantic intuition behind the distinction and then presenting some formal accounts of the respective constructions.

2.3.1 A semantically-driven syntactic distinction

The distinction of intransitive verbs into the two classes of unaccusative and unergative verbs in modern linguistics is originally due to Perlmutter (1978).[15] Perlmutter's dichotomy turned on whether the sole argument of these verbs was internal ("initial 2" in Relational Grammar) or external ("initial 1"). He sought a semantic basis for the distinction. Broadly, he claimed that unergative verbs were "predicates describing willed or volitional acts" including "manner-of-speaking verbs" and "sounds made by animals" as well as "certain involuntary bodily processes." Relevant to our purposes, these are predicates that would normally take an animate argument.

Unaccusative verbs, instead, include verbs of existence, "non-voluntary emission of stimuli that impinge on the senses," aspectual verbs, and inchoatives (*melt, freeze*). In addition, Perlmutter included adjectival predicates denoting sizes, colors, and so forth, but also states of mind. Thus, the class is not inherently restricted to taking inanimate arguments, but the preponderance of unaccusative predicates, according to Perlmutter's characterization of the split, are grammatical with an inanimate subject. In this they contrast with the unergative predicates.

Perlmutter also noted that a good many predicates are ambiguous, being able to behave either as unaccusative or unergative predicates. Here the assignment hinges to a large degree (perhaps exclusively, though Perlmutter does not specify this) on the animacy of the subject.

[15] Precursors to Perlmutter's explicit distinction are found in Hall (1965) (cited in Dowty (1991)) and in Case Grammar (Fillmore, 1968; Huddleston, 1970), where the single inanimate argument of certain verbs like *open* or *melt* was labeled with Objective case, corresponding roughly to the theme thematic role in later work; please see further discussion in Section 3.2 below.

(63) a. The wheels slid on the ice. (unaccusative)
b. Joe slid on the ice. (unergative or unaccusative)

(64) a. The train roared as it approached. (unaccusative)
b. The lion roared as it approached. (unergative)

In (63a), the action is involuntary and therefore the verb unaccusative; in (63b) the action can be volitional or involuntary.[16] Similarly, in (64a) the roaring comes from the approach of the train, while in (64b) the roaring comes from the lion itself, not from its approach. Therefore, Perlmutter considers (64a) to be unaccusative and (64b) to be unergative.

Although Perlmutter suggested that the Unaccusative Hypothesis was universal, he noted that variation can be found where a particular lexical item in a language admits or does not admit a volitional interpretation. For example, the English verb *travel* can have a volitional or non-volitional meaning (*John travelled around the world*, *The package travelled for two weeks*), but in Dutch the same verb, *reizen* 'travel' can only be volitional (the Dutch equivalent of *The package travelled for two weeks* is ungrammatical; cf. the English verb *journey*, which requires an animate subject). Further cases of "mismatches" (verbs that are classified as unaccusative in one language but unergative in another), as well as arguments for classifying verbs as unaccusative on a semantic as opposed to syntactic basis, are discussed extensively in Levin and Rappaport Hovav (1995). See also Van Valin (1990) for a semantically-driven approach.

Perlmutter's distinction is couched in semantic terms, but there are known syntactic effects of this split. His own illustration of impersonal passives in Dutch demonstrates this, where the construction admits unergative verbs but not unaccusatives.

(65) Er wordt hier veel geskied.
it was here much ski-PART
"It is skied here a lot"

(66) * In dit weeshuis wordt er door de kinderen erg snel gegroeid.
in this orphanage was it by the children very fast grow-PART
("In the orphanage it is grown very fast by the children")

Crucially, a given verb may admit the impersonal passive or not depending on whether the argument is interpreted as volitional (see also Zaenen (1988)).

[16] Note that, in contrast, a sentence like *Joe slid into third base* (which was Perlmutter's example) is unergative, since it is understood that Joe voluntarily slid into the base, not that he slipped and slid by accident, a scenario that is plausible when treading on ice.

(67) a. De kinderen hebben lekker op het ijs gegleden.
the children have with enjoyment on the ice slide-PART
"The children enjoyed sliding on the ice"

b. Er werd door de kinderen lekker op het ijs gegleden.
it was by the children with enjoyment on the ice slide-PART
"It was enjoyed sliding on the ice by the children"

(68) a. De sneeuw is van het dak afgegleden.
the snow is from the roof slide-off-PART
"The snow slid off the roof"

b. * Er werd door de sneeuw van het dak afgegleden.
it was by the snow from the roof slide-off-PART
("It was slid off the roof by the snow")

A complicating factor in defining the split between unaccusatives and unergatives has to do with verbs of sound, light, smell, and substance emission (e.g. *roar*, *glow*, *stink*, and *ooze*). Although these verbs appear to be unaccusatives on Perlmutter's diagnostic ("non-voluntary emission of stimuli that impinge on the senses"), Levin and Rappaport Hovav (1995) argue that they are in fact unergatives. In particular, verbs of emission pattern with other "internal causation" verbs in not having a transitive counterpart (**The electrician glowed the lightbulb*). And yet, these verbs take inanimate subjects, which I have argued is a hallmark of displacing predicates. As we will see in Chapter 3 verbs of emission display some hybrid behavior of unaccusatives and unergatives, making them difficult to classify as either displacing or non-displacing verbs. If Levin and Rappaport Hovav are correct in categorizing them as unergative (non-displacing), these verbs would appear to cast doubt on the robustness of my claim about inanimate subjects. However, we will see in Chapter 5 that children produce unaccusatives with both animate and inanimate subjects (in almost equal proportions) but limit unergative verbs (not counting verbs of emission) to having animate subjects. Thus, even if verbs of emission are problematic for extending my generalization about subject animacy to intransitive verbs, they do not appear to tamper with children's own knowledge of which kinds of subjects can be used with which types of intransitive verbs.

2.3.2 Formal representations of unaccusativity

Further syntactic effects of the unaccusative–unergative distinction were brought to light by Burzio (1986), who adapted Perlmutter's dichotomy to the Government-Binding syntactic framework. Burzio argued that the sole argument of unaccusative verbs was generated in the complement of V

(governed by the verb) and raised to matrix subject position (SpecIP). Here we will mainly look at evidence from Italian *ne*-cliticization, but I will briefly mention two other pieces of evidence for the syntactic distinction between unaccusatives and unergatives (auxiliary selection and participle agreement).

Unlike unergative verbs, unaccusatives in Italian allow *ne*-cliticization:

(69) a. Ne arrivano molti.
of-them arrive-3p many
"Many of them arrive"

b. * Ne telefonano molti.
of-them telephone-3p many
("Many of them telephone (call)")

The *ne*-cliticization diagnostic is instructive because it occurs in transitive constructions as well, but with the restriction that the clitic can only refer to direct objects.

