Robinson, E. J., & Whitcombe, E. L. (2003). Children's suggestibility in relation to their understanding about sources of knowledge. *Child Development, 74*(1), 48-62.

Robinson, E. J., & Whitcombe, E. L. (2005). Children's source reporting in relation to their decisions about the believability of utterances, *Paper presented at the Biennial Meeting of the Society for Research in Child Development*.Atlanta, GA.

Tomasello, M., & Akhtar, N. (1995). Two-year-olds use pragmatic cues to differentiate reference to objects and actions. *Cognitive Development, 10*, 201-224.

Tomasello, M., Strosberg, R., & Akhtar, N. (1996). Eighteen-month-old children learn words in non-ostensive contexts. *Journal of Child Language, 23*(1), 157-176.

Whitcombe, E. L., & Robinson, E. J. (2000). Children's decisions about what to believe and their ability to report the source of their belief. *Cognitive Development, 15*(3), 329-346.

Long Passives Are Understood by Young Children

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1. Background

Young children's knowledge of the verbal passive has been a topic of empirical and theoretical interest for a number of years. It has been observed that children rarely produce long passives (Baldie, 1976; Wells, 1979), and that the short passives they produce often have a result state interpretation (Horgan, 1978). These facts have been interpreted as evidence that young children lack adult-like knowledge of the verbal passive (Borer and Wexler, 1987). It is widely believed that English-speaking children do not begin to understand long actional passives until around age 4 or 5 (Bever, 1970; Horgan, 1978; de Villiers and de Villiers, 1978). Further, children demonstrate comparable levels of understanding of nonactional passives (verbs of cognition, emotion, perception) only around age 7-9 (Maratsos, Becker, Fox, and Chalkley, 1985).

The Maturation account (Borer and Wexler, 1987) posits that an aspect of the syntax needed for adult-like representation of verbal passives is biologically inaccessible to pre-school children. Children perform reasonably well on actional passives at a relatively young age because they give these passives an alternative representation compatible with their early grammar (adjectival passives, according to Borer and Wexler, 1987; resultative passives, according to Hirsch and Wexler, 2004). Since nonactional passives are argued to be incompatible with this alternative representation, they would constitute the only reliable measure of children's knowledge of the verbal passive. As reliable understanding of nonactional passives is reportedly achieved only around age 7-9, the delay proposed by the Maturation account is significant.

Fox, Grodzinsky, and Crain (1995) present evidence, however, that children's difficulty with nonactional passives is restricted to long nonactional passives. Using a Truth-Value Judgment Task (Crain and McGee, 1985), they found that 10 of the 13 children in their study performed perfectly on short nonactional passives, and all 13 (ages 3;6-5;5) performed perfectly on long actional "be" and "get" passives. However, only 2 children performed well on long nonactional passives. Based on this pattern of results, they suggest that children have access to all aspects of the verbal passive except for the discrete ability to transmit the external theta role of the predicate to the by-phrase. Since

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"by" can independently assign an "affector" theta role to its complement, children can interpret long actional passives, for which the affector role is appropriate; however, this strategy doesn't work for long nonactional passives because the by-phrase object (logical subject) is typically not an agent, but an experiencer (see also Fox and Grodzinsky, 1998).

While children perform better on long actionals vs. long nonactionals in many studies, their performance on long actionals is generally depressed relative to their performance on short actionals and actives. We wanted to pursue the possibility that an aspect of experimental design influences children's responses on long passives, both actional and nonactional. If so, then future studies controlling for this factor might lead to better, less variable results. In addition, we thought it would be important to see if Fox et al.'s findings on short nonactionals could be replicated, since other studies have shown children performing at around chance on both long and short nonactionals (Gordon and Chafetz, 1990; Hirsch and Wexler, 2004).

2. Felicity Conditions

Crain and Fodor (1993) note that while children produce few long passives, this is also true of adults. They suggest that the long passive is rarely produced because it is a marked form appropriate only in certain discourse situations. We hypothesized that children's relatively poor performance on tests of long passives, both actional and nonactional, may be due in part to failure to satisfy conditions on the felicitous use of the by-phrase. Crain, Thornton, and Murasugi (1987) successfully elicited long actional passive questions from children ages 3;4 to 5 years by making their use pragmatically appropriate (as reported in their 1987 BUCLD handout and in Crain and Fodor, 1993).

