When *Seem* Means *Think*:
The Role of the Experiencer-Phrase in Children's Comprehension of Raising[1]

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1. Introduction

One aspect of language noted to be acquired late by children involves certain long-distance dependencies. In particular, acquisition of the verbal passive has been observed to be quite delayed.[2] For all languages in which comprehension-based studies have been conducted, evidence of a comprehension delay for passives has been found (Crawford 2005). Input frequency theories relying on the paucity of passive sentences in child-directed speech have been called into serious question (Hirsch & Wexler 2006, Hirsch & Hartman 2006, Hirsch, Hartman & Wexler in preparation). Behavioral genetics research directly implicates a genetic component to the acquisition of verbal passives, demonstrating that passive comprehension is more correlated in identical than fraternal twins (Ganger, Dunn, & Gordon 2004). Finally, children's comprehension of passives is not predicted by either environmental factors or IQ (Hirsch, Modyanova, Perovic, & Wexler in preparation).

The evidence given above for delayed acquisition of verbal passives has inspired numerous maturational theories of passive development, (Borer & Wexler 1987, Wexler 2004, Snyder & Hyams 2005, among others). These maturational theories assert that the grammatical representations or operations necessary for allowing verbal passives by Universal Grammar (UG) for adults are unavailable for young children because of constraints imposed by their immature biology, rendering verbal passives ungrammatical for such children.

Borer and Wexler's (1987) A-Chain Deficit Hypothesis (ACDH), the first maturational theory of verbal passive acquisition to be developed, hypothesizes that it is A-chains that are ungrammatical for immature children. Since the ACDH was first formulated, however, it has been recognized that subjects are generated (merged) internal to the VP (Koopman & Sportiche 1991) and then raise to [Spec, TP], a form of A-movement, and thus all subject movement out of the VP is predicated by

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[2] Observable delay in verbal passives beyond the age of three or four years old is restricted in English to those passives involving verbs which denote "non-actional" states (i.e. subject-experiencer verbs: e.g. *hate*, *love, see*). Young children perform quite well on passives involving "actional" verbs (e.g. *kick, kiss, hold*) (Maratsos, Fox, Becker, & Chalkley 1985). One account for the statistical interaction of voice and verb type is that children are equally delayed in knowledge of all verbal passives (both actional and non-actional), but have learned and apply a strategy that allows them to interpret passives with actional verbs (Borer & Wexler 1987, 1992). In English, verbal passives are homophonous with adjectival passives, which are not derived through A-movement (or whatever operation is taken to be deficient in the immature child), and therefore are not predicted to be problematic for children. This "adjectival strategy" cannot be used with stative verbs, which do not make good adjectival passives. This account is supported by evidence from Russian aspect production (Babyonyshev & Brun 2003), and by languages such as Greek, in which verbal passives are not homophonous with adjectival passives. As such, Greek children show poor performance for all verbal passives, both actional and non-actional since no compensatory strategy is available (Terzi & Wexler 2002).

ACDH to be problematic for children. As children are not delayed in correctly placing the subject outside the VP (Stromswold 1996), it appears that A-chain formation is not by itself responsible for children's delay in passive comprehension.

An alternative proposal to ACDH, which does not predict delays in the comprehension of VP-internal subjects, is Babyonyshev, Ganger, Pesetsky and Wexler's (2001) External Argument Requirement Hypothesis (EARH), according to which sentences lacking external arguments are ungrammatical for immature children. EARH predicts that verbal passives, unaccusatives, raised structures (1a) and their unraised counterparts (1b) are ungrammatical for young children, as they all lack external arguments. Previous experimental evidence, however, as well as work presented in this paper, suggests that many children do comprehend unraised structures (Froud, Wexler, & Tsakali in preparation, Hirsch & Wexler 2005), indicating that lack of an external argument is not problematic for young children.[3]

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

ACDH and EARH cannot be maintained on empirical grounds, as they make incorrect predictions about children's linguistic knowledge. We instead focus on the predictions of two more recent maturational theories: the Universal Phase Requirement (UPR; Wexler 2004) and the Universal Freezing Hypothesis (UFH; Snyder & Hyams 2005), both of which avoid the incorrect predictions of ACDH and EARH. Following Chomsky (2001), when working at a phase (*v*P or CP), only the edge (specifiers and head) of the next lower phase is accessible to probes. Passives, unaccusatives, and raising structures are licit in the adult grammar because the relevant *v*Ps do not define strong phases (i.e. they are weak/defective). UPR holds that for young children, *v*P *always* defines a strong phase, whether or not *v* is defective in the adult grammar. UPR thus predicts that passive, unaccusative, and raising structures (with and without experiencer-phrases) will be delayed for children. UFH holds that immature children over-apply the Freezing Principle (Müller 1998) to cases of movement that involve Smuggling (Collins 2005a,b), namely, passives and raising over an experiencer. This leads children to a minimality violation with these two structures, but importantly, does not impact unaccusatives and raising without an experiencer as these do not involve Smuggling. Raising structures without an experiencer and unaccusatives, then, are two cases in which UPR and UFH make differing predictions: UPR predicts problems for all forms of subject-to-subject raising, as well as for unaccusatives, as the child will interpret them as having a strong phase, while UFH predicts no problems for raising structures without an experiencer and unaccusatives, as they do not involve Smuggling, and will therefore not cause minimality violations for the child who over-applies the Freezing Principle.[4]