(70) a. Gianni ne inviterà molti.
G. of-them invite-FUT-3s many
"John will invite many of them"

b. * Gianni ne parlerà a due.
G. of-them talk-FUT-3s to two
("John will talk to two of them")

c. * Molti ne arriveranno/telefoneranno.
many of-them arrive-FUT-3p/telephone-FUT-3p
("Many of them will arrive/phone")

What is crucial about (70c) is that the clitic *ne* is meant to refer to the subject; this is ungrammatical whether the subject is base-generated or derived. However, *ne* can refer to an underived argument that is complement to the verb, as in (70a). Example (70b) shows that it is not sufficient to be a non-subject, or for the argument to be within the VP: only the direct object, and not an indirect object, can undergo *ne*-cliticization. So, the fact that the lone argument of an unaccusative verb can undergo *ne*-cliticization, as in (69a) (but not the argument of an unergative, as in (69b)) shows that the argument of an unaccusative verb is a direct object.

By base-generating the argument of unaccusatives in the object position, Burzio adopts the spirit and intuition of Perlmutter's Relational Grammar analysis, but it is formalized according to the framework of GB theory (see (71)). The single argument of an unergative verb, on the other hand, is represented as being base-generated in subject position (72).

(71) a. [$_{IP}$ e [$_{VP}$ arriverà [$_{NP}$ Gianni]]
b. [$_{IP}$ Gianni$_i$ [$_{VP}$ arriverà t_i]]

(72) [$_{IP}$ Gianni [$_{VP}$ telefonerà]]

Burzio's analysis extends neatly to several other syntactic phenomena exhibited by unaccusative verbs. Two related ones are the selection of auxiliary *essere* 'be' and gender/number agreement in past participles. By considering the single argument of *arrivare* 'arrive' to be an underlying object, Burzio brings the behavior of the lone argument of *arrivare* into line with subjects of passives and *si* reflexives, and objects of transitive verbs. Both passives and *si* reflexives involve both auxiliary selection of *essere* (as opposed to *avere* 'have,' which is selected by transitive verbs and unergatives) and they induce past participle agreement (see (73)–(74)). Objects of transitive verbs, when cliticized, also induce past participle agreement (see (75)).

(73) Gli studenti$_i$ sono stati accusati t_i.
the student-M-p be-3p been accuse-PART-M-p
"The students were accused"

(74) Maria$_i$ si$_i$ è accusata.
Maria self be-3s accuse-PART-F-s
"Maria accused herself"

(75) Gli studenti la$_i$ hanno accusata t_i.
the student-M-p her have-3p accuse-PART-F-s
"The students accused her"

What all of these constructions have in common is that they have an underlying internal argument which raises in the syntax. Their common behavior is then accounted for in a unified way.

One of the puzzles about unaccusative constructions is why the lone argument of the verb must become a subject at all. This question is especially relevant for a language like Italian which does not require overt subjects. What Burzio argued was that the argument cannot receive Accusative case from the verb and therefore must raise to get Nominative case under government from tensed Infl. The reason it cannot get Accusative case is that a verb can assign Accusative to its complement *only* if it also θ-marks its subject. This became known as Burzio's Generalization. That is, a transitive verb will assign a θ-role to its subject (and object) and therefore can assign Accusative to its internal argument. But an unaccusative verb, not having an external argument at all, cannot then assign Accusative to its internal argument. That argument must raise to get Case, and in so doing it becomes a derived subject.

With the advent of the Minimalist Program the light-verb projection *v*P was proposed as the locus of the external argument and its causative or agentive θ-role: "Accordingly, the external argument cannot be lower than [Spec, *v*]. If it is [Spec,*v*] ... then the *v*–VP configuration can be taken to express the causative or agentive role of the external argument" (Chomsky, 1995, p. 315). Verbs that require an external argument, namely transitives and unergatives, will then project *v*P. Unaccusatives, on the other hand, will project only a VP structure, which contains the internal argument of the verb.

Current iterations of the Minimalist framework hold that all predicates project *v*P (Chomsky, 2001). A formal difference between predicates that take an external argument and those that don't is maintained, however. Transitive and unergative verbs project *v**P, which takes an agent or experiencer external argument. As discussed above in connection with raising-to-subject (see Section 2.1.1), such a projection is ϕ-complete and therefore constitutes a non-defective phase: merge operations and "valuation" of features (akin to "checking" of features in earlier iterations of the theory) must take place within the phase before a higher phase can be merged. Like raising verbs, unaccusative verbs project a *v*P (no *) with no external argument; this *v*P is not ϕ-complete, therefore "defective," therefore the operations within this phase are still visible even when higher phases have been merged (e.g. T and C). The defectiveness of the *v*P phase for unaccusative verbs is what allows NP-movement to take place from within that projection to SpecTP. In other words, because unaccusative *v*P is a defective phase, its internal argument is still "visible" at the higher CP phase (i.e. the main clause), and so this internal argument is accessible to movement/merge operations. It can be targeted for movement into the main clause.

Most relevant for our purposes is that these defective phases (*v*P and an untensed TP – non-ϕ-complete in the terminology used in Chomsky (2001)) lack an EPP feature and therefore do not host an external argument.

2.4 Passive

The passive shares with raising, *tough*, and unaccusative constructions the fact that the syntactic subject is not the semantic subject – it is derived. It also shares with them a willingness to host inanimate subjects. If the "prototypical" transitive sentence has an animate subject and inanimate object (*The boy threw the ball*) perhaps the prototypical passive has an inanimate subject and animate *by*-phrase (e.g. *The ball was thrown by the boy*). And yet, important syntactic and pragmatic differences between the passive and the other displacing

predicate constructions lead us to predict an asymmetry in the role that inanimate subjects will play in the acquisition of the passive, as opposed to the other displacing constructions. As we will see in Chapter 5, the acquisition data support this asymmetry.

2.4.1 Structure of passive

Until the GB era, passive was accounted for by a "passive rule," a transformation that applied specifically to this construction to derive the passive form from its active counterpart. The account of passive in *Syntactic Structures* (Chomsky, 1957) applied an ad hoc rule of inserting the auxiliary *be* plus the affix *-en* to the main verb, and a reordering of NPs.

(76) $NP_1 - Aux - V - NP_2 \quad \rightarrow \quad NP_2 - Aux + be + en - V - by + NP_1$

The treatment of passive developed in the *Aspects* model (Chomsky, 1965) differed from this somewhat by employing a slightly more general rule, but it was similar in that the surface subject was analyzed as an underlying object which raised in the derivation of the structure.

