

UNIVERSITY OF CALIFORNIA  
Los Angeles

Argument Intervention in the Acquisition of A-movement

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requirements for the degree Doctor of Philosophy  
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by

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ABSTRACT OF THE DISSERTATION

**Argument Intervention in the Acquisition of A-movement**

by

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This dissertation investigates the acquisition of subject-to-subject raising (StSR) in English. The goal is twofold: to determine whether StSR predicates that permit experiencers (1) are delayed relative to those which do not (2), and to link the acquisition of StSR to that of other A-movement structures.

- (1) William seems (to Leonard) to be dancing.
- (2) William is about/is going/tends (\*to Leonard) to be dancing.
- (3) William was seen (by Leonard).

This work is inspired by a dichotomy in the acquisition of A-movement: children are delayed in acquiring adult comprehension of verbal passives (3) (Slobin 1966, a.o.) and StSR with experiencer-type predicates (1) (Hirsch et al. 2008, a.o.), but they are not delayed with all A-movement. For example, in the active voice, subjects A-move out of the verbal domain (e.g. Koopman and Sportiche 1991), yet children have no difficulties correctly placing the subject outside the VP (Stromswold 1996). How can children's delay be defined such that it only impacts certain A-movement structures?

In this dissertation, I present findings from seven experimental studies which reveal that children comprehend and produce StSR with non-experiencer predicates (2) by four years old, while remaining selectively delayed on StSR with experiencer predicates until as late as six. Further,

a within-subjects comparison of finds an over 96% correspondence between the development of comprehension of verbal passives and experiencer-type StSR. This data suggests that children have no a priori difficulty with the process of A-movement itself; rather, their difficulty is caused by a specific trait that experiencer StSR and verbal passives share.

I take the relevant trait to be A-movement over the experiencer and by-phrase arguments, and propose the Argument Intervention Hypothesis (AIH): children are delayed in acquiring those structures which require A-movement across an intervening argument; namely, those which seem to violate Relativized Minimality (RM, Rizzi 1990) or a similar alternative formulation.

The AIH successfully captures the acquisition time course of several A-movement structures, including those described above. It also makes clear predictions about which untested A-movement structures are expected to be acquired late, both within English and cross-linguistically: children should be delayed in all structures that involve A-movement across an intervening argument.

The dissertation of Robyn Marie Orfitelli is approved.

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To Mr. Bear, for being so silly.

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DISSERTATION HAIKU

Kids love A-movement,  
but alas! Intervention  
will get in their way.

# CHAPTER 1

## The developmental problem of A-movement

### 1.0 The developmental problem of language acquisition

One of the most heralded characteristics of human language is the ease and rapidity with which children acquire it. First-language learners are exposed to input which is incomplete and error-filled, yet by the age of three years they have obtained an impressive mastery of many of the grammatical characteristics of their language. This apparent predisposition towards language is balanced by a few striking gaps as well; children demonstrate non-adult production or comprehension of certain syntactic structures until quite late in development. How can we characterize the process of language acquisition so as to explain how young children can rapidly master most aspects of their native language while simultaneously showing persistent areas of delay? Further, what do these areas tell us about the underlying grammar of individual languages and human language in general?

This problem, referred to as the ‘developmental problem of language acquisition’ (Hyams 1986), can be characterized as follows: if children are endowed with a rich mental structure of language and have access to primary linguistic data, then why aren’t *all* parts of language acquisition “instantaneous” (barring learning the idiosyncrasies of a specific language, e.g. lexical items) as in the familiar idealization by Chomsky (1965)? What characterizes the highly specific delays, stages and errors that we find in development, and how do children transition to adult-like final knowledge in these areas?

This dissertation addresses one particular instance of reported delay: the late acquisition of subject-to-subject raising (StSR) (4). Through seven experimental studies, I endeavor to determine what knowledge children have about StSR and to identify the cause of any errors they make.

- (4) {William/he} seems (to Leonard) to kiss a lot of aliens.

The fundamental characteristic of StSR predicates such as *seem* in (4) is that they select for a clausal complement and no external argument. Although the subject DP bears nominative case, it does not stand in a thematic relationship with the matrix raising predicate; in (4), *William* is understood to be the ‘kisser’, but not the ‘seemer’. In most modern generative accounts of StSR, the surface subject DP is therefore analyzed as initially merging as the subject of the embedded predicate, and then moving to Spec, TP of the matrix clause to satisfy the Extended Projection Principle (EPP, Chomsky 1981), or a similar alternative. As each of the positions involved in this process are argument positions, associated with either a thematic role or case, StSR is an instance of A(argument)-movement (as compared to  $\bar{A}$ -movement, which terminates in a non-argument position). In (4), the argument *William* receives its thematic role from the embedded predicate, but nominative case from the tense head of the matrix clause.

The acquisition of StSR has become an important topic for both acquisition and theoretical syntax, in light of a long-standing debate about whether the verbal passive, another instance of A-movement, is delayed in acquisition. The lack of clarity regarding the nature and extent of the passive delay has spurred investigations into the acquisition of other A-movement structures, including StSR. While recent experimental work suggests that English-speaking children are delayed in comprehension of certain types of StSR sentences (specifically ones like (4)) (Hirsch & Wexler 2007b; Hirsch, Orfitelli & Wexler 2007, 2008), remaining empirical gaps leave the cause of this delay - and its relationship to the verbal passive - unclear. In this dissertation, I present new experimental and naturalistic evidence regarding the acquisition of StSR, as well as a discussion of how these data bear on the ‘developmental problem’ with regard to both A-movement acquisition and the underlying structure of StSR.

The remainder of Chapter 1 describes previous research that bears on my investigation of StSR. I begin with studies on the acquisition of the verbal passive. The passive has an older and more extensive literature than that on StSR, and provides both historical context and a crucial point of comparison for work on the acquisition of other A-movement structures, in this case StSR.

## 1.1 Acquisition of passives in English

The verbal passive (5b) is possibly the most studied sentence structure in language acquisition.

- |     |    |                                |                |
|-----|----|--------------------------------|----------------|
| (5) | a. | George kicked Walter.          | <i>Active</i>  |
|     | b. | Walter was kicked (by George). | <i>Passive</i> |

In Chapter 2, I will discuss in greater detail the syntactic characteristics of the passive as they relate to the current study. Briefly, however, the most salient traits of the passive are the following: first, while the passive appears to mean something quite similar to its active voice variant (5a), the structural object of the active verb (*Walter* in 5) appears in canonical subject position in the passive. In modern generative analyses of the verbal passive, this relationship is not coincidental, but involves promotion of the object to subject position through either a lexical operation (Bresnan 1982) or A-movement (Jaeggli 1986; Roberts 1987; a.o.). At the same time, the subject of the active sentence is ‘demoted’ to an optionally pronounced *by*-phrase at the end of the sentence.<sup>1</sup> Finally, case assignment differs between the passive and active voice: structural accusative case, normally assigned to the object in an active sentence, appears to be missing in the passive, and the promoted object receives nominative case instead.

The English verbal passive therefore consists of a cluster of syntactic properties, each of which distinguishes it from active transitive sentences and may, individually or in some combination, pose a learning issue for children. Indeed, a large body of evidence suggests that children are delayed in acquiring the passive as compared to the active. As early as the late 1950s, it was noted that verbal passives are rare in the speech of young English-acquiring children, both in natural (e.g. Harwood 2; Wells 1979) and elicited production (e.g. Hayhurst 1967; Maratsos & Abramovitch 1975; Baldie 1976). In addition, children appear not to comprehend passives in an adult fashion (e.g. Slobin 1966; Turner & Rommetveit 1967). These early studies represent only a small fraction of the acquisition research concerning the English passive; countless studies since have reported that, for young English-acquiring children, the verbal passive presents some form of difficulty in

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<sup>1</sup>I intend the term ‘demotion’ here to be purely descriptive, rather than to imply anything explicit regarding the status or position of the *by*-phrase, although it has been used that way in several analyses of the passive, including the Government and Binding analysis (see Haegeman 1994 for an excellent overview).

both production and comprehension.<sup>2</sup>

Contra this generalization, two recent studies report that English-speaking children are capable of comprehending verbal passives when specific pragmatic conditions are met. O'Brien et al. 2006 addresses the pragmatic licensing of the *by*-phrase, while Crawford 2012 deals with the more general issue of pragmatically licensing passive versus active voice. I will temporarily set these apparent exceptions aside, returning to them in Chapter 6 when new experimental evidence can shed light on a potential explanation.

There are three remaining issues which have complicated attempts to identify the nature and severity of children's difficulty with the passive voice, which are briefly discussed in the following sections: which 'auxiliary' is used in the passive (Section 1.1.1), the aspectual properties of the passive participle (Section 1.1.2), and the presence or absence of a *by*-phrase (Section 1.1.3).

### 1.1.1 The *get*-passive

In addition to the more 'canonical' variant of the passive given in (5b), English has a non-canonical passive involving the verb *get* (6).<sup>3</sup>

- (6) Walter got kicked by George.

Unlike the *be*-passive, English-acquiring children show no delay in acquiring the *get*-passive.

---

<sup>2</sup>Early research (Turner & Rommetveit 1967; Baldie 1976) found that children are much better at imitating and answering comprehension questions when passives feature non-reversible arguments (i) rather than reversible ones (ii). This is often hypothesized to represent real world knowledge of what certain objects can or cannot do to other objects, rather than indicating grammatical knowledge of the structure involved. To avoid this potential confound, more recent studies have exclusively used reversible arguments.

- i. The cake was eaten by the man.
- ii. The girl was kissed by the boy.

<sup>3</sup>In early work, the *get* of the *get*-passive was considered to be an auxiliary verb, analogous to *be* in the *be*-passive. Haegeman 1994, however, convincingly argues against such an analysis by showing that *get* syntactically patterns with main verbs (and against auxiliary verbs) with respect to *do*-support, subject-auxiliary inversion, and placement of negation.

In fact, virtually of all the passives produced by young children are *get*-passives, in both experimentally elicited speech (Harris & Flora 1982; Crain & Fodor 1989; Crain 1994; Marchman et al. 1991; Crain et al. 2009) and spontaneous speech (Nevins and Marton 2002). Although less research has focused on children's comprehension of *get*-passives, both Harris & Flora (1982) and Fox & Grodzinsky (1998) find consistently high levels of comprehension from children three to eight years old. Together, these studies suggest that children have no difficulties with the *get*-passive in either production or comprehension.

While a detailed discussion of the acquisition or syntactic structure of the *get*-passive is beyond the scope of this dissertation, it is worth noting that it differs in substantial ways from the *be*-passive (Alexiadou 2005, and *references within*). These differences are extremely relevant for future investigations of the acquisition of passives and related constructions, and I will return to them in Chapter 6.

### **1.1.2 Actional versus non-actional passive participles**

One of the most noteworthy findings concerning passive acquisition in English comes from a 1985 study by Maratsos, Fox, Becker & Chalkley, who found that their subjects' comprehension of the passive voice was delayed with only a subset of participles: those formed with 'non-actional' verbs (e.g. *hear, see, love, remember*), which are characterized as having non-agentive subjects and less directly affected objects. With 'actional' verbs (e.g. *kick, hit, kiss, carry*), which have agentive subjects and more directly affected objects, children did not show such difficulties.

Since that study, further research has shown that very young children—under the age of three to four years old—do not comprehend any verbal passives, regardless of aspectual type (Hirsch & Wexler 2006b). However, while children reach adult comprehension of actional passives by



age four, the delay with non-actional passives persists until the age of six or seven years.<sup>4</sup> The difference does not appear to be due to an inherent difficulty with non-actional verbs, since no significant difference has been found at any age for comprehension of the two verb classes when used in the active voice. Thus, there is an interaction between verb class and grammatical voice which causes English-speaking children to be selectively delayed on non-actional passives (Table 1.1).

**Table 1.1:** Children’s comprehension of sentences by voice and verb type

	Active Voice	Passive Voice
Actional Verb	Adult-like from earliest age tested	Adult-like by ~3 years
Non-Actional Verb	Adult-like from earliest age tested	Non-adult-like until ~6 years

Virtually every study of English acquisition that has crossed voice and verb type has found evidence of such an interaction (Maratsos & Abramovitch 1975; Maratsos, Fox, Becker & Chalkley 1985; Sudhalter & Braine 1985; Gorden & Chafetz 1990; Fox & Grodzinsky 1998; Hirsch & Wexler 2006b; 2006a). The sole exception to this generalization is a 2006 study by O’Brien, Grolla & Lillo-Martin, which will be discussed further in Chapter 6.

### 1.1.3 The *by*-phrase

As stated in Section 1.1, English passives may occur with or without a *by*-phrase (5b), with the two variants conventionally referred to as ‘long’ and ‘short’ passives respectively. In a 1990 study using the CHILDES database (MacWhinney & Snow 1985), Gorden and Chafetz found not only that the passive voice is extremely rare compared to the active voice in child-directed English (combined, *be*- and *get*-passives comprise only 0.36% of all adult utterances in the Brown Corpus

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<sup>4</sup>For actional passives, Hirsch & Wexler (2006b) report chance performance by children under the age of three to four years. For non-actional passives, however, the type of non-adult behavior is not consistent across experiments. Some studies have found that children perform at chance levels on such items (e.g. Hirsch & Wexler 2006b), while others have reported that children consistently interpret passive sentences as actives, taking the derived subject to be the agent of the participle and the *by*-phrase to be the patient (e.g. Fox & Grodzinsky 1998).

(Brown 1973)), but that long passives are even rarer than short passives. Given the paucity of passives in child-directed speech in English (for pragmatic or other reasons), it might be expected that children would produce few passives, and Horgan (1978) shows that that is indeed the case, particularly with long passives.

This production data led Borer & Wexler (1987) to propose that long passives are more difficult for children than short passives, and their influential suggestion remains widely accepted to this day. Once comprehension studies are considered, however, the validity of the assertion is not as clear cut. Although almost all studies investigating passive comprehension in English-speaking children (and adults) find slightly better performance on short passives than long passives (Gorden & Chafetz 1990; Hirsch & Wexler 2006b, 2006a; O'Brien et al. 2006), the difference is not statistically significant, even in studies with large numbers of subjects, such as Hirsch & Wexler 2006b.

The exception is a subset of children tested in a 1998 study by Fox & Grodzinsky. While five of thirteen children performed equally poorly on both long and short non-actional passives, eight of the children performed significantly better on short non-actional passives than long non-actional passives (all children performed well on actional passives). While the discrepancy is intriguing, a number of considerations make it questionable. First, this is the only study that found a consistent split based on passive length. By comparison, in Hirsch & Wexler's (2006b) study, 54 out of 60 children under the age of six showed non-adult (chance) comprehension of both long and short non-actional passives. Five of the remaining six (all over five years old) showed adult comprehension of both, while only one child performed significantly better on short non-actional passives. In addition, Hirsch (2011) and Hirsch & Wexler 2006b also outline a series of methodological concerns with the study, including a small number of experimental items and non-randomized conditions, which may have contributed to the different result.

Overall, despite the longstanding debate surrounding short and long passives in acquisition, the data suggest that young English-speaking children do not comprehend non-actional passives, irrespective of the presence or absence of the *by*-phrase.

### 1.1.4 Summary of English passive acquisition

To summarize, English children appear to be delayed in acquiring adult knowledge of verbal passives, although the picture is somewhat less clear than has often been presented. In Chapter 3, I present results from a new passive experiment, as part of a within-subjects comparison to two experiments on the acquisition of StSR. I will return to the question of English children's acquisition of the passive at that point.

## 1.2 Acquisition of passives cross-linguistically

Evidence of a delay in passive acquisition is not restricted to English; rather, non-adult comprehension of (canonical) verbal passives has been found in numerous Indo-European language families, including Germanic, Romance, and Slavic, as well as in non-Indo European languages such as Hebrew, Japanese, and K'iche'. The actional/non-actional distinction appears to be limited to English for reasons which will be discussed in §2.1.2. In other languages, non-adult comprehension of the passive voice extends to all verbal passives, regardless of the aspect of the participle. Table 1.2 provides the breakdown of languages in which a comprehension task has found a passive delay.<sup>5</sup>

Table 1.2 strongly supports the existence of a cross-linguistic generalization: children are delayed in acquiring 'something' related to passivization that is found in a wide variety of languages, including those above. While there are many options for what this 'something' might be, the sheer number of data points suggests that it nonetheless exists.

In contrast to the languages in Table 1.2, there are also several languages in which children seem to produce the passive voice at very early ages. In including Sesotho and Cantonese, there is also experimental evidence of early comprehension (Demuth et al. 2010 and Lau 2011, respectively), although in Sesotho, there is also comprehension data supporting late acquisition (Crawford

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<sup>5</sup>Debate exists regarding the correct classification of both Hebrew and Japanese. For our purposes, however, what is important is that they are non-Indo-European languages from distinct language families.

**Table 1.2:** Languages showing a delay in passive comprehension, by family

	Language Family	Language	Study
Indo-European	Germanic	German	Bartke 2004, a.o.
		Danish	Diderichsen 2001
		Dutch	Verrips 1996
	Romance	French	Sinclair et al. 1971
		Spanish	Pierce 1992a
		Catalan	Parramon Chocarro 2009
		B. Portuguese	Gabriel & Plunkett 2000
	Slavic	Russian	Babyonyshev & Brun 2004
		Serbian	Djurkovic 2007
	Hellenic	Greek	Terzi & Wexler 2002
Afro-Asiatic	Semitic	Hebrew	Berman 1985, a.o.
Altaic	Japonic	Japanese	Sugisaki 1999, Sano 2000
Mayan	Quichean	K'iche'	Pye 1992

2009).<sup>6</sup> Multiple explanations for early passive comprehension in these languages have been offered; however, I will defer specific discussion until Chapter 6, in conjunction with the apparent English exceptions from §1.1. Even abstracting away from the specific details, however, these cases need not necessarily be counterexamples to the generalization shown in Table 1.2. Instead, they should be viewed as useful tools for pinpointing the specific syntactic sub-structure behind children's delay. Typological work on the passive reveals an entire spectrum of passive-like behavior, and the passive(s) of a particular language can fall at many places between the 'canonical' and 'non-canonical' endpoints. Indeed, many of the structures referenced in Table 1.2, while passive-like in many respects, differ from the English *be*-passive in substantial ways (see Siewierska 1984).

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<sup>6</sup>Early mastery has also been claimed for K'iche' Maya (Pye & Quixtan Pox 1988), Zulu (Suzman 1985), Kiswahili and Kigirama (Alcock et al. 2011) and Inuktitut (Allen & Crago 1996). In contrast to Sesotho and Cantonese, however, these claims are based solely on production data. In the absence of comprehension data, it is difficult to compare these findings to the data in Table 1.2. The fact that children acquiring these languages produce passives indicates that some representation is available to them. However, it is unclear whether this representation has an underlyingly adult syntactic structure or an alternative one, as has been argued for English-speaking children's early passive productions (Borer & Wexler 1987; see §2.1.2). Indeed, in the case of K'iche', a later comprehension study found a delay in passive comprehension (Pye 1992), supporting the possibility that the children's spontaneous passive productions were not syntactically equivalent to those of the adults.

Within English itself, there are two types of passive which exhibit different syntactic behaviors. Children's early acquisition of the non-canonical *get*-passive as compared to the *be*-passive likely reflects one of these structural differences.

### 1.2.1 Summary of cross-linguistic passive acquisition

There is a substantial amount of data suggesting that children are delayed in acquiring some element of the verbal passive, although this element is likely not present in all passives, given the cases of 'early passives' just mentioned. In Chapter 2, I will outline numerous attempts to isolate which sub-structure is the cause of children's non-adult behavior. Anticipating that discussion, what we will see is that the currently available data is insufficient to adjudicate between the various existing proposals.

One difficulty in pinpointing children's problem lies in reconciling the data collected in different studies. As noted, some studies find early comprehension and/or production of the passive (e.g. O'Brien et al. 2006 for English; Demuth et al. 2010 for Sesotho), while other studies of the same language find non-adult comprehension until a late age (e.g. Hirsch & Wexler 2006a for English; Crawford 2009 for Sesotho). A second difficulty arises in several languages (including those for which only production data is available) in which children show early mastery of seemingly passive-like structures. Can we link this early mastery to a different underlying syntactic structure?

An in depth consideration of cross-linguistic variation in passives is somewhat orthogonal to the focus of this thesis, however. Instead, I approach the A-movement 'problem' by investigating the acquisition of another A-movement structure which shares some, but not all, of its syntactic characteristics with the verbal *be*-passive: Subject-to-Subject Raising (StSR). If English-speaking children's acquisition of these two structures can be linked to their shared syntactic behavior, then the same substructure may be cross-linguistically common to passives on which children show a comprehension delay, and absent in those passives on which there is no delay.<sup>7</sup>

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<sup>7</sup>Previous research has employed similar logic in examining the acquisition of unaccusatives (i), but the evidence remains mixed. Some studies report early acquisition (e.g. Snyder et al. 1995, for Italian), while others report delayed

### 1.3 Acquisition of subject-to-subject raising

I now turn to the acquisition of StSR (7), the focus of this dissertation.

- (7) James<sub>i</sub> seems [to be *t<sub>i</sub>* fixing the engine]

Like passives, StSR involves promotion of an argument from its thematic base position to the matrix subject position; however, the moved argument is not the object of the passive participle, but the subject of a non-finite embedded clause. Some examples of verbal StSR predicates include *seem*, *appear*, *look*, *tend*, *happen*, *used (to)* and *(be) going*, while examples of non-verbal StSR predicates include *(be) (un)likely*, *(be) certain*, *(be) sure*, and *(be) about*, among many others.

There are two other key characteristics of StSR predicates, each of which will require the introduction of specific terminology. The first is that a small subset of them, including *seem* and *appear*, permit an optional PP containing a DP argument with the thematic role of experiencer (8a-b). The majority of StSR predicates do not permit experiencers, as demonstrated in (8c) with the predicate *tend*.

- |     |    |   |                               |
|-----|----|---|-------------------------------|
| (8) | a. | James seems to be fixing the engine.              | <i>Short Experiencer StSR</i> |
|     | b. | James seems to Walter to be fixing the engine.    | <i>Long Experiencer StSR</i>  |
|     | c. | James tends (*to Walter) to be fixing the engine. | <i>Non-Experiencer StSR</i>   |

The three-way contrast in (8) nicely parallels a three way contrast between adjective and verbal *be*-passives in English (9).

- |     |    |                                  |                             |
|-----|----|----------------------------------|-----------------------------|
| (9) | a. | The door was opened.             | <i>Short verbal passive</i> |
|     | b. | The door was opened (by George). | <i>Long verbal passive</i>  |
|     | c. | The door was open (*by George).  | <i>Adjectival passive</i>   |

The terminology I will use to describe the sentences in (8) attempts to reflect this relationship. First, I divide StSR sentences into ‘experiencer’ StSR (e.g. with *seem*) and ‘non-experiencer’ StSR

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acquisition (e.g. Babyonyshev et al. 2001, for Russian). In Chapter 6, I return to the acquisition of unaccusativity at length, fitting it within the larger context of A-movement acquisition in general.

- i. William arrived in style.

(e.g. with *tend*). This is similar to the distinction between verbal passives (9a-b), which optionally select for a *by*-phrase, and adjectival passives, which do not. Next, within the class of experiencer predicates, I will refer to sentences with an overt experiencer as ‘long’, and those without one as ‘short’, in a direct parallel to the presence versus absence of the *by*-phrase in verbal passives.

The second notable characteristic occurs in a slightly different subset of StSR predicates, still including *seem* and *appear*, but also *happen*, *(be) (un)likely*, *(be) certain*, and *(be) sure*. In addition to selecting for a non-finite embedded clause, these predicates can also select for a finite embedded clause (10). The subject of the embedded clause does not undergo StSR. Instead, an expletive DP *it* appears in matrix subject position. Given the lack of raising in these utterances, they are often called ‘unraised’ sentences, a convention I shall follow in this dissertation for the sake of brevity.

- (10) a. It {seems/appears} (to Leonard) that William kisses a lot of aliens.  
       b. It {happens/is (un)likely/is certain/is sure} (\*to Leonard) that William kisses a lot of aliens.

The ‘experiencer’ versus ‘non-experiencer’ dichotomy introduced for StSR also holds for unraised sentences. The same predicates that permit an optional experiencer in their raised forms also permit one in their unraised form (10a), while the other predicates do not (10b).

While the body of acquisition research on StSR is nowhere near as substantial as for the passive, a growing number of studies of English-acquiring children find late development of adult comprehension for StSR with experiencer-type predicates. In contrast to research on verbal passives, these findings are fairly consistent (but cf. Becker 2006, discussed in §1.3.1). Using a picture selection task, Hirsch & Wexler (2007b) tested three- to nine-year-olds’ comprehension of StSR with the predicate *seem* and an experiencer argument (e.g. 8b), and found that children’s overall group performance did not differ from chance until the age of seven years. This poor comprehension could not be attributed to any conceptual or semantic difficulty with the raising predicate *seem*, as the majority of the children in all age groups (85.6% correct for three-year-olds) showed adult comprehension of unraised sentences with *seem* (e.g. 10a).

Additional experimental investigations using the Truth-Value Judgment Task (TVJT) methodology (described in detail in Chapter 3) have since replicated Hirsch and Wexler’s results, finding

that English-speaking children do not comprehend long experiencer StSR in an adult manner until approximately six to seven years old (Hirsch, Orfitelli & Wexler 2007; Choe 2011).<sup>8</sup> Similarly non-adult comprehension was found for short experiencer StSR sentences with both *seem* and the semantically related raising predicate *appear* (Hirsch, Orfitelli & Wexler 2007, 2008), suggesting that it is not the presence of an overt experiencer DP that is at the root of children's difficulties.

In contrast to the above studies, Becker (2006) argues that young English-speaking children *do* comprehend short raising sentences, based on the results of a grammaticality judgment task and a TVJ task, in which she finds adult performance on short experiencer StSR and non-experiencer StSR from children as young as three years old.

In the following section I will discuss these two experiments in detail, concluding that the results are due to a methodological artifact that also impacted a subgroup of children in the Hirsch, Orfitelli & Wexler (2007) study. As part of this discussion, in Sections 1.3.1 and 1.3.2 I will address the types of interpretations that children assign to StSR with *seem* and *appear*. In Section 1.3.3, I revisit the optional experiencer argument selected for by *seem* and *appear*, as well as other unique syntactic properties these predicates share, and suggest that they may be linked to children's delay. Following from this discussion, Section 1.3.4 compares the acquisition of verbal passives and experiencer-type StSR. Finally, in Section 1.3.5, I outline the direction and goals of the current study.

### 1.3.1 The deletion analysis

Becker's conclusion that English-speaking children have acquired StSR from an early age is based on data from two experiments. In the first, a grammaticality judgment task, three- and four-year-old children accept raising verbs with "compatible" predicates (11) while rejecting raising verbs with "incompatible" predicates (12), indicated by #. Becker uses "compatibility" to mean that the embedded predicate could reasonably apply to the subject DP, irrespective of the matrix verb.

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<sup>8</sup>I am only aware of one non-English study on the acquisition of StSR. A TVJ task on the Dutch verbs *schijnen* and *lijken* (both translated as *seem* in English) suggests that Dutch children are delayed in comprehension of raising structures until as late as eight years old (Koring 2007).



(11) The flower seems to be pink.

(12) #The flower seems to fly away.

Before drawing strong conclusions about these adult-like judgments, Becker considers the possibility that children are ignoring the raising verb and assigning (11) a meaning similar to the copular sentence in (13).

(13) The flower is pink.

In this case, children's judgments would be solely based on the feasibility of pairing the subject with the embedded predicate, and not on actual comprehension of raising. Endeavoring to rule out this possibility, Becker conducted a subsequent TVJ task, using the dichotomy between appearance and reality to distinguish *is* (the copular structure) from *seem* (the StSR structure). One scenario involved a white dog that walking under a purple light, thus appearing purple. Children were then asked to judge the truth of '*The dog seemed to be purple*'. If children had correctly parsed *seem* as an StSR verb, and had no trouble with the syntactic process of StSR, they should respond 'true', since the dog does in fact seem to be purple. If, on the other hand, children interpreted the item as a copular sentence, they should respond 'false' since the dog's fur is actually white. Children provided adult responses for the raising sentences in this second experiment, from which Becker concludes, along with her first experiment, that children have no difficulties with (short) StSR.

Hirsch, Orfitelli & Wexler (HOW 2008) raise a number of concerns regarding these two experiments, one of which I will outline here, as it directly relates to the issues addressed in the current study. Recall that Becker's hypothesis for the second experiment was that if children do not represent StSR sentences in an adult manner, they might ignore the raising verb entirely and interpret the sentence as copular, incorrectly answering 'false' to '*The dog seemed to be purple*'. This hypothesis crucially assumes that the child would also answer 'false' to the simple copular sentence '*The dog was purple*.' This sentence was not tested, and the assumption that children would answer 'false' to it may not be warranted. Predicates such as *be purple* are ambiguous between an individual level interpretation, in which it is a fundamental quality of the dog that he

is purple, and a stage level interpretation, in which the dog is purple under a specific set of circumstances at a particular time. Given a scenario in which a white dog's fur changes appearance under a purple light, it is entirely plausible that children would assign a stage level interpretation to '*The dog was purple*', and answer 'true'. Therefore, we can no longer conclude anything about their performance on the StSR sentences.

In a pilot experiment, HOW (2008) tested a small group of English-speaking adults on a scenario identical to Becker's. Almost all adults judged '*The dog was purple*' to be acceptable in the context given. They justified their responses by stating that the dog was purple under the light since his fur looked purple (a stage level interpretation). When pressed if the dog really was purple (an individual level interpretation), all the adults changed their answer to 'false'. HOW then tested children using the same scenario and found that, like adults, they consistently accepted '*The dog is purple*' as a true description of the story. Also like adults, they changed their interpretation with the addition of the word *really*.

HOW's primary investigation consisted of a modified version of Becker's full-scale study with four similar scenarios (the dog scenario was retained). Three major changes were made. First, a copular declarative condition was included to test whether children were assigning a stage or individual level interpretation to the complex predicates like *be purple*. Second, an unraised condition was added to ensure that children knew the meaning of *seem* independent of StSR. Finally, the word *really* was added to all conditions as a modifier to the matrix predicate. While the copula condition was monoclausal, the unraised and raised conditions were biclausal. Thus, the addition of *really* served the important function of highlighting the matrix (as opposed to embedded) predicate. Sample items from HOW's study are given in Table 1.3.<sup>9</sup>

In the copula condition, *really* was intended to encourage an individual level interpretation of *be purple*. In the unraised and raised conditions, it – indirectly – accomplished a similar purpose. In order to test whether young children ignored the matrix predicate and treated StSR sentences as (in this case) copular sentences, it was paramount that the raised and copular items differed only

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<sup>9</sup>HOW 2008 additionally tested children's comprehension of subject control (e.g. The dog really wants to be purple/white), on which children performed perfectly from three years old, the youngest age tested.

**Table 1.3:** HOW 2008 sample test items by condition, with adult judgments

Condition	True	False
<b>Copula</b>	The dog really is white.	The dog really is purple.
<b>Unraised</b>	It really seems that the dog is purple.	It really seems that the dog is white.
<b>Raised</b>	The dog really seems to be purple.	The dog really seems to be white.

in the presence or absence of an StSR predicate. Similarly, an accurate comparison with unraised items required that they resembled the other conditions as closely as possible.<sup>10</sup>

With these alterations, the children in HOW's study ceased to interpret '*The dog really is purple/white*' as encoding stage level predication, instead taking the copula to indicate the permanent state of the dog (i.e. white). With this interpretation, they answered correctly on nearly all items. Furthermore, they showed non-adult performance on raised items, incorrectly answering 'false' to '*The dog really seems to be purple*'. Children's explanations for these answers suggest that they were ignoring the raising verb entirely. This is in stark contrast to unraised items, on which all children performed well.

It appears that Becker's original hypothesis was correct. When faced with StSR sentences they cannot interpret, one option young children have is to ignore the element of the sentence that causes them difficulty: the StSR predicate.<sup>11</sup>

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<sup>10</sup>Really is ambiguous between a meaning in which it serves as an intensifier, and one in which it links the sentence to reality. One might question the inclusion of really in raised and unraised items, given that for English adults, it is more plausibly interpreted as an intensifier in these cases, rather than the reality meaning it quite naturally receives in the copula items. This is true; however, if it were to cause children difficulties, we would predict that it should cause similar problems for both raised and unraised items. As the children included in HOW's final results all performed well on unraised items, the point appears to be moot.