1.1 Previous Research

While comparatively little research has been conducted on the acquisition of subject-to-subject raising, evidence from English suggests that children's comprehension of such structures is delayed. A two-choice sentence-picture matching experiment by Froud, Wexler and Tsakali (in preparation) found that four- and five-year-old children perform at chance (45% correct) on raised structures.

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[3] Furthermore, while some younger children do have trouble with unraised sentences like (1b), suggesting they simply have yet to learn the lexical item, such difficulties are not as pervasive and long lasting as those involving the other structures lacking external arguments.

[4] Evidence regarding children's comprehension of unaccusatives is mixed. Several studies examining the interaction of agreement and case selection have suggested that knowledge of unaccusatives is delayed: for Russian- (Babyonyshev, Ganger, Pesetsky & Wexler 2001), Japanese- (Miyamoto, Wexler, Aikawa & Miyagawa 1999), and Korean-speaking children (Lee & Wexler 2001). In addition, recent work by Hirsch, Hartman & Wexler (in preparation) suggests that English-speaking children do not comprehend non-agentive object-experiencer verbs in the "active" voice. Belletti and Rizzi (1988) argue that this particular class of verbs (their "*preoccupare* class") involves unaccusative syntax, which is also argued for by Pesetsky (1995). There is evidence from Romance languages, however, that children have mastered unaccusatives from a very early age, as they are able to correctly select auxiliaries in reflexive clitic constructions (Snyder, Hyams & Crisma 1995). Further experimental evidence is needed to resolve whether or not children comprehend and produce unaccusatives using adult syntactic means.

Hirsch and Wexler (in press) present further evidence that children are delayed in their comprehension of raising structures. Using a two-choice sentence-picture matching task, they tested 70 children ages 3- to 9-years-old, assessing their comprehension of unraised (e.g. *It seems to Marge that Homer is bowling a ball*) and raised (e.g. *Homer seems to Marge to be bowling a ball*) structures. While even the majority of the youngest children mastered the *unraised* condition (85.6% correct for three-year-olds), until the age of seven years children's overall performance on the raised condition did not differ significantly from chance level.

Hirsch and Wexler paired the correct picture with one of three incorrect pictures (foils). The correct picture for a sentence such as (2) consisted of the experiencer (*Lisa*) thinking, shown using thought-bubbles, about the matrix subject (*Bart*) performing the action denoted in the embedded clause (*kicking a ball*). When the correct picture was paired with two of the three foil types, children performed at chance level on the raised condition, suggesting they were guessing. The third foil type was the Double Reversal (DR) foil, which reversed both the character doing the thinking and the character that was performing the action. Thus, the DR foil for (2) consisted of Bart thinking about Lisa kicking a ball. When the correct picture is paired with the DR foil, 3-, 4-, and 5-year-old children showed consistent below-chance performance (<17% correct). That children consistently chose this *incorrect* picture when paired with a raising sentence suggests that they had a consistent, non-adult like interpretation of raising structures that matched the DR foil. Hirsch and Wexler propose that since the child cannot derive a raising interpretation, he assumes that *seem* behaves like semantically similar verbs (such as *think*), which allow a syntactic structure that he can interpret. This leads the child to interpret (2) as meaning (3), causing him to incorrectly and consistently choose the DR foil. The other two foils do not match this interpretation, and therefore the child is forced to guess.

(2)   Bart seems to Lisa to be kicking the ball.
(3)   Bart *thinks* Lisa is kicking a ball.

The question remains as to how this "*think*-analysis" might actually work in the child's grammar. One possibility is that the child could directly substitute a non-raising verb like *think* for *seem*. This might require the child to ignore the preposition *to* in both the experiencer-phrase and in the non-finite embedded clause, and to ignore the fact that *think* requires a finite clause complement elsewhere in his grammar. An alternative possibility, raised by Hirsch and Wexler, is that the child interprets *seem* as an object control verb with a meaning similar to *think*. The first preposition would then serve as a marker for this version of *think*/*seem*. Although this is not a licit interpretation in adult English with the verb *think*, this interpretation is allowed for several semantically related verbs (4).