An example from Crain et al.'s (1987) handout is given in (1). By making potential patients the topic of the discourse, the use of a passive question is pragmatically appropriate.

(1) **Adult**: In this story, there are two soldiers and an alligator. And the soldiers are standing in the water and they can't see the alligator. And the alligator goes up and bites one of the soldiers. You ask Keiko which one.
Child: Which one is getting bited by the alligator?

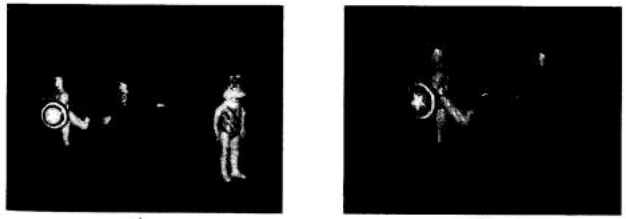
Crain and Fodor (1993) cite the example in (2) as a kind of stimulus that successfully elicited long passives from children. The authors note that "active constructions are also felicitous in this context (Which soldier is Darth Vader hitting?), [but] the contextual contrast with another agent (the Incredible Hulk) may tend to favor the passive stylistically" (p. 20).

(2) **Adult**: See, the Incredible Hulk is hitting one of the soldiers. Look over here. Darth Vadar goes over and hits a soldier. So Darth Vadar is also hitting one of the soldiers. Ask Keiko which one.
Child: Which soldier is getting hit by Darth Vadar?

It is the contextual contrast with another agent as in the second example that we examined in our study. We wanted to see if this kind of contextual contrast would also improve children's comprehension in a Truth-Value Judgment Task with both long actional and nonactional passives. We also wanted to discuss more explicitly why adding a character representing a contrast set for the agent/exeriencer might be particularly helpful for children, even in a test of comprehension.

Hamburger and Crain (1982) showed an increase in children's comprehension of restrictive relative clauses when an extra character representing a contrast set for the head of the relative clause was present. They argued that children are sensitive to pragmatic presuppositions and Gricean maxims, but are less able than adults to accommodate them in an experimental situation. We hypothesized that the by-phrase creates the expectation in the listener of a contrast class of alternative agents/experiencers, and that children would perform better on a test of the long passive, whether actional or nonactional, if this expectation were accommodated.

Consider the case of a context in which two potential chasers are interacting with someone who is chased, illustrated in Figure 1A. In this context, the by-phrase is clearly motivated. Captain Speed could have been chased by Miss Piggy, but it was the Fancy Lady who actually chased him. On the other hand, the situation is different when there is only one potential chaser, as in Figure 1B. In this context, it's not clear that the by-phrase is motivated. A short passive would be sufficient.



A. B.

Figure 1. ***Captain Speed was chased by the Fancy Lady.***

We thought that satisfying this felicity condition on the use of long passives might lead to improved performance. While it might not be the only reason for children's poor performance on previous studies, children might perform better on a test in which this condition is satisfied. We tested this hypothesis in Experiment 1.

3. Experiment 1

The hypothesis of Experiment 1 is that 4-year-old children will perform well on comprehension of long actional and nonactional passives when an extra character is added to satisfy a felicity condition on the use of a by-phrase.

3.1 Methods

Subjects. We tested 11 pre-school children age 4;0 - 4;10 (mean age 4;4).

Procedure. We used a Truth-Value Judgment Task (Crain & McKee, 1985) to see whether children would accept passive sentences as descriptions of stories acted out using toy props. Experimenter 1 told each story to individual children and acted it out with toys. Experimenter 2 manipulated a puppet, whom we called Gobu, who said what he thought happened after the story. The children indicated whether Gobu said the right thing or not with an appropriate reward. Each story included a patient and two potential agents/experiencers. It was made explicit that, while the extra character was a plausible agent/experiencer (Condition of Plausible Dissent, Crain et al. 1996), s/he was not the relevant one referred to in the by-phrase.