<sup>11</sup>More evidence of a 'deletion' interpretation can be found in a group of children tested in a TVJ task in Hirsch, Orfitelli & Wexler (HOW) 2007. Although most children showed non-adult behavior on 'short' raised sentences (those without experiencers), a subset provided adult-like responses. Unlike the counterfactual scenarios used in HOW 2008, the raised test items in HOW 2007 were factive in the given scenarios; therefore, interpreting the raising verb (i) and ignoring it (ii) should both be judged true. Thus, as in Becker's study, children could have potentially

This permits them to build a syntactic structure that is similar to the embedded clause of the sentence. In the case of *seem*, which can be used in both factive and counterfactual circumstances, a structure without the raising verb can even permit the child to respond appropriately to their surroundings.

### 1.3.2 The external argument analysis

The deletion analysis is not the only logical option for children who lack an adult representation of raising sentences. StSR sentences are string equivalent to a different syntactic structure: Subject control (SC), as in (14).

(14) James wants to fix the engine.

Both StSR and SC predicates select non-finite clausal complements; the main difference between them is that StSR predicates do not select for an external argument, and SC predicates do. The subject of an SC sentence is therefore associated with both the matrix and embedded predicates, with a structure like in (15).

(15) James<sub>i</sub> wants [to PRO<sub>i</sub> fix the engine]

Becker (2006, 2007) outlines the problem that StSR and SC pose for children attempting to learn a language. Given that the two sentence types sound identical other than the choice of verb, how can the child learn which verb selects for an external argument, and which does not? Becker hypothesizes that before they receive enough unambiguous evidence to separate the two classes (consisting of the small set of sentences which distinguish them, for example unraised sentences), children may interpret raising and control verbs as members of one set: either all raising, or all control.

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provided the correct ‘true’ response without actually comprehending the test item as involving raising at all. In fact, children’s justifications supported this conclusion; all children who answered ‘correctly’ on items like (i) explained their response by making statements like (ii).

- i. Barbie seems to be wearing a hat.
- ii. Barbie is wearing a hat.

There are several reasons why it is theoretically appealing to presume that if children have initial difficulties distinguishing SC and StSR, their mistakes would be in the direction of misinterpreting StSR predicates as SC predicates, rather than the reverse. First, there is a large literature suggesting that children correctly interpret SC structures from as young as three years (Pinker 1984; Wexler 1992). Second, this explanation is attractive from a learnability standpoint, given traditional assumptions about subset relationships in language acquisition. As mentioned in Section 1.3, because raising predicates do not select for an external argument, they are compatible with expletive subjects such as *it* or *there* (16). Control predicates, conversely, are not compatible with either (17). Thus, if children were to incorrectly interpret an StSR verb in the frame ‘James \_\_\_\_ to be fixing the engine’ as a control verb, they would be able to correct this mistake once they had heard the verb in an unraised sentence (cf. Becker 2005, 2006, 2007 for an in depth discussion of this issue).<sup>12</sup>

- (16) a. It seems that James is fixing the engine.  
       b. There seems to be a strange man in the engine room.

- (17) a. \*It wants that James is fixing the engine.<sup>13</sup>  
       b. \*There wants to be a strange man in the engine room.

Experimental data supports the hypothesis that children can interpret short StSR sentences with *seem* as if they contain control predicates, selecting for an external argument. Hirsch, Orfitelli & Wexler (2007) designed a TVJ task starring the popular children’s dolls Barbie and Ken. One

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<sup>12</sup>Frank 1998 also offers arguments that children interpret StSR as SC because the former is more computationally difficult. This reasoning is tied specifically to a Tree-Adjoining Grammar analysis, however, and I will not discuss it in detail here.

<sup>13</sup>In some dialects of English, it is possible to use control verbs such as *want* with an expletive subject, specifically with weather predicates (e.g. *It wants to rain*). This is especially prevalent in British English. For the adult speakers of these dialects, it is likely that it is referential rather than expletive when used with a weather predicate (see Chapter 6 for further discussion of the referentiality of *weather-it*). It has been suggested that such sentences could incorrectly lead children to change their initial SC interpretation of *want* to an StSR one, due to the expletive. However, in ‘weather-*it*’ sentences, the predicate selects for a non-finite complement, unlike the finite complement selected for in unraised sentences. This makes them distinctly different from unraised sentences, and without experimental evidence, there is no a priori reason to assume that they would trigger such a switch.

scenario involved Barbie searching for her hat, entirely unaware that it is already on her head. Ken, who is standing far away, remarks to the child and experimenter that he can see something on Barbie’s head, and he is pretty sure it is her hat.

Children were tested for comprehension of four sentence types: long and short raised sentences, unraised sentences with an experiencer argument, and a simple declarative sentence with the verb *think*. Example sentences for the scenario described above are given in Table 1.4.<sup>14</sup>

**Table 1.4:** HOW 2007 sample test items by condition, with adult judgments

Condition	True	False
<b>Long StSR</b>	Barbie seems to Ken to be wearing a hat.	Ken seems to Barbie to be wearing a hat.
<b>Short StSR</b>	Barbie seems to be wearing a hat.	Barbie seems to be wearing a hat.
<b>Long unraised</b>	It seems to Ken that Barbie is wearing a hat.	It seems to Ken that Barbie is wearing a hat.
<b>Think-declarative</b>	Ken thinks Barbie is wearing a hat.	Barbie thinks she is wearing a hat.

The goal of the task was to assess whether children might interpret StSR predicates as having an external argument, similar to that of a SC sentence. What would the meaning of *seem* be if it were a control verb? The authors hypothesize that it might be somewhat related to the predicate *think*, leading the sentence to have a meaning similar to (18).

- (18) Barbie<sub>*i*</sub> thinks [PRO<sub>*i*</sub> to be wearing a hat].

While *think* is not a verb that can take non-finite complements in English, this is certainly a reading allowed in many languages. Hirsch & Wexler (2007b) provide the following examples from French (19) and German (20).

- (19) Jean pense                    porter un chapeau. [French]  
       Jean<sub>*i*</sub> thinks [PRO<sub>*i*</sub> to wear a hat].  
       ‘Jean<sub>*i*</sub> thinks he<sub>*i*</sub> is wearing a hat.’

<sup>14</sup>Different scenarios were used for the ‘true’ and ‘false’ versions of the short StSR and long unraised conditions, which is why the items are identical.

- (20) Franz denkt, einen Hut zu tragen. wear]. [German]  
 Franz<sub>i</sub> thinks [PRO<sub>i</sub> a hat to  
 ‘Franz<sub>i</sub> thinks he<sub>i</sub> is wearing a hat.’

Furthermore, the English verb *claim*, which has a meaning related to *think*, does function in this way (21) (Pesetsky 1991).

- (21) Barbie<sub>i</sub> claims [PRO<sub>i</sub> to be wearing a hat].

HOW find that the majority of children under the age of six or seven years consistently answer incorrectly on short raising items. Even when Barbie seemed to be (and was) wearing a hat, children would answer ‘false’ to ‘*Barbie seems to be wearing a hat*’ giving the justification that she did not know she was wearing a hat, as if they were assigning a control interpretation to the sentence.<sup>15</sup> In fact, children’s response justifications often took the form of “Barbie thinks...” or “Barbie doesn’t think...” These same children performed well on the unraised test items, demonstrating that the problem is not a lack of understanding of *seem*; rather, it is something related to the structure of the raised sentence.

While long StSR sentences are not string identical to control structures, HOW hypothesize that children permit a similar interpretation to the one they assign to short StSR: namely, one in which *seem* selects for an external argument and has a meaning akin to *think* or *believe*. The experiencer DP is interpreted as the thematic external argument of the embedded predicate, as in exceptional case marking (ECM)/subject-to-object raising (StOR) sentences (22).

- (22) Barbie believes/imagines/understands Ken to be wearing a hat.

This prediction also appears to be borne out. HOW 2007 find uniformly below chance performance on long StSR items. Given the experimental scenario in which Barbie is wearing a hat, for instance, children consistently answered ‘true’ to ‘*Ken seems to Barbie to be wearing a hat*’, supplying the justification that Ken thinks that Barbie is wearing her hat. For the reversed sentence ‘*Barbie seems to Ken to be wearing a hat*’, children consistently answered ‘false’, saying that Barbie did not think Ken had her hat because she didn’t know where it was.

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<sup>15</sup>A small subgroup of children appeared to utilize the deletion strategy instead, as discussed in footnote 11.

Importantly, only experiencer predicates, since they have two arguments, are compatible with an interpretation of the predicate similar to *think* or *consider* in an ECM or StOR configuration, as discussed above. Under this analysis, the PP experiencer would be interpreted as the base subject of the embedded clause, which raises to object position of the matrix clause.

### 1.3.3 Verbal passives and StSR

Overall, experimental evidence suggests that English-speaking children are delayed in acquiring experiencer-type StSR until approximately six to seven years old, the same age at which they attain adult competence with (non-actional) verbal passives. In each case, children are equally delayed in acquiring ‘long’ and ‘short’ variants; the presence or absence of an overt experiencer or *by*-phrase does not significantly impact their performance.

This correspondence does not merely exist for English-speaking children as a whole, but also for individual children. As part of their 2007b study, Hirsch & Wexler tested children on two tasks. The first was the StSR task discussed at the beginning of this section, which tested long StSR sentences with the predicate *seem*. The second task tested verbal passive comprehension, crossing actionality of the participle (actional versus non-actional) with passive length (long versus short). For 51 of 55 children included in this within-subjects analysis, performance on long experiencer StSR sentences (23) mirrored performance with both short and long non-actional verbal passives (24): if a child had acquired one, he had acquired both, and visa versa.

(23) Homer seems to Marge to be licking a lamppost.

- (24) a. Bart was seen by Lisa.  
b. Bart was seen.

As part of a recent dissertation, Hirsch (2011) reports additional, previously unpublished results from HOW 2008 that extend this finding. As part of this study, the children who participated in HOW’s StSR comprehension task, described in Section 1.3.1, were also tested on a verbal passive task, similar to the one just described. In this within-subjects comparison, children’s performance on non-actional passives (24) was compared to their comprehension of short StSR ((25),



repeated from Table 1.3).

(25) The dog really seems to be purple.

A 100% correspondence was found between comprehension of short StSR sentences with *seem* and non-actional verbal passives. Every child who performed at above chance levels on one of the two tasks performed at above chance levels on the other, and every child who did not perform at above chance levels (below chance and chance performance were collapsed) on one task also did not on the other.

Such a strong within-subjects relationship between the acquisition of verbal passives and StSR suggests that the delays are not independent, but share a common underlying cause. I will return to what this cause may be in Chapter 2, when I discuss several previous accounts of A-movement acquisition. In Chapter 3, I perform my own within-subjects comparison of experiencer StSR and verbal passive acquisition, and introduce a third comprehension task for a previously untested non-experiencer StSR predicate.

#### 1.3.4 *Seem and Appear*

Although the evidence points to the existence of some form of delay in acquiring StSR, an interesting limitation exists in previous research. StSR comprehension tasks in English have been restricted almost exclusively to the verb *seem* and the semantically similar verb *appear*. This is true for Dutch as well; in Koring's (2007) study, the two raising verbs tested were *schijnen* and *lijken*, both of which translate into English as *seem*. The one exception to this pattern is the TVJ task described in Becker 2006, which also included the verbs *used* and *tend*. Unfortunately, *tend* was excluded in Becker's final analysis, and the data for *used* is subject to similar criticism as the data for *seem* and *appear* (discussed in Section 1.3.1). If children had ignored *used* entirely, interpreting the StSR sentences as copular constructions, they could have answered correctly without assigning an adult syntactic structure, rendering this data uninterpretable.

The experimental focus on *seem* and *appear* is potentially problematic because these two verbs comprise a very specific class of raising predicate. Along with *happen* and *be (un)likely*, they can

appear in an unraised structure (26a), in contrast to aspectual/temporal StSR predicates, which cannot (26b).<sup>16</sup>

- (26) a. It {seemed/appeared/happened/was (un)likely} that Walter was wearing a hat.
- b. \*It {tended/used/looked/started/stopped/kept/was going/was about} that Walter was wearing a hat.

*Seem* and *appear* can also take a finite complement clause headed by the complementizers *like*, *as though* or *as if*. Neither *happen* nor *(un)likely* can take such complements, although the predicate *look* can, introducing yet another division among the StSR predicates. The subject of such a sentence may either be an expletive (27a), as in unraised sentences, or it may be a referential DP (27b). In the latter case, the subject of the matrix clause (*Walter* in (27b)) must co-refer with a pronoun subject of the embedded clause, and the sentence is considered to involve raising a copy of the DP argument (Rogers 1971, a.o.).

- (27) a. It {seemed/appeared/looked} like Walter was wearing a hat.
- b. Walter {seemed/appeared/looked} like he was wearing a hat.

An additional similarity between *seem*, *appear* and *look* is that they optionally select for an experiencer argument (28).<sup>17</sup>

- (28) a. Walter {seemed/appeared/looked} (to George) to be wearing a hat.
- b. Walter {happened/was (un)likely/tended/used/started/began/continued/was going/was about} (\*to George) to be wearing a hat.<sup>18</sup>

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<sup>16</sup>Begin and continue are partial exceptions to this generalization, although their ability to select a finite clause complement is restricted to an archaic register, and even then, is best when the described action is habitual (i).

- i. And thus it {began/continued} that Walter wore a hat every Sunday.

<sup>17</sup>There is an additional StSR predicate which permits an experiencer: *strike* (e.g. Leonard struck William as smart). With *strike*, however, the experiencer is obligatory (e.g. \*Leonard struck as smart), and appears as a DP rather than inside a PP headed by *to*. Due to these structural differences, I consider *strike* to be part of its own (possibly entirely unique) subclass of StSR predicates, distinct from the *seem/appear* subclass.

<sup>18</sup>*Stop* and *keep* are excluded, as they require a gerund complement, unlike verbs such as *start*, *begin* and *continue*, which allow both complement types. These two predicates, however, also do not allow an experiencer argument.

- i. \*John {stopped/kept} to Mary wearing a hat.

Experiencer StSR predicates are also rare cross-linguistically. Raising over a non-clitic experiencer is not allowed in Icelandic (Collins & Thráinsson 1996; Schütze 1997; Boeckx 1998), Greek (Anagnostopoulou 1997), and throughout the Romance language family (Rouveret & Vergnaud 1980; Rizzi 1986; Torrego 1996), shown in (29). The cross-linguistic rarity of the experiencer in raised StSR structures points to it being a marked phenomenon, which may be reflected in English-speaking children's delayed acquisition of StSR with *seem* and *appear*.

- (29) a. Gianni sembra (\*a Maria) essere stanco. (from Rizzi 1986)  
 Gianni seems to Maria to.be tired.  
 'Gianni seems to Maria to be tired'
- b. Sembra (a Maria) che Gianni 'e stanco  
 seems to Maria that Gianni is tired  
 'It seems to Maria that Gianni is tired'

*Seem* and *appear* are the only two StSR predicates to share this unique confluence of syntactic properties, which may have contributed to the poor performance on raised sentences noted in prior studies. Moreover, unlike aspectual raising predicates, *seem* and *appear* are quite conceptually difficult. They require children to understand the difference between appearance and reality, and also requires a mastery of Theory of Mind, the notion that unique individuals can experience different mental states. While children's adult-like performance on the unraised sentences and their justifications for these answers suggest that they understand the meaning of *seem* (Hirsch, Orfitelli & Wexler 2007, 2008), it nonetheless remains desirable to test other, simpler StSR predicates. Hirsch & Wexler (2007b) find that fully 37% of children do not comprehend *seem* in its unraised form, although the predicate is as common in child-directed speech as the verb *dance* (Hirsch & Wexler 2007b). The selection of an additional experiencer argument also adds a complexity that other raising predicates lack, both conceptually and syntactically. Indeed, Hyams & Snyder (2005) propose that it is the presence of this additional DP which is at the root of children's difficulties. I discuss the details of this account further in Chapter 2. For now, it is enough to note that a large gap exists in our understanding of the acquisition of StSR: how and when do children acquire knowledge of StSR in utterances with conceptually simpler predicates, and/or predicates which do not permit an experiencer argument?

### 1.3.5 Summary of the acquisition of StSR

As we have seen, there is some evidence that young children fail to understand raising in an adult-like manner. This evidence is suggestive, but questions remain, particularly because previous studies tested only *seem* and *appear*. In a series of seven studies, this dissertation asks whether children are routinely delayed in acquiring adult comprehension of StSR. If they are not, can we explain previous findings by appealing to either the lexical complexity of *seem* and *appear*, or the additional experiencer argument they permit?

In order to guide the presentation of this new data, I turn first to a discussion of several previous proposals that attempt to account for the acquisition of A-movement.

## CHAPTER 2

### Accounting for the acquisition of A-movement

#### 2.0 Grammar-based and input-based accounts

As discussed in Chapter 1, most research on the acquisition of A-movement has centered around the verbal passive. Most accounts of how and when A-movement is acquired have therefore focused on this structure. Accordingly, in reviewing accounts of A-movement acquisition, I will primarily concentrate on how well they capture the acquisition of the passive, keeping in mind the predictions they make regarding Subject-to-Subject Raising (StSR).

Of the many theories posited, most have fallen into two broad classes, depending on what mechanisms are held responsible for children's non-adult behavior and their transition to adult behavior. I will refer to these two classes as grammar-based accounts (e.g. Borer & Wexler 1987, 1992; Wexler 2004; Hyams & Snyder 2005) and input-based accounts (e.g. Maratsos et al. 1985; Pinker et al. 1987, Deen 2011). As the names might suggest, the core claim of grammar-based theories is that young children's non-adult behavior arises from a difference between their grammar and that of adults, largely irrespective of input, while input-based theories posit a much more direct connection between the input children receive and their grammatical performance and competence.

Although the terms 'grammar-based' and 'input-based' will be useful in our discussion, it is important to recognize that there are many conceptually possible explanations for the acquisition of A-movement which appeal to both the grammar and the input to varying degrees, and only a small subset of theories exist at either extreme of the spectrum. For instance, a parameter (mis)setting (Chomsky 1981) type account (which to my knowledge has not been proposed for the acquisition of A-movement) would posit that children use the input to decide between sev-

eral predetermined grammatical options related to the structural representation of A-movement. Thus, while at a given moment a child might have a non-adult grammar, the input is a crucial part of the transfer to an adult representation. This chapter will describe specific instantiations of grammar-based and input-based accounts, and evaluate them with respect to previous findings. In Chapters 5 and 6 I will return to the question of what type of theory best explains the development of A-movement structures, in light of the new data presented in this dissertation.

Many grammar-based accounts make strong predictions regarding acquisition for related sentence structures. By proposing that a child's grammar differs systematically from adults with regard to a specific sub-structure or process, all derivations that contain the same sub-structure or process should be similarly delayed for that child. Within a language then, we may expect to see developmental milestones for several grammatically related structures at a similar time, irrespective of differences in input frequency. Unfortunately, these co-occurrence effects may in principle be obscured by other syntactic differences which alter the timeline of acquisition, making positive evidence of co-occurrence much more compelling than negative evidence.

To a lesser extent, strict grammar-based accounts of passive acquisition also predict cross-linguistic similarity in the acquisition of a particular sub-structure. If children are delayed in acquiring a particular piece of grammar, then it is likely that we will find evidence of delay in those languages (and only those languages) which employ this same sub-structure. That said, superficial similarities between sentences in two languages may be misleading, as their underlying grammatical representation may not necessarily be identical in the relevant respect. Crawford (2005) makes such an argument in the case of early passive production in Sesotho, claiming that children's productions are predominantly 'resultative' passives (Embick 2004), which differ crucially from verbal passives in several ways, including the distance of A-movement involved.

In contrast to grammar-based accounts, input-based accounts do not take children to have a problem with the process of passivization itself. Rather, they claim that some facet of children's linguistic input, either within or across languages, determines when they will produce and comprehend verbal passives (cf. Deen 2011). Input accounts vary according to both the type and amount of input that is considered to be necessary and sufficient for children to acquire the relevant struc-

ture. They *tend* to predict greater variation (within and across languages) than grammar-based accounts, but this is not necessarily the case. On the whole, what such accounts predict is that variation in the input will correspond to variation in performance and/or comprehension.

In the remainder of this chapter, I describe several specific accounts for A-movement acquisition. In Section 2.1, I describe some early grammar-based accounts that have since been rejected on the basis of empirical data, beginning with Borer and Wexler's (1987, 1992) A-Chain Deficit Hypothesis. Then, in Section 2.2, I turn to input-based accounts. Finally, in Section 2.3, I describe two more recent grammar-based accounts, Wexler's (2004) Universal Phase Requirement and Hyams & Snyder's (2005, 2006) Universal Freezing Hypothesis. I then propose a new account, which I call the Argument Intervention Hypothesis.

## 2.1 Early grammar-based accounts

### 2.1.1 The A-Chain Deficit Hypothesis

The seminal grammar-based account is Borer and Wexler's (1987, 1992) A-Chain Deficit Hypothesis (ACDH), which states that immature children lack the ability to form A-chains. The majority of modern generative accounts of the verbal passive involve the formation of an A-chain between object position and the specifier of TP (setting aside temporarily the issue of the *by*-phrase). Abstracting away from specific details of individual theories, if we roughly assume the verbal passive structure shown in (1a), the ACDH will predict that children will have no way to establish the necessary thematic relation between the surface subject and the predicate, as A-chains are not yet available to them.<sup>1</sup> Similarly, as StSR (1b) involves A-movement, the ACDH predicts that children

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<sup>1</sup> Along with the ACDH, Borer and Wexler (1987, 1992) appeal to the concept of 'maturation': the idea that certain areas of language may be unavailable to children under a certain age because of constraints imposed by their immature biology—the cognitive equivalent of physiological limitations that are in place until the onset of puberty (Felix 1987). At a certain age, these constraints will no longer be in effect, and the child will transition to an adult grammar and be capable of producing and comprehending passives in an adult manner.

Although several accounts of passive acquisition have, either explicitly or implicitly, assumed maturation, I shall set aside the question of how children transition from non-adult to adult comprehension of the passive voice until

will be unable to represent the relationship between the surface subject and the predicate of the embedded clause.

- (1) a. Cheryl<sub>i</sub> was loved *t<sub>i</sub>*  
b. Brent<sub>i</sub> seems [to be *t<sub>i</sub>* smart]

The ACDH is thus able to capture children's difficulties with verbal passives and StSR, as well as the apparent link between the two structures in acquisition. Even as it was first formulated, however, certain empirical issues for the ACDH were recognized. As stated previously, the ACDH makes the strong prediction that all A-chains—not merely those found in verbal passives or StSR—are absent from immature children's grammar. This raises a question: How can we explain the actional/non-actional discrepancy in English children's passive comprehension? Borer and Wexler's solution to this problem was to posit that children do not actually comprehend actional passives in an adult manner, but are able to use an 'adjectival strategy' that leads them to an alternative (but closely related) interpretation. This strategy is unavailable for non-actional passives, leaving immature children with no way of interpreting them.

Although the adjectival strategy was initially proposed by Borer and Wexler, it is not conceptually dependent on the ACDH, and several subsequent theories have, either explicitly or implicitly, adopted variants of it. For this reason, I will consider the merits and drawbacks of the adjectival strategy independently in Section 2.1.2.

A second and more serious problem for the ACDH is that A-chains do not appear to be universally absent from young children's grammars. In active voice sentences, for example, there is evidence that subjects are merged internal to the verbal domain (Koopman & Sportiche 1991) before raising to Spec, TP. This is a clear example of A-movement, yet children are not delayed in correctly placing the subject outside the VP, as evidenced by its position relative to negation (Stromswold 1996). Even on more recent syntactic analyses, which completely dissociate external arguments from the verbal complex (cf. Kratzer 1996), movement to Spec, TP to satisfy the EPP forms an A-chain which the ACDH should rule out.

More recent research has provided additional evidence that certain structures with A-movement



are acquired early. For instance, experimental work shows that children comprehend Subject-to-Object Raising (StOR) (2) from as young as four years old (Kirby 2010). Like StSR, these sentences are argued to involve argument promotion from the subject position of the embedded clause, although unlike StSR, this A-movement terminates in the surface object position of the matrix predicate (cf. Postal 1974).<sup>2</sup>

- (2) Patrick believes Brent<sub>i</sub> [to be *t<sub>i</sub>* smart].

It thus appears that the ACDH is too strong of a hypothesis, predicting a delay for structures on which children perform well from the earliest ages. The challenge for subsequent theories of A-movement acquisition, then, is to derive a split between those instances of A-movement which appear to be delayed (e.g. verbal passives and StSR) and those which do not (e.g. active sentences and StOR). In addition, these accounts must explain the division between actional and non-actional predicates in English passive acquisition, which we turn to in the following section.

### 2.1.2 The adjectival (S-homophone) strategy

Alone, the ACDH cannot account for the interaction between voice (active vs. passive) and verb type (actional vs. non-actional) in English passive acquisition. If A-chain formation is uniformly unavailable to young children, some further explanation is needed to account for children's better comprehension of verbal passives with actional verbs (e.g. 3) as compared to non-actional verbs (e.g. 4).

- (3) Cheryl was kicked/hit/carried (by Patrick).

- (4) Cheryl was seen/heard/remembered (by Patrick)

To explain this interaction, Borer and Wexler appeal to the idea that children will always endeavor to parse an utterance, even if the adult representation is unavailable to them. Depending on

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<sup>2</sup>Another possible example of early A-movement acquisition are unaccusatives, which are argued to be acquired early in Romance languages and Hebrew. However, there is controversy surrounding the experimental findings, as well as disagreement concerning which sentence structures should be considered syntactically unaccusative as opposed to unergative. See Chapter 6 for discussion.

what this alternative structure is, children may be able to respond appropriately in either natural or experimental settings, even though their parse is non-adult like. In effect, they would be providing the right answer for the wrong reason. Applying this logic to the case of passives, Borer and Wexler note that in English, many verbal passives (5) are homophonous with adjectival passives (6).

- |     |   |                           |
|-----|---|---------------------------|
| (5) | The door was broken (by the wind).<br>(=describes breaking event) | <i>verbal passive</i>     |
| (6) | The door was broken<br>(=describes the state of the door)         | <i>adjectival passive</i> |

While verbal and adjectival passives have the same phonological surface form, Borer and Wexler take them to differ structurally in two crucial ways. First, they follow Wasow 1977 in assuming that adjectival passives are formed in the lexicon, and do not involve an A-chain. They are therefore not expected to be impacted by the ACDH. Second, Borer and Wexler take participles of actional verbs to be semantically compatible with adjectival passives, while participles of non-actional verbs are not. While acknowledging that exceptions to this pattern exist, they argue for a general contrast between the acceptability of non-actional (7) and actional (8) participles as adjectival modifiers (sentences from Borer & Wexler 1987; page 135).

- |     |  |
|-----|--|
| (7) | a. *the doll appears seen; *the seen doll; *seen though the movie was, John decided to go again.<br>b. *the doll appears liked; *the liked doll; *liked though the doll was, John did not keep it. |
| (8) | a. the doll appears combed; the combed doll; combed though the doll was, Janie re-combed her.<br>b. the doll appears torn; the torn doll; torn though the doll was, John decided to keep her.      |

The compatibility of actional predicates with adjectival passives provides English-acquiring children with a viable alternative structure for actional verbal passives, but not for non-actional verbal passives. When a child encounters a passive with an actional verb, the adjectival passive serves as what Babyonyshev et al. (2001) call a s(yntactic)-homophone for the verbal passive, a

phrase with distinct grammatical structure, but common pronunciation. Comprehension of non-actional passives, which have no s-homophone, is predicted to occur only once A-chains become available to children, permitting an adult-like analysis for all verbal passives.

This split between actional and non-actional passives arises in English because the adjectival strategy relies on the homophony between adjectival and verbal passives, and the former are primarily (although not exclusively) compatible with actional predicates. For other languages in which there is no homophony between adjectival and verbal passives, children are predicted to be delayed in acquiring all passives, not just non-actional ones. Indeed, in Greek (Terzi & Wexler 2002) and Hebrew (Berman 1985) adjectival passives are not homophonous with verbal passives, and children are delayed on all verbal passives.

A serious empirical problem for the adjectival strategy as it originally related to the ACDH comes from recent work in the syntax of adjectival passives. Unlike Wasow's lexical account, modern accounts assume that adjectival passives are derived syntactically, like verbal passives (Kratzer 2000, Anagnostopoulou 2003, Embick 2004). This means that they too involve an A-chain, and should be unavailable to young children under the ACDH. This difficulty applies only to the interaction of the adjectival strategy and the ACDH. Other grammatical theories, which do not posit that all A-chains are absent for immature children, are not necessarily subject to the criticism, and we can consider their compatibility with the adjectival strategy on a case by case basis.<sup>3</sup>

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<sup>3</sup>In an effort to update the S-homophone strategy, Hirsch & Wexler (2006b) suggest that perhaps children are not interpreting verbal passives as if they were adjectival, but instead resultative, in the sense of Embick (2004). Under this analysis, the details of which are orthogonal to the current discussion, the passive participle would represent the end state of an event.

### 2.1.3 Other early grammar-based accounts<sup>4</sup>

Babyonyshev et al.'s (2001) attempt to address the problems of the ACDH with their External Argument Requirement Hypothesis (EARH). According to the EARH, young children's grammars do not license predicates which do not select for an external argument. The formalization of this proposal, given in (9), is couched in the Minimalist framework (Chomsky 1995).

- (9) EARH: Young children consider structures with defective *v* to be ungrammatical.

At the time the EARH was proposed, *v*P was analyzed as being the outermost verbal projection, responsible for introducing the external argument. In structures lacking an external argument, such as verbal passives<sup>5</sup>, StSR, and unaccusatives, the *v* head is 'defective' (Chomsky 1995). By positing that children's grammars do not permit defective *v*, EARH successfully distinguishes between verbal passives and StSR on the one hand, and active transitive sentences and StOR on the other. The latter cases—but not the former ones—each take an external argument, and therefore do not have defective *v*. Like the ACDH, the EARH relies on Wasow's (1977) analysis of adjectival passives, in which participles introduce an external argument and should therefore not be problematic for children. The authors therefore appeal to the 'adjectival strategy' as an explanation for the actional/non-actional distinction in English, and this explanation is subject to the same strengths and concerns noted in the previous section.

As the authors themselves point out, the EARH also predicts that unraised sentences such as (10) will be ungrammatical for children. Like their StSR counterparts, unraised sentences lack an external argument, instead taking an expletive *it* subject to satisfy the EPP.

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<sup>4</sup>Fox & Grodzinsky's (1998) Theta Transmission theory fits into the category of grammar-based accounts of passive acquisition; however, I will not discuss it in detail here, for two reasons. First, Theta Transmission does not bear directly on the acquisition of StSR. Second, independent of the acquisition of StSR, there are numerous difficulties with the analysis as applied to passive acquisition, which have been raised elsewhere (cf. Hirsch & Wexler 2006b,a and Hirsch 2011 for more details).

<sup>5</sup>Collins (2005b) provides a convincing line of argumentation that the *by*-phrase of the verbal passive is, in fact, the external argument of the passive participle. If this is the case, then EARH would predict that children should not be delayed in comprehension of the long verbal passive, contra the authors' goal. Other empirical difficulties for the EARH, however, render this point moot.

- (10) It seems that Brent is smart.

Unfortunately, as discussed in Section 1.3, robust empirical data shows that children comprehend unraised sentences much earlier than either verbal passives or StSR (Hirsch & Wexler 2007b; Hirsch, Orfitelli & Wexler 2007, 2008), rendering the EARH empirically inadequate.

Hyams et al. (2006) avoid the difficulties faced by the ACDH and the EARH, basing their Canonical Alignment Hypothesis (CAH, (11)), on the observation that in verbal passives, the thematic object surfaces in the structural subject position.

- (11) CAH: Children cannot form A-chains that derive a misalignment of thematic and grammatical hierarchies, viz. an external argument (*agent, experiencer*), if there is one, maps onto the subject (Spec IP or TP).