(4)   Bart <u>believes / imagines / understands</u> Mary to wear a hat (every Sunday).

Contrary to the above claims that English-speaking children are delayed in their comprehension of raising, Becker (2006) argues that young children *do* comprehend raising, based on data from two experiments she conducted. In the first, a grammaticality judgment task, Becker finds that three- and four-year-old children accept raising verbs with "compatible" predicates (e.g. *The flower seems to be pink*) while rejecting raising verbs with "incompatible" predicates (e.g. *The flower seems to fly away*).

Becker acknowledges that these adult-like judgments could have been due to children ignoring the matrix verb and interpreting the sentence as a copular structure (e.g. *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 truth-value judgment task, using scenarios in which a character seemed to be doing something, but in fact was not. One scenario involved a white dog who stood under a black light, and thus "seemed" purple before stepping out from under it (thus again appearing white). The child was then asked to judge the truth of the sentence "The dog seemed to be purple". Children performed well on this task, leading Becker to conclude that children were parsing the raising verb in her first experiment, and that therefore young children do comprehend raising.

An alternative explanation for these data, however, exists. Becker attempted to control for the possibility that children might ignore the matrix raising verb if they could not interpret it in the relevant structure. She writes, "A child parsing only *the dog . . . be purple* should respond "false", since the dog was not in fact purple; but a child parsing *the dog seemed to be purple* should respond

"true" since the dog did seem to be purple when standing under the lamp (p. 448)." Unfortunately, Becker's test items might be confounded. In the above case, the child is being asked to judge "The dog seemed to be purple" after the dog has already walked out from under the purple light (thus again appearing white). If the child cannot interpret this sentence and thus attempts to ignore the matrix verb, he is still likely to parse it as a past tense form, and thus should substitute the past tense form of the copula (i.e. *was* not *is*), arriving at something like "The dog was purple". Since Becker never explicitly tested such sentences, it is not at all clear that the child might not say this is correct, that the dog was purple, namely, when he was standing under the purple light. For many adults we have asked, such a statement is quite acceptable.

That is, Becker never establishes that in her test scenarios, the child is truly distinguishing what truly appeared to be the case from what really was the case.[5]

1.2 The Role of the Experiencer-Phrase

An important difference exists between the test items used by Hirsch and Wexler (in press) and Becker (2006). While the raised items used by Hirsch and Wexler (5) contain an experiencer-phrase, the items used by Becker (6) do not.

(5) Bart seems **to Lisa** to be bowling a ball.   (Hirsch and Wexler)
(6) The dog seemed to be purple.   (Becker)

The possibility exists, then, that children do not have a general problem with raising *per se*, as Hirsch and Wexler claim, but instead have a specific problem with raising over an experiencer. Such a problem might be expected given that many languages with raising structures nonetheless do not allow raising over (non-clitic) experiencers, including Icelandic (Collins & Thráinsson 1996; Boeckx 1998), Romance (Rizzi 1986; Torrego 1996) and Greek (Anagnostopoulou 1997).

Importantly, UPR and UFH differ with respect to their predictions regarding the impact of the experiencer-phrase on children's comprehension of raising. According to UPR, the presence of an experiencer is not the cause of children's poor raising comprehension, which is taken to be due to a general problem with subject-to-subject raising. UFH, on the other hand, predicts that raising without an experiencer will not be delayed, and that only when attempting to raise over an experiencer will children have difficulties.

2. Methods
2.1 Comprehension of Raising With and Without an Experiencer-Phrase: A TVJ Experiment

To investigate the possibility that the presence of an experiencer-phrase was responsible for children's poor comprehension of raising in Hirsch and Wexler's study, we have conducted an experiment to directly compare children's comprehension of raising with and without an experiencer-phrase. Our goals were threefold. First and foremost, by testing raised forms both with and without an experiencer, we assess the differing predictions made by UPR and UFH, as well as Becker's claim that children comprehend raising structures. Second, we sought to confirm the use of Hirsch and Wexler's hypothesized *think*-analysis in raising structures with an experiencer. Finally, we examined whether use of the *think*-analysis extends to raising structures without an experiencer.