Materials. Four passive sentences (long match, long mismatch, short match, short mismatch) were tested for each of 3 verbs: SEE, CHASE, HUG.[1] A sample story for the long match condition is given in (3).

(3) Experiment 1 – Match sample

EXP1: Bart, the gorilla, and the cheetah were relaxing in the jungle one day, when Bart found a bunch of bananas.
Bart: Hey, cool! Look what I found!
Gorilla: Would you mind sharing some of those with me?
Bart: No way, dude, these are mine, all mine! Hee, hee. If you want some, you're gonna have to chase me.
Cheetah: I could chase him, but I'm not all that fond of bananas.

1. We also tested HEAR, but children performed much worse on this verb than on any other. Fox & Grodzinsky also found depressed performance with HEAR, and so did Maratsos et al. (1985), even with older children. Like Maratsos et al., we removed it from further analysis.

Gorilla: Well bananas are my favorite, so watch out Bart, here I come!!!! (Gorilla chases Bart)

EXP1: Gobu, can you tell me something about that story.
Gobu: Well, let's see. In that story, Bart was chased by the gorilla.

Note: The mismatch target would be "The gorilla was chased by Bart."

The different sentence types were presented in the same pseudo-random order for all participants. Pretest and filler items were active sentences, including both actional and nonactional verbs. Participants had to answer correctly on at least five out of six pretest items to be included in the study; all participants correctly responded to three active fillers in the test.

3.3 Results

The average percent correct for the four stimuli types for all participants is presented in Figure 2. We found that the children correctly responded to both long and short passives, whether actional or nonactional, at an average rate of 91% correct (range on items 80-100% correct). The response accuracy was significantly greater than chance for each type by 1-sample *t*-test, as reported in table 1.

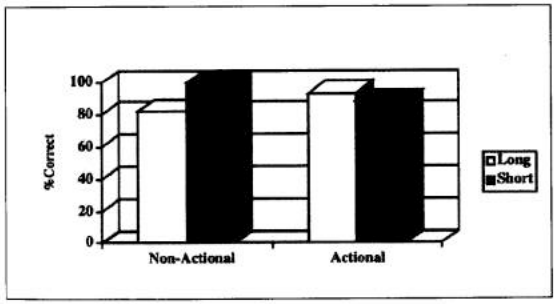


Figure 2. Comprehension of Passives by 4-year-olds

Table 1. Results of Experiment 1

TYPE	Percent correct	*t*	*df*	*p*
Non-actional, long	82%	3.13	10	<.011
Non-actional, short	100%	INF	10	<.001
Actional, long	93%	8.86	10	<.001
Actional, short	88%	7.02	10	<.001

3.4 Discussion

We found that four-year old children showed high levels of comprehension of both long actional and nonactional passives when tested using a procedure that satisfies a felicity condition on the use of long-passives in the context of a truth value judgment task. It is possible that these experimental manipulations allowed children to more accurately reveal their linguistic competence by removing some performance-dampening factors. In addition, we replicated Fox et al.'s results on short nonactionals and confirmed the widespread finding of good performance on short actionals.

In order to test our claim that our improved results on long passives were in fact due to our experimental manipulations, we decided to conduct a second experiment with two conditions: one traditional (no extra character), and one modified (an extra character). We also wanted to test an additional nonactional verb, and even younger children.

4. Experiment 2

The hypothesis of Experiment 2 is that 3-year-old children will perform better on comprehension of long actional and nonactional passives when an extra character is added to satisfy a felicity condition on the use of a by-phrase, as compared to a condition without this extra character.

4.1 Methods

Subjects. We tested 12 pre-school children age 3;2 - 4;2 (mean age 3;6). Three participants (ages 3;5 - 3;11) were excluded because they could not complete the training. Two participants (ages 4;0 and 4;3) had less than 50% correct, across all conditions, including active fillers. These participants were excluded from further analysis. Seven participants (average age 3;4) had 62% - 92% correct across all conditions - a combined total of 77% correct for the seven in all conditions. To be included, they answered correctly on at least 3 out of 4 active items (which included both actional and nonactional verbs). All further analyses include only the seven participants who scored over 50%.