The CAH predicts that the only A-chains which are delayed in acquisition are those in which the surface subject has a non-canonical (object) thematic role, and there is a structurally lower argument which receives a subject thematic role. Essentially, for children, the surface ordering of arguments within a given clause must match the typical hierarchy of thematic roles, with agents and experiencers appearing higher than themes and goals. Any A-movement which disrupts this ordering, such as verbal passives, will prove problematic for young children.<sup>6</sup>

The CAH successfully distinguishes between the active and passive voice, since in active sentences, the argument which undergoes movement from spec *v*P to spec TP is both the external argument of the verb and the grammatical subject of the sentence. In addition, the CAH does not fall prey to the same pitfall as the EARH: in unraised sentences (10), the external argument of the embedded clause maps onto the subject of that clause, while the expletive subject of the matrix clause receives no thematic role at all. Thus, the CAH does not apply. However, the CAH has difficulties accounting for the acquisition of StSR. Neither experiencer StSR predicates such as *seem* nor non-experiencer StSR predicates like *tend* select for an external argument, meaning that A-movement from the embedded clause does not lead to misalignment between the thematic and

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<sup>6</sup>As stated, the CAH (incorrectly) predicts that actional passives will be delayed for children, since they also involve a misalignment of thematic and grammatical roles (e.g. the agent appears lower in the structure than the theme). Adopting the ‘adjectival strategy’ (Section 2.1.2) easily rectifies this issue, however, and is entirely compatible with the account.

grammatical hierarchies. The CAH, then, predicts that children should not be delayed in acquiring StSR with any predicate. This contradicts previous results showing that children are delayed in acquiring experiencer-type StSR with *seem* and *appear*, discussed in Section 1.3.

## 2.2 Input-based accounts

Two accounts of passive acquisition base their explanation on properties of the input. I refer to these as the Frequency account and the Consistency account. The first, initially proposed by Demuth (1989) for Sesotho, and adopted by Allen & Crago (1996) for Inuktitut, asserts that the age at which children acquire a passive relates directly to the rate at which the construction is used in the children's input. In Sesotho and Inuktitut, where passives are used at a relatively high frequency in the adult language (cf. Demuth 1989 and Allen & Crago 1996, a.o), children are predicted to master the passive at an early age. In contrast, the paucity of passive-voice input causes English-acquiring children to acquire the passive extremely late.

Demuth's Frequency account matches well with children's productions in these three languages. In Sesotho and Inuktitut, children produce passives early, while in English, children avoid the use of the *be*-passive, producing the *get*-passive almost exclusively until well past the age of seven years. Comprehension data for English is also consistent with the Frequency account. Unfortunately, no data exists regarding the comprehension of passives in Inuktitut, and the data in Sesotho is inconsistent (see Section 6.2.2).

In the case of Cantonese, however, the data run contra to the Frequency Account. Lau (2011) finds good comprehension of the *bei*-passive by Cantonese-speaking children, despite its extremely low frequency in the input (0.00002% of child directed utterances). To the extent that this passive is syntactically comparable to English and Sesotho passives, these data are not consistent with a pure Frequency account (see Section 6.2.3) for concerns regarding the structure of the *bei*-passive).

To capture the discrepancy between Cantonese and Sesotho, Lau (2011) proposes a modified version of the Frequency account in which the consistency of passive input is as important as

frequency. In Cantonese, the passive is rare, but *bei* is obligatory, unlike *by* in English passives. Lau argues that this consistency assists children in theta role assignment, allowing them to identify the non-canonical order of the arguments (As discussed in Section 6.2.3, however, *bei* does not require an object, which may make it more difficult to use it as a cue for thematic role assignment). Although Sesotho has two passives, one where the ‘*by*-phrase’ is expressed and one where it is not, Lau proposes that the high frequency of the Sesotho passive performs a similar function to the consistency in Cantonese, and children are able to correctly assign thematic roles to all arguments.

The success of an input-based account relies on its ability to match the supposed ‘causal input’ to children’s successful production or comprehension of that structure. In languages which neither require a *by*-phrase nor have frequent passives in the input, the Consistency account predicts children will be delayed in comprehension.<sup>7</sup> Conversely, in languages that exhibit at least one of these two properties, the theory predicts early comprehension. It remains to be seen if these predictions are borne out cross-linguistically.

Extending an input-based account of passive acquisition to other forms of A-movement, namely StSR, leads to similar predictions. Earlier acquisition is predicted for those languages in which StSR is more frequent, as compared to languages in which the construction is rare. On a lexical level, children may be expected to acquire StSR predicates in order of their frequency. The latter prediction is addressed in Chapter 5, which examines the frequency of StSR predicates in English, and compares them to the acquisition data presented in Chapters 3 and 4.

## 2.3 Recent grammar-based accounts

### 2.3.1 The Universal Phase Requirement

Like the EARH, the Universal Phase Requirement (UPR) (Wexler 2004) is couched within the Minimalist Framework (Chomsky 1995), and relies heavily on a particular set of assumptions about adult syntactic structure. It is thus worth discussing the relevant background before outlining

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<sup>7</sup>One component of the theory which is not clear is exactly how frequent the passive needs to be to facilitate acquisition.

the acquisition theory itself.

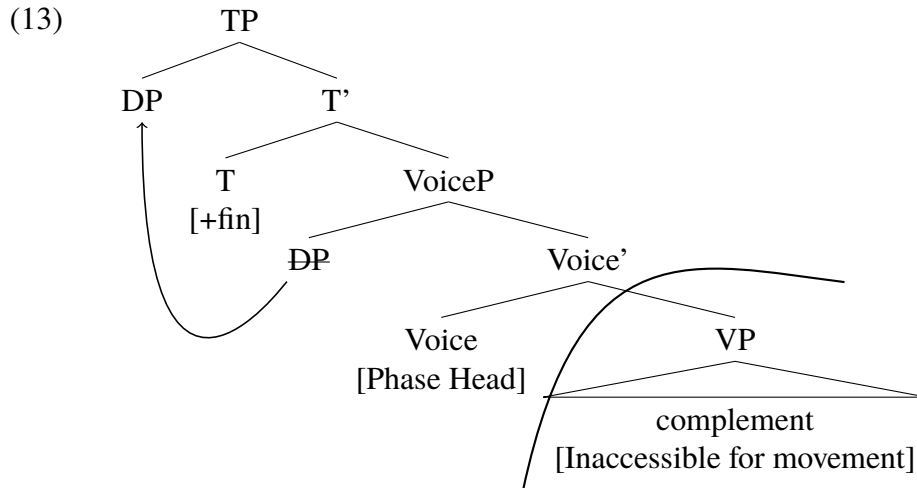
Chomsky (2000, 2001) endeavors to derive a strong cyclic theory of syntax within the Minimalist Framework by introducing the notion of phases. He posits that at particular places in the syntactic structure (phases), the derivation up to that point becomes syntactically frozen in order to undergo phonological and semantic processing. The material is rendered inaccessible to further syntactic alteration, meaning that all syntactic feature checking and agreement must occur within the domain delineated by the phase. The only exception to this rule is the boundary, or “edge”, itself. Chomsky refers to this restriction as the Phase Impenetrability Condition (PIC), which Wexler 2004 summarizes as in (12).

- (12) PIC: When working at a phase, the edge (the head and any specifiers) of the next lower phase is available for analysis, but nothing lower than the edge. In particular the complement is not available.

For the current discussion, the relevant phasal boundaries are the Complementizer (C) and the edge of the verbal domain, which introduces the external argument. In Chomsky’s (2000) proposal, this is *v*; however, such an account is equally compatible with the notion that an additional verbal shell, voiceP, is responsible for external argument introduction (cf. Kratzer 1996, Pytkäinen 2002), and is itself the phase, rather than *v*.

Accounting for cyclicity through phases captures numerous constraints on movement phenomena, particularly in the case of  $\bar{A}$ -movement. At the same time, the stipulation that the edge of a phase is accessible to the next higher phase is compatible with a VP-internal subject; subjects of *v*P (or voiceP) may move to Spec, TP because the DP argument is at the edge of its phase. This is illustrated in (13).





Passives, unaccusatives and StSR pose a problem for phase theory. Under many current analyses of these constructions, A-movement starts in one phase and ends in the next higher phase, without stopping in an edge position.<sup>8</sup> This form of movement should be impossible, yet it is clearly not.

To combat this problem, Chomsky proposes that the *v* of passives, unaccusatives, and StSR is “defective”. This assumption is employed by the EARH, discussed earlier: a defective *v* does not select for an external argument. In addition, a defective *v* does not represent a phase boundary. In passives, then, the object of the verb is available in the higher phase, because the *v* will not function as a phasal head. Similarly, the *v* of StSR predicates is defective, permitting the subject of the embedded clause to undergo movement to spec TP of the matrix clause.

UPR relies heavily on the assumptions outlined above. It states that young children cannot represent defective phase boundaries; their passives, unaccusatives and StSR structures will all have phasal *v*Ps. Therefore, for these children A-movement out of these sub-structures is not grammatical. In contrast to the ACDH, UPR does not stipulate that A-movement itself is impossible for children. The problematic constructions are only those that demand movement across a defective phase in the adult language, such as passives, unaccusatives, and StSR.

<sup>8</sup>Collins’ 2005a analysis of long StSR is a notable exception to this generalization. Through the process of ‘Smuggling’ (discussed in the following section), a moved constituent containing the raised argument does stop at the edge of the *v*P phase. Given this specific analysis of long StSR, UPR would therefore predict no delay in acquisition.

The UPR's reliance on defective phases leaves its explanatory adequacy vulnerable to theoretical critique. Legate (2003) offers several arguments against the existence of defective phases for unaccusatives and verbal passives, including evidence from reconstruction, Antecedent Contained Deletion (ACD) movement, and nuclear stress assignment. Additional arguments against the notion of phases in general are offered in Boeckx & Grohmann (2007) and Bošković (2007), among others.<sup>9</sup>

### 2.3.2 The Universal Freezing Hypothesis

Hyams & Snyder (2005, 2006) take a different approach from Wexler, focusing on which argument gets promoted across various A-movement structures. As Wexler adopted Chomsky's notion of the defective phase in formulating UPR, Hyams and Snyder adopt the syntactic assumptions put forth in Collins' (2005a, 2005b) "Smuggling" account of verbal passives and StSR.

Under Collins' analysis of passives, the thematic subject of the participle is generated in a *by*-phrase in canonical external argument position, rather than as an adjunct (e.g. Jaeggli 1986; Roberts 1987). Under this account, the *by*-phrase structurally intervenes between the base position of the thematic object and its final position in spec TP. Similarly, Collins's (2005a) analysis of long StSR (14) posits that the experiencer DP is merged as the argument of a high applicative head, and thus structurally intervenes between the base position of the moved argument in the embedded clause and its final position in spec TP of the matrix clause.

- (14) Jonathan seems to Patrick to be growing a beard.

Collins offers evidence that the experiencer DP is in an intervening position, through a series of diagnostics showing that the experiencer c-commands into the embedded clause. These tests include Principle C effects (15a), pronominal binding (15b), NPI licensing (15c), and superiority violations (15d).

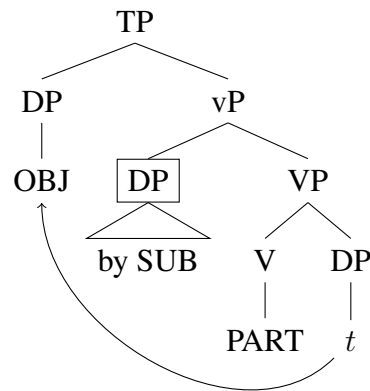
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<sup>9</sup>A potential empirical issue also exists. The UPR predicts delayed acquisition of unaccusativity. While several studies have argued for late acquisition (e.g. Babyonyshev et al. 2001, a.o.), others have argued that they are acquired early (e.g. Friedmann 2007, a.o.). This disagreement will be addressed in detail in Chapter 6, where I will argue that unaccusatives are acquired early, contra the UPR.

- (15) a. \*Patrick seems to her<sub>1</sub> [to like Cheryl<sub>1</sub>].  
 b. That cat seems to every man<sub>1</sub> [to like all of his<sub>1</sub> shirts].  
 c. That cat seems to no man<sub>1</sub> [to like any of his<sub>1</sub> shirts].  
 d. \*Who<sub>1</sub> does Jonathan seem to who(m) [to like] t<sub>1</sub>?  
 (cf. Who seems to Jonathan [to like who(m)]?)

If the passive *by*-phrase and the StSR experiencer intervene between the base and final positions of the structures' promoted arguments, how is it possible for that DP to raise to subject position, when a closer DP is available? These two constructions would violate locality constraints on movement, such as the Minimal Link Condition (MLC, Chomsky 1995) or Relativized Minimality (RM, Rizzi 1990), roughly schematized below:

(16) .



To explain how the movement like 16 is possible in StSR, Collins (2005a) proposes that the subject of the embedded clause undergoes “Smuggling”, a process in which a larger piece of verbal structure containing the DP moves past the experiencer. This is abstractly schematized in (17), where ZP represents the intervening experiencer, and XP the subject, contained in YP, which is smuggled over it. Thus, locality requirements are not violated, because the moved constituent (YP) is not of the same kind as the constituent it is moved past (ZP).

- (17) XP [<sub>YP</sub> ~~XP~~] ... ZP ... [<sub>YP</sub> ~~XP~~]  
 ↑     ↑     ↓

In a similar manner, Collins (2005b) utilizes Smuggling to explain how the thematic object

is able to move past the *by*-phrase in the passive. The verbal constituent containing the object DP is moved past the *by*-phrase. Thus, the movement of the object to Spec, TP does not violate minimality. (18).

- (18) DP [<sub>PartP</sub> DP] ... by DP ... [<sub>PartP</sub> DP]

The crucial component of Collins' analysis for the UFH is that smuggling necessarily represents an exception to the Freezing Principle developed in Wexler & Culicover (1983), and reformulated by Müller (1998). The Freezing Principle rules out movement from an already moved phrase, which is precisely the operation involved in Smuggling. Hyams and Snyder propose that while adult grammar permits exceptions to the Freezing Principle, the immature child's grammar is 'zero-tolerance' in this regard. This would make smuggling—and by extension, verbal passives and StSR—impossible for young children. Importantly, however, VP-internal subjects, StOR, and unaccusatives should not pose any difficulties, as none of these structures involve locality violations of the sort that would require Smuggling.

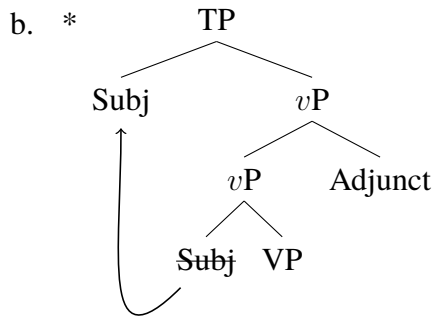
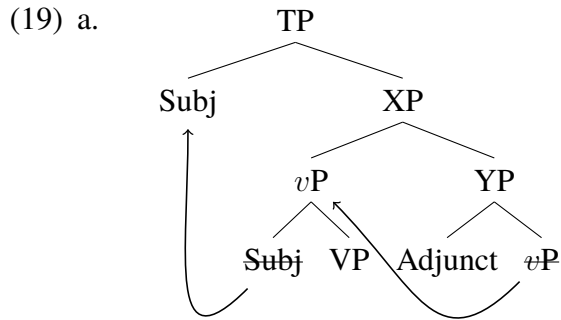
More central to this thesis, the UFH predicts that not all StSR structures will be equally delayed. Recall from Section 1.3.4 that only a limited subset of StSR predicates, including *seem* and *appear*, optionally select an experiencer argument. A much larger group of predicates, such as *tend*, *used (to)*, *(be) going*, and *(be) about*, do not select for this argument. In these cases, Smuggling need not apply, and hence, according to the UFH, children should not be delayed in acquiring these raising structures.

In addition, because it is based on Collins' specific analysis, the UFH seems to predict that, even with the predicates *exitseem* and *exitappear*, only long StSR sentences—those in which the experiencer argument is present—will be delayed. If the experiencer is absent, then no Smuggling is required, and under the UFH, children should not be delayed. Likewise, the only verbal passives which should be delayed are those with a *by*-phrase intervener. On the surface, these predictions seem to be wrong. As discussed in Chapter 1, English-speaking children show non-adult comprehension of StSR with *seem* and *appear* whether the experiencer is present or not, and show non-adult comprehension of verbal passives with or without the *by*-phrase.

There is binding evidence, however, that suggests that the passive *by*-phrase is syntactically active even when unpronounced (Baker, Johnson & Roberts 1989, but cf. Bhatt & Pancheva 2006). In formulating the UFH, Hyams and Snyder assume that an implicit *by*-phrase argument is present in short passives, leading to delayed comprehension. Unfortunately, the diagnostics used to argue for an implicit *by*-phrase are not usable with the syntactic configuration of raising sentences, although English-speaking adults report the intuition that *seem* requires an experiential point of reference. If a covert experiencer is present in all instances of StSR with *seem* and *appear*, a similar line of argumentation would hold, and a parallel could be drawn between the poor performance found for long and short passives and the equally poor performance found for long and short experiencer-StSR. In fact, if the experiencer can be implicated as the cause of children's delay with StSR, then acquisition data finding poor performance on short StSR sentences may be taken as indirect evidence for the presence of a covert experiencer. I will return to the issue of covert arguments in Chapter 6 in an extended discussion.

A problem for the UFH is that it relies on a very specific syntactic representation of the passive that includes the processes of Smuggling and Freezing, each of which are subject to critique. Gehrke & Grillo (2009) offer a series of criticisms against the existence of Smuggling, the primary one being that it poses a significant look-ahead problem for the computational system. Since the UFH explains children's delayed comprehension as an over-application of the Freezing Principle, it is inherently tied to a Smuggling analysis.

The notion of Freezing is itself potentially problematic, as it precludes any syntactic structure in which a small constituent moves out of a larger constituent that has already moved. For instance, Kayne (1994) and Cinque (1999) offer extensive arguments that post-verbal adverbs must be derived through movement (19a), rather than right adjoined (19b). The movement analysis is incompatible with Freezing, as the subject DP must move out of the *v*P once it has already moved.



### 2.3.3 A new account: The Argument Intervention Hypothesis

Although intervention appears to be a promising avenue for describing children's difficulty with verbal passives and experiencer-type StSR, the UFH as instantiated has several theoretical difficulties. I therefore propose a new account, which abstracts away from the specific details associated with Smuggling and Freezing. I refer to this account as the Argument Intervention Hypothesis (AIH), and it has two general components:

- (20) a. for adults, verbal passives and experiencer-type StSR sentences (with *seem* and *appear*) require some (as of yet unspecified) syntactic operation that allows them to circumvent typical locality constraints on A-movement;
- b. children do not have recourse to this syntactic mechanism.

## 2.4 Summary and directions of current study

The UPR, UFH and AIH are all based on the notion of locality: according to UPR, children have difficulties with constructions which require non-local A-movement, where it is necessary to tra-

verse a phase boundary without stopping at the edge; in the UFH and AIH, the difficulty resides with constructions in which an argument is promoted past a more local one. Notably, if we permit the possibility of implicit arguments, each of these theories predicts that verbal passives and StSR with *seem* and *appear* will be equally delayed, and experimental data bears out this prediction.

The theories differ strongly, however, in their predictions regarding unaccusatives and StSR with predicates that do not select an experiencer DP. While UPR predicts that these structures should be delayed, as they require movement past a defective phase, the AIH predicts that they will not be delayed, as no argument intervenes between the base and final positions of the promoted argument.

Thus, StSR is especially important to our understanding of how and when the acquisition of A-movement occurs. In particular, it is crucial to determine whether young children comprehend StSR with non-experiencer predicates. This is the question this dissertation will address, through an investigation of children's comprehension of the raising predicates *(be) about*, *(be) going*, and *tend*, none of which permit an experiencer argument. These findings are compared to children's comprehension of *seem*, as well as to their comprehension of non-actional verbal passives. Finally, a CHILDES study will investigate whether children's comprehension and production of these different raising constructions is in line with the input they are receiving.

## CHAPTER 3

### Study 1: Argument intervention in the acquisition of A-movement

#### 3.0 Introduction

Why are children delayed in acquiring adult comprehension of subject-to-subject raising (StSR) sentences with *seem* and *appear* (1)?

- (1) Rene {seemed/appeared} (to Alexander) to be wearing a hat.

Does non-adult comprehension reflect a general problem with StSR, as specified by Wexler's (2004) Universal Phase Requirement (UPR; Section 2.3.1)? Or, does it instead reflect one of the rather unique set of properties specifically shared by these two predicates? As discussed in Section 1.3.4, *seem* and *appear* differ from most other raising predicates in several ways. Two of these differences are particularly relevant to the current discussion, and I will briefly reiterate them here. First, these predicates have a complicated meaning: an adult definition requires children to be able to separate appearance and reality and also to have mastered the idea that different people can have different mental states, known as Theory of Mind. Hirsch, Wexler and Orfitelli (HOW 2007, 2008) argue against conceptual difficulty of *seem* as an explanation for children's delay, however. They found that while not all children performed well on unraised test items (2), those who did perform well still showed non-adult comprehension of experiencer StSR (1). Since answering correctly on unraised items requires the same knowledge of *seem* and *appear* required by the StSR utterances, HOW conclude that conceptual difficulty cannot be an adequate explanation for children's delay.



- (2) It {seemed/appeared} (to Alexander) that Rene was wearing a hat.

The second difference between *seem* and *appear* and most other English StSR predicates is that the former select an optional argument which receives the thematic role of experiencer (3).<sup>1</sup>

- (3) Rene {happened/was (un)likely/tended/used/started/began/continued/was going/was about} (\*to Alexander) to be wearing a hat.

In addition to the UPR and lexical complexity, I have proposed the Argument Intervention Hypothesis (AIH, see section 2.3.3), under which movement past the experiencer is impossible for young children, because it represents a violation of locality constraints on movement, such as relativized minimality (Rizzi 1990). This account abstracts away from the problematic syntactic analysis required by Hyams & Snyder (2005, 2006) Universal Freezing Hypothesis (UFH), a previous minimality-based explanation of A-movement acquisition.

Each of the three aforementioned accounts—the UPR, lexical complexity, and the AIH—predicts delayed comprehension with experiencer-StSR, albeit for different reasons. In order to adjudicate between the alternative explanations, it is clear that children’s comprehension of other StSR predicates needs to be tested.

This chapter presents the first steps of such an investigation, through three within-subject experiments. The first two experiments compare children’s comprehension of raising sentences with *seem* and the non-verbal raising predicate *(be)about*. *(Be) about* not only disallows an experiencer argument (3), but is conceptually simpler than *seem* and *appear*.

If the same children are similarly delayed in comprehension of *(be) about* and *seem* StSR in comparable tasks, this would suggest a general delay with StSR, in line with the UPR. Conversely, if they show markedly better comprehension of StSR with *(be) about* than with *seem*, then the acquisition of StSR cannot be treated homogeneously, and we must appeal to differences between the two predicates. Under the AIH, this difference is the presence or absence of an intervening

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<sup>1</sup>StSR predicates taking experiencers are rare cross-linguistically. Indeed, raising over a non-clitic experiencer is not allowed in Icelandic (Collins & Thráinsson 1996; Schütze 1997; Boeckx 1998), Greek (Anagnostopoulou 1997), and across the Romance language family Rouveret & Vergnaud 1980; Rizzi 1986; Torrego 1996).

argument between the base and surface positions of the moved DP.<sup>2</sup>

(4) Rene seemed to be wearing a hat.

(5) Terry was hit.

The two raising tasks also address a secondary topic: the status of the expletive in weather-*it* sentences with raising predicates (6).

(6) It seems to be raining.

A long-standing issue regarding this construction is whether the expletive is inserted in the matrix clause due to the EPP, as in unraised sentences, or whether it is initially inserted in the embedded clause and then raised to matrix subject position in the same way as the promoted DP of other raising sentences. By comparing children's performance on these sentences to their performance on raised and unraised sentences, the current study provides experimental evidence that directly addresses this question.

The third experiment is a test of children's comprehension of (non-actional)verbal passives (7), and is also a within-subjects task, with the children who participated in the two StSR comprehension experiments. This is necessary to determine whether the delay in StSR comprehension shares an underlying cause with the similar delay noted for non-actional verbal passive comprehension. By comparing children's performance across all three tasks, we can establish whether the development of passive and raising comprehension are related, and if so, whether this relation applies to all raising predicates, or only to those that permit an optional experiencer.

(7) Terry was seen (by Avery).

In sum, three broad experimental questions are at stake, as given in (8):

- (8) a. Do children vary in their comprehension of different raising predicates?  
b. How do weather-*it* constructions relate to raised as opposed to unraised sentences?  
c. Does the development of (non-actional) passive comprehension relate to the development of short raised *seem*, and if so, does this relation extend to raised (*be about*)?

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<sup>2</sup>As noted in section 2.3.2, the AIH assumes that in 'short' StSR sentences (i), the experiencer argument is covertly present, analogous to the implicit *by*-phrase of short passives (ii) proposed by Baker et al. (1989).

The outline of the chapter is as follows: In the following section, I describe the children who participated in this study. Sections 3.2, 3.3, and 3.4 outline the methods and procedure employed for the three experiments that comprise the study, as well as the results. Finally, in section 3.5 I discuss the implications of the findings, and remaining questions to be addressed in the remainder of the dissertation.

## 3.1 Subjects

### 3.1.1 Child participants

A total of 30 monolingual English-speaking children (11 boys, 19 girls) from the Los Angeles area were tested on all three of the experiments. This group consisted of 10 children in each one-year interval between four and six years of age. The age range spans three relevant periods: the period in which children have previously shown consistent non-adult comprehension of raised sentences with *seem/appear* (four years), the period in which there is a small amount of variation in performance (five years), and the period in which the majority of children have previously provided a consistently adult interpretation (six years and older). Participant details are shown in Table 3.1.

**Table 3.1:** Experiments 1-3 participant details

Group	Age Range	Mean Age	N
4;0–4;11	4.20–4.91	4.54	10
5;0–5;11	5.36–5.89	5.63	10
6;0–6;11	6.06–6.72	6.59	10
Total	4.20–6.72	5.70	30

Testing was primarily conducted on the UCLA campus in a dedicated testing facility, in two sessions which occurred within one week of each other. A small number of participants were tested in daycares, preschools, and after-school programs in the West Los Angeles area. In this case, testing occurred over two to three sessions, again with no longer than one week between the first and final test.

### **3.1.2 Adult participants**

Five adults between the ages of 20 and 30 years old (mean age 26.2) were tested in one session on each of the three experiments. The methodology used was the same as with the children. All adults performed at 100% on each task, demonstrating that these experiments were not subject to any methodological flaws that would hinder a mature speaker of English. Children's performance can therefore be considered separate from any potential issues in this area.

## **3.2 Experiment 1: Raising with *seem***

Experiment 1 assessed children's comprehension of raising structures using the predicate *seem*. It served to provide a within-subjects comparison to children's comprehension of raising sentences with *(be) about*, as well as their comprehension of verbal passives with non-actional predicates.

### **3.2.1 Experiment 1 procedure**

The experimental methodology employed was a Truth-Value Judgment task (TVJT; Crain & McKee 1985; Crain & Fodor 1993). In this paradigm, the child observes a story and then listens to a puppet comment on it. Following that, the child indicates whether or not the puppet commented truthfully or untruthfully. In Experiment 1, the story was depicted through a series of pictures of several animal characters engaged in various activities. The events were observed by a puppet named Mr. Bear. The child was told that Mr. Bear would comment at the end of each scenario, but that he was somewhat silly and would sometimes make mistakes. The child was asked to serve as Mr. Bear's teacher, and to let him know when he was right or wrong, and why, so that he could learn to do better.

### **3.2.2 Experiment 1 materials**

Six unique scenarios were used to keep children engaged in the task, each one consisting of two pictures and an accompanying story. Four of these scenarios were similar or identical to those

employed in Hirsch, Orfitelli & Wexler 2008 and Becker 2006. In the first picture of one scenario, a white dog is standing next to a purple light. In the second picture, he has gone under the light, making his fur look purple, although a tiny portion of his tail remains outside of the light, to remind the child that in reality, his fur is white (Figure 3.1). Following the scenario, the child is asked two comprehension questions before the puppet comments on what has occurred: “What color is the dog in real life?”, and “What color does it look like the dog is?”



**Figure 3.1:** Experiment 1 sample pictures: The left picture shows *reality* – the dog is white. The right picture shows *appearance* – the dog seems purple.

Once the child had demonstrated that he understood the scenario, the first picture (e.g. The dog standing next to the light) was removed, and Mr. Bear commented *only* on the second picture (e.g. The dog standing under the light), using one of three sentence types: finite clauses with the copula (9), unraised sentences (10), and raised sentences without an experiencer (11).<sup>3</sup> Half of the test items were true by adult English judgments, and half were false. Sentences with adult judgments are provided in Table 3.2.<sup>4</sup>

An additional weather-*it* condition was included, which required a separate set of scenarios. Two of the six scenarios thus depicted weather events, and were used exclusively for this condition. As an example, in the first picture of one story, a boy is shown outside of a house on a sunny day,

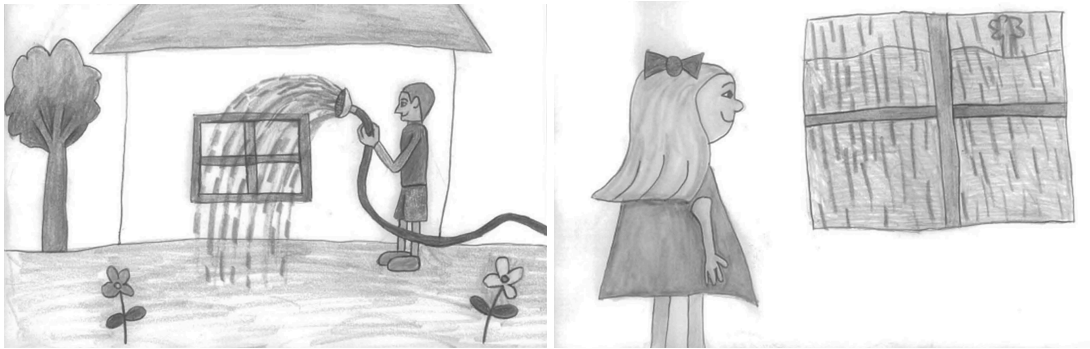
<sup>3</sup>Each test item was read with primary stress placed on the main clause predicate (*be* or *seem*), and secondary stress placed on *really*.

<sup>4</sup>The inclusion of *really* follows Hirsch, Orfitelli & Wexler (2008), as a way to force children’s attention to the dichotomy between appearance and reality. See Section 1.3.1 for a discussion of the impacts of *really* on the choice of stage versus individual level predication, as well as a discussion of the ambiguity of *really* when applied to the copula *be* as opposed to *seem*.

**Table 3.2:** Experiment 1 test items with adult judgments

	True Test Items	False Test Items
(9)	The dog really is white.	The dog really is purple.
(10)	It really seems that the dog is purple.	It really seems that the dog is white.
(11)	The dog really seems to be purple.	The dog really seems to be white.

running a hose in front of a window. In the second picture, the point of view has changed to the inside of the house, where his sister is watching water pour down outside the window. She remarks that it must be raining outside, and that she is going to put on her raincoat (Figure 3.2).



**Figure 3.2:** Experiment 1 sample pictures: The left picture shows *reality* – It is sunny. The right picture shows *appearance* – It seems to be rainy.

As with the other scenarios, children were asked two comprehension questions about the story before Mr. Bear commented: “In the story, what is the weather like outside?”, and “In the story, what does it look like the weather is like outside?” Note that ‘in the story’ was utilized in place of ‘in real life’. This was to prevent children from report on the actual weather at the time of testing.

Once the child demonstrated comprehension of the story, the first picture was removed, and Mr. Bear remarked on the second picture, using one of two sentence types: finite sentences with the copula (12) and weather-*it* sentences (13). As before, half of the test items were true by adult English judgments, and half were false. Sentences with adult judgments are provided in Table 3.3.