The main shift in analyses of the passive came with the advent of GB theory. GB brought the passive into the family of constructions involving NP-movement, which, in turn, was seen as one instantiation of the even more general rule "Move-α." The surface subject of the passive was still seen as being derived from the underlying object position, like with unaccusatives (see Section 2.3), but the movement rule was of a more general sort, thus no longer requiring a construction-specific rule. In addition, although the active and passive voices were seen as semantically and lexically related, the passive was not derived directly from the active per se. Rather, the active and passive versions of a sentence each had distinct D-structures.

According to Chomsky (1981) the main properties of the passive are (1) that the subject position at D-structure is not assigned a θ-role, and (2) the object position at D-structure is not assigned Case. The notion that the underlying object "becomes" the S-structure subject is actually purely incidental and unnecessary, as the surface subject need not be an argument of the verb at all, as in (77).

(77) It was believed [that John was late].

Under GB the account of passives like *John was kissed* was reduced to an instance of Move-α and was motivated by the requirements of Case Theory, Theta Theory and the Extended Projection Principle (all clauses must have a

subject). In (78) the surface subject raises from its D-structure object position because it is not assigned Case by the verb and therefore must raise to get Nominative case by matrix tensed Infl. It can raise to this position because that position is not theta-marked and therefore available to host a derived NP. Also, the EPP requires a subject and (78) has no subject.[17] The product of this movement is (79). The inability of the verb to take a direct object is further exhibited by the ungrammaticality of (80).

(78) [*e* was kissed John]

(79) John$_i$ was kissed t_i

(80) * John$_i$ was kissed the girl

One question left open by this account is what happens to the external θ-role. That is, assuming that as part of the verb's lexical entry a transitive verb specifies an argument structure involving two arguments, one internal and one external, and assuming, following the Theta Criterion and Projection Principle, that each of those arguments must be represented in the structure and assigned a θ-role, the lack of an external argument in a passive like (79) is problematic. Jaeggli (1986) explained the absence of the external argument in terms of θ-role "absorption."[18] According to Jaeggli, the "passive suffix *-en*. . . functions as the recipient of the external θ-role of the predicate" (Jaeggli, 1986, p. 590). If the external θ-role is assigned to the *-en* suffix, it is no longer available to be assigned to the subject position. Furthermore, Jaeggli claimed that it is the external role and not the internal role that gets absorbed by the bound affix because only the external θ-role is unlinked to the verb, in the sense of Chomsky (1965) (also Williams (1981); Zubizarreta (1985); and see Baker *et al.* (1989) for a similar account of the passive within GB).

A different approach to the passive is found in non-transformational frameworks like Lexical-Functional Grammar (LFG). In LFG active and passive predicates are lexically distinct (so, *kick* and *be kicked* are different lexical items), and no movement occurs in the syntax. Rather, the apparent reordering of arguments falls out from differences between the a- and f-structures of active vs. passive predicates. That is, active and passive verbs have different

[17] The EPP can also be fulfilled by the insertion of an expletive when the complement of the verb is a CP (and therefore immune to the requirement for Case), as in (77). Expletive subjects are not possible with verbs like *be kissed* (**It was kissed e*) because the θ-role of the verb needs to be discharged to a real argument, and expletives are not arguments.

[18] See Baker *et al.* (1989) for an extension of this proposal, where the *-en* affix is analyzed as an argument.

subcategorization frames. An active transitive verb specifies that it takes both a subject and object argument, as in (81).

(81) kick <(SUBJ)(OBJ)>

A passive predicate, on the other hand, specifies an oblique and a subject argument.

(82) kick <(OBL_{ag})(SUBJ)>

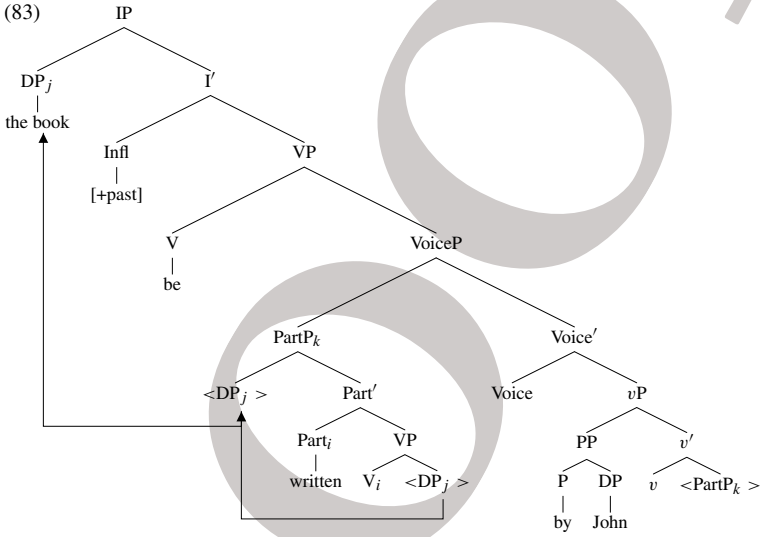
In (82) the subject argument role is assigned to the internal argument. But since English requires subjects to precede the main verb, this argument will appear in the canonical subject position (i.e. preverbally), even though it is the internal argument of the predicate (Bresnan, 1982c, 2001).

The passive construction has not been a primary focus of work in Minimalism (though see Boeckx (1998) for a formulation of the GB-style treatment of passives within the formal apparatus of the Minimalist Program). Chomsky (2001) groups passive verbs together with raising and unaccusative verbs in projecting a defective vP (not v*P, i.e. no external argument), and in this gives a much more lexicalist-flavored treatment of the construction. However, Collins' (2005b) Minimalist account departs from previous derivational accounts of the passive in a number of respects. He employs the operation of "smuggling" (see above in our discussion of Minimalist accounts of raising-to-subject and *tough*-constructions) to combine what he considers to be the best aspects of the *Syntactic Structures*-type account of the passive (i.e. the intuition that the "deep subject" is doing the same thing in both the active and passive counterparts) and GB-type accounts (i.e. an account of passive which, unlike the one in *Syntactic Structures*, does not rely on a special rule).

Unlike in Jaeggli's (and Boeckx's) treatment of passive, the *-en* morpheme does not have any special status in Collins' account. In fact, he argues explicitly that the passive participle is equivalent to the past participle. Moreover, Collins argues that the external argument is generated in the same position in a passive construction as in the active counterpart: in Spec$v$P. However, instead of a DP the external argument is realized as a PP headed by "dummy" *by* (i.e. Collins analyzes passive *by* as not having any interpretable features). Thus, Collins draws on the intuition expressed in the *Syntactic Structures* analysis of the passive that the logical subject and object should be generated the same way in active and passive constructions, and the passive surface order should be derived in some way.