The task used to assess children's comprehension of such structures was a Truth-Value Judgment (TVJ) task (Crain & Fodor 1993). This paradigm involves having the child observe a scenario while listening to a puppet comment on it, and then having the child indicate whether or not the puppet commented truthfully or untruthfully. In this study, scenarios consisted of the interactions of two

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[5] A better test controlling for this possibility would involve the same white dog starting away from the purple light, then walking under it (thus appearing purple), and then asking the child, while the dog is still under the purple light, to judge "The dog really is purple" and "The dog really seems to be purple". If the child answers the first sentence correctly and the second sentence incorrectly, this would establish that Becker's original experiment was confounded and that children do have trouble with raising. We have run 50 subjects on just such a modified version of Becker's original task, and indeed, children comprehend the copular sentences and fail on the raising sentences (Hirsch, Orfitelli, & Wexler in preparation).

popular childhood dolls *Barbie* and *Ken*, observed by the child and a stuffed animal named *Mr. Bear*. The child is told that Mr. Bear will comment at the end of each scenario, but that he is somewhat silly and will oftentimes make mistakes. Thus, the child must serve as Mr. Bear's teacher for the day, and let him know when he is right or wrong, and why, so that he can learn to do better.

In each scenario, one or both of the non-puppet characters said something incorrect about what was occurring. For instance, in one scenario, Barbie is wearing her favorite hat. She does not realize this, however, and searches for it everywhere, stating that she cannot find it, but at least knows Ken is not wearing it. Ken, who is standing a good distance away from Barbie, tells the child, out of Barbie's hearing, that he believes that he can see that Barbie is wearing her hat. Following the presentation of the scenario, the child is asked three background questions before Mr. Bear comments on what occurred: "Is Barbie wearing a hat?", "Does Barbie know she is wearing a hat?", and "Does Ken know Barbie is wearing a hat?" These questions served to establish that the child understood the details of the scenario. If the child did not answer these questions correctly, the scenario was repeated.

Once the child demonstrated that he understood the scenario, Mr. Bear commented on some aspect of what occurred, using one of four sentence structures: finite clauses with the verb *think* (7), *unraised* sentences with an experiencer-phrase using *seem* (8), and *raised* sentences with (9) and without (10) an experiencer-phrase using *seem*.

	True Items	False Items
(7)	Ken thinks Barbie is wearing a hat.	Barbie thinks she is wearing a hat.
(8)	It seems to Ken that Barbie is wearing a hat.	It seems to Ken that Barbie is wearing a hat.
(9)	Barbie seems to Ken to be wearing a hat.	Ken seems to Barbie to be wearing a hat.
(10)	Barbie seems to be wearing a hat.	Barbie seems to be wearing a hat.

Following Hirsch and Wexler (in press), we chose to use *seem* as the only raising verb in this experiment. As they note, *seem* is not only the most frequently used raising verb in child-directed speech for the English portion of the CHILDES corpus, it is also frequent in absolute terms, appearing more often than verbs such as *dance*, *crawl*, and *hug*. Furthermore, while children are exposed to *seem* in both raised and unraised sentences, it is actually much more commonly used in its raised form (87% of input utterances). Given such data, any problems that children have with raised forms of the verb *seem* cannot be due to not having heard the verb *seem* or to not having heard it in its raised form.

Each of the sentence structures was presented to the child eight times, with four each of true and false items, for a total of 32 test items. These items were pseudo-randomly balanced such that children were not tested on the same condition more than twice in a row. Sentences were read twice before the child responded, and the children's response justifications were noted before moving to the next test item. Sessions with each child were transcribed in real time and also recorded onto audio cassettes.

The *think*-condition (7) served in part as an attentional control, establishing that the child was paying attention to the task. As a verb somewhat semantically similar to *seem*, it also served as an assessment of the child's theory of mind, that is, whether or not he could understand verbs and scenarios requiring knowledge about other people's beliefs. To ensure that performance on the raised conditions accurately reflected a child's level of grammatical comprehension, children scoring less than 7 out of 8 items correct on this condition were not included in subsequent analyses.

To ensure that any observed poor performance on raising was not simply due to children not knowing the verb *seem*, an *unraised* expletive-*it* condition with *seem* was included (8). Again, all children scoring less than 7 out of 8 items correct on this condition were not included in further analysis. Importantly, it is the false items of this condition that establish that the child actually understands the raising verb, and did not merely parse the embedded clause to arrive at the correct answer. Given the scenario described above, in which Barbie does not realize that she is wearing a hat, a child could correctly identify that (8) is true by solely attending to the embedded clause.

To keep the child from being able to ignore the matrix verb, the false items for this condition had altered scenarios, in which Ken is standing so far away from Barbie that he cannot see her very well, and thus (mistakenly) concludes that she must be wearing a scarf. Barbie *is* wearing a hat, so the embedded clause of (8) is true, but because it seems to Ken that she is wearing a scarf, (8) is actually false. A child only attending to the embedded clause would therefore incorrectly answer 'true' to these items, and so we can conclude that children answering these false items correctly comprehend the verb

seem, at least in its unraised form. Furthermore, as one of the major goals of this experiment was to establish whether or not it is the experiencer-phrase that causes children's difficulties with raising structures, we included an experiencer-phrase in the *unraised* items. Good performance on this condition thus also establishes that it is not the mere presence of an experiencer-phrase in the sentence which causes difficulties for children on raising items.