The two types of scenarios (regular and weather-*it*) were randomly interspersed throughout the task. In total, for both types of scenarios, the copular declarative condition was tested 12 times, and

**Table 3.3:** Experiment 1 weather-*it* test items with adult judgments

	<b>True Test Items</b>	<b>False Test Items</b>
(12)	It really is sunny.	It really is rainy.
(13)	It really seems to be rainy.	It really seems to be sunny.

the unraised, raised, and weather-*it* conditions were tested 8 times each, for a total of 36 test items. A semi-random presentation order was generated for the items, with the one stipulation that the same scenario did not occur more than twice in a row. As children's responses were categorical, a binomial distribution was utilized to establish whether their performance significantly deviated from chance in either direction. For the copula condition, 0 to 2 items correct constituted below chance performance and 10 to 12 items correct constituted above chance performance, at the  $p < 0.05$  level. Any other number of items correct cannot be meaningfully distinguished from chance performance. For all other conditions, which had fewer items, 0 to 1 and 7 to 8 were required to determine below and above chance performance, respectively.

Crucially, each of the experimental stories hinges upon the difference between reality and some form of appearance or expectation. While the dog seems to be purple when he stands under the light, in reality his fur is white. Similarly, from Mary's point of view it seems to be raining, yet in reality it is sunny outside. This distinction is important given the finding, discussed in Section 1.3.1, that when faced with a raised utterance, immature children may ignore the raising predicate entirely and concentrate solely on the truth of the embedded clause.

For this reason, the copula condition was tested for every scenario. It served in part as an attentional control, showing that the child understood the task. In addition, establishing that children can answer correctly on the copular items creates a baseline for comparison to the raised condition. If young children's attempt to interpret StSR involves ignoring the raising predicate, as argued by Hirsch, Orfitelli & Wexler 2008 (See Section 1.3), the remainder of the sentence will be quite similar in meaning—if not identical—to a copular sentence. Any child using such a strategy is therefore led to a non-adult pattern of answers. To ensure that children were paying attention,

and that we had an accurate point of comparison, children scoring less than 10 out of 12 items correct on this condition were not included in subsequent analyses; however, only 3 children were excluded for this reason.

The unraised condition served to verify that children had an understanding of the lexical properties of the raising verb *seem*. Their performance on the raised condition must therefore be separate from this consideration. Again, children scoring less than 7 out of 8 items correct on this condition were excluded from further analysis. This requirement resulted in the elimination of the data from 19 children.

The raised condition was the core of the experiment. To answer correctly, the child must pay attention to the raising verb. A child who ignores *seem* and only pays attention to the embedded clause will consistently answer incorrectly, because the character appears to be something he is not (the white dog looks purple).

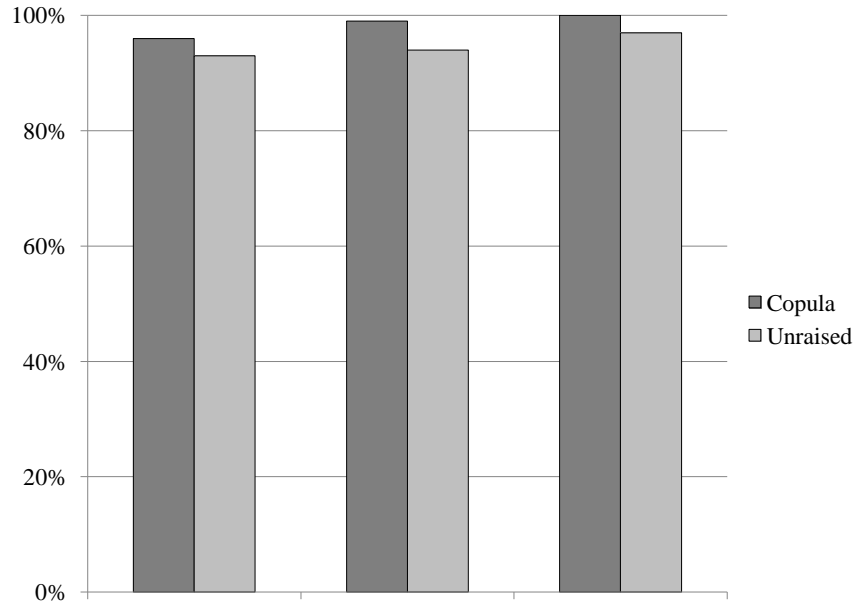
Children's performance on the weather-*it* condition will speak to the long standing debate on these sentences: namely, is the expletive generated in the matrix subject position, as in unraised sentences, or does it raise? If the former, we expect children's performance on this condition to match their performance on the unraised condition. If the latter, we expect it will match their performance on the raised condition. All Experiment 1 items are included in Appendix A.

### **3.2.3 Experiment 1 results**

Children's performance by age group on the copula and unraised conditions is shown in Figure 3.3.

As stated in the previous section, when children did not perform at above chance levels (7 or 8 correct out of 8) on these control conditions, their data was not included in further analysis. This resulted in a total of 22 children not being included. In all cases except one, it was the unraised condition that these children failed, indicating that they did not understand the meaning of *seem* independent of raising. Thus, 39.6% of total children tested were excluded for not knowing *seem*, which is comparable to numbers found in previous work (Hirsch & Wexler 2007b; Hirsch, Orfitelli & Wexler 2007; 2008).





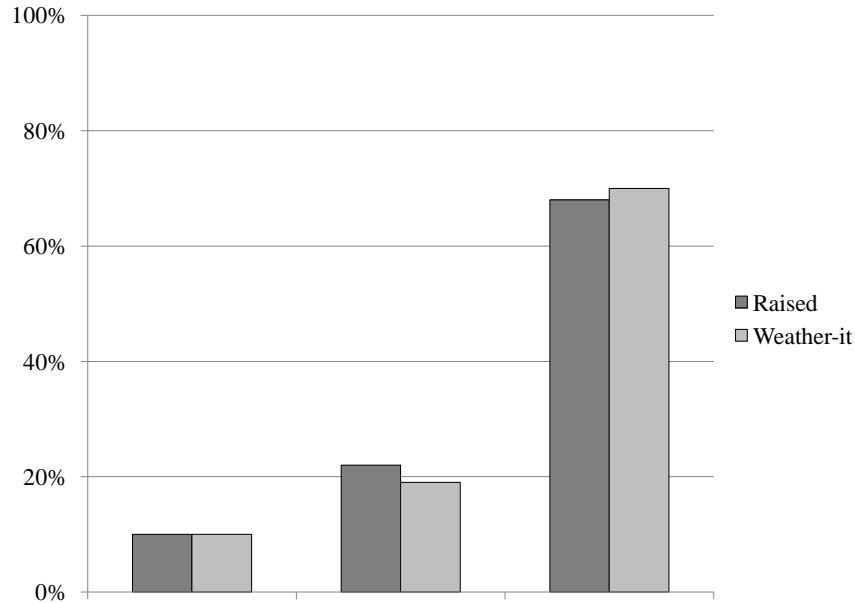
**Figure 3.3:** Children's performance on the copular and unraised conditions (Experiment 1)

By performing well on these conditions, the remaining 30 children included in the analysis (see Section 3.1 for details) demonstrated that they understood the task and had mastered the lexical meaning of *seem*. Thus, their performance on the raised and weather-*it* conditions can be considered independently of these issues. Children's group and individual performance on the raised and weather-*it* conditions are shown in Figure 3.4 and Table 3.4, respectively.

**Table 3.4:** Experiment 1 individual performance on the raised and weather-*it* conditions, divided into above-chance (AC), chance (C), and below-chance (BC) performance.

	Raised			Weather-it		
	AC (7-8)	C (2-6)	BC (0-1)	AC (7-8)	C (2-6)	BC (0-1)
4 years (N=10)	0	1	9	0	1	9
5 years (N=10)	1	2	7	1	2	7
6 years (N=10)	7	0	3	7	0	3

Overall, children performed extremely poorly on these two conditions. As a group, four-year-olds answered only 10 % correctly on both conditions, while five-year-olds answered at 22% and 19% on the raised and weather-*it* conditions, respectively. A logistic regression reveals no



**Figure 3.4:** Children’s performance on raised and weather-*it* conditions (Experiment 1)

significant difference in accuracy between the performance of these two groups, although there is a highly significant increase in comprehension for both conditions between the five and six year old age groups ( $p < 0.001$ ), reflecting the leap to approximately 70% accuracy.<sup>5</sup>

Turning to individual data, in the youngest two age groups, only one five-year-old comprehended raised sentences at an above chance level (this child was also above chance on the weather-*it* condition). Three additional four- and five-year-old children performed at chance; however, the remainder of the younger children performed at below chance levels. This regular below-chance performance indicates that children are analyzing the raised and weather-*it* sentences in a consistent, non-adult way; specifically, their performance is consistent with an analysis in which they ignore *seem* entirely and pay attention only to the truth or falsity of the embedded clause.

Children in the oldest age group show mixed performance. One set of children performs similarly to the younger two age groups, with consistent below chance performance. The larger set of

<sup>5</sup>Model run in R using the *lmer* function of the lme4 package, with accuracy as the binomial dependent variable, age group as fixed effect, and subject as random effect. P-values obtained using the *pvals.fnc* function with 10,000 simulations (Baayen, Davidson & Bates 2008). A near identical model adding item as a random effect was run and compared to the first, using R’s *anova()* function. There was no significant difference to model fit, showing that there was no item effect.

six-year-olds, however, performs near ceiling.

Response justifications from children performing at below chance on the raised condition support the hypothesis that they are ignoring the raising predicate, leading them to interpret both raised and copula items identically, as simple copular declaratives (14).

- (14) a. It's only a light, Mr. Bear. He's not really purple.  
*Child's justification for (correctly) answering false to "The dog really is purple".*
- b. Because the dog is too white, not purple, see? [grabs first picture and points]  
*Child's justification for (incorrectly) answering false to "The dog really seems to be purple".*

Children's similarly poor performance on the weather-*it* condition, in contrast to the unraised condition, suggests that the expletive in weather-*it* constructions undergoes raising-to-subject in a manner comparable to full DP arguments. Importantly, the link between the two conditions holds for individual subjects as well as the group. If a child showed non-adult comprehension of the raised condition, then he also did on the weather-*it* condition, and visa versa for adult comprehension. For those children who did not comprehend the weather-*it* items, their response justifications were comparable to those for the raised items, again suggesting a similar underlying structure. For example, one child's justification is given in (15).

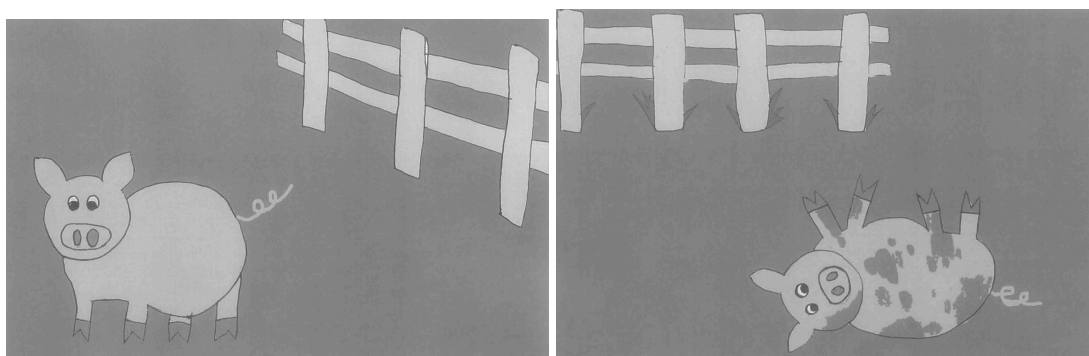
- (15) Billy's just playing a trick and Mary doesn't know it.  
*Child's justification for (incorrectly) answering false to "It really seems to be raining".*

Overall, the results of Experiment 1 replicate previous findings that the acquisition of StSR with *seem* is delayed. Further, the extension of these findings to include previously untested weather-*it* sentences suggests that the two are derivationally similar. In the following section, I turn to Experiment 2, which tests children's comprehension of the raising predicate (*be*) *about*.

### 3.3 Experiment 2: Raising with *(be)about*

#### 3.3.1 Experiment 2 procedure and materials

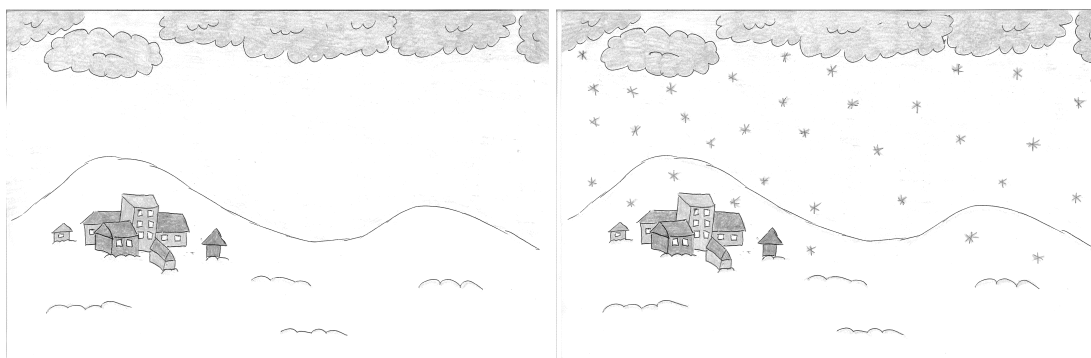
Experiment 2 was designed as a companion to Experiment 1, and used a similar design and procedure. A TVJ task was constructed with a total of eight simple two-picture stories, four of which were about animals, and four of which were about weather events. In one of the animal stories, the first picture shows a pig standing in the grass. He remarks that he loves rolling around in the muddy grass, and “will roll in the mud in just one moment.” In the second picture, he is shown on his back in the grass, covered in mud splashes (Figure 3.5). The future tense was consistently used in lieu of an StSR utterance with *(be) about*, to avoid giving the child any information about the test item.



**Figure 3.5:** Experiment 2 sample pictures: The left picture shows the moment before the event – the pig is about to roll in the mud. The right picture shows the event itself – the pig is rolling in the mud.

Similarly, one of the weather stories begins by showing a town on a wintry hill side underneath a grey sky covered in dark clouds. The experimenter remarks that dark clouds in the winter time are a sign that snow will fall very soon, and then reveals the second picture, in which snow is falling (Figure 3.6). All Experiment 2 items are included in Appendix B.

All eight of the picture pairs thus include one picture in which something is about to occur, and one picture in which it is occurring. As in Experiment 1, the child was asked two comprehension questions before the puppet commented on the scenario: “Which picture shows right before it happened?”, and “Which picture shows it happening?” These questions established that the child



**Figure 3.6:** Experiment 2 sample weather pictures: The left picture shows the moment before the event – it is about to snow. The right picture shows the event itself – it is snowing.

had grasped the temporal/aspectual contrast necessary to assess the truth of the test items.

Mr. Bear’s comments took four possible forms: a simple progressive declarative (16), a raised sentence (17), a copular *weather-it* sentence, (18), or a raised *weather-it* sentence (19). 8 items were tested for each condition, although, as discussed below, the two declarative control conditions (progressive and copular *weather-it*) were collapsed in my analyses, for a total of 32 test items. Example test items with adult judgments are provided in Table 3.5.<sup>6</sup>

**Table 3.5:** Experiment 2 test items with adult judgments

	Test Items	Applied to First Picture	Applied to First Picture
(16)	The pig is playing in the mud.	False	True
(17)	The pig is about to be playing in the mud.	True	False
(18)	It is snowing.	False	True
(19)	It is about to be snowing.	True	False

Unlike Experiment 1, the truth and falsity of an item does not depend on the characteristic discussed (e.g. white versus purple), but with the timeline of the event. Therefore, while in Experiment 1, different test sentences were true or false with regard to a single picture (e.g. a white

<sup>6</sup>Unlike Experiment 1, the relevant contrast is not between appearance and reality. Therefore, there was no reason to include *really* in any of the test items.

dog is under a purple light), in this experiment, a single test sentence was true or false of different pictures (e.g. before the event versus during the event). Specifically, if Mr. Bear commented with a raised sentence such as “The pig is about to be playing in the mud”, this was true of the first picture, but not of the second. The converse is true for a present progressive sentence. If Mr. Bear remarked that “The pig is playing in the mud,” this was true of the second picture, but not of the first. A similar dichotomy was established for the weather-*it* scenarios. Because the progressive and raised sentences are true or false of different pictures, we could be sure that children were not merely ignoring the raising predicate and judging the sentences on the truth of the embedded clause.

The progressive and copular weather-*it* conditions once again served as attentional controls, showing that the child understood the task. Only one child’s data was excluded from further analysis based on this criterion, however.

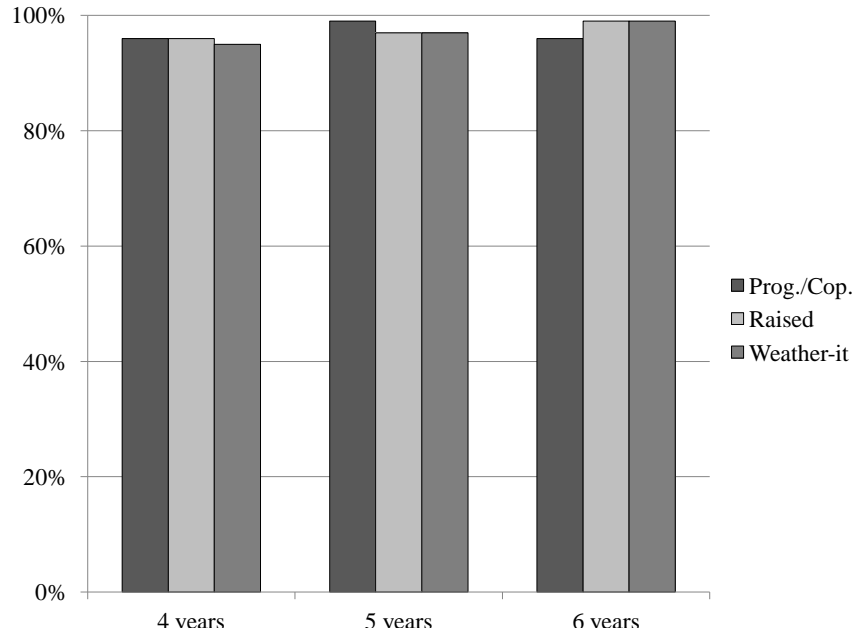
Unlike *seem*, *(be) about* does not have an unraised form (e.g. 20), making it impossible to verify that children understood the meaning of the predicate independent of raising. This issue will be discussed further in Section 3.4.2, however, where I conclude that the children tested did indeed have the adult lexical representation of *(be) about*.

(20) \**It* is about that Rene is dancing.

As in Experiment 1, the raised and weather-*it* conditions are those of interest. The experiment is designed such that children who do not have adult comprehension of raising will answer incorrectly on these items, mirroring their responses on control items.

### 3.3.2 Experiment 2 results

Of the 53 total children tested for the Experiments 1-3, only one child’s data was excluded based on Experiment 2, because he did not pass the attentional progressive and copular weather-*it* control conditions. Therefore, none of the 30 children included in our within-subjects comparison had any difficulty understanding the temporal relationships in Experiment 2’s TVJT stories. Performance by age group on all conditions is shown in Figure 3.7.



**Figure 3.7:** Children’s performance, by condition (Experiment 2)

In stark contrast to what we find for *seem*, children show adult comprehension of StSR with *(be) about* from the earliest ages tested. In the three age groups, performance is at above chance levels on all conditions. Moreover, each of the 30 children individually showed above chance performance, including the 19 four- and five-year-old children who perform at or below chance on the *seem* task in Experiment 1. Reflecting this high performance from all age groups, an identical logistic regression to that used in Experiment 1 finds no significant differences based on age.

Although no unraised *(be) about* sentences were included in this task, due to their ungrammaticality, children’s high performance and response justifications strongly suggest that they were assigning an adult interpretation to the predicate. To answer correctly on raised and weather-*it* items required an understanding of the meaning of *(be) about*; any child ignoring it would provide consistently wrong answers, which none did. In addition, response justifications often made reference to the relative timing of the action or weather event, as well as displaying an understanding of character intentionality and causation (21).

- (21) He loves cake and he wants to eat it now.  
*Child's justification for (correctly) answering true to "The rabbit is about to be eating the cake".*

It appears that these children are able to perform StSR with *(be) about*, although they are not able to with *seem*. Turning to weather-*it*, the fact that children perform well on both the raised and weather-*it* conditions does not, in and of itself, suggest that weather-*it* sentences involve raising. However, the fact that children's performance in Experiment 2 on weather-*it* items becomes near-perfect in tandem with near-perfect performance on the raised condition does support this hypothesis. It appears that children are sensitive to a crucial difference between *seem* and *(be) about*, and that this difference impacts weather-*it* sentences in addition to traditional raising sentences.

Broadly speaking, this data suggests that, vis á vis acquisition, all raising predicates are not created equal. The same children who show non-adult comprehension of raised sentences with *seem* show adult comprehension of raised sentences with *(be) about*. I take this to indicate that the process of raising itself cannot be generally delayed in children. What remains to be determined is the precise nature of the delay with raised *seem* sentences. One explanation has been eliminated: raising itself is not universally delayed. The results also rule out the conclusion that children's low performance with experiencer-StSR is due to lexical difficulty with *seem*. The high performance that children show on the unraised condition makes such an explanation unlikely. The remaining possibility is that the presence of the experiencer in *seem*-type StSR leads to an intervention violation. Nonetheless, I will raise and address possible alternative explanations for this split in Chapter 4, with three experiments that test children's comprehension of StSR with predicates other than *seem* or *(be) about*.

### 3.4 Experiment 3: Verbal passives

Experiment 3 tests the children's comprehension of verbal passives. These data will be compared to their comprehension of raising with *seem* and *(be) about* found in Experiments 1 and 2, in order to address the question of what underlies non-adult comprehension of *seem*. If it is a lexical difficulty with the verb itself (although this seems unlikely, as noted in the previous section), then



there is no reason to predict a correspondence between performance on raising and verbal passives. If the experiencer argument is causing an intervention violation, however, then the *by*-phrase of the passive is expected to cause a similar difficulty, leading to a correspondence in performance on the two constructions.

### 3.4.1 Experiment 3 procedure

In contrast to Experiments 1 and 2, the experimental methodology used in Experiment 3 was a two-choice picture matching task, in which the child is presented with two pictures while the experimenter reads a test item. The child is asked to indicate which picture best matches the sentence. Items were presented on a laptop screen, in a different random order for each child, and the child's response was recorded before moving to the next item.

Test items fell into one of six conditions. The three primary divisions were: *active* voice declarative sentences (22), 'short' passive voice sentences which do not include a *by*-phrase (23), and 'long' passive voice sentences which do (24). These three conditions were further split by verb type. Half used 'actional' verbs characterized by both agentivity of the subject and affectedness of the object (*push, kiss, kick, carry*). The other half used 'non-actional' verbs denoting emotional or sensory states (*remember, love, hear, see*). For each condition, eight items were tested, for a total of 48 items. Example test items are presented in Table 3.6. All Experiment 3 items are provided in Appendix C.

**Table 3.6:** Experiment 3 test items

	<b>True Test Items</b>	<b>False Test Items</b>
(22)	a. Kermit pushes Miss Piggy. b. Kermit remembers Miss Piggy.	Actional Active Non-actional Active
(23)	a. Miss Piggy is pushed. b. Miss Piggy is remembered.	Actional Short Passive Non-actional Short Passive
(24)	a. Miss Piggy is pushed by Kermit. b. Miss Piggy is remembered by Kermit.	Actional Long Passive Non-actional Long Passive

Children were familiarized with pictures of each verb before the experiment began. Pictures

were constructed such that characters were clearly engaged in a non-reciprocal relation. For *remember* and *love*, thought bubbles were used to indicate the desired semantic relation between the two characters. Both Maratsos et al. (1985) and Hirsch & Wexler 2006b find that children have no difficulties understanding the relationship indicated by these thought bubbles.

### 3.4.2 Experiment 3 results

Active voice items, both actional and non-actional, were used as an attentional control, and children answering fewer than 7 of 8 items correctly were not included in further analyses. One child's data was eliminated for not passing this control. This means that the 30 children included in the within-subjects analysis had no inherent difficulty with any of the predicates or pictures used in Experiment 3, and their passivization performance is independent of these elements. Children's performance by age on each condition is given in Table 3.7.

**Table 3.7:** Experiment 3 percent correct, by condition, by age for Experiment 3

	Active		Short Passive		Long Passive	
	Actional	Non-Actional	Actional	Non-Actional	Actional	Non-Actional
4 years (N=10)	99%	96%	80%	34%	82%	38%
5 years (N=10)	97%	97%	96%	47%	92%	39%
6 years (N=10)	100%	100%	100%	79%	100%	82%

As Table 3.7 shows, even in the youngest age group, 8 of 10 children perform at above chance levels on both long and short actional passives, and all of the children in the two oldest age groups perform at or near ceiling. However, the data for non-actional passives is strikingly different. In the two youngest age groups, children's performance is significantly (at the  $p < 0.01$  level) lower than their performance on actional passives, both with and without the *by*-phrase. Further, as was reported previously, these children's performance does not differ significantly from chance (at the  $p < 0.05$  level). Performance on non-actional passives is much higher in the oldest age group; however, this is not due to an increase in group performance. Rather, the majority of children

performed above chance on the two non-actional passive conditions, while four children were still performing at chance levels. These findings directly replicate those found in Hirsch & Wexler 2006b using a similar methodology.

The crucial data for our purposes is whether or not children's performance on the non-actional passives corresponds to their performance on the raised and weather-*it* items in Experiments 1 and 2. If the acquisition of passives and raising are connected, we predict to find a near perfect within-subjects correspondence between the two constructions. In addition, if we *do* find such a connection, we can ask if it holds for both *seem* and *(be) about*, or for only one predicate. The UPR predicts an across the board delay in StSR acquisition, and thus that acquisition of both predicates will mirror passive acquisition. The AIH, under which a minimality violation is the cause of children's delay predicts that only *seem* will match the acquisition of passives. Children's performance on the three tasks is compared in Table 3.8.

**Table 3.8:** Number of children showing above chance performance for raised and weather-*it* conditions and non-actional passive conditions in Experiments 1-3

	Raised <i>seem</i>	Weather- it <i>seem</i>	Raised ( <i>be</i> ) <i>about</i>	Weather- it ( <i>be</i> ) <i>about</i>	Long non- actional passive	Short non- actional passive
4 years (N=10)	0	0	10	10	0	0
5 years (N=10)	1	1	10	10	1	1
6 years (N=10)	7	7	10	10	7	6

As seen in Table 3.8, there is almost a 100% correspondence between above chance performance on raised and weather-*it* items from Experiment 1, and non-actional passives in Experiment 3.<sup>7</sup>

No such connection exists, however, between non-actional passives and the *(be) about* items

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<sup>7</sup>It is worth noting that the one child whose performance did not correspond for the two experiments barely misses the above chance cutoff for short non-actional passives, answering 6 out of 8 items correctly. This same child answers 7 of 8 items correctly on the long non-actional passive condition, which is significantly higher than chance.

from Experiment 2. This is contra to the predictions of the UPR, which would predict a correspondence between the acquisition of non-actional passives and the acquisition of raised sentences, irrespective of predicate.

### 3.5 Discussion

In designing these experiments, I set out to address three issues. The first was whether varying the raising predicate would affect children's comprehension of StSR. Is some element unique to the verbs *seem* and *appear* responsible for children's non-adult interpretation, or is it, as has been proposed, a problem endemic to raising itself? Second, I compared the development of passive comprehension to the development of raising comprehension. Do children show parallel behavior on raising with *seem*, raising with *(be) about*, and non-actional passives, or some subset? Or, alternatively, is there no connection at all between the three? The answer to this question has major ramifications regarding the underlying cause(s) of children's delay with these two instances of A-movement. Finally, I sought to determine whether children treat the expletive in weather-*it* sentences more similarly to the matrix expletive-*it* of unraised sentences or the thematic DP of raising sentences. This is one metric for identifying whether or not the weather-*it* is base generated in the subject position of the embedded clause, or as a reflex of the EPP requirement in the main clause. I discuss these issues in the following sections.

#### 3.5.1 Ramifications for theories of A-movement acquisition

In Chapter 1, several current theories for the delayed acquisition of raising were discussed, two of which I consider here: Wexler's (2004) Universal Phase Requirement (UPR), which predicts that children will be delayed with all raising-to-subject structures, and the Argument Intervention Hypothesis (AIH) which predicts that only raising structures with an intervening experiencer will be delayed. The results of Experiments 1 and 2 strongly suggest, contra the UPR, that there is no general delay for raising. From the youngest age tested, children performed nearly perfectly on raised *(be) about* sentences, in marked contrast to the late acquisition of raised *seem* found

both in the current and previous studies. Furthermore, the within-subjects design means that the same subjects who showed this poor performance on StSR with *seem* (and non-actional passives) performed well on StSR with *(be) about*.

The AIH accounts for the discrepancy between *seem* and *(be) about* easily: the first selects an experiencer argument, and the second does not. The remaining question is why earlier studies found a correspondence between delays of raised *seem* sentences with and without experiencers (Hirsch, Orfitelli & Wexler 2007, 2008). To explain how children come to be delayed in comprehension of short raising sentences within the AIH, it is necessary to assume that the experiencer is syntactically present even when it is phonetically unpronounced. This assumption is in line with the claim that an implicit *by*-phrase is active even in short verbal passives, and leads to the additional prediction that a child's acquisition of raising—with or without a pronounced experiencer—will coincide with his acquisition of non-actional passives—with or without a pronounced *by*-phrase.

This prediction is borne out by the evidence from four separate experimental investigations. Hirsch & Wexler 2006b find a connection between the acquisition of short and long passives; Hirsch, Orfitelli & Wexler (2007) find a similar link for short and long raising structures using the verb *seem*. The connection between non-actional passives (both long and short) and long raising structures with *seem* is found in Hirsch & Wexler 2007b. This study provides the final piece of the puzzle by demonstrating a link between passivization and short raising structures. The results of the within-subjects comparison reveal that individual children acquire an adult comprehension of non-actional verbal passives at the same time as raised *seem* utterances that lack an overt experiencer. Together, these four studies indicate that raising structures with *seem* and non-actional passives co-occur in the acquisition of English, and that they are acquired quite late in development.

In contrast, as shown here, StSR with *(be) about* is already in place at the earliest ages tested, and hence, are acquired much earlier than either StSR with *seem* or non-actional passives. As noted above, this discrepancy is predicted if children's delay with raising comprehension is not general, but limited to those raising predicates which select an experiencer. In sum then, this study

bears not only on the issue of raising acquisition, but provides concrete evidence in favor of the hypothesis that only a subset of A-movement structures are delayed in children's comprehension: those which involve movement over an intervening argument.

### 3.5.2 Raising and weather-*it*

In Experiments 1 and 2, children's performance on the weather-*it* condition matched their performance on the respective raised conditions. For weather-*it* items with *seem*, children appear to ignore the raising predicate entirely, utilizing the 'deletion' analysis discussed in Section 1.3.1. Conversely, the children provided adult responses for weather-*it* items with *(be) about*, just as they did for the raised items. Once again, this finding supports the conclusion that *seem* poses a particular challenge due to an implicit intervening argument. Putting that aside, this constitutes the first experimental evidence that the expletive in weather-*it* structures is base generated in a thematic position and raises, unlike matrix expletive-*it* insertion in unraised sentences. While it is possible that the adult representation of such utterances differs from children's representation, for these children at least, a fundamental similarity exists between weather-*it* and raised sentences.

### 3.5.3 Remaining issues

*Seem* and *(be) about* differ not only in the presence or absence of an experiencer argument, they also differ in their categorical status. *Seem* is a verbal predicate, while *(be) about* is not. A priori, there is no reason to assume that the category distinction itself should lead to a difference in children's performance with respect to raising. It is possible however, given the expansion of VP structure (cf. Larson 1988), that *seem* contains verbal shells that *(be) about* does not, increasing the distance of required movement. In the following study, I therefore assess children's comprehension of the raising verb *tend*.

Study 2 also addresses the learnability difficulty posed by the homophony of raising and control sentences. Given a compatible experimental scenario, children permit raising predicates to assign an external theta role, à la subject control (see Section 1.3.2). What determines when children will allow this particular analysis, in comparison to an analysis in which the raising predicate

is ‘deleted’ or ignored? One factor which appears to play a large role is subject animacy. Both children and adults have been found to preferentially interpret a raising/control sentence frame (25a) as control when the subject is animate (Becker 2007). Becker 2009 further argues that the presence of an inanimate or expletive subject (e.g. 25b) will force a raising interpretation from children.