The way Collins derives the surface word order of the passive is through a sequence of movements (see (83), Collins' (22)). The verb *write* raises from V to Part, where it is realized as a participle. The direct object raises from the complement of V to SpecPartP. The crucial step needed to obtain the right word order is that PartP raises to SpecVoiceP, which Collins argues is what licenses PartP. At this point in the derivation, the direct object correctly precedes both the participle and the *by*-phrase, but it needs to raise to SpecIP in order to end up in subject position and precede the auxiliary. It is now in a position to take this step since it has been "smuggled" out of the lower part of the clause.

(83)



Importantly, the thematic role of the surface subject of the passive is obtained the same way as that of the object of the active, namely by being generated as the sister of V (see also Baker *et al.* (1989)). According to this view the active and passive are derivationally related; they are not lexically distinct predicates.

2.4.2 A different displacing predicate

As hinted at in the beginning of this section, we will see arguments in Chapter 5 that inanimate subjects do not facilitate the acquisition of the passive the same way they do raising verbs, *tough*-adjectives, or unaccusatives. The primary claim of this book is that inanimate subjects indicate a derived or displaced

subject. The subject of a passive is displaced, so why should this cue work differently for passives?[19] Recall that the learning problem tackled here is not only about discovering the underlying structure of an opaque string, but also about predicate categorization: Which kinds of predicates are displacing predicates? Which kinds of predicates are not? The question of predicate categorization is important for language acquisition because the category, or subcategory, of a predicate lines up with its argument structure properties: displacing predicates don't select an external argument; non-displacing predicates do. And knowing the argument structure of a predicate is highly informative about the kinds of lexical meanings a predicate might or might not have (Gleitman, 1990).

The event or state denoted by a verb that can be either active or passive (e.g. kicking, seeing) has an agent and patient (kicker and kickee) or an experiencer and a stimulus (seer and thing seen), regardless of whether the verb is used in its active or passive form. The denotation of a verb like *seem* or *arrive*, or an adjective like *easy* does not have an agent or experiencer. The meanings of verbs like *kick* and *see* are in this way fundamentally different from the meanings of *seem*, *arrive*, or *easy*. Hearing an inanimate subject provides a key to unlocking the lexical meaning of *seem*, *arrive*, or *easy* in a way that it does not for *kick* or *see*. Put another way, *be kicked by* is in some sense a different "version" of *kick*, but *claim* is not another version of *seem*, *eager* is not a different version of *easy*, and *laugh* is not a different version of *arrive*. The latter pairs of predicates are lexically distinct in a way that the former (active–passive) are not.

Passives are unlike the other constructions considered here in another important respect: they are not entirely opaque. That is, there is no other construction that is *identical* to a full passive on the surface and does not involve a displaced subject. An active voice sentence can have a locative *by*-phrase as in *The girl threw rocks by the river*, but the morphology of the verb and lack of auxiliary disambiguate the constructions. Short, or truncated passives, however, do have an alternative underlying structure. As mentioned in the introduction, short passives with auxiliary *be* (as opposed to *get*) could have an adjectival structure instead. *The door was closed* could mean that the door was in the state of being in a closed position (adjectival passive), or that it underwent the action of being closed by someone (verbal passive). Borer and Wexler (1987, 1992)

[19] Even on an LFG account the NP assigned to the syntactic subject position is the theme, or semantic object, and so its syntactic position is not the canonical one given its semantic role. This non-canonical syntactic role assignment is parallel to displacement in movement-based frameworks.

exploited this ambiguity in their account of children's early passives: they suggested that what appear to be children's correct productions of the passive are really adjectival in their structure. What is the difference between the verbal and adjectival structures? In the case of verbal passives the internal argument of the verb raises from the complement of V to the subject position. In the case of adjectival passives the subject NP is a theme argument of the deverbal adjective. Following Stowell (1981) predicate adjectives form a Small Clause with their theme, with the theme argument being generated in an external position within the Small Clause. Thus, the movement to matrix subject position is different in the two cases: only in the verbal passive does the subject raise from an internal position. However, since the argument of adjectival passives is a theme it is free to be inanimate, just like the raised subject of verbal passives. So subject animacy will not help disambiguate these structures.

Given the important differences between the passive and the other displacing predicates, one might question whether it should be covered in the same volume. My argument for including it is that it involves the same (general) sort of syntactic displacement as the other constructions. Just like in raising, *tough*, and unaccusative constructions, the syntactic subject of a passive is not a semantic subject. So even though it lacks the extra puzzle of a truly opaque surface form, children still have to figure out that the syntactic subject is not the agent or experiencer of the verb. Moreover, this is a case where language acquisition data can help inform our theory of adult language structure. As we will see in Chapter 5 (Section 5.3.4), inanimate subjects are not as informative in terms of acquiring the underlying structure of the passive as they are for acquiring subject raising, *tough*-constructions, or unaccusatives. This might suggest that a derivational analysis of the passive is more likely to be correct than either a lexicalist analysis, which considers active and passive predicates to be lexically distinct, or Chomsky's (2001) approach which aligns the passive more closely with subject raising and unaccusatives.

The passive is relevant for a further reason: like most of the other displacing constructions covered in this book the passive has been argued to develop quite late in first language acquisition (Fraser *et al.*, 1963; Slobin, 1966; Bever, 1970; Horgan, 1978; Maratsos *et al.*, 1985; Borer and Wexler, 1987; Hyams *et al.*, 2006). While there is not strict agreement over when the passive is acquired, nor how to account for certain evidence suggesting apparent early acquisition of the passive (Crain *et al.*, 1987; Demuth, 1989; O'Brien *et al.*, 2006), most researchers of child language agree that there is something non-canonical about the passive in terms of development. In this sense, then, it forms a class with raising-to-subject and *tough*-movement constructions in that much of the

acquisition literature places its acquisition at a relatively late point. Again, though, I will argue that passive is different. We will see in Chapter 5 that while there may be a true delay in the development of the passive, contrary to the conventional wisdom children do not experience particular difficulty with subject raising or *tough*-constructions. Apparent evidence for the late acquisition of raising and *tough*-constructions will be argued to stem from effects of experimental methodology.

2.5 The learning problem

The question at hand is how children determine the underlying structures of the types of sentences just discussed, and, relatedly, how children categorize predicates as displacing or non-displacing predicates. In the first three constructions discussed (raising-to-subject, *tough*-constructions, and unaccusatives), the subject is displaced, yet the sentence's surface form is identical to that of a parallel construction without subject displacement. We saw that in each case, the displaced subject is free to be inanimate, while the parallel non-displaced subject generally must be animate (with a possible exception involving unergative verbs of emission; these are discussed in Section 3.1.2 in more detail).