Procedure. We employed a Truth-Value Judgment Task, as in Experiment 1. In Condition 1, there was no extra character. In Condition 2, an extra character was included. As in Experiment 1, it was made explicit that, while the extra character was a plausible experiencer / agent, s/he was not the relevant one referred to in the by-phrase. Condition 1 items were presented to all participants before Condition 2. The different sentence types within each condition were presented in the same pseudo-random order for all participants.

Materials. For each condition, two passive sentences (long match, long mismatch) were constructed for each of two non-actional verbs (SEE, LIKE), and one passive sentence was used for each of 2 actional verbs (CHASE, HUG). A sample story from Condition 1 is given in (4), and a sample story from Condition 2 is given in (5).

(4) Experiment 2, Condition 1 – Match sample

EXP1: In this story, we have Santa and a naughty elf. The elf took a plate of goodies left for Santa and hid behind a wall so Santa would not see him.
Elf: Hee, hee. Santa won't see me behind this wall, and I can have these treats all for myself.
EXP1: What the elf forgot, though, is that Santa has super vision. That's how he can see who is naughty and who is nice. He can see through anything, even a wall. So, right away, Santa saw the elf.
Santa: Aha! I see you elf. I see you!!

EXP1: Gobu, can you tell me something about that story?
Gobu: Well, let's see. In that story, The elf was seen by Santa.

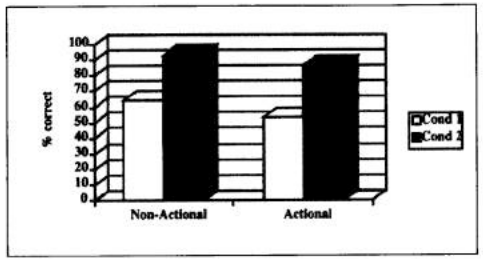
(5) Experiment 2, Condition 2 – Match Sample

EXP1: Oscar is very grouchy. He doesn't like anybody. I wonder if someone likes him, though? Here's a Fancy Lady and a parrot. I wonder if the Fancy Lady likes Oscar?
Fancy Lady: Ew! Oscar stinks. I don't like him because he lives in a garbage can.
EXP1: Well, I wonder if the parrot likes him?
Parrot: Oh, yes, I like Oscar. I don't mind that he lives in a garbage can. I like you, Oscar.

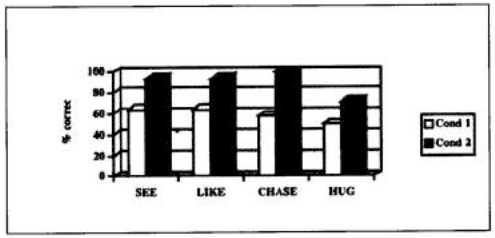
EXP1: Gobu, can you tell me something about that story?
Gobu: Well, let's see. In that story, Oscar was liked by the parrot.

4.2 Results

Responses in Condition 2 were significantly better than responses in Condition 1 overall ($t(6) = 3.31$, $p = .016$). The number of items in the nonactional and actional conditions alone were too low to obtain significant contrasts, but as illustrated in Figure 3A, performance was better in Condition 2 for both actional and nonactional passives; and as illustrated in Figure 3B, this pattern was attested for individual verbs. Response accuracy for Condition 2 was significantly greater than chance: Overall: ($t(6) = 8.18$, $p < .001$); Actional: ($t(6) = 2.83$, $p = .030$); Non-Actional: ($t(6) = 9.30$, $p < .001$). Response accuracy for Condition 1 was not significantly greater than chance: Overall: ($t(6) = 1.40$, $p = .212$ NS); Actional ($t(6) = 0.55$, $p = .604$ NS); Nonactional: ($t(6) = 1.55$, $p = .172$ NS).



3A. By Verb Type



3B. By Individual Verb

Figure 3. Comprehension of Passives by 3-Year-Olds

4.3 Discussion

As hypothesized, in this study, three-year-old children showed improved levels of comprehension of long passives with actional and nonactional verbs when tested with an extra character as compared to a condition with no extra character. Our Condition 1 results replicate most others showing poor performance on passives by three-year-olds. Three-year-olds in Hirsch and Wexler's (2004) study performed at 54-66% correct on long actional passives, comparable to our 50-64% accuracy for long actional and nonactional passives. Our Condition 2 results show significant improvement. As in Experiment 1, overall performance in the extra character condition was quite good. In this study, we extended this finding to an additional verb, and to younger children (recall that the average age of participants in Experiment 1 was 4;4, while that of Experiment 2 was 3;6).