- (25) a. Avery \_\_\_\_ to be eating a cake.  
b. It \_\_\_\_ that Avery is eating a cake.

Chapter 4 presents a set of three experiments that address this issue, testing raised sentences with animate, inanimate and expletive subjects. If children are indeed using (in)animacy as a cue to raising versus control, we potentially expect to find different patterns of results for animate and inanimate test items.

## CHAPTER 4

### Study 2: Animacy, predicate type, and conceptual complexity in the acquisition of StSR

#### 4.0 Introduction

In the previous chapter, I presented the results from three experimental investigations conducted with a within-subjects design. These experiments led to three empirical conclusions. First, I replicated the previous findings of Hirsch, Orfitelli & Wexler (HOW) 2008 that children are delayed until approximately six years old in acquiring short, experiencer-type subject-to-subject raising (StSR) with the predicate *seem* (1).<sup>1</sup>

- (1) Jeri seems to be fixing the engine.

Second, a within-subjects comparison demonstrated that the delay in raising corresponds to a delay in acquiring non-actional passives, both short (2a) and long (2b).

- (2) a. Robert was seen.  
b. Robert was seen by Kate.

Finally, and most importantly, I found that the same children who fail to comprehend sentences like (1) and (2) show early acquisition of StSR with *(be) about*; children consistently perform well on sentences like (3) from as young as four years old, fully two years before they are able to comprehend *seem*.

- (3) Jeri is about to be fixing the engine.

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<sup>1</sup>Experiencer-type = StSR predicates which permit an optional experiencer argument. Short StSR = The optional experiencer argument is unpronounced.



Taken together, these results suggest that StSR predicates are split into two classes with regard to acquisition: StSR with predicates like *seem* or *appear* is delayed, while StSR with predicates such as *(be) about* is not delayed. I take this split to indicate that StSR itself is acquired early by children and that children's delay with predicates like *seem* follows from the Argument Intervention Hypothesis (AIH, Section 2.3.3), as given in (4).

- (4) Young children are delayed in acquiring syntactic structures which require A-movement of one argument over an intervening argument.

*Seem* and *appear* are among the small set of StSR predicates (along with *look* and *strike*) which select for an optional experiencer (*Mary* in 5), and thus raising with these predicates should appear late, according to the AIH. I account for the parallel delay in long and short seem StSR structures by assuming that there is a covert (i.e. syntactically projected but unpronounced) experiencer argument present in short raising sentences, analogous to the covert *by*-phrase proposed to exist in short verbal passives. See Section 2.3.2 for discussion. This is in direct contrast to non-experiencer StSR predicates, which will never have an experiencer argument, either overtly or covertly.

- (5) Ethan seems (to Tim) to be wearing a hat.

The AIH also predicts that verbal passives will be acquired late, due to movement over the intervening *by*-phrase, which accounts for the near-perfect correspondence found between StSR and non-actional passive acquisition found in Experiments 1 and 3.<sup>2</sup>

While the AIH successfully captures the data presented thus far, this chapter will examine three factors which might provide an alternative explanation for the high performance that was found in Experiment 2 for StSR with *(be) about*: animacy/agentivity of the moved argument, the grammatical category of StSR predicate, and the conceptual difficulty of the StSR predicate.

#### 4.0.1 Animacy

The conclusion that children have acquired adult comprehension of StSR with the predicate *(be) about* rests on the assumption that they interpret such sentences as involving StSR, rather than

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<sup>2</sup>See Section 1.1.2 for a discussion of actional versus non-actional passives in English acquisition.

assigning an alternative (non-adult) structure. It is particularly important to rule out a subject control (SC) interpretation, as StSR predicates like *be about* and SC predicates like *intend* appear in the same sentence frames (6).

- (6) Kate {is about/intends} to leave.

In a series of experimental studies, Becker (2005, 2007) establishes that animacy of the surface subject is one of the most salient cues of an SC structure, for both adults and children. Unlike StSR predicates, SC predicates select for an external argument, and do not involve A-movement.<sup>3</sup> If children were to interpret *(be) about* as selecting an external argument, it might mean something similar to “intend”. This raises a potentially serious experimental confound for Experiment 2, in which the subjects of the sentences were not only animate, but highly volitional. For instance, the TVJT story that preceded the test sentence “The pig is about to be rolling in the mud” included the pig explicitly stating that he planned to play in the mud. Given such a strong cue, we cannot ignore the possibility that children were interpreting *be about* as an SC predicate with roughly the meaning of “intend”. Since in all scenarios, the animals involved *did intend* to perform the action they were *about* to do, a child with this interpretation would provide adult-like answers despite not having the adult structure for the sentence.

Of course, it is also possible that the children in Experiment 2 have acquired StSR, and were assigning an adult-like structure to the sentences.

Experiment 4 is aimed at ruling out the possibility of a non-adult SC interpretation by including only inanimate subjects. If children continue to show adult comprehension of StSR sentences with *(be) about*, it would strongly suggest that their high performance is due to a mastery of StSR, rather than a non-adult-like SC interpretation of the sentences. Although Experiments 5 and 6 are meant to address different questions, they too involve only inanimate arguments, in an effort to bias children towards an StSR interpretation.

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<sup>3</sup>I remain agnostic regarding Hornstein’s (1999) proposal that control does involve A-movement, as the debate is not directly relevant to the current discussion.

#### 4.0.2 Predicate type

As discussed in Chapter 3, *be about* behaves like an StSR predicate in several ways, including the selection of a non-finite clausal complement headed by infinitival *to*. Like the TP complements of other raising predicates, this complement cannot undergo pseudoclefting (7).

- (7) \*What Kate is about is to leave.

Despite this evidence that *(be) about* selects for a TP complement, it remains true that it is a prepositional predicate, while *seem* and *appear* are verbal. It is therefore possible that the two types of predicate select for a different type or size of complement, leading to a difference in children's performance that is unrelated to the presence or absence of an intervening experiencer argument.<sup>4</sup>

Experiments 5 and 6 address this possibility by testing children's comprehension of StSR with the verbal predicates *(be) going* and *tend*. These StSR predicates do not select for an experiencer. They are therefore not subject to intervention effects, and under the AIH, children are predicted to acquire them at a young age. If children's difficulty with *seem* was because verbal StSR predicates encode additional verbal structure, we may expect to find decreased performance on *(be) going* and *tend*, comparable to that seen with *seem* in Experiment 1.

#### 4.0.3 Conceptual difficulty

The final alternative explanation that will be considered is that children's delay in acquiring StSR with *seem* is because *seem* is conceptually more difficult than *be about*. *Seem* not only requires children to understand the difference between appearance and reality, but also to have mastered Theory of Mind, the notion that unique individuals can experience different mental states. In contrast, *be about* requires only the ability to place events in an immediate temporal sequence. There is evidence that children understand prospective events as early as the Root Infinitive stage

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<sup>4</sup>Ken Wexler, p.c., suggests that *(be) about* might select non-phasal complement. If so, then the Universal Phase Requirement (Wexler 2004, see section 2.3.1 for details) would not necessarily predict children to be delayed. Regardless of whether this analysis is correct, Experiments 5 and 6 test predicates to which it would not apply.

(2-3 years) when they use RIs with future/modal meaning (cf. Wijnen 1997; Hoekstra & Hyams 1998).

The predicate used in Experiment 5 is *be going*, which involves the same type of temporal sequencing involved in comprehending *be about*. It was necessary to test another predicate with a higher level of conceptual complexity to see if this was at the root of children's difficulties. Accordingly, Experiment 6 was designed to test an StSR predicate which does not select for an experiencer, but has a high level of conceptual complexity. To accomplish this, the StSR predicate *tend* was chosen. *Tend* requires the child to have mastered the notion of habituality, and to be able to recognize that an event can be habitual, even if there are exceptions to it. If children do not comprehend StSR sentences with *tend*, it may suggest that their difficulties with *seem* were unrelated to an intervening argument, but instead reflect a lack of understanding of the meaning of the predicate.

The outline of the chapter is as follows: In Section 4.1, I describe the subjects, methods, and results of Experiments 4 and 5, which test children's comprehension of raising sentences with *(be) about* and *(be) going*. These experiments are similar to experiment 2 in many ways, but use exclusively inanimate subjects. Section 4.2 describes Experiment 6, which tests children's comprehension of StSR with the predicate *tend*. Finally, in Section 4.3, I conclude the chapter by discussing the ramifications of these results.

## **4.1 Experiments 4 and 5: Inanimate raising with *(be) about* and *(be) going***

### **4.1.1 Experiment 4 and 5 participants**

One group of 30 monolingual English-speaking children from the Los Angeles area was tested in Experiment 4. A separate comparable group of 30 children was tested in Experiment 5.<sup>5</sup> Each of these two groups consisted of 10 children in each one-year interval between four and six years of

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<sup>5</sup>In order to reach the total of 60 children for these two experiments, three additional children were tested. Of these three, two children's data were excluded because they did not pass the control condition for Experiment 4, and one was excluded for not passing the control condition for Experiment 5.

age, the same age range tested in Experiments 1-3. As noted in Section 3.1.1, this range includes the age at which the majority of children show non-adult performance on StSR with *seem/appear*, as well as the age by which they are consistently showing adult comprehension. Testing for each experiment was conducted on the UCLA campus in a dedicated testing facility, in a single session lasting no more than one hour. Participant details are shown in Tables 4.1 and 4.2.

**Table 4.1:** Experiment 4 participant details

Group	Age Range	Mean Age	N
4;0–4;11	4.01-4.84	4.46	10
5;0–5;11	5.21-5.97	5.59	10
6;0–6;11	6.13-6.78	6.42	10
Total	4.01-6.78	5.31	30

**Table 4.2:** Experiment 5 participant details

Group	Age Range	Mean Age	N
4;0–4;11	4.13-4.86	4.49	10
5;0–5;11	5.08-5.91	5.52	10
6;0–6;11	6.03-6.81	6.39	10
Total	4.13-6.81	5.28	30

In addition to the child participants, a group of five adults between the ages of 20 and 30 years old were tested on each experiment, using identical methodology as was used with the children. All ten adults performed at 100% on the task they were given, demonstrating that neither of the experiments had methodological flaws that would hinder a mature speaker of English. Children’s performance can therefore be considered separate from any potential issues in this area.

#### 4.1.2 Experiment 4 and 5 procedure

Experiments 4 and 5 use a Truth-Value Judgment task (TVJT; Crain & McKee 1985; Crain & Fodor 1993) similar to that of Experiments 1 and 2 (see Section 3.2.1). The children observed a story, in this case illustrated through a pair of pictures. Following that, a puppet (named Mr. Bear) commented on the story. Half of Mr. Bear’s comments were true, and half were false. The child was asked to be Mr. Bear’s teacher for the day: to listen carefully and to tell him when he said something right and when he said something wrong, and why.

### 4.1.3 Experiment 4 and 5 materials

The similarity in meaning between *(be) about* and *going* permitted the same TVJT scenarios to be used in both tasks. A total of eight two-picture stories were constructed. Four of these depicted weather events, and were identical to the weather stories used in Experiment 2 (see Section 3.3.1).

The remaining four stories were constructed with the goal of ruling out a subject control interpretation for the StSR test items. To this end, the scenarios used in Experiment 4 differ in two major ways from those that were used in Experiment 2. First, each story was about an inanimate object (e.g. a ball) undergoing an event. The cause of the event in the story (e.g. the wind) was also inanimate. Prior to the experiment, the experimenter told the child that all of the stories would be about “things that aren’t alive.” The experimenter then explicitly stated that non-living things could neither “want to do anything,” nor “do anything by themselves,” and confirmed this with the child. With this concrete reminder, even the youngest children easily accepted the inanimacy of the objects in the stories.

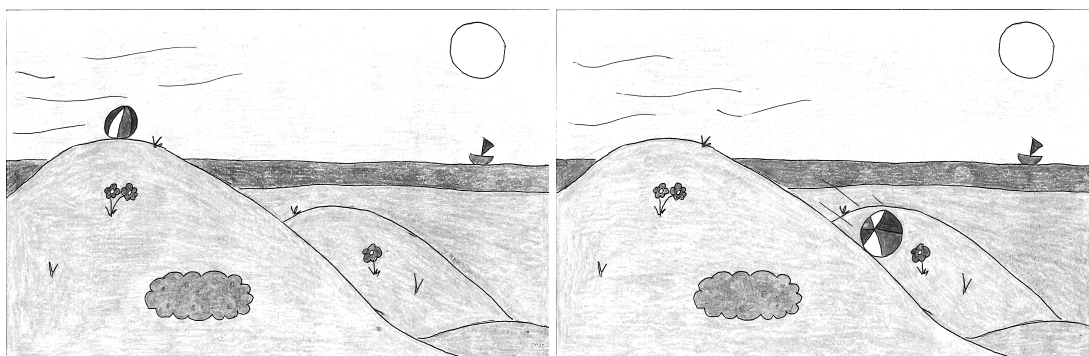
The second difference concerned the embedded predicates used in the test items. The sentences in Experiment 2 exclusively contained transitive embedded predicates (e.g. *The rabbit is about to be eating the cake*). These predicates are incompatible with inanimate external arguments, as well as being highly agentive. Instead, test items in Experiment 4 used one of four predicates which were compatible with inanimate arguments: two of these were transitive predicates that permit an inanimate external argument (*hide*, *touch*), and two were intransitive predicates, one unergative (*roll*) and one unaccusative (*fall*).<sup>6</sup> Prepositional phrases were added to the end of the intransitive sentences to roughly equalize sentence length across test items.

The pictures for one story are provided in Figure 4.1.

The first picture shows a ball at the top of a hill. A breeze is depicted with wavy lines behind the ball, and the experimenter explained to the child that “it will soon push the ball forward”. As in

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<sup>6</sup>Unaccusative embedded predicates are perhaps most effective at precluding a control interpretation for an StSR sentence, since they do not select an external argument. However, given conflicting evidence regarding whether children in the relevant age group have acquired unaccusatives (to be discussed in Chapter 6), unergative and transitive predicates were included in Experiment 4 as well.



**Figure 4.1:** Experiments 4 and 5 Sample pictures: The left picture shows the scene immediately *before* an event—the ball is ABOUT to be rolling down the hill. The right picture shows a scene *during* the event—the ball IS rolling down the hill.

Experiment 2, the experimenter always used future tense in order to avoid using an StSR utterance with *(be) about* or *going*, since these were the structures under examination. In the second picture, the ball is shown rolling down the hill. All Experiment 4 and 5 items are included in Appendices D and E.

Just as in Experiment 2, the relevant contrast between the two pictures in each story is temporal. In the first picture, an event is about to occur, and in the second, it is occurring. Therefore, StSR sentences using *(be) about* or *going* are true of the first picture, but not the second, while the progressive sentences are true of the second picture, but not the first. Because progressive and raised sentences are true or false of different pictures, we could be sure that children were not merely ignoring the raising predicate and judging the sentences on the truth of the embedded clause.

Before the puppet commented on the story, children were asked the same two comprehension questions they were asked in Experiment 2: “Which picture shows right before it happened?”, and “Which picture shows it happening?” These questions established that the child grasped the temporal contrast necessary to assess the truth of the test items.

Experiments 4 and 5 each included 32 test items, evenly divided into the same four conditions as in Experiment 2: a simple present progressive (8, 12), a simple future progressive (9, 13), a raised sentence (10, 14), and a raised weather-*it* sentence (11, 15). Example test items with adult judgments for Experiments 4 and 5 are provided in Tables 4.3 and 4.4.

**Table 4.3:** Experiment 4 test items with adult judgments

	<b>Test Items</b>	<b>Applied to First Picture</b>	<b>Applied to First Picture</b>
(8)	The ball is rolling down the hill.	False	True
(9)	The ball will be rolling down the hill.	True	False
(10)	The ball is about to be rolling down the hill.	True	False
(11)	It is about to be rainy.	True	False

**Table 4.4:** Experiment 5 test items with adult judgments

	<b>Test Items</b>	<b>Applied to First Picture</b>	<b>Applied to First Picture</b>
(12)	The ball is rolling down the hill.	False	True
(13)	The ball will be rolling down the hill.	True	False
(14)	The ball is going to be rolling down the hill.	True	False
(15)	It is going to be rainy.	True	False

The present progressive and future progressive conditions served as attentional controls, showing that children understood the task, were able to answer both true and false to the TVJ puppet (meaning they did not have a “yes bias”), and grasped the temporal relationship inherent in the stories. To ensure that all of these things were true, data was only included in the final analysis if the child had performed at above chance levels on both of these conditions. There were 8 items in each condition; thus a binomial distribution defines above chance performance as 7 or 8 out of 8 items correct. Despite this requirement, only one child’s data was eliminated for Experiment 4 and only two for Experiment 5, suggesting that the experiments were not difficult for children.

As in Experiments 1 and 2, the raised and weather-*it* conditions are those of interest, and different patterns of results correspond to different accounts of StSR (and A-movement) acquisition.



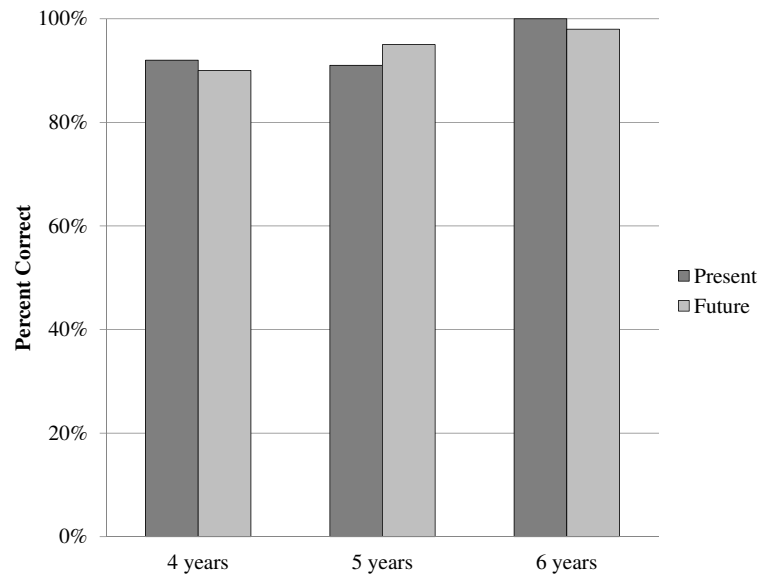
First, if children perform poorly on both conditions, it suggests that children have not acquired StSR. The high performance found in Experiment 2 could then be explained as an effect of animacy: because the moved argument was animate, children were biased towards a (non-adult) subject control structure. Even though this structure is non-adult-like, the experimental design was such that children's pattern of responses seemed to be adult-like. A second possible pattern of results is for children to perform well on the raised and weather-*it* conditions in both Experiments 4 and 5. This would constitute strong evidence that they comprehend StSR, irrespective of predicate type and the animacy of the moved argument. The final possibility is that children perform well on raised and weather-*it* test items with the StSR predicate (*be*) *about* (Experiment 4), but perform poorly on those with the StSR predicate *going* (Experiment 5). This pattern would suggest that the grammatical category of the predicate is the factor which determines the time-course of acquisition.

These three possible data patterns are consistent with different accounts of the acquisition of StSR. The first pattern—consistently poor performance—would support the UPR, under which children should be delayed in acquiring StSR. Such a pattern would not support the AIH, which predicts a divide in performance between those StSR predicates which select experiencers and those which do not. Conversely, the second data pattern—consistently good performance—is inconsistent with the UPR and supportive of the AIH, because children's delay with StSR would thus be limited to *seem* and *appear*, predicates that select for an intervening experiencer.

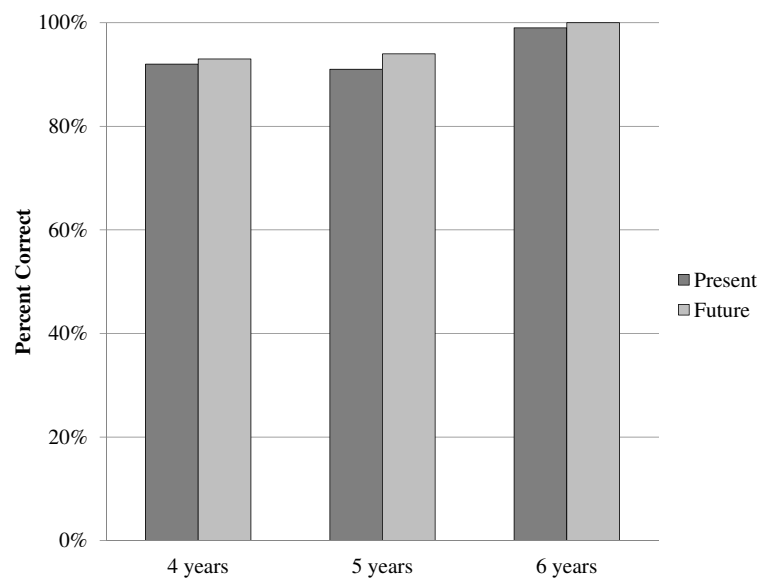
The final data pattern requires the most involved explanation. Similar to consistent poor performance, a difference in comprehension between StSR with (*be*) *about* and *going* is inconsistent with the predictions of the AIH, because neither predicate selects for an experiencer. This difference is not straightforwardly predicted by the UPR either, however, unless we assume that verbal StSR predicates select for a larger complement than do non-verbal StSR predicates. In this case, we might hypothesize that non-verbal predicates lack the phase boundary that causes children's difficulties under UPR.

#### 4.1.4 Experiment 4 and 5 results

Children's performance on the present progressive and future progressive conditions is shown in Figure 4.2 for Experiment 4 and Figure 4.3 for Experiment 5.



**Figure 4.2:** Children's performance on present progressive and future progressive conditions (Experiment 4)



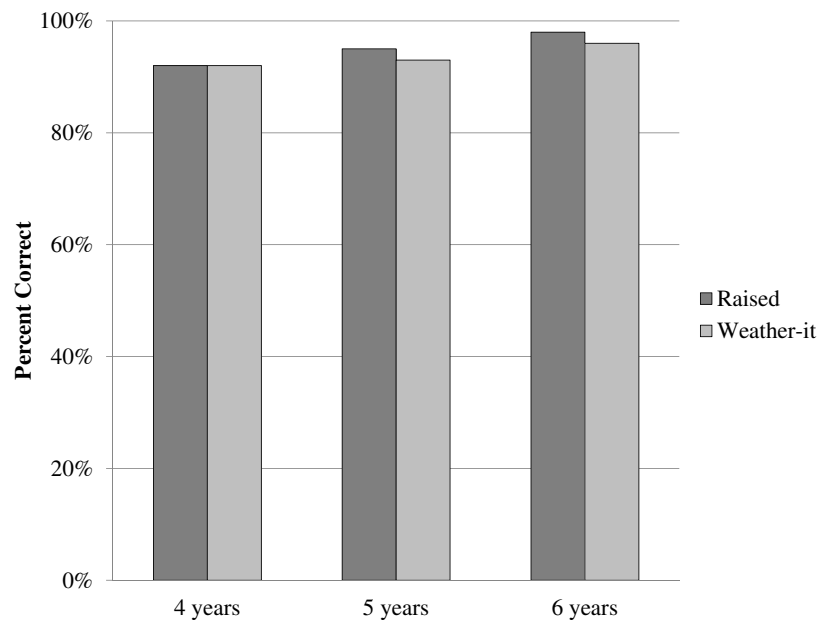
**Figure 4.3:** Children's performance on present progressive and future progressive conditions (Experiment 5)

From the earliest age tested, children show comprehension of these test items, and provide justifications for their answers which matched the TVJT scenarios. This high performance is not surprising, given the aforementioned requirement that children performed significantly higher than chance on these two control conditions in order to have their data included. It is worth reiterating, however, that only 3 total children had to be eliminated for not passing the control conditions. Through this requirement, we have ensured that the 60 children included in Experiments 4 and 5 understood the experimental task. Their results on the raised and weather-*it* conditions can thus be considered independently from these issues.

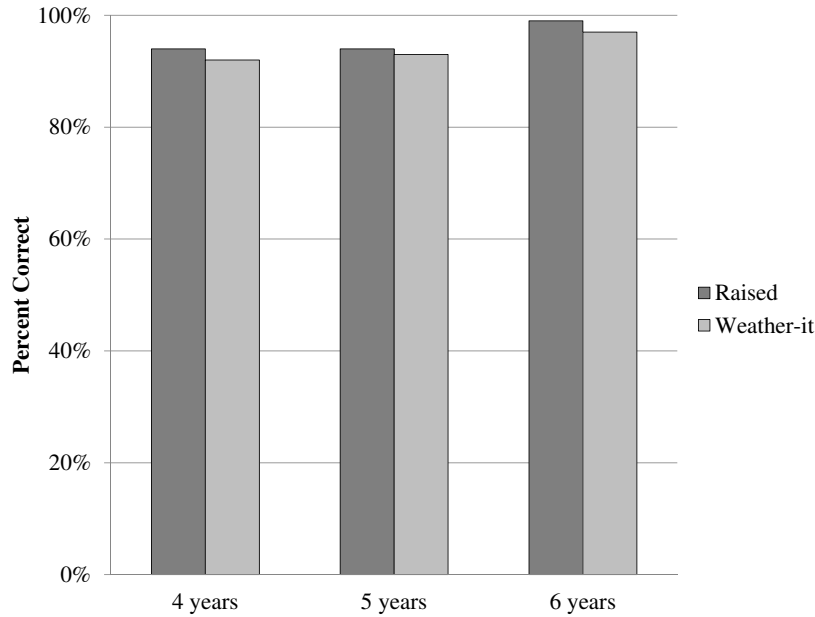
Children's performance on the raised and weather-*it* conditions is shown in Figure 4.4 for Experiment 4 and Figure 4.5 for Experiment 5.

Just as was found in Experiment 3, the children tested in Experiment 4 show adult comprehension of raised sentences with (*be*) *about* from the earliest ages tested. For all three age groups, performance is at above chance levels on both the raised and weather-*it* conditions. Individual performance tracks this pattern: all 30 children perform at above chance levels for each condition.

The same high performance is seen in Experiment 5—both group and individual performance



**Figure 4.4:** Children's performance on the raised and weather-*it* conditions (Experiment 4)



**Figure 4.5:** Children’s performance on the raised and weather-*it* conditions (Experiment 5)

were significantly above chance for the raised and weather-*it* conditions. In both experiments, there was no significant increase in performance based on age.<sup>7</sup>

Children’s responses, and their justifications for these responses, both support the conclusion that they were correctly interpreting both StSR predicates. To answer correctly on raised and weather-*it* items in Experiments 4 and 5 required an understanding of the meaning of (*be*) *about* and *going*, respectively; any child ignoring the predicate would provide consistently wrong answers, and none did. In addition, response justifications often made reference to the relative timing of the action or weather event. A sample response justification for an Experiment 4 item is given in (16), and one for an Experiment 5 item is given in (17).

- (16) It’s already off of the tree Mr. Bear, it can’t fall again.  
*Child’s justification for (correctly) answering false to “The apple is about to be falling from the tree,” when applied to the second picture, in which the apple is already falling.*

<sup>7</sup>Model run in R using the *lmer* function of the lme4 package, with accuracy as the binomial dependent variable, age group as fixed effect, and subject as random effect. P-values obtained using the *pvals.fnc* function with 10,000 simulations (Baayen, Davidson & Bates 2008). A near identical model adding item as a random effect was run and compared to the first, using R’s *anova()* function. There was no significant difference to model fit, showing that there was no item effect.

- (17) The ball is almost in the sand.

*Child's justification for (correctly) answering true to "The ball is going to be touching the sand," when applied to the first picture, in which the ball is rolling towards the sand.*

Importantly, children's performance on raised and weather-*it* trials suggest that their high performance in Experiment 3 was not due to a subject control mis-analysis. In Experiment 4, the inanimacy of the surface subject should lead to a strong bias towards an StSR interpretation, yet children still performed very well. Additionally, no performance difference was found between those items with intransitive versus transitive embedded predicates. Even with intransitive predicates that particularly strongly favor an StSR (rather than subject control) interpretation, children show clear comprehension from as young as four years old. Finally, children's early comprehension cannot be explained as a function of the grammatical category of the predicate. While *(be) about* and *going* are similar in meaning, the former is a prepositional StSR predicate, while the latter is verbal.

Taken together, these findings continue to support the existence of two classes of StSR predicate. With the first, which includes *seem* and *appear*, children do not show adult comprehension until approximately six years old. The second class, which includes *(be) about* and *going*, does not show such a delay; children comprehend StSR with these predicates from the earliest ages.

This experiment does not address the issue of lexical complexity; in fact, it was designed to avoid this issue, with the choice of a predicate that was similar in meaning to *(be) about*. In the following section, I turn to Experiment 6, which directly examines lexical complexity by testing children's comprehension of StSR with the predicate *tend*.

## 4.2 Experiment 6: Raising with *tend*

### 4.2.1 Experiment 6 participants

In experiment 6, as in the previous experiments, 30 monolingual English-speaking children from the Los Angeles area were tested. However, in contrast to the previous experiments, no four-year-olds were tested; the subjects consisted of 15 five-year-olds and 15 six-year-olds. The age range was determined following pilot testing in which four-year-olds demonstrated extreme difficulty with the task. Because previous studies of *seem* and *appear* (Hirsch, Orfitelli & Wexler 2007, 2008; Experiment 1 of this dissertation) have not found consistent adult comprehension until six to seven years old, we felt that we could catch potential non-adult performance with five-year-olds. To account for the slight amount of variance found in five-year-olds with *seem* and *appear*, however, a larger group of children was tested.

Testing for each experiment was conducted on the UCLA campus in a dedicated testing facility, in one or two sessions lasting no more than one and a half hours combined. Participant details are shown in Table 4.5.

**Table 4.5:** Experiment 6 participant details

Group	Age Range	Mean Age	N
5;0–5;11	5.03-5.89	5.51	15
6;0–6;11	6.01-6.94	6.39	15
Total	5.03-6.94	5.95	30

In addition to the child participants, a group of five adults between the ages of 20 and 30 years old were tested on each experiment, using identical methodology as was used with the children. All ten adults performed at 100% on the task they were given, demonstrating that neither of the experiments contains methodological flaws that would hinder a mature speaker of English. Children's performance can therefore be considered separate from any potential issues in this area.

### 4.2.2 Experiment 6 procedure

Experiment 6 uses a modified version of the TVJT procedure described in Section 3.2.1. Just as in the previous TVJ tasks in this dissertation (see Experiments 1, 2, 4, and 5), the child viewed a story which consisted of two pictures. A puppet named Mr. Bear would then comment on this story, and the child was asked to tell him if what he said matched the scenario or not.

The primary difference is that before the test began, the child needed to be taught the meaning of *tend*. To accomplish this, children were told that they would be Mr. Bear's teacher, and that the lesson for the day was to learn a new word: *tend*. The experimenter would then ask the child if he or she already knew what *tend* meant.<sup>8</sup> Regardless of the child's answer, the experimenter would then explain the meaning of *tend*, using a scripted definition and three pairs of training pictures. These scenarios were unique, and were not used in the test portion of the experiment. To avoid using StSR sentences with *tend*, the training materials used only bi-clausal sentences containing a nominalized form of *be true* (18). Training materials are provided in Appendix E.

(18) It tends to be true that apples are red.

At two predetermined points during the later testing phase, the experimenter halted and suggested that it would be a good idea to remind Mr. Bear of what *tend* meant. One of the practice scenarios was used for this purpose, along with the script which went with that scenario. In addition, in cases where it was not possible to complete testing in one session, the entire training session was repeated at the beginning of the second session, before testing resumed.