So far we have been assuming that a given predicate is fundamentally either displacing (it never selects a subject) or non-displacing (it always selects a subject). However, the situation is somewhat more complex than this, as there are some predicates that can do both: they are ambiguous between being displacing and non-displacing predicates. These are verbs like *begin* (Perlmutter, 1970). Other ambiguous verbs include *start*, *fail*, *continue*, *need*, and *have*, as in *I have to go now*, or *There has to be some way out of here*. The ambiguous verbs can occur in all of the environments that allow both raising and control verbs.

(84) a. John needs to find Susan before she leaves town. (infinitive complement)
b. It needs to rain or else the crops will die. (weather-*it*)
c. There needs to be a peaceful resolution. (expletive subject)
d. What John needs is to relax a little. (pseudocleft)
e. John needs the car this afternoon. (transitive)

It turns out that these predicates provide quite strong support for the feature of subject animacy as the relevant cue for distinguishing both the (non-ambiguous) displacing predicates (*seem*, *tend*) from the (non-ambiguous) non-displacing ones (*claim*, *try*), and the displacing vs. non-displacing behavior of these ambiguous predicates (*begin*, *need*). Perlmutter's account of these verbs

is that there is a raising verb *need* and a control verb *need*, and what distinguishes them is whether the subject is volitional or not. In syntactic terms this would boil down to a difference in whether the verb takes an external argument, and external arguments typically bear a thematic role of agent or experiencer. Thus, what distinguishes the interpretations of an otherwise ambiguous string (like (84a)) is whether the subject is agentive or not. Animate subjects, then, can be volitional (agentive), so (84a) can have a control structure. But inanimate subjects cannot be agentive, so a sentence like (85) would have to have a raising structure.[20]

(85) The sheets need to be dry before we can put them back on the bed.

Thinking about how these facts apply to the learning procedure for categorizing unknown verbs, let us dispel two naive approaches. First, the learning procedure for discriminating raising verbs from control verbs cannot rest *solely* on the subject being animate or inanimate. According to this type of procedure if the subject is animate, a verb with an infinitive complement is a control verb; if the subject is inanimate, a verb with an infinitive complement is a raising verb. However, this fails to capture the right generalization. There are raising verbs that are not ambiguous between a raising and a control reading, yet they can occur with both animate and inanimate subjects. For instance, when *tend* is used with an animate subject, as in (87a), the sentence does not have a control structure. So, while ambiguous verbs like *begin* and *need* may have a control interpretation when used with an animate subject, and while certain raising verbs might be coerced into having control-like properties in the presence of an animate subject (as in (86), where emphasis on the verb is needed in addition to the animate subject), others cannot be so coerced (87) (see further discussion of these phenomena in Section 3.3.1, and see Asudeh and Toivonen (2012) for links between copy raising (*seems like*) and both raising and control).

(86) John wanted to SEEM to be smart (in order to impress Mary).

(87) a. John tends to shop on Tuesdays. (raising)
b. * John wanted to TEND to shop on Tuesdays.

In brief, children must allow *begin*, *need*, and other ambiguous verbs to have a control interpretation when they occur with an animate subject, but they must

[20] Recall a similar effect of animacy with adjectives like *ready* and *good*, although in that case the inanimate subject merely suggests an object gap in the infinitive; it neither requires an object gap nor does it actually make the adjective a *tough*-adjective. See Section 2.2.2.

not make this allowance for *tend* (and, in the unmarked case, they should not make this allowance for *seem* either).

The second naive learning account we must dispel has to do with using expletive subjects to discriminate these verb classes. Although raising and control verbs overlap partially in their distribution (both occurring in the frame *John verbed to predicate*), it is clear that they are distinguished in other contexts. As noted above, raising verbs and *tough*-adjectives (unaccusatives to a lesser degree) can occur with an expletive subject while control verbs cannot, and (some) control verbs can occur in certain other constructions such as pseudoclefts (*What John liked was to vacation in Florida*) and transitive expressions (*John wants a car*) that bar raising verbs (**What John seemed was to be nice/*John seemed his student*). Therefore, both inanimate arguments and expletives could serve as learning cues to displacing predicates, and transitive frames and pseudoclefts could point to non-displacing predicates. But it would be naive to propose that categorization of raising vs. control could be wholly explained by a simple default rule like the one in (88).

(88) i. Assume a verb taking an infinitive complement is a control verb.
ii. If that verb is heard with an expletive subject change the analysis to raising.

This rule will not work since a verb like *begin/need*, once it is heard with an expletive subject, will be incorrectly categorized as only a raising verb. The rule could, of course, be expanded so that if a verb is encountered with an expletive subject *and* in a transitive frame (as might happen with *begin* or *need*), the learner then determines that the verb is ambiguous. However, not all control verbs can occur in the transitive frame (**John hoped the winner*), and so that frame cannot serve as a general cue for the control verb class. It could only serve the highly specific purpose of signaling an ambiguous verb (in conjunction with the expletive cue). As a matter of course, we want to avoid requiring the learner to assume such specific rules that have relatively little buying power.

Ultimately, the learning procedure will need to rely on the cue of subject animacy probabilistically, in conjunction with other available cues (expletive subjects, transitive frames, etc.). While all of these cues undoubtedly play some role in children's learning of these constructions, the focus of this book will be on inanimate referential subjects. As we will see in Chapter 3 the link between inanimacy and derived arguments is cross-linguistically robust. But beyond that, there are reasons for viewing inanimate subjects as being at least

as good a cue as expletive subjects. One of them was just cited; namely, the problem of ambiguous verbs. In addition, there are five further reasons for focusing on inanimate subjects rather than expletives. Let us look at them each in turn.

(a) One reason for focusing on inanimate subjects is that expletives do not exist in every language, while inanimate NPs do. If we want our learning strategy to be plausible, it should be available to children learning any language, whether or not the language has expletives. For instance, null-subject languages lack expletives (e.g. Italian, Spanish, Mandarin, Japanese). In these languages, constructions which in English employ expletives simply have an obligatory null subject.

(89) *e* Sembra che Gianni sia stanco
Ø seems that Gianni be-SUBJ tired-M
"It seems that John is tired."

The difference between languages with expletives and languages without expletives may not be so grave after all, if we consider the fact that expletives are often homophonous with a non-expletive (i.e. referential) pronominal form, as in English for example. Thus, the learner must determine the difference between expletive *it* and referential *it*, and between expletive *there* and locative *there*, just as they must distinguish between *e* and *pro*. Nevertheless, if it is easier to distinguish between two overt forms than between two non-overt forms, children acquiring non-expletive languages would be at a disadvantage for acquiring displacing predicates if their learning strategy depended on expletives. I know of no comparative studies of the acquisition of displacing predicates between expletive and non-expletive languages, and in the absence of data bearing on this I will assume that a strategy relying on inanimate referential arguments is more universally applicable, and therefore more plausible, than one that relies solely on expletives.