The raised conditions, with (9) and without (10) an experiencer-phrase, constitute the crux of this study. While UPR and UFH each predict children will be delayed in comprehending raised sentences with experiencers, they differ in their predictions regarding raised sentences without an experiencer. UPR predicts children will be delayed on these structures, while UFH predicts no such delay.[6]

The scenarios are designed such that a child using a *think*-analysis should consistently answer the raised sentences with an experiencer-phrase incorrectly. Recall that while *Ken* thinks Barbie is wearing a hat, *Barbie* does not realize that she is, and explicitly states that she can see that *Ken* is not wearing a hat. Upon hearing (9) then, a child using a *think*-analysis will incorrectly answer 'true' because Ken does think that Barbie is wearing a hat. Likewise, for the false item "Barbie seems to Ken to be wearing a hat", the child will again respond incorrectly using the *think*-analysis, because Barbie does not think Ken is wearing a hat. Thus the *think*-analysis would be consistent with below-chance performance on this condition.

How might a *think*-analysis work for items like (10), which lack the experiencer? One way in which they might work is if the child interpreted the sentence as involving subject-control, as in (11).

(11)   Barbie thinks PRO to be wearing a belt.

While English does not allow *think* to take a non-finite complement, this is certainly a reading allowed in many languages, such as French (12) and German (13). As such, it is a UG possibility even for English-speaking children.[7]

(12)   Jean pense porter un chapeau.   [French]
        Jean thinks PRO to wear a hat.
        'Jean$_i$ thinks he$_i$ is wearing a hat.'

(13)   Franz denkt, einen Hut zu tragen.   [German]
        Franz thinks PRO a hat to wear.
        'Franz$_i$ thinks he$_i$ is wearing a hat.'

In the scenario where Barbie is wearing a hat but does not know she is, Mr. Bear is perfectly correct to state that "Barbie seems to be wearing a hat". Yet if a child were to apply a subject-control analysis to this structure, he would consistently answer incorrectly, since it is not the case that Barbie thinks that she is wearing a hat (she explicitly does not). We therefore predict that a child using a *think*-analysis for raising structures without experiencers will demonstrate below-chance performance, interpreting the sentences as involving subject-control, and giving them a reflexive interpretation.

3. Results

As mentioned in the previous section, we eliminated children who did not score at least 7 of 8 correct on the *think* and *unraised* conditions. This is because we wanted to eliminate all factors that might negatively impact performance on raising items other than comprehension of the syntax of raising itself. This goal is quite different from that of previous raising studies, including Hirsch and Wexler (in press), that wished to also assess children's knowledge of raising verbs in their unraised form. By organizing our study in this way, we ensure that all children for whom we will present data

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[6] Note that Becker predicts children should have no difficulties with either raised condition, nor does she offer an explanation for the findings of Froud, Wexler, & Tsakali (in preparation) and Hirsch & Wexler (in press).

[7] C. Schütze (personal communication) notes it is even allowed for at least one quasi-semantically related verb in English (i).

        (i)   Bob claims to wear a hat.

on raising (with and without an experiencer-phrase) possess theory of mind, and understand the raising verbs and experiencer-phrases. Comprehension of these factors was addressed by the *think* condition and the *unraised* condition, respectively.

Due to this goal, many children, especially younger children, were tested and eliminated before we reached a total of 40 children who both possess theory of mind and comprehend the verb *seem*. These 40 children (12 boys, 28 girls) consisted of 10 children in each one-year interval between four and seven years of age (4.35-7.95 years, mean age 5.97). Participant details are shown in Table 1.

Table 1

Group	Age Range	Mean Age	N
4 year-olds	4.35-4.97	4.67	10
5 year-olds	5.07-5.90	5.42	10
6 year-olds	6.08-6.99	6.51	10
7 year-olds	7.29-7.95	7.62	10
Total	4.35-7.95	5.97	40

On *think* and *unraised* trials, children performed well, in accordance with our stipulation that any child scoring less than 7 of 8 correct on either condition be eliminated from the study. This high accuracy indicates that these 40 children all understood the task, had theory of mind, including knowledge of false belief, understood the meaning of *seem*, and could comprehend experiencer-phrases, at least in *unraised* sentences. We have therefore ensured that children's performance on raising sentences is independent of these factors.