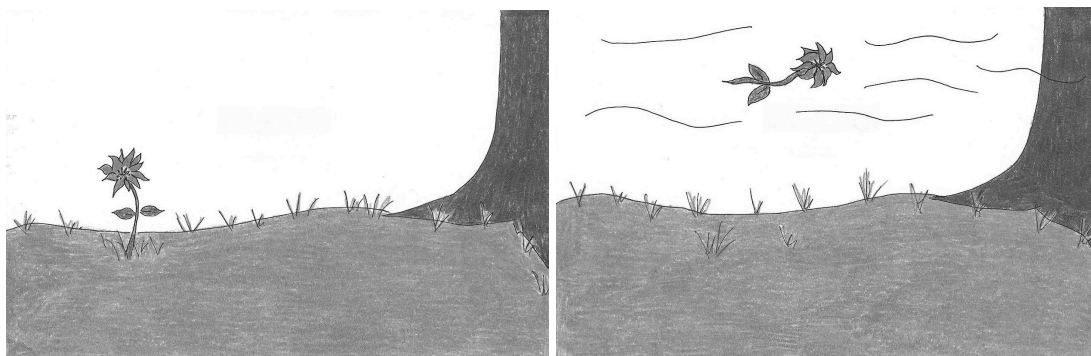
### 4.2.3 Experiment 6 materials

A total of eight two-picture stories were constructed, each of which depicted a contrast between a typical state of events and the current state of events, which notably differs from what normally happens. The pictures for one story are shown in Figure 4.6.

The first picture shows a flower growing in the grass. The experimenter explains to the child

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<sup>8</sup>While several children answered yes to this question, only one was able to provide the definition of *tend*. I will discuss this particular child in Section 4.2.4, when I present the results of the experiment.



**Figure 4.6:** Experiment 6 sample pictures: The left picture shows the habitual situation—the flower *TENDS* to be touching the ground. The right picture shows the current, out of the ordinary event—the flower *IS* flying through the air.

that “most of the time, flowers are touching the ground”. The adverb phrase was used in order to avoid using an StSR sentence with *tend*, since this was the structure under examination. In the second picture, the wind has picked up, and the same flower is shown flying through the air. The experimenter explains that this current situation is unusual, since flowers normally stay in the ground. Each story therefore contrasts two events: what normally happens, and what is currently happening. Therefore, StSR sentences using *tend* are true with one predicate phrase (*touching the ground*) and false with the other (*flying through the air*), while the exact reverse predicates are true and false of the progressive sentences. Because progressive and raised sentences are true or false with different predicates, we could be sure that children were not merely ignoring the raising predicate and judging the sentences on the truth of the embedded clause.

Before Mr. Bear commented, children were asked two comprehension questions: “Which picture shows what happens on most days?”, and “Which picture shows what is happening right now?” These questions established that the child had grasped the difference between habitual and current behavior, and were repeated until the child understood the scenario. All Experiment 6 items are included in Appendix F.

Once the child demonstrated that he understood the scenario, Mr. Bear commented on the pictures, using one of four sentence types: a simple present progressive (19), a simple progressive with a habitual adverb (20), a raised sentence (21), and a raised weather-*it* sentence (22). Example test items with adult judgments for Experiment 6 are provided in Table 4.6.



**Table 4.6:** Experiment 6 test items with adult judgments

	<b>True Test Items</b>	<b>False Test Items</b>
(19)	The flower is flying through the air.	The flower is touching the ground.
(20)	On most days, the flower is touching the ground.	On most days, the flower is flying through the air.
(21)	The flower tends to be touching the ground.	The flower tends to be flying through the air.
(22)	It tends to be sunny.	It tends to be rainy.

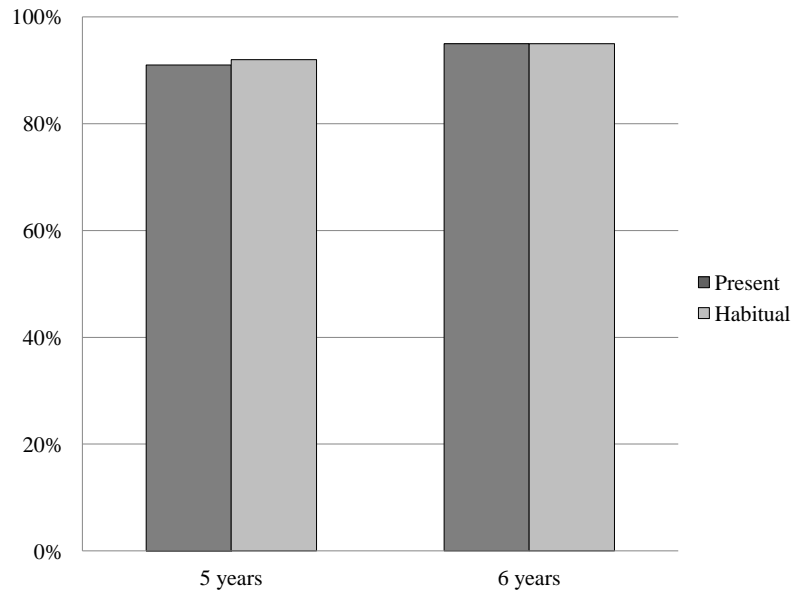
The present progressive and habitual conditions served as attentional controls, showing that children understood the task, were able to answer both true and false to the TVJ puppet (meaning they did not have a “yes bias”), and grasped the habitual relationship inherent in the stories. To ensure that all of these things were true, data was only included in the final analysis if the child had performed at above chance on both of these conditions, based on the same criteria outlined in Section 4.1.3. Given the complexity of the task, 14 additional children (10 five-year-olds and 4 six-year-olds) were eliminated from further analysis before reaching the target of 30 child participants.

The raised and weather-*it* conditions are those of interest. If children comprehend these items, it is evidence that they have mastered StSR independent of lexical complexity. Poor performance on *seem* must then receive a different explanation. If children do not comprehend these items, we find evidence that lexical complexity affects the time course of StSR acquisition.

#### **4.2.4 Experiment 6 results**

Children’s performance on the present progressive and habitual progressive conditions is shown in Figure 4.7

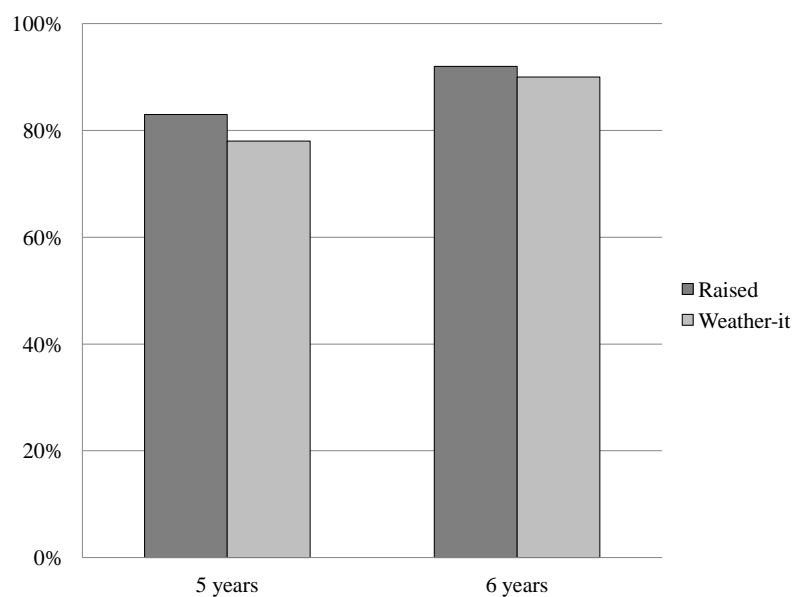
Both as a group and individually, the 30 children included in Experiment 6 perform at above chance levels on these two control conditions, as was required for their data to be included. The complexity of the scenarios led to slightly dampened performance, and the majority of five-year-olds answered only 7 out of 8 test items correctly, compared to the perfect performance found for many children in Experiments 2, 4, and 5. However, as children were performing significantly higher than chance, we may assume that they comprehended the scenarios, and their results on



**Figure 4.7:** Children’s performance on the present progressive and habitual progressive conditions (Experiment 6)

the raised and weather-*it* conditions can thus be considered independently from these issues.

Children’s performance on the raised and weather-*it* conditions is shown in Figure 4.8.



**Figure 4.8:** Children’s performance on the raised and weather-*it* conditions (Experiment 6)

Despite having just learned the meaning of the word *tend* (only 1 child out of 30 knew the meaning prior to testing), children perform quite well on both the raised and weather-*it* conditions.

As a group, six-year-olds perform at above chance levels on both conditions, and of the 15 children, 14 individually perform above chance.

The performance of the five-year-olds is markedly lower, although as a group they do not differ significantly from the six-year-olds.<sup>9</sup> Despite this, they also do not differ significantly from chance on either condition, answering correctly on 83% of raised items, and 78% of *weather-it* items.<sup>10</sup> Two things are worth noting. First, in the raised condition, the five-year-olds were extremely close to the cutoff between chance and above chance performance; if the group had answered an additional 3 items correctly, they would have passed the cutoff. Second, the group pattern masks the fact that individually, the majority of five-year-olds performed at above chance levels (Table 4.7).

**Table 4.7:** Experiment 6 individual performance on the raised and *weather-it* conditions, divided into above-chance (AC), chance (C), and below-chance (BC) performance.

	Raised			Weather-it		
	AC (7-8)	C (2-6)	BC (0-1)	AC (7-8)	C (2-6)	BC (0-1)
5 years (N=10)	11	4	0	10	5	0
6 years (N=10)	14	1	0	14	1	0

11 five-year-olds comprehended raised items at an above chance level, answering 7 to 8 out of 8 items correctly. Given that these children had just learned the meaning of *tend*, this is remarkably high performance. In fact, the one child who already knew the meaning of *tend* prior to the experiment was among this group, and performed perfectly on all items.

Among the 4 children who performed at chance levels on the raised condition, 3 of 4 answered correctly on 6 out of 8 items. On the items which they answered correctly, these children (as well as the 11 who scored at above chance) provided justifications which demonstrated an understanding of *tend* in an StSR sentence, as seen in (23). In some cases, children even used *tend* in their justification response (24).

<sup>9</sup>See footnote 7 for details of logistic regression model.

<sup>10</sup>Based on a binomial distribution, 87.5% of items must be answered correctly to be considered significantly above chance at the 0.05 level.

- (23) Boats don't normally sink, silly. That's just for today.  
*Child's justification for (correctly) answering false to "The boat tends to be sinking."*
- (24) The car doesn't...it tends to go fast cause the engine isn't broken.  
*Child's justification for (correctly) answering true to "The car tends to be moving fast."*

A similar pattern of results is seen with the weather-*it* condition, with one exception. One specific weather-*it* item proved particularly difficult for children. This item was "It tends to be sunny", and was false, given a story about a village called "Bear-ville" in which it rains on most days. Many children became confused between the fictional Bear-ville and the city of Los Angeles, however, and answered true, providing justifications such as (25). When this item is removed from consideration, the five-year-old's group performance increases to 85% correct.

- (25) It rained when I went to Pop-pop's house, but it doesn't rain very much here.  
*Child's justification for (incorrectly) answering true to "It tends to be sunny."*

It seems that, although not all children had completely mastered the meaning of *tend*, those who had were able to comprehend an StSR sentence using it with no difficulty.

### 4.3 Discussion

Experiments 4-6 were designed to assess three alternative explanations to the AIH for the findings of Experiments 1-3. The first was whether the animacy of subjects in Experiments 2 led children to assign a non-adult SC structure to raised sentences with *(be) about*, allowing them to answer correctly without appealing to StSR at all. Experiments 4-6 each addressed this possibility by using only inanimate arguments.

The second alternative was that verbal StSR predicates encode more structure than non-verbal StSR predicates, and are therefore more difficult for children to acquire. Experiments 5 and 6 each addressed this by testing children's comprehension of the verbal StSR predicates *be going* and *tend*.

The last alternative was that StSR does not pose a problem at all for children, and that *seem*

is merely so lexically complex compared to *(be) about* that children cannot comprehend StSR sentences with the former. In this case, the presence or absence of an intervening argument would be entirely unrelated to children's behavior. Experiment 6 tested this alternative by looking at children's acquisition of StSR with *tend*, another lexically complex StSR predicate.

In all three experiments, regardless of animacy, predicate category, or lexical complexity, children show adult comprehension of StSR. It seems, then, that none of these alternative explanations can appropriately capture the data found in Experiments 1-3. We are left with two classes of StSR predicates: children perform well on StSR with non-experiencer predicates, but do not perform well on StSR with experiencer-type predicates. It is clear that children cannot have a general difficulty with StSR, as expected under the Universal Phase Requirement (UPR), because they show no delay in acquiring StSR with *(be) about*, *going* and *tend*. While these three raising predicates differ in various respects, they share the crucial characteristic that they have no intervening argument.

The AIH captures the division between these two groups of raising predicates, by postulating that children's difficulty is not with StSR itself, but with A-moving an argument over an intervening argument.

In the following chapter, I present the findings of a naturalistic study comparing children's production of the two proposed classes of StSR predicate: those which permit an experiencer argument, and those which do not.

## CHAPTER 5

### Study 3: A corpus study of raising predicates

#### 5.0 Introduction

The previous two chapters have focused on children's comprehension of Subject-to-Subject Raising (StSR) with a variety of predicates, including *seem*, *(be) about*, *(be) going*, and *tend*. The results of six experiments suggest that while children have acquired adult comprehension of StSR from as young as four years old, they are selectively delayed in comprehending StSR with *seem*.

To explain this difference, I have proposed the Argument Intervention Hypothesis (AIH): Children are delayed in acquiring A-movement if and only if the movement takes place over an intervening argument. As discussed in §1.3, *seem* is rare among StSR predicates in optionally selecting an experiencer argument, which intervenes between the base and final positions of the moved argument. I call such StSR predicates 'experiencer' StSR predicates, in contrast to 'non-experiencer' StSR predicates, which never permit experiencer arguments.

Since children are equally delayed on experiencer-type StSR whether or not the argument is pronounced, I have further argued that it can be covertly projected in the syntax, even in sentences where it does not overtly appear.

In this chapter, I examine the naturalistic production data from the Child Language Data Exchange System (CHILDES; MacWhinney & Snow 1985) to assess the predictions of several competing analyses of A-movement acquisition, including the AIH.

## 5.1 Predictions for StSR in production

As in Chapter 2, I will split the current discussion into grammar-based accounts and input-based accounts of A-movement acquisition. Some of the comprehension data gathered in Experiments 1-6 has already been used to support or refute particular accounts. For purposes of the current discussion, however, I will set this evidence aside, focusing solely on the predictions each account makes for production, and whether these predictions are met.

### 5.1.1 Grammar-based accounts

Grammatical theories of A-movement delay predict that young children's production of StSR predicates will be non-adult-like in a highly specific way which mirrors their non-adult comprehension. Under the AIH, children's area of delay should be limited to the production of raising sentences with experiencer-type predicates (1a), because the combination of those two characteristics leads to an intervention violation.<sup>1</sup> In raising sentences with non-experiencer-type predicates (1b), there cannot be intervention because there is no experiencer argument, and so the AIH predicts no delay. Using similar logic, unraised sentences should not be delayed, even if they have an experiencer argument (1c), because the subject of the embedded clause does not move, and so there is no intervention violation.

- (1) a. John seems (to Mary) to be wearing a hat.
- b. John is about to be wearing a hat.
- c. It seems (to Mary) that John is wearing a hat.

Under Wexer's (2004) UPR, children's delay is more general, extending to all raised sentences, whether they have an experiencer predicate or a non-experiencer predicate. Thus, children are predicted to produce unraised sentences (1c) with no difficulty, but to show non-adult behavior on the raised sentences (1a-b). Non-experiencer StSR (1b) is therefore the relevant test case for

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<sup>1</sup>If children do produce any raised sentences with experiencer predicates, the AIH would predict that these utterances would have an underlying non-adult structure, such as the deletion analysis (§1.3.1) or external argument analysis (§1.3.2).

deciding between theories like the AIH and the UPR.

### 5.1.2 Input-based accounts

In contrast to the accounts of the previous section, input-based accounts posit a direct link between the input children receive for a given structure and their production and comprehension of that structure. Here, I consider two specific instantiations that have been proposed for the acquisition of A-movement.<sup>2</sup>

Demuth's (1989) account of passive acquisition, which I will refer to as a 'Structural Frequency' account, links higher frequency of the passive in the adult language to earlier acquisition by children, and lower frequency to later acquisition. When extended to the acquisition of StSR, it predicts that children acquiring languages in which StSR is comparatively common should acquire it earlier than children acquiring languages in which it is rare. This prediction is not easily tested without crosslinguistic data, and I will not address it in depth here.

A structural frequency account makes two additional predictions that the current study *can* address, however. If the acquisition of a given syntactic structure is linked to the degree to which children are exposed to that structure, then even within the same language, children should acquire more frequent structures before less frequent structures. Therefore, if the current study finds a large quantitative difference between experiencer- and non-experiencer predicates in the input, we expect children to acquire the more frequent verb type first. A similar prediction is made for any differences in the input between raised and unraised sentences.

The second input-based theory examined here is Lau's (2011) account of passive acquisition, under which children must *either* receive frequent input *or* structurally consistent input in order to acquire the passive early. This proposal, which I refer to as the 'Structural Consistency' account, is based on Cantonese children's early mastery of the *bei*-passive, which is extremely rare in the input. The authors argue that children successfully learn the structure because the *bei* is obligatory,

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<sup>2</sup>Kirby (2011b) proposes a prototype model of raising and control acquisition, couched in a construction grammar model of language learning (Goldberg 2003, et seq.). The predictions of such an account for StSR and subject control (SC) in production require further consideration, and so this account is not considered here.



unlike the optional *by* of an English passive, and this consistency provides information about the structure.

In the case of StSR in English, the predictions of the Structural Consistency account depend highly on how adult speakers use experiencer arguments in the input to children. If adults frequently produce experiencer-type predicates such as *seem* with overt experiencers, while also producing them without then the lack of consistency in the input might lead children to produce very few raising sentences in general (and to be generally delayed in comprehension). Alternatively, if experiencers are rare in the input across all StSR predicates, then children's input is consistent: StSR predicates do not ever permit experiencers. Children might then be expected to treat both experiencer and non-experiencer StSR predicates similarly, as if they did not permit an experiencer.<sup>3</sup>

## 5.2 Previous research

Recently, Hirsch (2011) conducted an investigation of StSR in children's and adults' natural speech, exclusively limited to *seem*, which he argues is the most frequent StSR verb in the input to children.<sup>4</sup> Hirsch finds that child and adult uses of *seem* differ greatly. In a search of the entire set of American English corpora on CHILDES (as of 2004), Hirsch finds that adults produce 448 utterances with *seem*. Based on this, he reports that "children hear a unique utterance containing *seem* every 1700 utterances," and that "the number of input utterances containing *seem*... exceeds the number of input utterances containing verbs that most researchers... would judge children to know, including *crawl*, *feed*, *hug*, *lift*, *pass*, and *rub*."

In contrast, out of slightly over half a million child-produced utterances, Hirsch found only 33

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<sup>3</sup>In a language in which the experiencer was obligatorily pronounced, the structural consistency hypothesis would predict that children would produce and comprehend StSR early, irrespective of intervention. I am not aware of any such language.

<sup>4</sup>Hirsch does not quantify this result, and it is not replicated in this study. *Used (to)* is found to be much more frequent than *seem* in the input to children, at a 2:1 ratio, and *(be) going* is so frequent in the input that it was not practical to include it in the current analysis.

non-repetitive uses of *seem*. Children's use of *seem* (both raised and unraised) increased with age; the majority (67%) of sentences with *seem* were produced by children above five years old.

Hirsch takes the comparative lack of *seem* in children's naturalistic speech to indicate a general deficiency in their ability to represent StSR, supporting the UPR. The data, however, is also compatible with the other accounts outlined in §5.1. If the AIH is correct, and children's difficulty lies not with raising itself, but with raising over an intervening argument, then StSR sentences with *seem* are predicted to be uniquely difficult, as compared to StSR with other raising predicates. Similarly, without comparative information about children's production of other StSR predicates, we cannot eliminate input-based accounts.

Finally, children's lack of *seem* utterances may reflect a general difficulty with the predicate itself. In Experiment 1 of this dissertation, as well as in previous research (Hirsch & Wexler 2007b; Hirsch, Orfitelli & Wexler 2007), we found that approximately 40% of four to six year old children tested had not yet acquired the meaning of *seem*, independent of raising. If many young children do not know the meaning of *seem*, then it is not surprising that the frequency of production across children is lower than for adults.<sup>5</sup>

This 'lexical' explanation also makes predictions for children's production of StSR predicates. If the delay in producing (and comprehending) *seem* StSR is due to children's not having acquired the meaning of *seem*, then predicates which are more frequent in the input, particularly those which are conceptually simpler, should be produced earlier, irrespective of structure (e.g. raised versus unraised).

The current study examines a larger set of StSR predicates, making it possible to assess the various possible explanations. The following section details the methodology used to gather and code the production data from CHILDES.

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<sup>5</sup>In order to avoid any issue of lexical complexity in Experiment 1, children who did not perform at above chance on unraised *seem* items were not included in subsequent analyses.

## 5.3 CHILDES methodology

### 5.3.1 Included data

Seven StSR predicates were included in this study. This total includes five predicates which have been tested in comprehension, either here or in other work: *seem*, *appear*, *(be) about*, *tend*, and *used (to)*.<sup>6</sup> In addition, *likely* and *unlikely* were included, as examples of adjectival StSR predicates. Of these seven predicates, only *seem* and *appear* permit experiencer arguments.

Each of the 45 American English corpora that were available as of September, 2011 were searched, using the CLAN program. Within these corpora, only those files in which the target child was four to six years old were included. This age range includes the period when children have been seen to not comprehend StSR with *seem/appear* as well as a period in which some of them are beginning to acquire it, and matches the age range tested in the comprehension studies of Chapters 3-4. Data from siblings and other non-target children were included in cases where their ages fell within this range. Based on the criteria outlined in the previous section, certain corpora were excluded from analysis. A complete list of included corpora and files is provided in Appendix G.

### 5.3.2 Excluded data

With the exception of *seem*, each of the predicates examined has an alternative, non StSR use. This includes unaccusative *appear* (2a), transitive *tend* (2b)<sup>7</sup>, both transitive meanings of *used (to)* (2c-d), prepositional and nominal modifier forms of *(be) about* (2e-f), and attributive *likely* and *unlikely* (2g). None of these uses were included in the final analysis, as they do not directly bear on children's use of raising predicates.

- |     |    |  |              |
|-----|----|--|--------------|
| (2) | a. | The magician appeared from behind the curtain. | Unaccusative |
|     | b. | He tended (to) the garden.                     | Transitive   |

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<sup>6</sup>*(Be) going* was initially included, but appeared so frequently in both child directed and child-produced speech that it was deemed unrealistic to examine it across the entire set of American English corpora and it was set aside.

<sup>7</sup>Based on clear context, one instance of *tend* which was a shortened form of *pretend* was excluded.

c.	John used the wrench to fix the faucet.	Transitive
d.	I am used to that.	Transitive
e.	They talked about it.	Prepositional
f.	About six people are coming.	Modifier
g.	He is a likely candidate.	Attributive

Finally, if either omission or ungrammaticality made the structure of the sentence unclear, it was excluded from further analysis.

### 5.3.3 Coding

Once the data was separated into child-directed and child-produced speech, two researchers independently coded each utterance for four structural characteristics, which I will address individually below.

Utterances were initially divided into those which involve raising and those which do not. For this division, sentences were considered to be ‘raised’ if the matrix subject was a referential DP (3), and to be ‘unraised’, if the matrix subject was an expletive (4). The definitions of raised and unraised will change slightly later in the chapter, for reasons that will be discussed.

- (3) a. Bill seems to be wearing a hat.
- b. Bill seems like he’s wearing a hat.
  
- (4) a. It seems that Bill is wearing a hat.
- b. It seems like Bill is wearing a hat.
- c. There seem to be three men in the room.

Each of the predicates under examination can appear in the StSR structure given in (3a), but only *seem* (and marginally *appear*) can appear in the ‘*seems-like*’ structure shown in (3b). In this structure, originally noted by Rogers (1971), and now called ‘copy-raising’, the matrix subject corefers with a pronoun in a finite embedded clause headed by *like* or *as though*.

The ‘unraised’ items can be similarly divided. Only four of the measured predicates (*seem*, *appear*, *likely*, and *unlikely*) can appear in the ‘unraised’ form shown in (4a), taking an expletive *it* subject and a finite complement clause headed by *that*. Like the copy-raising example in (3b),

the unraised ‘*seems like*’ structure in (4b) is limited to the predicate *seem* and *appear*. However, all seven predicates permit the structure in (4c), with *there* as the matrix subject and a non-finite embedded complement clause. Chomsky (1981, et seq) takes *there* to be an expletive merged in Spec, TP in order to satisfy the Extended Projection Principle (EPP), making this structure ‘unraised’ in a similar fashion to (4a) and (4b).

The utterances were coded for three other characteristics, all unique to *seem* and *appear*, among the predicates examined in this study. The second type of coding separated prototypical StSR (3a) from the copy raising *seems-like* structure in (3b) and the non-raising *seems-like* structure in (4b).<sup>8</sup> The distinction between the two types of ‘raising’ in (4a) and (4b) will become important in the discussion of how and when children produce these verbs. I will set it aside until the following section.

The third characteristic was whether or not the optional experiencer was pronounced, and if so, whether it appeared in sentence initial, medial, or final position (5).

- (5) a. To me, Bill seems to be happy.
- b. Bill seems to me to be happy.
- c. Bill seems to be happy to me.

Finally, utterances were coded based on whether the complement of the StSR predicate was a full infinitival TP or a small clause (6).

- (6) a. Bill seems to be happy.
- b. Bill seems happy.

## 5.4 Results

One overall finding that emerged from this study was that children’s use of different raising predicates matches the adult input. When the seven StSR predicates are ranked by number of utterances produced, child and adult rankings closely align (Table 5.1).

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<sup>8</sup>In addition to *seem* and *appear*, these structures are possible with other predicates denoting perception, as with *looks like*, *sounds like*, and *feels like*.

**Table 5.1:** Number of adult and child utterances per StSR predicate

<b>Predicate</b>	<b># adult utterances</b>	<b># child utterances</b>
Used (to)	330	175
Seem	260	33
(Be) about	42	23
Tend	13	0
Appear	5	0
(Be) likely	4	2
(Be) unlikely	0	0

For the three most common predicates, *used (to)*, *seem*, and *(be) about*, children and adults match in order of frequency exactly, although it is worth noting that descriptively, children produce *seem* less than might be expected relative to their production of *used (to)*, when compared to adult speech. The ratio of child to adult speech for *seem* is just above 1:8, while with *used (to)*, it is almost 1:2.

There is an extreme drop off in frequency between the three most common and four least common StSR predicates, reflected in both adult and child speech. Children in particular demonstrate a floor effect, producing only two instances of *tend*, *appear*, *(be) likely* and *(be) unlikely* combined. Based on this, the difference between adults and children in the comparative ranking of *(be) likely* and the other three predicates is not necessarily meaningful, but may instead reflect a sampling artifact.

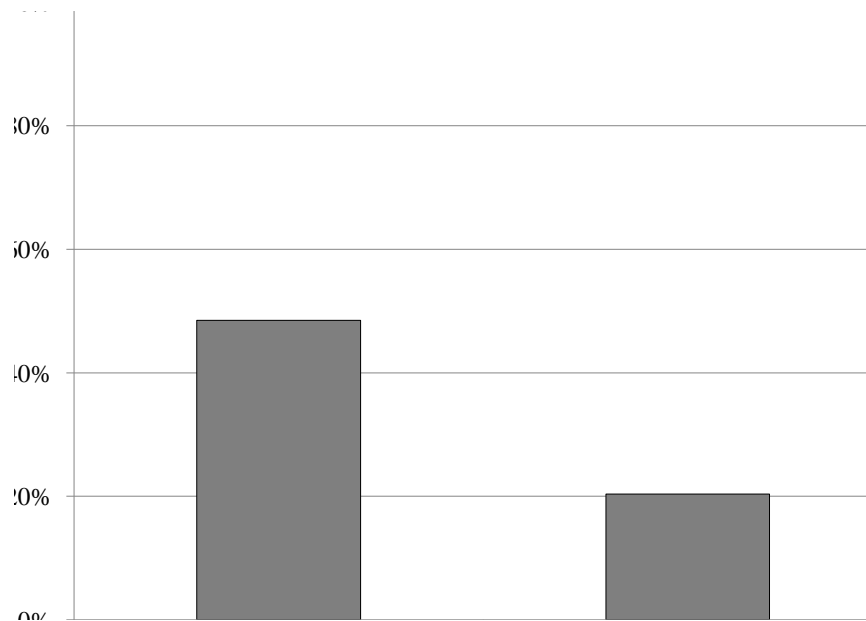
As mentioned previously, *seem* and *appear* are the only two of the predicates examined to permit an experiencer argument. In both child and adult speech, uses of *seem* dramatically eclipse uses of *appear*. For this reason, the two predicates will be collapsed in further discussion.

#### **5.4.1 *Seem* and *appear* in production**

As in Hirsch's study, a large quantitative discrepancy can be seen between children's and adults' uses of the predicate *seem* (as well as *appear*). While adults produced 265 non-repetitive sentences containing *seem* and *appear*, four to six year old children produced only 33.<sup>9</sup> The absolute numbers

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<sup>9</sup>Slight differences between the numbers presented here and the data in Hirsch 2011 should be expected for three reasons: First, several American English databases have been added since 2004, when Hirsch conducted his study;



**Figure 5.1:** Percentage of children's and adults' experiencer-StSR utterances that involve '*seems-like*' (Experiment 7)

themselves are not strictly informative. Across the CHILDES database, children generally produce fewer utterances than adults; Hirsch reports an overall 2:1 ratio of adult to child utterances. What is far more telling are qualitative differences between the sentences children and adults use. One important difference is the relative rates of *seems-like* sentences (both copy raising and non-raising versions) versus other complement-types (Figure 5.1).

While adults rarely produce *seems-like* utterances of either type (20.38%), fully 48.5% of children's uses of *seem* involve *seems-like*, including the copy-raising example in (7), spoken by a child who had just turned four years old. Note that the *it* of this sentence is not an expletive, but a pronoun that corefers with the sandwich the child is talking about.

- (7) It doesn't seem like a bologna sandwich. (MacWhinney 68a1.cha, line 750)

The high prevalence of *seems-like* utterances in children's speech is particularly interesting given that the non-raised *seems-like* sentences quite clearly do not involve raising, and the term

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second, the current study is restricted to data from files in which the target child is four to six years old; finally, as noted, the current discussion also includes data from the predicate appear. In fact, it is surprising that with such different coding criteria, both studies happened to calculate 33 total *seem* utterances for children.

‘raising’ in the copy raising *seems-like* sentences may well be a misnomer. Recent analyses within both the Minimalist (Potsdam & Runner 2001, Fujii 2005) and Lexical-Functional Grammar (Asudeh & Toivonen *to appear*) frameworks take the subject of copy raising structures to be based generated in Spec, TP, and related to the embedded pronoun through a restricted form of anaphoric binding or chain formation.<sup>10</sup>

Summing up, children use *seems-like* far more than would be expected given the adult input. In conjunction with recent theoretical claims, this suggests that children’s *seems-like* sentences should not be taken to indicate acquisition of StSR. Therefore, copy-raising *seems-like* sentences were re-coded to be in the ‘unraised’ category for all subsequent analyses.

Another area where we might expect a difference is in the use of full TP (6a) versus small clause (6b) complements. In his study, Hirsch notes that the types of sentences children used changes over time. When children under five and a half years old produced raised sentences with *seem*, the complements were almost exclusively small clauses, while the raised sentences of children above five and a half years had predominantly TP complements.

Perhaps due to the different age groups examined, the current study does not replicate this effect. Children’s use of small clause complements as compared to full TP complements in StSR sentences is similar to adults’ (Figure 5.3), and a chi-square analysis finds that children do not use significantly more SC complements than would be expected, given what adults produce ( $\chi^2(1)=0.073$ ,  $p=0.79$ ).