(b) A second reason for focusing on inanimate subjects is that expletives are exceedingly rare in speech to children. As we will see in Chapter 6, it is quite likely that learners will encounter raising verbs with referential subjects before they encounter them with expletive subjects.[21] If this is true, then having a cue like inanimate referential subjects would be highly beneficial.

[21] In that chapter we will also see an interesting asymmetry between raising verbs and *tough*-adjectives, but the overall prevalence of referential subjects remains true for both types of predicates.

(c) Third, psycholinguistic research has demonstrated that animacy can have a powerful influence on how speakers interpret sentences – inanimate NPs tend to be interpreted as patients in locally ambiguous constructions (discussed in Chapter 4). Furthermore, the concept of animacy is something available to children from quite early in development, long before language production or even comprehension begins (Chapter 5). Expletives, on the other hand, are acquired significantly later (Kirby and Becker, 2007).

(d) Fourth, an inanimate referential subject is roughly as reliable a cue to the predicate being a displacing predicate as an expletive subject. Verbs that take a sentential complement (either infinitive or tensed) generally select either an agent or experiencer subject (external argument) or nothing at all. I do not know of sentential complement-taking verbs that select a theme external argument. Verbs of communication can take an inanimate source subject, as in *The manual says that we have to do step A first*, but verbs denoting mental states (*believe*, *know*, etc.) cannot have a source subject. Thus, if agents and experiencers are limited to animate NPs, then an inanimate NP could not be an agent or experiencer, and hence in a biclausal structure it is very likely to be derived.

(90) a. John gorps that it is sunny. (John = experiencer; gorp = non-displacing predicate)
b. # The rock gorps that it is sunny.
c. It_{expl} gorps that it is sunny. (gorp = displacing predicate)

(91) a. John gorps to be in the yard. (John = experiencer or theme; gorp = displacing or non-displacing)
b. The rock gorps to be in the yard. (rock = theme; gorp = displacing)
c. It gorps to be sunny outside. (gorp = displacing)

Expletives may in fact be a more informative cue for the narrow class of *tough*-adjectives (and raising adjectives, e.g. *likely*) than for raising verbs (see end of Section 2.2.2). There do not seem to be any truly ambiguous adjectives that can function both as *tough*-adjectives and control adjectives, and both *tough* and raising adjectives occur with expletives while no other adjectives do. There are some adjectives that admit both a subject-gap and object-gap reading, like *ready*, but these are not truly *tough*-adjectives as they do not occur with an expletive subject.[22]

(92) * It/there is ready to be a riot.

[22] I find the sentence *It's ready to rain* natural, but it feels colloquial and somehow not quite standard, like a use of *ready* in place of *about*, which is a raising predicate.

While expletives single out true *tough*-adjectives, as we saw in Section 2.2.2 when the subject is referential the subject- vs. object-gap reading is influenced (at least to some degree) by animacy. For example, consider again the sentences in (93).

(93) a. The girl$_i$ is ready [PRO$_i$ to eat e].

b. The sandwich$_i$ is ready [PRO$_{arb}$ to eat t_i].

In general, inanimate subjects are roughly as informative as expletives for determining that the subject of a biclausal construction is displaced, but what about monoclausal constructions? There are two things to consider, one which points to expletives being a better cue, and another which points to expletives being a worse cue than inanimate subjects.

In English and many other languages certain transitive verbs permit an inanimate subject as the external causer argument (e.g. *The poll results influenced voter turnout*). As we will see in Section 3.3 not all languages permit inanimate subjects of transitives, and some do not permit the subject to be less animate (lower on the Animacy Hierarchy) than the object. However, in languages that do permit inanimate subjects of transitives, like English, we don't want children to mistakenly construe these NPs as displaced. If inanimate subjects are a potential red herring in transitive constructions, then in the general grammar expletives might be a more decisive cue to displacing predicates than inanimate subjects. (No transitive verbs occur with expletives, but some – in some languages – can occur with inanimate subjects.)

On the other hand, there are two other types of monoclausal sentences that admit inanimate subjects, where the subject is in fact derived: unaccusatives and certain types of psychological verb (psych-verb) constructions.

(94) The letter arrived/The rock fell.

(95) The noise bothered me.

In English certain unaccusative verbs can occur with an expletive *there* subject while unergatives cannot.

(96) a. There arrived three letters in the mail yesterday.

b. * There danced three people at the party yesterday.

But occurrence with an expletive subject seems to be restricted to a subset of unaccusatives (*arrive*, *begin*, *come*, *go*) and is not a general property of this

class (**There fell a book off the shelf*). Moreover, psych-verb constructions do not allow expletive subjects at all.

(97) * There bothered me the noise.

For these kinds of constructions it would seem that inanimate NPs are a better cue than expletives.

(e) Finally, it is interesting to observe that expletives might not be an entirely unproblematic cue. There are predicates that can occur with expletive subjects but which do not, in fact, allow a referential NP to raise into that subject position. (These predicates do allow a CP to raise into subject position.)[23]

(98) a. It is likely that John left.
b. John is likely to have left.

(99) a. It is probable that John left.
b. * John is probable to have left.

(100) a. It seems that John left.
b. John seems to have left.

(101) a. It sucks that John left.
b. * John sucks to have left.

These predicates are potentially problematic because they mean that encountering an expletive subject is not definitive evidence that a lower NP can raise into subject position. Thus, the learner should not generalize from *seem* and *likely* to *suck* and *probable*.

At this point let me bring up a complicating factor relating to animacy: a very limited number of control verbs permit inanimate subjects. I am aware of only two verbs in English that allow this, *serve* and *help* (Rudanko, 1989):

(102) a. This pamphlet serves to explain the rules of the organization.
b. * It serves to rain.
c. * There serves to be a pamphlet.

(103) a. Oil helps to make the engine run smoothly.
b. * It helps to rain.
c. * There helped to be some oil in the engine.

[23] Chomsky and Lasnik (1977) account for the asymmetry between *likely* and *probable* by saying that *likely* selects a null complementizer while *probable* does not (p. 445).

(102b,c) and (103b,c) show that *serve* and *help* do not behave like raising verbs. On the other hand, these verbs may have some kind of hybrid status. Note that *help* does allow a pleonastic *it* subject with a tensed complement: *It helped that the engine was well lubricated* (*serve* does not have this capacity). But the status of this construction is not quite clear in terms of verb category diagnostics. While some raising verbs can occur in this context (*It seems that John is nice*), not all of them can (**It tends that John is nice*).