Children's performance by age group on raised items with an experiencer is shown in Figure 1. Overall, children perform extremely poorly on this condition. Of the 20 four- and five-year-old children, none perform above-chance on this condition, and 17 perform below-chance. [8] This below-chance performance indicates that children are using a consistent strategy that leads them to the incorrect answer, and supports Hirsch and Wexler's *think*-analysis proposal. We find extremely few children performing at chance level; children have either mastered this condition, or do not comprehend it at all. Between the ages of six and seven, many children begin to perform well on this condition. The observed increase in group performance is not due to a marginal increase in each older group's performance, but is instead due to a small number of children showing nearly perfect above-chance performance. [9] This sudden increase in comprehension just after age six is similar to that which has been noted for verbal passives (Maratsos et al 1985, Hirsch & Wexler 2006)
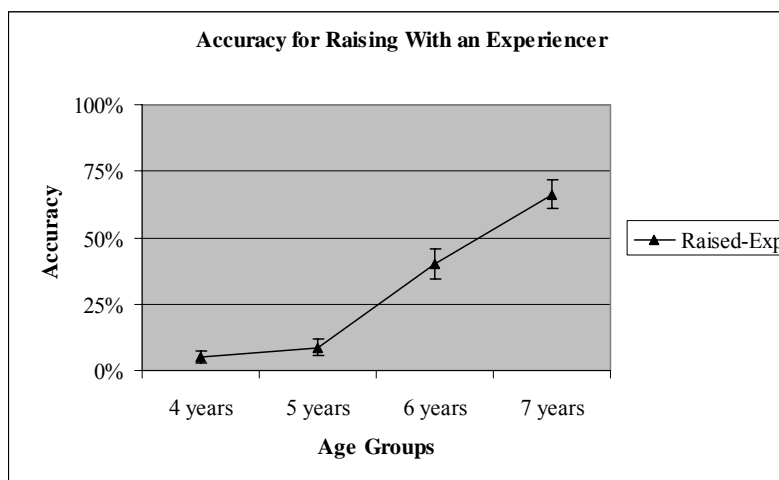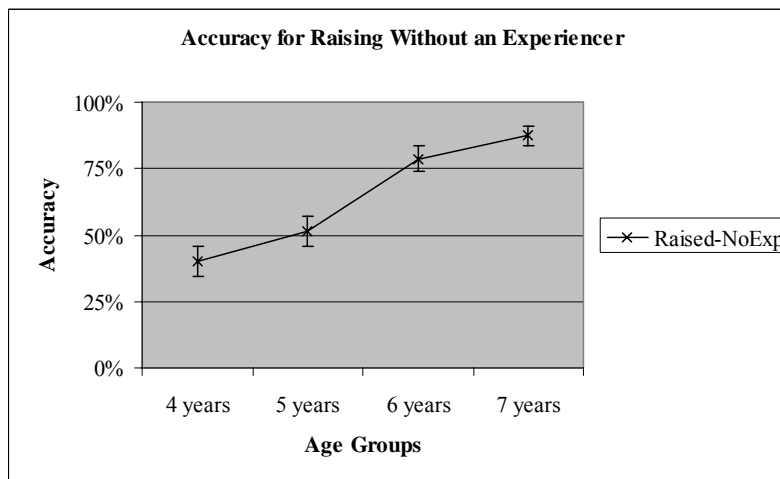

Figure 1

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[8] Zero or one items correct.
[9] At least seven of eight items correct.

Children's individual justification responses further support the idea that they are using a *think*-analysis in this condition (Appendix 6.1). Most justifications for answers included words such as *think* or *know*, and many children, when faced with a raising sentence of the form "X seems to Y to be Z" would produce justifications of the exact form "X thinks Y is Z". This suggests that for raising structures with an experiencer-phrase, children are consistently and incorrectly using a *think*-analysis.

Just as in the *raising with experiencer* condition, children perform poorly on the *raising without experiencer* condition, not reaching above-chance performance as a group until around the age of six- or seven-years-old (Figure 2).

Accuracy for Raising Without an Experiencer

Figure 2

Accuracy as a function of age group is higher in this condition than for *raising with an experiencer*. Nevertheless, we continue to see a majority of four- and five-year-olds scoring below-chance on this condition. Comprehension appears to be an all or none issue for each child. Almost all children scored either above- or below-chance, not at chance. For instance, six four-year-olds scored below-chance on this condition, while four scored above-chance, and zero scored at chance. This general lack of chance performance is seen in all age groups; increasing group performance is due to higher numbers of children scoring above-chance, not individual children scoring slightly better in each subsequent age group.