With experienter StSR predicates, children’s use of full TP versus SC complements appears

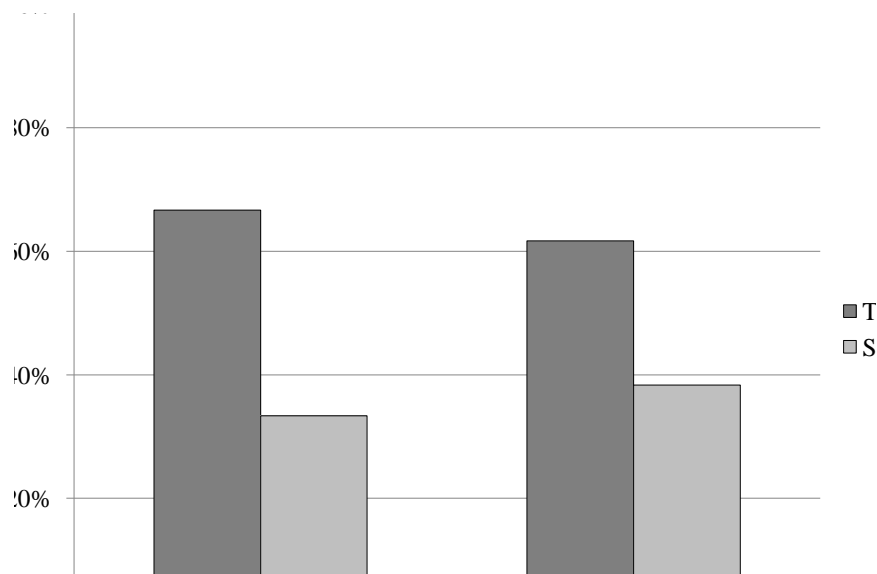
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<sup>10</sup>Once piece of evidence for an analysis of this sort comes from the ‘puzzle of the absent cook’: Unlike StSR sentences, copy raised sentences are not felicitous if the matrix subject is not the perceptual source of evidence for the embedded proposition (i) (Data from Asudeh & Toivonen *to appear*).

- i. Two people walk into a kitchen. There’s no sign of Tom, but there are various things bubbling away on the stove and there are several ingredients on the counter, apparently waiting to be used.
  - a. #Tom seems like he’s cooking.
  - b. Tom seems to be cooking.

The puzzle is therefore an instance of presupposition failure. As the copy raised subject is not part of the proposition predicated upon by *seem*, the real world object it refers to must be physically present in order to provide direct perceptual evidence.





**Figure 5.2:** Percentage of experienter-StSR sentences with TP and SC complements in child and adult speech (Experiment 7)

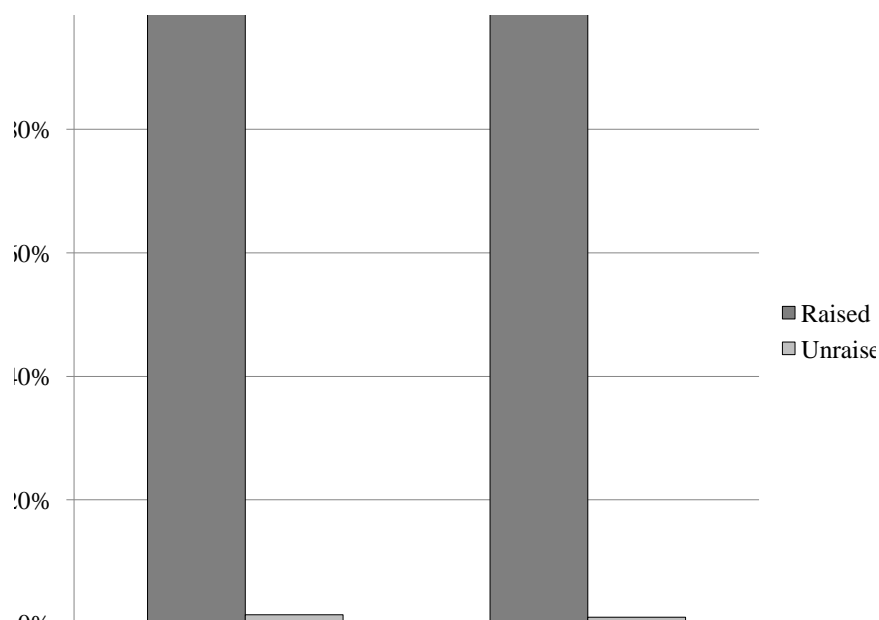
to match their input. This suggests that raising out of SC complements is neither more nor less difficult than raising out of TP complements for them, contra the claims made in Hirsch 2011.

The final area of comparison between children and adults is in their use of overt experienter arguments (see 5a-c). In both child and adult speech, experiencers are extremely rare. Adults use experiencers in only 14 of over 500 total utterances with *seem* or *appear*, and children in only 3 of 33 total. This lack of experiencers in natural production is in line with the rarity of experiencers cross-linguistically as well as the rarity of predicates that permit them, even within English (see Section 1.3.4), and adds to the evidence suggesting that raising over an intervening argument is difficult, or marked, in some way.

#### 5.4.2 Experienter versus nonexperienter predicates

We are now in a position to compare children's productions with *seem* and *appear*, two predicates which permit experienter arguments, to the five other StSR predicates which do not. As noted in §5.4, the relative frequency of non-experienter predicates is similar between adults and children. The similarity between adults' and children's use of non-experienter StSR predicates persists when we compare relative use of raising versus non-raising utterances. Figure 5.3 shows that over

98% of the sentences adults and children produce with *(be) about*, *(be) likely*, *(be) unlikely*, *used (to)*, and *tend* involve raising. Examples of raised (8a) and unraised (8b) sentences are provided for *used (to)*.



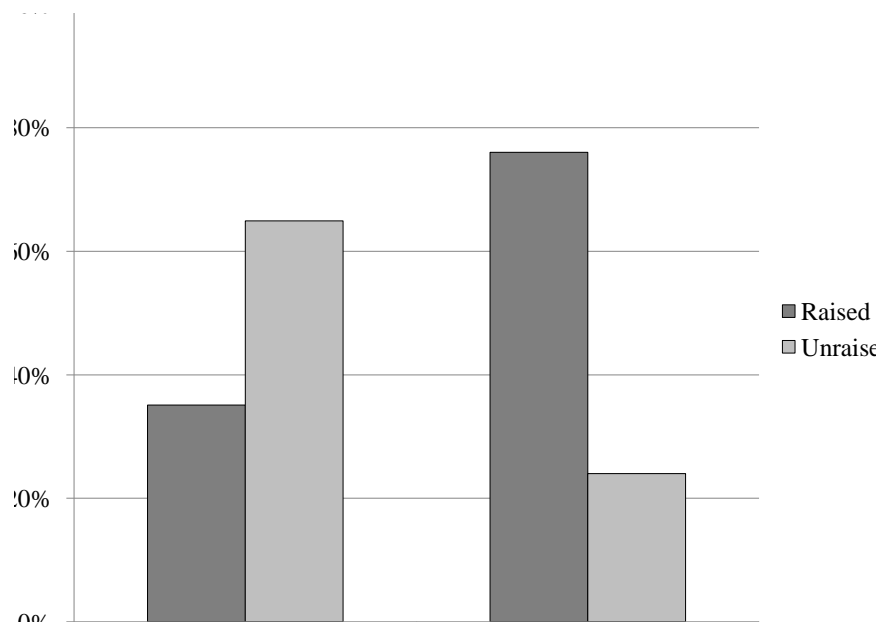
**Figure 5.3:** Raised versus unraised utterances using ‘non-experiencer’ predicates, in child and adult speech (Experiment 7)

- (8) a. He used to be in mommy’s school? (Brown adam52.cha, line 2724)  
 b. (Be)cause there used to be dinosaurs in the forest. (HSLLD ethtp3.cha, line 58)

The picture changes drastically when we examine the amount of raising versus non-raising utterances produced with *seem* and *appear*, the two predicates which permit experiencer arguments. With these predicates, children’s and adults’ behavior are almost entirely complementary: approximately 65% of children’s utterances do not involve raising, while 76% of adult utterances do (Figure 5.4). Examples of children’s utterances are provided in (9).

- (9) a. This seems so special to me today. (MacWhinney 61a2.cha, line 696)  
 b. It seems that there should be a line that goes up in the mountains. (MacWhinney 80a2.cha, line 1527)

Figures 5.3 and 5.4 descriptively suggest that while children and adults treat non-experiencer predicates the same, they treat experiencer predicates very differently. In order to quantify this



**Figure 5.4:** Raised versus unraised utterances using ‘experiencer’ predicates, in child and adult speech (Experiment 7)

intuition, a statistical analysis was performed, using an uncrossed logistic mixed-effects model in R (Baayen, Davidson & Bates 2008). The binomial dependent variable was whether or not the utterance was raised, and the fixed effects were the speaker’s age group (child versus adult) and the verb type (experiencer versus non-experiencer predicate). Random coefficients were included for each speaker. The model finds age group to be a significant predictor of raising production ( $p < 0.05$ ), as well as verb type ( $p < 0.001$ ). Most importantly, there is a highly significant interaction between age and verb type ( $p < 0.001$ ). What these results indicate is that the production of raising sentences with experiencer predicates increases significantly between four- to six-years-old and adulthood, while production of non-experiencer predicates does not.

## 5.5 Discussion

Children and adults show marked differences in their use of sentences with the predicate *seem*. While adults primarily produce raised utterances, children produce primarily unraised utterances, including those with copy raising.

I earlier suggested that *seem* may be infrequent in children’s speech because of its conceptual

difficulty. However, the fact that children in the relevant age range selectively produce *seem* in certain sentence structures shows that conceptual difficulties are not the only factor. If four- to six-year-old children did not know the meaning of *seem*, we would expect them to produce few *seem* utterances across the board, not to selectively produce *seem* in certain sentence structures. Importantly, I am not refuting the idea that children in this age group may have conceptual difficulty with *seem*; the experimental evidence presented in Chapter 3 suggests that some of them do. What this data indicates is that there must be an additional difficulty beyond the conceptual difficulty of the predicate.

The data also argue against input-based accounts. An account based on structural frequency cannot explain why children differ markedly from adults with respect to the frequency of raising with experiencer and non-experiencer predicates (see Figures 5.3-5.4). An account based on structural consistency similarly fails to explain this relationship. The input children receive lacks consistent experiencers. This consistency might lead us to expect children should treat all StSR predicates alike, failing to differentiate between experiencer and non-experiencer predicates. Instead, children's delay in producing the experiencer predicates clearly shows that they differentiate between the two classes.

The sensitivity that children show to the difference between experiencer and non-experiencer predicates suggests that a grammatical account is required to account for the data, but at the same time, argues against a general delay with StSR, as predicted by Wexler's (2004) Universal Phase Requirement. If children are generally delayed with raising, we would expect to find the same differences we see for *seem* with other raising predicates. However, we do not. Instead, we see that children behave quite similarly to adults in the types of raising sentences they produce with non-experiencer predicates ((*be*) *about*, (*be*) *likely*, (*be*) *unlikely*, *tend*, and *used (to)*), but quite differently from adults with experiencer predicates (*seem* and *appear*). This behavior is in line with the AIH, which is the only account that explicitly predicts this contrast.

## CHAPTER 6

### Extensions of the Argument Intervention Hypothesis

#### 6.0 Summary of experimental findings and conclusions

##### 6.0.1 Experiencer and non-experiencer StSR predicates

The experimental data presented in this dissertation show that children acquire subject-to-subject raising (StSR) from as young as four years old, but that their acquisition of StSR is sensitive to two different subtypes of StSR predicates: ‘experiencer’ predicates such as *seem*, which permit an optional experiencer argument, and ‘non-experiencer’ predicates such as *(be) about*, which do not. While children demonstrate adult comprehension of raising sentences with the StSR predicate *(be) about* (Experiment 2), adult performance on StSR sentences with the predicate *seem* is delayed until as late as six or even seven years old (Experiment 1), replicating previous findings of delay for raised *seem* and the semantically related verb *appear*.

Further experimentation rules out several alternative explanations for this split in performance. First, children’s high performance with *(be) about* cannot be due to them interpreting the StSR items as subject control, because they continue to demonstrate adult comprehension even when the raised argument is inanimate, ruling out a control interpretation (Experiments 4-6). Second, predicate type is insufficient to explain the early acquisition of prepositional *(be) about*, compared to verbal *seem*, because children show equally early comprehension of the verbal StSR predicates *(be) going* and *tend*. Finally, children’s non-adult comprehension of StSR with *seem* is not due to the conceptual difficulty of the predicate. This explanation is arguably ruled out within Experiment 1 itself, since the same children who performed poorly on raised *seem* items demonstrated adult comprehension of *seem* in unraised sentences. Further evidence comes from Experiment 6, in

which children are shown to comprehend raised sentences with *tend*, a predicate that involves a similar level and type of conceptual complexity to *seem*.

I take this data to indicate StSR poses no special difficulty for children, and explain their selective difficulty with *seem*-type StSR with the Argument Intervention Hypothesis (AIH), first discussed in §2.3.3:

- (1) Argument Intervention Hypothesis (AIH): Children are delayed in acquiring those structures which require A-movement across a structurally intervening argument.

The naturalistic production data gathered in Experiment 7 lends further credence to the AIH. Children rarely use experiencer predicates in their raised form, despite the prevalence of such sentences in the input. Instead, they predominantly use *seem* in structures which involve no StSR, thereby avoiding argument intervention effects.

With non-experiencer predicates, however, children predominantly use sentences with raising, just as the adults do. I suggest that because these predicates never permit an experiencer argument, StSR does not lead to an intervention effect, hence children perform well.

The most striking support for the AIH, however, comes from the near perfect within-subject correspondence found for children's delay in acquiring *seem*-type StSR and their delay in acquiring (non-actional) verbal passives (Experiments 1-2). If one of these structures is delayed for a given child, both are, and if one has been mastered, both have. Such a tight relationship suggests that children's delay is caused by a shared underlying grammatical characteristic. A-movement itself is not an option. Children demonstrate mastery of A-movement in several of the experiments presented here, and in numerous other instances discussed later in the chapter (see §6.3). However, verbal passives and *seem*-type StSR have both been argued to involve movement of one argument over another argument (Collins 2005a,b), once again making the AIH a viable explanation of children's delay.

### 6.0.2 Weather-*it*

In addition to investigating the acquisition of StSR with various predicates, each of the StSR comprehension experiments in the current study tested children's comprehension of weather-*it* sentences (2).

- (2) It seems to be raining.

An exact within-subjects link was found between children's performance on weather-*it* and StSR sentences with experiencer predicates. Non-adult comprehension of StSR sentences aligned with non-adult comprehension of weather-*it* sentences. Similarly, adult comprehension of one matched adult comprehension of the other. The same correspondence was found with the non-experiencer predicates (*be*) *about*, (*be*) *going*, and *tend*, for which all children showed adult comprehension of both structures.

This relationship between the acquisition of StSR and weather-*it* constitutes the first experimental evidence for a derivational similarity between the two sentences; namely, the *it* of weather-*it* sentences is merged in thematic subject position of the weather predicate, and undergoes raising. This movement, like that of StSR structures, is also subject to the AIH, which explains children's selective difficulty with *seem* (this difficulty is predicted to impact weather-*it* sentences with other experiencer predicates as well, such as *appear*).

This leads to the conclusion that the weather-*it* is not an expletive but a referential subject, which is supported by the fact that the same children who could not comprehend sentences like (2) showed no difficulties comprehending unraised sentences, whose subjects are true expletives.

## 6.1 Implicit arguments in acquisition

If intervention by the *by*-phrase of the verbal passive and the experiencer argument of *seem*-type StSR is responsible for children's comprehension and production delays, the issue that arises is: what conditions are necessary for an argument to serve as an intervener? Put more specifically, I have been assuming that the unpronounced *by*-phrases and experiencer arguments of short pas-

sives and StSR are nonetheless syntactically projected, and therefore subject to the AIH (3). Is such an assumption warranted?

- (3) a. Zachary was heard. *Short passive*  
b. Karl seems to be upset. *Short raising*

The following two sections will argue for this hypothesis with respect to *by*-phrases and experiencers.

### 6.1.1 By-phrases

Independent of acquisition, there are syntactic arguments in favor of positing an implicit, syntactically active *by*-phrase, the spirit of which dates back to the seminal work of Baker, Johnson & Roberts (1989).<sup>1</sup> The claim is based on observations in Manzini 1983 regarding the apparent presence of an agent in short passives, including the ability of the implicit *by*-phrase to license the use of volitional adverbs (4) and to bind into purpose clauses (5).

- (4) The boat was sunk deliberately.  
(5) The boat was sunk [to collect the insurance].

If control into purpose clauses and modification by volitional adverbs require the agent to be syntactically projected, then some such agent must be present even when the *by*-phrase is unpronounced. Bhatt & Pancheva (2006) point out that such an assumption may not be warranted in (4), as the implicit presence of an agent in the semantic representation should be sufficient to permit volitional adverbs. Regarding (5), they cite evidence from Williams (1985) that not even semantic representation is necessary to license purpose clauses, as in (6), where there doesn't seem to be an external argument, and *grass* cannot serve as the controller.<sup>2</sup>

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<sup>1</sup>For these authors, the relevant participant in the structural diagnostics was the overt passive morpheme *-en*. However, given a Collins 2005b style analysis of the passive in which the *by*-phrase is the external argument of the participle, rather than an adjunct, the tests may lead to similar conclusions about its implicit presence in the syntactic structure.

<sup>2</sup>Nina Hyams (p.c.) observes that (6) may not be acceptable without the understanding that 'nature' is in some way responsible for the greenness of grass, and therefore the data does not argue against the presence of a covert external argument. An informal poll of several linguistically naïve speakers confirms this judgment for at least a subgroup of



- (6) Grass is green [to promote photosynthesis].

Notably, Bhatt and Pancheva do not argue that *by*-phrases are not syntactically projected; rather, they argue that the issue is unclear, stating “...we are unable to conclude that implicit arguments are not projected syntactically. However, we are also unable to conclude that the environments discussed in [e.g. (4)-(5)] must involve syntactic projection of the implicit arguments.”

While I remain agnostic regarding the syntactic projection of implicit *by*-phrases in the adult language, the acquisition data strongly supports the conclusion that for children, the *by*-phrase serves as a syntactically projected intervener, even in short passives (3a). In Experiment 3 of the current study, children are equally delayed in comprehension of all non-actional passives, irrespective of whether the *by*-phrase is pronounced. This replicates the findings of a substantial number of previous studies on the acquisition of the English verbal passive, described in §1.1.3.

### 6.1.2 Experiencers

Unfortunately, the diagnostics of implicit argumenthood (imperfect as they may be) that are available for the *by*-phrase of the passive are not available for the experiencer of an StSR sentence because they are agent-oriented. We are therefore left with the native speaker intuition that a proposition cannot ‘*seem*’ without there being a ‘*seem-ee*’ to experience it, either in the form of the speaker or a contextually salient individual or group.

The experimental data, however, supports existence of a covert experiencer argument, at least in children’s grammars. The results of Experiment 1 demonstrate that adult-like comprehension of short *seem*-type StSR is delayed. In conjunction with previous findings that long *seem*-type StSR is delayed to the same age (Hirsch, Orfitelli & Wexler 2007; Choe 2011), this points to the existence of covert experiencer arguments.

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native English-speaking adults.

## 6.2 Cases of early passive acquisition

Under the AIH, verbal passives should be acquired late if the *by*-phrase is merged in the same position as the subject of an active sentence, rather than as an adjunct (Collins 2005b). In subject position, the *by*-phrase intervenes between the initial position of the object, and its final position in Spec, TP. In a summary of previous experimental studies in Chapter 1, I note that the predicted comprehension delay exists, and is extremely cross-linguistically common, found in at least 14 languages (including English) across 7 language families. Alongside this widespread delay, however, are several languages for which early comprehension of the passive has been claimed, including English (§6.2.1), Sesotho (§6.2.2), and Chinese (§6.2.3). In the following sections, I will discuss these experimental studies and endeavor to reconcile their findings with those presented here.

### 6.2.1 English

O'Brien, Grolla & Lillo-Martin (2006) make two hypotheses with regard to the acquisition of the English passive, given in (7).

- (7) a. English-speaking children are not delayed in the acquisition of short non-actional *be*-passives (in line with claims made by Fox & Grodzinsky 1998).
- b. Previously found delays with long passives are due to a methodological flaw in the scenarios used in previous studies.

Taken together, (7a) and (7b) assert that there is no delay whatsoever in the acquisition of the passive. To elaborate on point (7b), what the authors suggest is that because the passive *by*-phrase is optional, there must be a pragmatic reason for a speaker to include it: namely, to distinguish between two or more separate individuals to whom the *by*-phrase could refer (e.g. The monkey was caught by the cheetah, and not by the tiger). Since previous comprehension task scenarios only included two characters (e.g. the monkey and cheetah, but not the tiger), they claim that the use of the *by*-phrase was not pragmatically felicitous. While adult controls were capable of looking past this infelicity, the children who were tested were not, leading to their poor comprehension.

To address this concern, O'Brien et al. designed two tasks with three characters in each scenario, such that there were always two potential referents present for a *by*-phrase. In the first task,

the authors tested comprehension of short and long non-actional passives in eleven 4-year-old children, finding near perfect performance on short non-actional passives. They also found a significant increase in comprehension (82% correct) on long non-actional passives, as compared to previous studies. In a second experiment, they found similarly high comprehension among seven 3- and 4-year-old children. Most tellingly, the seven children in the second experiment participated in a second task. This task was designed to be comparable to previous studies, and did not feature an additional character present to license the *by*-phrase. Children's performance dropped significantly, which the authors took as support for their claim that children comprehend passives, and that previous results were due to a lack of pragmatic licensing for the *by*-phrase.

One concern with this conclusion is the observation made in §1.1.3 that English-speaking children as young as  $3\frac{1}{2}$  years old have shown no significant difficulty comprehending long *actional* passives in previous studies, despite the fact that the *by*-phrases in these items were no more pragmatically licensed than the *by*-phrases of long non-actional passives.<sup>3</sup> In addition, it remains unclear how to reconcile the high performance found in this study on *short* non-actional passives with the low performance found by previous studies for these same structures. In these cases, pragmatic licensing of the *by*-phrase is unnecessary, so the addition of a third character should not impact children's comprehension; however, the addition in the O'Brien et al. (2006) experiment appears to have led to a striking between-studies contrast (Table 6.1).<sup>4</sup> For comparison, Table

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<sup>3</sup>To explain this, O'Brien et al. (2006) appeal to Fox and Grodzinsky's theta transmission hypothesis, which explains the difference in comprehension of long actional and non-actional passives by saying that children interpret passive *by*-phrases (ii) as nominal agent/affecter *by*-phrases (i). This non-adult structure nonetheless permits children to interpret actional passives, but cannot be used with non-actional passives, since the nominal *by* does not assign the experiencer thematic role (iii).

- |      |                           |                |
|------|---------------------------|----------------|
| i.   | The book by Zoe.          | (Mary = agent) |
| ii.  | Zachary was hit by Zoe.   | (Mary = agent) |
| iii. | Zachary was loved by Zoe. | (Mary ≠ agent) |

If this account were correct, an agentive *by*-phrase would not need to be pragmatically licensed, and children's high performance is expected. However, Hirsch & Wexler 2006b show that children do not understand the meaning of agent/affecter *by*-phrases (i) until sometime past five years old, making the explanation untenable.

<sup>4</sup>The final concern with O'Brien et al.'s study is that there were a limited number of test items, and only two non-actional predicates were tested (see and like). Hear was also tested initially, but children performed poorly on these

6.2 shows the same contrast for studies examining comprehension of long passives.<sup>5</sup>

**Table 6.1:** Comprehension of short non-actional passives, by study

Above chance performance	Below chance/chance performance
Fox & Grodzinsky (1998, TVJT <sup>6</sup> , 8 of 13 children)	Fox & Grodzinsky (1998, TVJT, 5 of 13 children)
O'Brien et al. (2006, TVJT)	Hirsch & Wexler (2006b, PST <sup>7</sup> )
Gorden & Chafetz (1990, TVJT)	Hirsch & Wexler (2006a, PST)

**Table 6.2:** Comprehension of long non-actional passives, by study

Above chance performance	Below chance/chance performance
O'Brien et al. (2006, TVJT)	Fox & Grodzinsky (1998, TVJT)
	Maratsos et al. (1985, QA <sup>8</sup> )
	Hirsch & Wexler (2006b, PST)
	Hirsch & Wexler (2006a, PST)

No incontrovertible pattern emerges based on type of task, nor is it merely the addition of a third character that makes children perform well on short non-actional passives in the O'Brien et al. study. A sub-group of children tested in Fox & Grodzinsky 1998 also performed well on short non-actional passives, there were only two characters in the test scenarios (modulo concerns about this data; see section 1.1.3).

In summary, the contrast between children tested with and without a third argument is striking. However, the pragmatic licensing account leaves a number of data points unexplained in English, and the data set is small, making it difficult to come to a concrete conclusion about these findings without further investigation. The following section discusses one such investigation with possibly telling findings.

Crawford (2012) also investigates the impact of pragmatic factors on children's passive comprehension, using a grammaticality judgment task. In contrast to O'Brien et al., proposing that

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items and so they were excluded from the final analysis.

<sup>5</sup>These tables show only a subset of recent work on English passive acquisition; however, to my knowledge all other studies which tested long and/or short non-actional passives found non-adult comprehension.

<sup>6</sup>Truth-Value Judgment Task, described in §3.2.1.

<sup>7</sup>Picture Selection Task, described in §3.4.1.

<sup>8</sup>Question and Answer Task (see Maratsos et al. 1985 for details).

short passives may be pragmatically licensed given focusing of the object. To date, only limited findings have been presented, in the form of a conference talk, and so I shall set them aside for later consideration and discussion.

### 6.2.2 Sesotho

Sesotho, a Bantu language spoken primarily in South Africa, is the most well-known counterexample to the ‘universality’ of passive delay. In a 1989 paper, Demuth notes that child speakers of Sesotho start producing passives at a much earlier age than their English-acquiring counterparts. She takes this to indicate that Sesotho children have productively acquired the passive. Re-examining her data, however, Crawford (2005) concludes that the Sesotho children’s passive production is not as productive as originally claimed. In particular, she argues that children’s long passive forms may reflect rote memorization.

The logical way to adjudicate between these conflicting interpretations of the production data is to collect comprehension data and determine whether Sesotho children have an adult understanding of their utterances. While two such comprehension tasks exist, they unfortunately come to different conclusions. In a picture selection task, Demuth et al. (2010) tests 16 Sesotho-acquiring children, all roughly three years old. When asked to match a long passive to a picture, they choose correctly at significantly higher than chance levels. In stark contrast, Crawford (2009) finds poor comprehension of long passives by Sesotho-acquiring children up through the age of six years, despite using a similar methodology.

One difference between the studies is that the pictures utilized by Crawford featured two participants, while the pictures in Demuth’s study included three, in line with the pragmatic constraints proposed by O’Brien, Grolla and Lillo-Martin (2006). In conjunction with the English results, this supports the conclusion that the passive *by*-phrase must be pragmatically licensed for children to comprehend it.<sup>9</sup>

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<sup>9</sup>Jean Crawford (p.c.) points out that four of the ‘non-actional’ predicates used in Demuth’s study are arguably more actional in nature: help, look for, expel and leave behind. It is therefore possible that the children were interpreting the passives in a non-adult-like way, similar to the S-homophone analysis suggested for English speaking children

### 6.2.3 Chinese

Lau 2011 also uses a picture selection task to investigate Cantonese children's comprehension of the *bei*-passive (8). Based on children's high performance, she concludes that Cantonese children have mastered the *bei*-passive from as young as age three, and, like Demuth, suggests that there is no universal delay in acquiring the passive.

- (8)    neoizai bei naamzai sek From Lau 2011  
       girl        BEI boy        kiss  
       *'The girl is kissed by the boy'*

While there is no reason to doubt the findings, there are three reasons to question Lau's conclusions regarding their relevance to the development of the verbal passive. First, Huang and colleagues' syntactic analysis of (8) likens it to the English tough-movement construction in (9) (Huang 1999; Huang, Li and Li 1999). Under this analysis, shown in (10), the long *bei*-passive involves null operator movement within an embedded clause ( $\bar{A}$ -movement, rather than A-movement), and then control of the operator by the subject of the matrix clause.

- (9)    Karl is tough to please.
- (10)   Zhangsan<sub>i</sub> bei [OP<sub>i</sub> Lisi ti-le         $t_i$ ]  
       Zhangsan    BEI [        Lisi kick-PERF    ]  
       *'Zhangsan got kicked by Lisi'*

One piece of evidence that the *bei*-passive involves  $\bar{A}$ -movement comes from its compatibility with the  $\bar{A}$ -movement particle *suo* (11), also found in Cantonese relative clauses. If indeed (10) represents the correct analysis for the long Cantonese *bei*-passive, then there is no reason to expect that the acquisition of these sentences will correspond with the acquisition of verbal passives in other languages.<sup>10</sup>

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(see §2.1,2 for discussion).

<sup>10</sup>Although, if this is the correct analysis for these sentences, a different acquisition puzzle arises: why do Cantonese-acquiring children master null operator movement from the age of three? English-acquiring children are noted to incorrectly interpret tough-movement constructions until as late as ten years old (cf. C. Chomsky 1969; Cromer 1987; Broihier & Wex 1995). Recent work by Becker (2011) suggests that animacy may significantly improve children's comprehension. While this is an interesting puzzle, I will not address it further in the current work.

- (11) zhege jieshi        bu neng bei ta suo liaojie  
       this explanation not can BEI he suo understand  
       ‘this explanation could not be understood by him’

Second, as shown in (10), the *bei*-passive is often translated, not with the canonical verbal passive auxiliary *be*, but with non-canonical *get*.<sup>11</sup> Indeed, Cantonese speakers Hoshi (1994) and Huang (1999) point out several similarities between the *get*-passive and the *bei*-passive, including that the surface subject is usually interpreted as (adversely) affected.

Finally, Lau’s explanation for why the passive is acquired earlier in Cantonese than in other languages is that the ‘*bei* phrase’ is required in adult speech, while in English (and many other languages) it is optional. She argues that this consistency makes it easier for the child to identify the thematic roles of the arguments in the *bei*-passive, thus leading to earlier acquisition. However, while it is true that *bei* itself must be pronounced, the object of *bei* is optional (12), similar to the underlying subject of the English passive.<sup>12</sup> It is unclear how the presence of *bei* by itself, with no DP argument, would facilitate the assignment of thematic roles.

- (12) Zhangsan bei ti-ke  
       Zhangsan BEI kick-PERF  
       ‘Zhangsan got kicked’

Overall, while it is possible that the *bei*-passive should be included in the pantheon of structures which must be considered for a complete picture of A-movement acquisition, it does not seem to directly bear on the question of what (if anything) is delayed in the acquisition of the verbal passive.<sup>13</sup>

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<sup>11</sup> According to C.-T. James Huang (p.c.), sentences like (8) or (10) involve a level of object-affectedness that makes *get* a far better translation than *be* when they occur in spoken language. In a highly formal written register *be* becomes more acceptable, perhaps reflecting a prescriptive bias.

<sup>12</sup> When the DP argument is absent, the short *bei*-passive resembles the *get*-passive even more strongly, in that the surface subject may also be interpreted as responsible for the events of the sentence. Indeed, Huang (2011) argues that (12) is a subject control structure, which is reminiscent of the control analysis of English *get*-passives mentioned in §1.1.1.

<sup>13</sup> A similar line of argumentation holds for Mandarin Chinese, investigated in Xu 2010.

#### 6.2.4 Summary: Pragmatic licensing and the acquisition of the passive

We have now seen that in two languages, the addition of a third possible by-phrase referent is linked to increased comprehension in children, suggesting that children's difficulty may be 'purely' pragmatic. In contrast, the experiments in this dissertation identify a 'purely' syntactic environment in which children have difficulties: A-movement over an intervening argument. In the current section, I discuss a recent attempt by Snyder and Hyams (2008) to unify these two observations, thus permitting us to retain the AIH while explaining how the addition of a third character might assist children in understanding the passive.

Under Rizzi's (1994) version of Relativized Minimality, there is a way to avoid an intervention violation in certain cases, even when moving one argument over another. When an argument has a distinctive morphosyntactic features, for instance the discourse features [+focus] or [+topic], it may move across another argument that lacks such a feature. Snyder and Hyams (2008) make an addition to this account, suggesting that perhaps if the *intervening* argument has a discourse feature (rather than the moved argument), it can also prevent an intervention effect.

Applying this to the O'Brien et al. scenarios, they note that by contrasting the actual referent of the by-phrase with another potential referent, O'Brien et al.'s manipulation for 'felicity' has in fact given the by-phrase a [+focus] feature. They then propose that children are able to move the object DP, which lacks any discourse features, across the by-phrase DP, without triggering a violation of the AIH. The relevant manipulation is therefore not the addition of a third character by itself, but the addition of the [+focus] feature to the by-phrase.