Further support for a hybrid account of these verbs is that *help* and *serve* appear to allow a Quantifier Lowering-type of interpretation (in fact, my judgment is that the QL reading is preferred), which suggests that they may in fact both have some properties of raising verbs.[24]

(104) Justifications don't serve to help your case.
= (?)There are justifications that don't serve to help your case
= No justifications serve to help your case

(105) A ticket doesn't help to prevent one from speeding.
= (?)There is a ticket that does not help prevent one from speeding
= No ticket helps to prevent one from speeding

The fact that there are verbs that display some properties of raising verbs but other properties of control verbs, thus having a sort of hybrid status, should not derail the learning process. Instead, these counter-examples to the general trend are a reminder that the learning process needs to be probabilistic and not deterministic: a single counter-example should not throw off the categorization of verbs that adhere to the main trend. The probabilistic nature of the learning strategy will be the focus of Chapter 6.

To summarize, we have seen that raising-to-subject, *tough*-constructions, unaccusatives, and passives all involve a structure in which no external argument is projected. Instead, an NP derived either from an internal argument position (passives, unaccusatives) or from an embedded clause (raising, *tough*-constructions) occupies the matrix subject position. Due to the lack of a thematic selectional relationship between the subject and the matrix verb, the subject is free to have any semantic features as long as they are compatible with the predicate that selected it, and thus in principle can be inanimate.

Superficially similar to these constructions (except the passive) is a set of constructions in which the subject *is* the external argument of the matrix predicate and is thus subject to the semantic selectional requirements of that predicate. In these cases, the subject generally must be animate. I have

[24] I'm grateful to Kyle Johnson for this suggestion and for discussion about this effect.

proposed that animacy can be used as a learning cue by children to distinguish these superficially similar strings according to their correct underlying structures. Specifically, hearing a (biclausal or intransitive) sentence with an inanimate subject provides a clue that the subject is likely to be displaced. In the next chapter we will look at how animacy relates to argument structure, and how inanimacy is a frequently attested property of derived subjects across a variety of languages.

3.3.1.1 Bleached control verbs, copy raising, and the sliding scale of raising–control

Cross-linguistically there is both relative uniformity in the semantic features of raising and control verbs, and also within languages we can see that, broadly speaking, raising and control verbs can be distinguished according to particular diagnostics (see Section 2.1). But it turns out that neither raising verbs nor control verbs are completely uniform either syntactically or semantically. In this section I'll discuss some of the syntactic and semantic variation we find, within English and certain other languages, in these classes of verbs.

The unacceptability of inanimate subjects with control predicates is semantic in nature, hence the # diacritic (rather than *) in sentences like *#The book tried to be interesting*. They are ill-formed in the same way as a sentence like *#The paperweight devoured a rainbow*. Metaphorical extension permits language users to bend the canonical semantic rules, either by attributing animate qualities to an inanimate object or by modifying a predicate's typical meaning (the latter is known as the Verb Mutability Effect; Gentner and France (1988)). In the present case, modification of a control predicate's meaning to make it more like a raising verb would involve a bleaching of its lexical meaning, i.e. making it more auxiliary-like.

To give a concrete example, many speakers of English find the sentence in (67) marginally to perfectly acceptable, even though it violates the ban on control verbs taking a weather-*it* subject.

(67) It seems like it wants to rain.

This example actually brings to light two independent issues that raise problems for the dichotomy between raising *qua* non-thematic verbs and control *qua* thematic verbs. The first problem has to do with the ability of *want* to lack a thematic subject. The second has to do with the ability of *seem* (and similar raising verbs) to take a thematic subject. We will look at each of these briefly in turn.

The sense of *want* in (67) lacks the usual meaning of 'desire' that *want* has when used with animate subjects. Instead it has more of a sense of meaning 'potential.' Note that such a meaning is often associated with modals (*could*, *might*), which are arguably raising verbs (Wurmbrand, 2001). Thus, *want* in this case could be said to have a comparatively semantically "bleached" meaning. As an aside, I think it plausible that the acceptability of *want* with a weather-*it* subject is enhanced by being embedded under *seem*; *??It wants to rain* strikes me as less acceptable than (67). If this intuition is correct, I suspect the reason is that the appearance-denoting matrix predicate allows the embedded proposition more flexibility in terms of its own denotation. Note that since the verbs *seem* and *appear* allow both true and false appearance interpretations, one can easily embed absurd or patently false propositions under them and maintain plausibility of the entire proposition (*(While John was tripping on acid) It seemed (to him) like the sky was filled with floating elephants*). (I don't mean to imply that people who find (67) acceptable are hallucinating; rather, my point is simply that embedding a predicate under *seem* could enhance its mutability.) On the other hand, the ability of control verbs to take on this type

of bleached or auxiliary-like meaning, even when embedded under a verb of appearance, seems to be limited. Note that *try* seems somewhat more marginal in the same context, and *claim*, *decide*, and *forget* are outright impossible.

(68) a. ?? It seems like it's trying to rain.
b. # It seems like it's claiming to rain.
c. # It seems like it decided/forgot to rain.

The control verb *try* appears to be quite natural in other contexts with an inanimate subject, provided the inanimate subject bears certain P-Agent properties in Dowty's sense. For example, consider a situation in which one's car won't start. One can easily utter (69), but neither of the sentences in (70).

(69) The engine didn't even try to turn over.

(70) a. # The engine didn't even claim to turn over.
b. # The engine didn't even remember to turn over.

The relative acceptability of these control verbs with inanimate or weather-*it* subjects appears to support a continuum, with verbs like *claim*, *decide*, and *remember/forget* being more canonically control, *try* being less so, and *want* even less canonically control. Relatedly, although English *want* is standardly categorized as a control verb, it also has certain unusual properties. Its control-like behavior is seen in its inability to take expletive subjects (modulo the discussion about (67) above) or to exhibit the scopal ambiguity found in raising constructions.

(71) * There wants to be a solution to this problem.

(72) Someone from New York wants to win the lottery.
a. = There is someone from New York who wants to win the lottery.
b. $\neq$ It is wanted that the person who wins the lottery (whoever that is) is from New York.

On the other hand, it deviates from more canonical control or transitive verbs in some respects. Although it can function as a transitive verb it is awkward under passivization, even as near synonyms easily permit passivization.

(73) a. We want that outcome.
b. * That outcome was wanted.
c. That outcome was desired.

In many Romance and Germanic languages the verb meaning 'want' is a modal, and modals are often argued to be raising verbs – Wurmbrand (2001) specifically argues that all modals are raising verbs, though she gives a special treatment of the German modal *wollen* 'want.' Even in English it exhibits certain modal-like properties such as taking a bare verb complement in *wanna* contraction (*I wanna go*) (Postal and Pullum, 1978; Pullum, 1997).