Importantly, the group of children who score poorly on the raising sentences without an experiencer are more telling than the subgroup who show above-chance performance. The majority of younger children showing below-chance comprehension is strong evidence for a general delay in raising not linked to the presence of an experiencer-phrase. Further, among this group of children who does not score above-chance, we see that the great majority (75%) score *below-chance*, once again suggesting the use of a strategy that leads children to consistently wrong answers. Just as in the raising condition with an experiencer, this pattern is also consistent with the *think*-analysis. Indeed, those children who answered incorrectly provided justification responses matching the *think*-analysis (Appendix 6.2). In these responses, children appear to adopt a control analysis, considering *think* to take an infinitival complement with PRO subject. For instance, when responding to the (true) sentence "Barbie seems to be wearing a hat", some children incorrectly respond 'false', giving the justification "Barbie does not think/know that she's wearing it!"

4. Discussion

In designing this experiment, we set out to address three issues. We first tackled what role the experiencer-phrase plays in children's comprehension of raising. Are children only delayed on those structures with experiencer-phrases, as predicted by UFH, or is their delay a more general one, independent of the experiencer-phrase, as predicted by UPR? Also, can we find support for Becker's

(2006) claim that children are not delayed at all in the comprehension of raising? Second, we sought to assess the validity of the hypothesized *think*-analysis, as put forth by Hirsch and Wexler (in press), as a strategy children use when faced with raising structures containing an experiencer that cannot be parsed on the adult interpretation. Finally, we addressed whether or not this *think*-analysis can be applied by children when presented with raising structures without an experiencer-phrase.

4.1 The role of the experiencer phrase: Are children delayed?

The results of this study strongly suggest that children are generally delayed in the comprehension of raising structures independent of the presence of an experiencer-phrase. Below the age of six, not a single child tested performed above-chance on the *raising with an experiencer* condition. While a small number of children below six-years-old do perform at above-chance levels on the *raising without an experiencer* condition, the majority of children do not. As mentioned before, above-chance performance from a small subgroup of four- and five-year-old children is less informative than the poor performance seen in the majority of four- and five-year-olds, for two reasons. The first is that above-chance performance could be due to a strategy of ignoring the matrix verb, an idea to which we return momentarily. The second reason is that the poor performance we find for the *raised* conditions stands in stark contrast to the results found for the *unraised* condition. In particular, the same children who performed above-chance on the *unraised* items performed below-chance on the *raised items with an experiencer-phrase*. We see that the experiencer-phrase itself cannot then be causing the problem for the child, given that both of these conditions contain an experiencer.

The *unraised* condition is important for other reasons as well. By requiring that children show above-chance performance on the *unraised* condition, we ensure that poor performance on the raising conditions cannot simply be due to children not comprehending the raising verb itself. While Hirsch and Wexler (in press) do test children on *unraised* items, thus making it possible to distinguish two subgroups of children (one which comprehends the raising verb, and one which does not), Becker (2006) did not test children on *unraised* items, making it impossible to discern which children (and how many) did not comprehend the raising verbs to begin with. This is an important oversight, as it is unclear what to conclude about a child's knowledge of raising if he does not understand the meaning of the verb used in the test. Given that Hirsch and Wexler report that approximately 37% on 3-5 year-olds, the age range Becker examines, do not comprehend the unraised form, it is quite unclear what to make about Becker's claim that these children understand the raised forms.[10]

4.2 Accounting for children's delayed comprehension: UPR and UFH

As predicted by both UPR and UFH, children perform quite poorly on raising structures with an experiencer-phrase, until around the age of six- or seven-years-old. This developmental pattern matches that found previously for raised structures with experiencers, and for verbal (psychological) passives (Hirsch & Wexler in press). A majority of four- and five-year-olds also show poor performance on raising structures without an experiencer. This behavior is in line with the predictions of UPR, which asserts that *all* subject-to-subject raising structures are ungrammatical for immature children. It is not at all predicted by UFH, however, which instead predicts that it is only when attempting to raise over an experiencer that raising will prove problematic for the child. The data, therefore, provide strong evidence in favor of UPR as a unified maturational explanation for children's delay in both verbal passive and subject-to-subject raising structures. If children are indeed over-applying the Freezing Principle as Snyder and Hyams claim, we expect children to have no difficulties comprehending raising sentences without an experiencer since they do not have the opportunity to 'over-apply' the Freezing Principle in these cases, as there is no intervening DP over which the moved object must be smuggled, so Freezing will never apply. Smuggling is specific to passives and raising over an experiencer, in which minimality would otherwise be violated.

If children's problem is that they take all *v*Ps to define strong phases, then the pattern of behavior is both understandable under and predicted by UPR. Even raising forms without experiencers must have a non-defective *v* in the child grammar. If immature children take *v* to always represent a strong

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[10] This is roughly similar to the number of younger children we had to exclude due to poor performance on the *unraised* condition alone, and is the primary reason we chose not to include three-year-olds in this study.

phrase, than the experiencer should have no impact on their comprehension of subject-to-subject raising, which is predicted to be uniformly poor.