If the alterations to Rizzi's original account can be theoretically substantiated, an account such as this would not only unify an extensive literature on passive delay with the purported exceptions in English and Sesotho, it also makes specific predictions for the acquisition of experiencer type StSR (as well as inverse copulas, discussed in the following section). In the current study, the identity of the experiencer argument was not mentioned, let alone contrasted with another possibility. If the experiencer argument can be sufficiently focused in the discourse, and the above explanation is correct, then children's difficulties should cease.



### 6.3 Beyond verbal passives and StSR: The AIH in acquisition

The AIH divides the class of A-movement structures into two types, and makes distinct predictions about their acquisition. A-movement over an intervening argument is predicted to be delayed until approximately the same time as verbal passives and *seem*-type StSR (roughly six or seven years old) within the general population, and each individual child should acquire them in tandem. Conversely, A-movement with no intervening argument is not subject to the AIH, and may be acquired quite early.<sup>14</sup>

Beyond the findings presented here, a large body of acquisition work supports this division. Two examples of this, first mentioned in §2.1.1, are children's early mastery of VP-internal subject movement and subject-to-object raising (StOR), schematized in (13) and (14), respectively.

(13) Bruce<sub>i</sub> is not [VP *t<sub>i</sub>* eating the cake].

(14) Anton believes Eric<sub>i</sub> [to be *t<sub>i</sub>* smart].

At a very young age, children correctly place the subject outside of negation, showing that it has moved from within the verbal domain to Spec, TP (Stromswold 1996). In the case of StOR, children not only spontaneously produce sentences like 14, but show adult comprehension of them from as young as four years old (Kirby (2011a)).

These instances of early A-movement acquisition are captured perfectly by the AIH. Neither VP-internal subject raising nor StOR involve movement past an intervening DP, and therefore, neither presents an intervention violation. While experimental investigations of these processes have been thus far limited to English, the AIH would make similar predictions cross-linguistically.

There are two other A-movement structures for which a more substantive discussion is warranted: Unaccusatives and inverse copular sentences. I turn to these in the following sections.

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<sup>14</sup>Crucially, this should not be taken to suggest that every sentence lacking argument intervention will be acquired early, as there are many other factors besides the AIH which may lead children to produce or comprehend a structure in a non-adult manner.

### 6.3.1 Unaccusatives

Unlike the clear cases presented by VP-internal subject movement and StOR, evidence regarding the acquisition of unaccusatives 15 is mixed. I will first summarize the evidence for early acquisition of unaccusatives, then to turn to evidence for a delay. Finally, I will discuss some critiques of certain metrics used to test unaccusativity in children, and conclude that the AIH captures the acquisition of this structure, as well.

(15) Anton arrived.

The reflexive clitic construction in French and Italian, given in (16), has been argued to require an unaccusative analysis, in which the subject pronoun (*je*, below) is initially merged as the object of the predicate and then undergoes raising (Marantz 1984, Sportiche 1990, a.o.).<sup>15</sup>

(16) Je me suis/\*ai mordu (from Snyder et al. 1995)  
I myself am/\*have bitten  
*'I bit myself'*

Like unaccusative predicates, reflexive clitic constructions must necessarily appear with the auxiliary *be* in the simple past, in contrast to transitive and unergative predicates, which appear with *have*. Snyder et al. (1995) use this diagnostic to test whether children have mastered the unaccusative syntax of sentences such as (16), using *be* rather than *have*. In a CHILDES investigation of one French child and three Italian children, they find virtually no errors in auxiliary selection with reflexive *si/se*, which they take to indicate that the children have an adult representation of unaccusativity and its selectional restrictions. This finding is replicated in Hyams & Snyder (2005), for four additional children, two acquiring Italian, and two acquiring French.

Hebrew-speaking children also distinguish between unaccusatives and unergatives in production. Both in elicited and spontaneous speech, they produce word order differences between the two types of intransitives that match those in the adult language, which is argued to indicate that they have an adult representation of unaccusatives from as young as 1;9 (Friedmann 2007).

The above studies clearly demonstrate that children successfully distinguish unaccusative verbs

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<sup>15</sup>But see Sportiche 2010 for recent counterevidence suggesting that such structures do not involve unaccusativity.

from unergatives in production. In a 2007 study of Japanese acquisition, Shimada & Sano tested children's comprehension of unaccusativity as compared to unergativity, utilizing the Japanese *te-iru* aspect construction. With unaccusative verbs such as *rise*, a *te-iru* sentence is ambiguous between a progressive and resultative meaning (17).

- |                              |                            |
|------------------------------|----------------------------|
| (17) Buta-san-ga agat-te-iru | (from Shimada & Sano 2007) |
| pig-NOM rise-TEIRU-PRES      |                            |
| 'The pig is rising'          | <i>progressive</i>         |
| 'The pig has risen'          | <i>resultative</i>         |

With unergative verbs like *run*, however, only the progressive reading is available (18).

- |                               |                            |
|-------------------------------|----------------------------|
| (18) Buta-san-ga hasit-te-iru | (from Shimada & Sano 2007) |
| pig-NOM run-TEIRU-PRES        |                            |
| 'The pig is running'          | <i>progressive</i>         |
| '#The pig has run'            | <i>resultative</i>         |

As *te-iru* passives pattern with unaccusatives in terms of their meanings, Takezawa (1991) argues that the resultative meaning is parasitic on an A-chain relationship. Using a truth-value judgment task, Shimada and Sano find that children are adult-like in the readings they permit for the three structures (passive, unaccusative, unergative), indicating that they have acquired both the relevant generalization, and the A-movement involved in unaccusativity.<sup>16</sup>

It is not necessary to turn far afield to find studies reporting a delay in the acquisition of unaccusativity; in a study of young Japanese children's production of case marking, Miyamoto et al. (1999) report a substantial difference between the degree to which children drop nominative case marker *-ga* from the subjects of unergative and transitive sentences (23%), versus their rate of case dropping from the subjects of unaccusative sentences (63%). Prima facie, the fact that children treat unaccusative and unergative verbs differently with respect to nominative case omission would seem to indicate that children represent the two classes of verbs differently, as are for adults. However, the authors provide a different explanation. They argue that Japanese children, unlike adults, the unaccusative argument does not undergo A-movement. Rather, it remains within

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<sup>16</sup>This work is the most recent in a series of comprehension and production-based studies finding early acquisition of unaccusativity in Japanese, the details of which I will not review here (Sano 2000; Sano et al. 2001; Okabe & Sano 2002).

the VP, receiving accusative case which is then dropped. Support for this position is provided by the fact that accusative case marker *-o* is omitted in as many as 77% of Japanese children's spontaneous utterances (Miyata 1992). To explain the 37% of cases in which the theme argument *does* receive nominative case, the authors hypothesize that children are misanalyzing the predicate as unergative.

Although intriguing, this proposal raises the following question: why, if children are assigning accusative case to the internal argument, is the accusative case marker *-o* never realized?<sup>17</sup> While it is true that Japanese children often drop accusative case marking from the object of transitive verbs, Miyata (1992) still finds that 23% of their objects are overtly case marked. All else being equal, Miyamoto et al.'s analysis therefore leads us to expect that up to a quarter of the unmoved unaccusative subjects would also show up with accusative marking, which does not occur.

Overall, while the Japanese unaccusative data are non-adult-like, they simultaneously show that children are sensitive to the differences between the argument structure of unergative and unaccusative predicates, contra the authors' proposal.

Babyonyshev et al. (2001) report that Russian children are delayed in acquiring unaccusativity as well, based on a production study of the Genitive of Negation (GN). GN is a phenomenon in which negation optionally licenses genitive case on direct objects in its scope, including unaccusative objects, which remain internal to the VP (19).

- (19) a.   ni-kak-ie           grib-y           zdes' ne rast-ut  
           NEG-kind-NOM.PL mushroom-NOM.PL here not grow-PRES.3PL  
       b.   ni-kak-ix           grib-ov           zdes' ne rast-ot  
           NEG-kind-GEN.PL mushroom-GEN.PL here not grow-PRES.SG  
           '*No mushrooms/none of the mushrooms grow here.*'

When the authors investigated children's productions of GN with transitive objects, they are found to produce GN in approximately 75% of the cases where an adult would, producing nominative in the other 25% of cases. With unaccusatives, however, children produce GN much less frequently, even with predicates that explicitly require genitive case, such as existential *be*. The

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<sup>17</sup>Note also that if children are able to assign accusative case in an unaccusative, they must be doing so in some non-adult fashion, perhaps with accusative case as a default.

children in their younger age group, whose average age was 4;0, use GN only 30% of the time, while the older age group (mean 5;4) used it 60% of the time.

What is hidden by the group performance is that across both the younger and older age groups, different children showed one of three distinct sets of behavior. The first subgroup never produced GN correctly, even with transitive sentences, while the second always produced GN in adult manner. These two types of behavior are therefore not informative, as they show no particular deficiency with respect to unaccusatives.

The final subgroup tended to produce GN with transitive sentences, but not with unaccusatives. Based on the absence of a subgroup that produced GN with unaccusatives, but not with transitives, Babyonyshev et al. conclude that Russian children do not have an adult representation of unaccusatives, specifically, that they cannot represent the A-chain involved.

This conclusion crucially relies on the author's claim that the objects of Russian unaccusatives, which do not visibly move (see 19), nonetheless undergo covert A-movement to Spec, TP; however, recent work by Potsdam & Polinsky (2011) provides three compelling arguments against a covert A-movement analysis, including grammaticality judgment data demonstrating that an important piece of ungrammatical data taken to support a covert A-movement analysis is not in fact ungrammatical when several extra-syntactic factors are controlled for.

If Russian unaccusatives do not involve A-movement, then children's increased difficulties with GN in unaccusatives must be otherwise accounted for. One possible alternative is that GN is independently difficult to learn, irrespective of movement. This explanation can account for the two groups of children who perform consistently, regardless of construction type, and may possibly be extended to the group who performs better on transitives if frequency is taken into account.<sup>18</sup>

Overall, the evidence for a delay in the acquisition of unaccusatives is problematic. In Russian,

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<sup>18</sup>Indeed, Masha Polinsky (p.c.) observes that GN is generally infrequent in adult Russian, and moreover, far less frequent with unaccusative verbs than with transitive verbs. Children's higher production of GN with transitive sentences as opposed to unaccusatives could therefore be a reflection of their input, rather than an indication of a deficiency with A-movement.

it appears that previous experiments were not, in fact, testing the acquisition of A-movement, and in the case of Japanese, a delay-related explanation requires the conclusion that Japanese children are non-adult-like in two entirely separate ways, mis-analyzing unaccusatives as unergatives one third of the time, while simultaneously distinguishing the two structures the other two thirds of the time, yet still failing to raise. Further, there is no sign of any overt accusative case that would demonstrate that children had indeed left the unaccusative argument in situ. Although accusative case omission is a feature of Japanese acquisition, it does not occur 100% of the time, and its perfect omission in this particular instance is conspicuous.

Given these difficulties, and the abundance of data showing mastery of unaccusativity, I conclude that unaccusative acquisition occurs early. This is in line with the predictions of the AIH, since unaccusatives, by definition, involve only one argument, and therefore cannot lead to an intervention violation.

### 6.3.2 Inverse copulas

In his 1997 analysis of copulas, Moro proposes that the two copular sentences in (20a-b) are derivationally related, each having the underlying structure in (20c).

- (20) a. The bully is the cause of the argument.
- b. The cause of the argument is the bully.
- c. be [<sub>DP</sub> the bully [<sub>DP</sub> the cause of the argument]]

To form the non-inverted copular structure in (20a), the subject DP raises, while to form the inverse copular structure in (20b), the predication DP, which represents unknown information, raises. While the non-inverted copula represents a simple case of VP-internal subject movement (in this case, predicate internal subject movement is more apt), the inverse copular structure involves movement of one DP past a higher DP. Thus, the AIH predicts that the inverse copula, but not the non-inverted copula, will constitute an intervention violation for children, like verbal passives and experiencer-type StSR do. Children should therefore be delayed in acquiring an adult representation of inverse copular sentences until the same age as they are delayed with the other sentence structures.

Recent comprehension evidence supports this prediction, suggesting that children are delayed in acquiring inverse copular sentences, but not non-inverted copular sentences (Hirsch & Wexler 2007a). Moreover, this delay lasts until children are approximately six to seven years old—exactly the age at which they begin to comprehend non-actional verbal passives and StSR. While no within-subjects comparisons of the structures have been conducted, this similarity in age of acquisition between them, along with their derivational similarity, is further support for the AIH.<sup>19</sup>

### 6.3.3 Summary

In addition to the delayed acquisition of passives and *seem*-type StSR, the AIH receives empirical support from several other instances of A-movement acquisition. In cases where there is no argument intervention, as with *(be) about*-type StSR, VP-internal subject raising, StOR, and unaccusatives, children show adult comprehension and production from an early age. Conversely, in cases where A-movement occurs over a structurally intervening argument, as with inverse copular structures, children are delayed.

Table 6.3 provides a summary of the predictions AIH makes for the seven A-movement structures discussed here, as well as the languages which provide evidence for these predictions. For the moment, I restrict my generalization on verbal passives to English, for which I have assumed, following Collins (2005a), that the *by*-phrase is the external argument of the participle, comparable to the subject of an active sentence. While many passives are delayed, cross-linguistically, there also exist exceptions (see §1.2 for discussion), which need to be carefully examined to determine whether their syntactic structure is comparable to that of the English passive.

## 6.4 AIH as a syntactic diagnostic

The ramifications of the AIH extend beyond acquisition into our theory of syntactic structure. By identifying a widespread developmental phenomenon that has explicit links to syntactic structure, we are now able to use acquisition data as a syntactic diagnostic. In the case of the AIH, acquisition

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<sup>19</sup>Such results are also compatible with the UPR, as discussed in Hirsch & Wexler 2007a

**Table 6.3:** Acquisition evidence for the AIH, by structure

Sentence Type	Prediction	Evidence?
Verbal passives (English type; <i>by</i> -phrase as external argument)	Delay	✓(cross-linguistically inconsistent – further investigation needed)
<i>seem</i> -type StSR	Delay	✓(in English and Dutch)
<i>(be) about</i> -type StSR	No delay	✓(in English)
Subject-to-object Raising	No delay	✓(in English)
VP-internal subject mvnt	No delay	✓(in English)
Unaccusatives	No delay	✓(in French, Italian, Hebrew, Japanese)
Inverse Copulas	Delay	✓(in English)

data can identify whether a covert argument is present in the syntactic structure, or alternatively, identify the position of an overt DP, as either an intervening argument or a non-intervening adjunct.

A specific example of the potential for acquisition to inform syntactic theory is in the case of the middle voice (21).

(21) This candy sells easily

Candy does not sell itself; in sentences like (21), the hearer understands that there must be an implicit agent of the selling event. The middle, however, does not pass several standard syntactic tests for identification of covert arguments, including those discussed for verbal passives in §6.1.1: modification by volitional adverbs (22) and control into purpose clauses (23) (Baker et al. (1989)).

(22) \*This bureaucrat bribes deliberately.



(23) \*This bureaucrat bribes easily [to avoid the draft].

However, the middle *does* permit modification by a *for*-PP whose argument seems to reflect the intended agent (24), which Stroik (1992) argues is the overt realization of the external argument of the middle, just as the *by*-phrase is the overt realization of the external argument of the passive.<sup>20</sup>

(24) French books read easily for educated people.

The AIH makes a clear prediction for the interaction of syntax and acquisition: If there is a syntactically projected agent in middle constructions, children should be delayed in acquiring them. If there is not, children should show early acquisition. To date, only a small subset of data from a comprehension task of Spanish passives bears on this issue, suggesting that Spanish speaking children may acquire the middle voice early (Pierce 1992b). However, further work is necessary before any conclusions can be drawn.

## 6.5 Moving beyond the AIH

If the AIH is a stage of acquisition that all children experience, how do they exit it in order to acquire adult comprehension of the relevant sentence structures? I will consider two broad types of explanation here, which I will term maturation and input-based accounts. The arguments for and against these explanations were specifically developed in reference to children's delay in acquiring passives, but to the extent that the current study persuasively establishes a link between the acquisition of verbal passives and StSR, similar evidence is expected to obtain for StSR as well.

As the name might suggest, the core claim of any maturational theory, be it linguistic or otherwise, is that young children's non-adult behavior arises from immaturity in an area of cognition to which mature adults have access. In the case of A-movement, Borer & Wexler (1987, 1992)

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<sup>20</sup>Ahn & Sailor (*to appear*) argue that *for*-PPs are not the realization of the abstract agent, given that some middles clauses, such as (i), do not allow *for*-PPs.

i. Spam sells (\*for grocery stores).

suggest that verbal passives are unavailable to children under a certain age because of constraints imposed by their immature biology—the cognitive equivalent of physiological limitations that are in place until the onset of puberty. At a certain age, these constraints will no longer be in effect, and the child will transition to an adult grammar and be capable of producing and comprehending passives in an adult manner. While Borer and Wexler also specifically identify A-chains as the element of the grammar that matures, this is orthogonal to the issue of maturation in general. A maturational theory is, in principle, compatible with any type of immaturity in child language (or general cognition).

By its nature, an appeal to maturation leads to several strong predictions regarding how the structure in question will be acquired. First, as a biological process, maturation will not merely impact children speaking one language, but should be universal. Thus, in all languages which employ the relevant process, children should be similarly delayed.<sup>21</sup> This leads to the second prediction, which is that as a biological process, we expect linguistic maturation to happen to children of similar age, especially in children acquiring the same language. The third prediction is that increased genetic similarity, for instance in identical versus fraternal twins, should correspond to a greater similarity in onset of maturity.

In contrast to maturational accounts, input-based accounts do not take children to have a problem with the process of passivization itself. Rather, they predict that some facet of children's linguistic input, either within or across languages, determines when they will produce and comprehend verbal passives (cf. Deen 2011). Input accounts vary according to what type of input (and how much) is considered to be necessary for children to acquire the relevant structure. All of them, however, will predict greater variation than that predicted by maturation accounts. For instance, an account in which children must learn a structure verb by verb predicts great variation in age of acquisition, even within the same language. Such an account also predicts that there will be a direct connection between the verbs a particular child has heard in the passive voice, and the verbs

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<sup>21</sup>Importantly, this does not mean that we should see impacts of a delay in all of the languages of the world, since not all languages will make use of identical sentence structures. Furthermore, even if two languages have sentences which sound superficially the same, this does not necessarily mean that their underlying grammatical representation is identical.

he will be able to use and comprehend in the passive voice.

A more cross-linguistic input account, however, may predict a similar acquisition timeline for children speaking the same language, although across languages, acquisition might be predicted to differ greatly. Such accounts tend to be less oriented towards particular lexical items, and more towards the frequency with which children are exposed to a given structure: the higher the frequency, the earlier children acquire an adult representation of the relevant process. This type of input account is equipped to describe the concurrent acquisition of several different sentence types. If each involves a similar sub-structure, then a child reaching the relevant input threshold for one, also does for the other.

A certain amount of evidence has been amassed in support of both maturational and input-based theories. As discussed in Section 1.2, the delay in children's acquisition of the passive is quite common cross-linguistically, appearing in a wide range of languages. This is consistent with the first prediction of a maturational theory: a biological phenomenon should apply in all instances in which it is applicable. There also exist languages for which children have been argued to produce or comprehend the passive early, but these exceptions do not necessarily rule out a maturational account, if one successfully argues that these instances of the "passive" differ in some significant way from passives in languages which do show a delay. Crawford (2005) endeavors to do this for a particular class of passive in Sesotho, claiming that children's productions are predominantly 'resultative' passives (Embick 2004), which differ crucially from verbal passives in several ways, including the type of A-movement involved and the position of the *by*-phrase. To make such an argument necessitates rigorous syntactic analysis of the relevant structures.

Regarding the second prediction that children should mature at a similar age, the evidence is entirely unclear. Studies of different languages report different ages for the acquisition of passives, ranging from five to eight years old. A number of different explanations for this distribution exist, one of which is that maturational accounts cannot account for the data. A proponent for maturation, however, might point out that the age of passive mastery is far more consistent within particular languages than it is cross-linguistically. Even if maturation of a particular grammatical phenomenon occurs at the same age for all children, language specific factors (including input

frequency) might conspire to allow speakers of one language to ‘master’ it more quickly than speakers of another. Second, variation within a given language can potentially reflect testing different structures which just happen to go by the same name. Early studies of the English passive claimed that children were performing like adults from the age of  $5\frac{1}{2}$ , however, these studies often included the *get*-passive, which is known to be acquired far earlier than the *be*-passive, and argued to have a different structure.

It is the third prediction, that genetic similarity should be a predictor for passive acquisition, which argues most strongly for a maturational account. Ganger et al. (2005) find that monozygotic (identical) twins are more strongly correlated in the age at which they acquire the verbal passive than dizygotic (fraternal) twins are. As twins share the same environment regardless, this points to the influence of genetic similarity. Further, a study by Hirsch et al. (2006) concludes that language input does not predict whether or not a child has mastered the passive. Language input was indirectly measured in three ways: a standardized vocabulary test (Peabody Picture Vocabulary Test; Dunn 1965), a parental questionnaire on socioeconomic status and level of education, and a parental estimation of the number of hours per week spent reading to the child (if the child could read, this estimation included the number of hours the child spent reading to himself). None of these measures was found to be a significant predictor of whether the 60 children in their study had mastered the passive. Indeed, the sole predictor found to be significant was age: children under the age of 6 were extremely unlikely to comprehend non-actional passives at above chance levels, while children above age 6 were extremely likely to show adult comprehension.

## 6.6 Conclusions

A-movement is not acquired as a whole, but rather falls into two groups. Children are delayed in acquiring A-movement only when it passes over an intervening argument, leading me to propose the Argument Intervention Hypothesis (AIH). Such a theory not only unifies the acquisition data surrounding numerous A-movement constructions, but provides a new syntactic diagnostic for the presence of covert arguments.

## Appendix A

### Experiment 1 test items by condition

Adult judgment depends on embedded predicate

**Table A.1:** Experiment 1 test items by condition

Test Sentence	Condition	Adult Judgment
The dog really is white.	Copular declarative	T
The cat really is clean.	Copular declarative	T
The horse really is small.	Copular declarative	T
The pig really is dry.	Copular declarative	T
It really is warm.	Copular declarative	T
It really is sunny.	Copular declarative	T
The dog really is purple.	Copular declarative	F
The cat really is dirty.	Copular declarative	F
The horse really is big.	Copular declarative	F
The pig really is wet.	Copular declarative	F
It really is cold.	Copular declarative	F
It really is raining.	Copular declarative	F
It really seems that the dog is purple.	Unraised	T
It really seems that the cat is dirty.	Unraised	T
It really seems that the horse is big.	Unraised	T
It really seems that the pig is wet.	Unraised	T
It really seems that the dog is white.	Unraised	F
It really seems that the cat is clean.	Unraised	F
It really seems that the horse is small.	Unraised	F
It really seems that the pig is dry.	Unraised	F
The dog really seems to be purple.	Raised	T
The cat really seems to be dirty.	Raised	T
The horse really seems to be big.	Raised	T
The pig really seems to be wet.	Raised	T

<b>Test Sentence</b>	<b>Condition</b>	<b>Adult Judgment</b>
The dog really seems to be white.	Raised	F
The cat really seems to be clean.	Raised	F
The horse really seems to be small.	Raised	F
The pig really seems to be dry.	Raised	F
It really seems to be raining.	Weather-it	T
It really seems to be cold.	Weather-it	T
It really seems to be snowing.	Weather-it	T
It really seems to be dark.	Weather-it	T
It really seems to be sunny.	Weather-it	F
It really seems to be warm.	Weather-it	F
It really seems to be foggy.	Weather-it	F
It really seems to be light.	Weather-it	F

## Appendix B

### Experiment 2 test items by condition

Each item tested twice; adult judgment on item/picture pairing.

**Table B.1:** Experiment 2 test items by condition

Test Sentence	Condition	Adult Judgment
The dog is standing under the light.	Progressive declarative	T/F
The rabbit is eating the cake.	Progressive declarative	T/F
The pig is playing in the mud.	Progressive declarative	T/F
The girl is riding the horse.	Progressive declarative	T/F
The dog is about to be standing under the light.	Raised	T/F
The rabbit is about to be eating the cake.	Raised	T/F
The pig is about to be playing in the mud.	Raised	T/F
The girl is about to be riding the horse.	Raised	T/F
It is raining.	Copular weather-it	T/F
It is snowing.	Copular weather-it	T/F
It is sunny.	Copular weather-it	T/F
It is dark.	Copular weather-it	T/F
It is about to be raining.	Weather-it	T/F
It is about to be snowing.	Weather-it	T/F
It is about to be sunny.	Weather-it	T/F
It is about to be dark.	Weather-it	T/F

## Appendix C

### Experiment 3 test items by condition

**Table C.1:** Experiment 3 test items by condition

Test Sentence	Condition
Cookie Monster pushes Miss Piggy.	Actional Active
Big Bird pushes Kermit.	Actional Active
Big Bird kisses Cookie Monster.	Actional Active
Kermit kisses Miss Piggy.	Actional Active
Cookie Monster kicks Big Bird.	Actional Active
Miss Piggy kicks Kermit.	Actional Active
Miss Piggy holds Cookie Monster	Actional Active
Kermit holds Big Bird.	Actional Active
Big Bird remembers Cookie Monster.	Non-actional Active
Kermit remembers Miss Piggy.	Non-actional Active
Cookie Monster loves Miss Piggy.	Non-actional Active
Big Bird loves Kermit.	Non-actional Active
Cookie Monster sees Big Bird.	Non-actional Active
Miss Piggy sees Kermit.	Non-actional Active
Miss Piggy hears Cookie Monster.	Non-actional Active
Kermit hears Big Bird.	Non-actional Active
Cookie Monster is pushed.	Actional Short Passive
Big Bird is pushed.	Actional Short Passive
Kermit is kissed.	Actional Short Passive
Big Bird is kissed.	Actional Short Passive
Miss Piggy is kicked.	Actional Short Passive
Cookie Monster is kicked.	Actional Short Passive
Kermit is carried.	Actional Short Passive
Miss Piggy is carried.	Actional Short Passive



Test Sentence	Condition
Kermit is remembered.	Non-actional Short Passive
Big Bird is remembered.	Non-actional Short Passive
Big Bird is loved.	Non-actional Short Passive
Cookie Monster is loved.	Non-actional Short Passive
Miss Piggy is seen.	Non-actional Short Passive
Cookie Monster is seen.	Non-actional Short Passive
Kermit is heard.	Non-actional Short Passive
Miss Piggy is heard.	Non-actional Short Passive
Kermit is pushed by Big Bird.	Actional Long Passive
Miss Piggy is pushed by Cookie Monster.	Actional Long Passive
Miss Piggy is kissed by Kermit.	Actional Long Passive
Cookie Monster is kissed by Big Bird.	Actional Long Passive
Kermit is kicked by Miss Piggy.	Actional Long Passive
Big Bird is kicked by Cookie Monster.	Actional Long Passive
Big Bird is carried by Kermit.	Actional Long Passive
Cookie Monster is carried by Miss Piggy.	Actional Long Passive
Miss Piggy is remembered by Kermit.	Non-actional Long Passive
Cookie Monster is remembered by Big Bird	Non-actional Long Passive
Kermit is loved by Big Bird.	Non-actional Long Passive
Miss Piggy is loved by Cookie Monster.	Non-actional Long Passive
Kermit is seen by Miss Piggy.	Non-actional Long Passive
Big Bird is seen by Cookie Monster.	Non-actional Long Passive
Big Bird is heard by Kermit.	Non-actional Long Passive
Cookie Monster is hated by Miss Piggy.	Non-actional Long Passive

## Appendix D

### Experiment 4 test items by condition

Each item tested twice; adult judgment on item/picture pairing.

**Table D.1:** Experiment 4 test items by condition

Test Sentence	Condition	Adult Judgment
The apple is falling from the tree.	Present progressive	T/F
The ball is rolling down the hill.	Present progressive	T/F
The ball is touching the sand.	Present progressive	T/F
The water is hiding the book.	Present progressive	T/F
The apple will be falling from the tree.	Future progressive	T/F
The ball will be rolling down the hill.	Future progressive	T/F
The ball will be touching the sand.	Future progressive	T/F
The water will be hiding the book.	Future progressive	T/F
The apple is about to be falling from the tree.	Raised	T/F
The ball is about to be rolling down the hill.	Raised	T/F
The ball is about to be touching the sand.	Raised	T/F
The water is about to be hiding the book.	Raised	T/F
It is about to be raining.	Weather-it	T/F
It is about to be snowing.	Weather-it	T/F
It is about to be sunny.	Weather-it	T/F
It is about to be dark.	Weather-it	T/F

## Appendix E

### Experiment 5 test items by condition

Each item tested twice; adult judgment on item/picture pairing.

**Table E.1:** Experiment 5 test items by condition

Test Sentence	Condition	Adult Judgment
The apple is falling from the tree.	Present progressive	T/F
The ball is rolling down the hill.	Present progressive	T/F
The ball is touching the sand.	Present progressive	T/F
The water is hiding the book.	Present progressive	T/F
The apple will be falling from the tree.	Future progressive	T/F
The ball will be rolling down the hill.	Future progressive	T/F
The ball will be touching the sand.	Future progressive	T/F
The water will be hiding the book.	Future progressive	T/F
The apple is going to be falling from the tree.	Raised	T/F
The ball is going to be rolling down the hill.	Raised	T/F
The ball is going to be touching the sand.	Raised	T/F
The water is going to be hiding the book.	Raised	T/F
It is going to be raining.	Weather-it	T/F
It is going to be snowing.	Weather-it	T/F
It is going to be sunny.	Weather-it	T/F
It is going to be dark.	Weather-it	T/F

## Appendix F

### Experiment 6 test items by condition

Adult judgment depends on embedded predicate.

**Table F.1:** Experiment 6 test items by condition

Test Sentence	Condition	Adult Judgment
The boat is sinking.	Present progressive	T
The car is moving slowly.	Present progressive	T
The flower is flying through the air.	Present progressive	T
The wall is not hiding the river.	Present progressive	T
The boat is floating.	Present progressive	F
The car is moving fast.	Present progressive	F
The flower is touching the ground.	Present progressive	F
The wall is hiding the river.	Present progressive	F
The boat is usually floating.	Habitual progressive	T
The car is usually moving fast.	Habitual progressive	T
The flower is usually touching the ground.	Habitual progressive	T
The wall is usually hiding the river.	Habitual progressive	T
The boat is usually sinking.	Habitual progressive	F
The car is usually moving slowly.	Habitual progressive	F
The flower is usually flying through the air.	Habitual progressive	F
The wall is usually not hiding the river.	Habitual progressive	F
The boat tends to be floating.	Raised	T
The car tends to be moving fast.	Raised	T
The flower tends to be touching the ground.	Raised	T
The wall tends to be hiding the river.	Raised	T
The boat tends to be sinking.	Raised	F
The car tends to be moving slowly.	Raised	F
The flower tends to be flying through the air.	Raised	F
The wall tends to not be hiding the river.	Raised	F

<b>Test Sentence</b>	<b>Condition</b>	<b>Adult Judgment</b>
It is tends to be raining.	Weather-it	T
It is tends to be snowing.	Weather-it	T
It is tends to be sunny.	Weather-it	T
It is tends to be cold.	Weather-it	T
It is tends to be raining.	Weather-it	F
It is tends to be snowing.	Weather-it	F
It is tends to be sunny.	Weather-it	F
It is tends to be cold.	Weather-it	F

## **Appendix G**

### **Experiment 7 CHILDES search information**

CHILDES corpora searched (=all available as of September 2011), listed alphabetically:

Bates, Bernstein, Bliss, Bloom 70, Bloom 73, Bohannon, Brent, Brown, Carterette, Clark, Cornell, ErvinTripp, Evans, Feldman, Garvey, Gathercole, Gleason, Haggerty, Hall, Higginson, HSLLD, Kuczaj, MacWhinney, McCune, McMillan, Morriset, Nelson, NewEngland, Peters, Post, Providence, Rollins, Sachs, Snow, Soderstrom, Suppes, Tardiff, VanHouton, VanKleeck, Warren, Weist

Criteria for file inclusion:

- File includes child-directed speech (not just adult to adult speech).
- Target child was between 4;0 and 6;11.

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