Indonesian also offers an example of this kind of variable behavior, as the verbs in this language meaning 'want' can function as raising verbs. Polinsky and Potsdam (2008) demonstrate that the Indonesian verbs *mau* and *ingin* 'want' take a clausal complement and allow an unusual interpretation when that complement clause is passivized. In contrast to English, both (a) and (b) are possible interpretations of (74) (from Polinsky and Potsdam (2008, p. 1618); the same type of reading is permitted with 'want' verbs in other Austronesian languages).

(74) anak itu mau/ingin di-cium oleh ibu
child that want PASS-kiss by mother
a. "The child wants to be kissed by the mother"
b. "The mother wants to kiss the child"

Polinsky and Potsdam argue that the interpretation in (74b) comes about through syntactic raising, rather than through the operation of backwards control (meaning that the controller is c-commanded by the controllee, attested in, for example, Malagasy (Potsdam, 2006)) or clause union ('want' and the lower verb occur together in a single clause, e.g. Aissen and Perlmutter (1983)). The raising analysis appears problematic from the view that a verb meaning 'want' selects an external experiencer argument, i.e. it needs to have a "wanter." Polinsky and Potsdam's solution, briefly, is that the Indonesian 'want' verbs are semantically similar to the so-called "subject-oriented adverbs" (*deliberately*, *intentionally*), and thus semantically require an animate (in this case, experiencer) argument but do not select this argument syntactically.

For our purposes, what is important to note is that, consistent with the construction in (74) involving A-movement, the derived subject may be inanimate (75). And consistent with *mau/ingin* having a semantic requirement for an experiencer, (76b) is ill-formed.

(75) rumah itu mau/ingin di-hancurkan oleh mereka
house that want PASS-destroy by 3p
"They want to destroy that house"

(76) a. kota ini di-hancurkan oleh api
town this PASS-destroy by fire
"This town was destroyed by fire"

b. # kota ini mau/ingin di-hancurkan oleh api
town this want PASS-destroy by fire
"#Fire wants to destroy this town"

In addition to control verbs forming a continuum from "more control-like" to "more raising-like," we will now see that a symmetrical continuum is appropriate for raising verbs. Sentence (67) is an instance of "copy" raising (Rogers, 1974; Potsdam and Runner, 2001; Asudeh, 2002; Asudeh and Toivonen, 2012, among many others). In a copy-raising construction, a pronominal "copy" of the matrix subject (in (67) it is weather-*it*) appears in the finite lower clause, typically in the subject position of the lower clause. The copied pronominal subject can also be referential, as in (77).

(77) Richard seems like he is in trouble.

Sentences like (77) have the same truth conditions as the standard raising sentences like *Richard seems to be in trouble*, as well as the unraised version *It seems (like/that) Richard is in trouble*.[15] The challenge that the copy-raising construction poses is this: if *Richard* is raised from the embedded clause (a) what motivated that movement, since it moved out of a finite clause and therefore out of a Case position, and (b) why is its trace expressed as an overt pronoun? One way to solve this conundrum is to argue that in these cases, *seem* actually selects its own (thematic) subject and therefore does not involve raising at all. For example, in (78a–b) *seem* appears to be able to assign a θ-role to PRO, and *seem* has a meaning along the lines of "give the impression of" (or, "intentionally seem"). (These examples are from Potsdam and Runner (2001), but note that Potsdam and Runner do not in fact argue that *seem* is a thematic verb in copy-raising constructions.)

(78) a. The workers$_i$ want [PRO$_i$ to at least seem like they are busy.]

b. It is important [PRO$_{arb}$ to seem like you want the job.]

On the other hand, *seem* can clearly be non-thematic in a copy-raising construction, as in (79). Here the copy raising *seem* is able to host an expletive

[15] This is not to say that the copy raised and non-copy raised sentences are semantically identical. See Rett *et al.* (2013) for discussion about asymmetries in the evidential status of these constructions.

subject or part of an idiom in its subject position ((79b) is due to Horn (1981)).[16]

(79) a. % There seem like there are problems.
b. It seems like it's raining harder than it is.
c. The shoe looks like it's on the other foot.

To reconcile these apparently conflicting properties, some researchers have suggested that *seem* is ambiguous between being thematic (assigning a θ-role to its subject) and non-thematic. If *seem* is lexically ambiguous between being raising and control, we would expect this ambiguity to surface even in more canonical raising constructions, i.e. when it takes an infinitive complement. In fact, this appears to be the case. My own judgment is that the infinitive counterparts of (78) also allow this intentional sort of meaning, though emphasis on *seem* is needed (cf. *The workers want to at least SEEM to be busy*; see also Section 2.5).

Potsdam and Runner (2001) argue that even though *seem* need not assign an external θ-role, sentences like (77) involve a base-generated subject that is co-indexed with the lower pronoun. Evidence for base-generation comes from scope effects. Recall from Chapter 2 that raising verbs allow scopal ambiguity not allowed by control verbs, and this is attributed (on derivational accounts) to the fact that a raising verb's subject is derived and can therefore reconstruct to its underlying position at LF.

(80) Two people seem to have won the lottery.
two > seem; seem > two

(81) Two people seem like they have won the lottery.
two > seem; *seem > two

(82) Two people tried to win the lottery.
two > try; *try > two

Thus, *seem* behaves like a control verb in taking an external argument when it occurs in a copy-raising construction (the same holds for *appear*). Note, however, that not all raising verbs have this property. For example, *tend* and *happen* are completely ungrammatical in a copy-raising type construction. This is probably related to the fact that *seem* and *appear* are the only raising verbs that permit a tensed clause complement at all.

[16] The symbol % indicates inter-speaker variation in acceptability. In my own dialect (79a) is well-formed.

(83) a. * John tends like he eats fish on Fridays.

b. * It tends that John eats fish on Fridays.

So certain raising verbs (notably those whose meanings relate to appearance) appear to be able to function as control verbs, taking a thematic subject. This kind of intermediate behavior is suggestive of a continuum in which some verbs have more canonical raising or control properties while others display hybrid properties, rather than a strict dichotomy. As previewed at the beginning of this section, such a continuum will have repercussions for the learning procedure proposed in Section 3.5. And as we will see in Chapter 5, children's interpretations of these predicates is in line with their continuous nature: for example, children appear to grant intermediate status to the verb *want*, allowing it to have a more modal-like, or semantically bleached meaning that is compatible with its functioning as a raising verb.

(84) control ..... raising
decide try want seem/appear turn out happen/tend