4.3 Re-examining Becker: The copular strategy

The majority of four- and five-year-old children do not perform well on *raised* items without an experiencer, suggesting that children have a general problem with raising. What then to make of the children who performed well on raising items without an experiencer-phrase?

We have proposed that the high performance found by Becker might be explained if children were ignoring the matrix verb and treating the test sentences as copular constructions (e.g. *The dog was purple*). Interestingly, our experiment is equally susceptible to use of this strategy for the *raising without an experiencer* condition. In our experiment, a child ignoring the matrix verb in a sentence such as (14) could give the sentence a copular analysis, interpreting it to mean something like (15).

(14)   Barbie **seems to be** wearing a hat.
(15)   Barbie **is** wearing a hat.

Recall that in the example scenario described previously in which Barbie cannot find her hat, Barbie *is* already wearing it. The child therefore answers 'true' to (14) without comprehending the sentence in an adult manner. Importantly, this interpretation is only available to the child for raising sentences without an experiencer-phrase. When the experiencer is present (16), ignoring the matrix verb and applying a copular analysis produces a nonsensical sentence (17). This explains the below-chance results found both in our experiment and in Hirsch and Wexler (in press) for raised items containing an experiencer. Children were able to use only the *think*-analysis, which gave them a consistently incorrect (non-adult) interpretation of the sentence.

(16)   Barbie **seems** to Ken **to be** wearing a hat.
(17)   *Barbie **is** to Ken **to be** wearing a hat.

It seems likely, then, that we are finding a "false positive" on the *raising without an experiencer* condition: children are answering correctly, not because they comprehend raising, but because their (incorrect) interpretation of the raising sentence leads them, in this case, to the "correct" answer. If indeed children are utilizing this strategy, we expect them to answer incorrectly in cases where what *seems* to be going on and what is *actually* going on are different. In current work, we investigate this possibility, and are finding strong evidence that children are overwhelming willing and able to use a copular strategy when faced with raising structures without an experiencer phrase. In addition, we are currently working on a project which compares within-subject performance on passive and raising (without an experiencer) structures. If, as is predicted by UPR, *all* subject-to-subject raising is delayed for children for the same (maturational) reason as verbal passives, we expect to find that children who comprehend verbal passives will comprehend raising without an experiencer, and visa versa. Such correlations between comprehension of verbal passives and raising without an experiencer would of course be unexpected on UFH.

5. Conclusion

The experiment presented here assessed children's comprehension of two types of raising sentences: those with an experiencer-phrase and those without. Our data suggest that children do not comprehend raising sentences with or without an experiencer. Of the two maturational theories we consider, it is UPR that captures this behavioral pattern, and not UFH. Furthermore, we find no evidence for Becker's claim that children comprehend raising from an early age and suggest that her findings are due to children using a copular strategy. We also present evidence supporting Hirsch and Wexler's hypothesis that children utilize a *think*-analysis when faced with raising structures with experiencer-phrases. When presented with a raising form without an experiencer, however, children have multiple options. While many children continue to utilize a (reflexive) form of the *think*-analysis, other children ignore the matrix verb and treat the sentence as a copular construction.

6. Appendices

6.1 Sample of Children's justification responses for raised items with experiencer-phrases

<u>Child answers 'True' when the correct response is 'False'</u>
Ken seems to Barbie to be carrying a red backpack.
"Cause he thinks that Barbie has a red backpack." (5;10)

Ken seems to Barbie to be in the woods.
"Because Ken thinks she is in the woods." (4;9)
"She is in the forest, Ken thinks Barbie is in the forest." (6;1)

<u>Child answers 'False' when the correct response is 'True'</u>
Barbie seems to Ken to be carrying some candy.
"Because she doesn't think there's any." (5;1)

Barbie seems to Ken to be wearing a necklace.
"Barbie doesn't think Ken has a necklace." (6;1)
"Barbie was wrong, Ken doesn't have a necklace." (5;8)

6.2 Sample of Children's justification responses for raised items without experiencer-phrases

<u>Child answers item incorrectly</u>
Barbie seems to be wearing a belt. (correct answer is 'false')
"Cause Barbie isn't wearing a belt but she thinks so." (4;9)

Barbie seems to be carrying a book. (correct answer is 'true')
"Because Barbie thinks she doesn't have a book." (5;1)

Barbie seems to be wearing a belt. (correct answer is 'true')
"Because she thinks she isn't wearing a belt." (5;10)

<u>Child answers item correctly</u>
Barbie seems to be wearing a belt. (correct response is false)
"Because she doesn't have a belt." (4;11)

Barbie seems to be carrying a book. (correct response is false)
"Because Barbie doesn't have a book in her bag because Ken took it." (7;6)

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