5. General Discussion

Not every language has passives, and those that do differ with respect to the class of verbs which may participate. Even when we treat passive not as a 'construction', but as a constellation of independent factors (Chomsky 1981; Jaeggli 1986), children must learn through exposure a number of facets of passivization: whether their language allows it, the morphological marker(s) of the passive, which verbs may be passivized, how the 'demoted' argument is treated, etc. Certain nonactional verbs such as 'hear' may pose the greatest difficulty, since they are not always passivizable even in languages with a productive passive.

A number of studies have shown that children perform consistently at or around chance on nonactional passives. This might relate to the rarity of these passives in input to children (Gordon and Chafetz, 1990). When studies control for input (Pinker, Frost, and Lebeaux, 1987; De Villiers, 1984) the "Maratsos effect" seems to diminish or disappear. However, Pinker et al. note that children are resistant to productively passivizing "anti-canonical" novel verbs. These are verbs that have an agentive logical object and a logical subject that is a patient. To the extent that a given nonactional verb might be interpreted as "anti-canonical," a child might be more cautious about accepting it in the passive if it has not been previously heard in the passive. We speculate that children might reject passivized "hear" for this reason. The child might interpret the logical object as an active stimulus that is more "agentive" than the logical subject, since the character who takes the role of the logical object must produce sound, but the character portraying the logical subject passively receives sound.

In an analysis of adult input to three children in the CHILDES database (McWhinney and Snow, 1985), Gordon and Chafetz (1990) found only 4 long passives out of 84,000 utterances, and found the majority of passives to be adjectival (197 adjectival passives vs. 91 verbal passives). So it may not be surprising if some time is needed for children to work out the details about

verbal passives. However, it is not clear that 7-9 years is required. For example, it is unlikely that the children in Fox et al.'s study interpreted actional verbal passives as adjectival/resultative passives, since actional passives were presented in the progressive. Progressive passives are not homophonous with adjectival/resultative passives, nor are they consistent with a result state interpretation.

It is clear that experimental factors also influence children's performance, given the range of accuracy levels in previous studies using a variety of methods. If children are unsure about how to interpret a picture or what question an experimenter is getting at, performance may well fall off, leading to an overall lower rate of accuracy across children and items. The Truth-Value Judgment Task we employed in our study may have helped ease some of the performance impediments inherent in other methods. But it is clearly not the only relevant factor. The difference in performance by three-year-olds on the two conditions of our Experiment 2 is a clear indication of this.

Making the experimental stimuli as felicitous as possible is another relevant manipulation. We have shown that by accommodating the expectation that a full passive is more felicitous when the 'demoted' agent/experiencer is contrasted with another potential one, children are better able to grasp the relevant point of the experimental stimuli and respond with greater accuracy. We hope that our study prompts others to incorporate this experimental manipulation into their own studies, to see if the result can be replicated in other labs.

References

Babyonyshev, Masha, Jennifer Ganger, David Pesetsky and Kenneth Wexler. 2001. The maturation of grammatical principles: Evidence from Russian unaccusatives. *Lingusitic Inquiry* 32 (1):1-44.

Baldie, B.J. 1976. The acquisition of the passive voice. *Journal of Child Language* 3:331-48.

Bever, Thomas G. 1970. The cognitive basis for linguistic structures. In *Cognition and the development of language*, ed. by J.R. Hayes, 279-362. New York: John Wiley & Sons.

Borer, Hagit and Kenneth Wexler 1987. The maturation of syntax. In *Parameter setting*, ed. by Thomas Roeper and Edwin Williams, 123-172. Drodrecht: Reidel.

Chomsky, Noam. 1981. *Lectures on government an binding*. Dordrecht: Foris.

Crain, Stephen and Janet Dean Fodor. 1993. Competence and performance. In *Language and Cognition: A Developmental Perspective*, ed. by E. Dromi. Norwood, N.J.: Ablex.

Crain, Stephen and Cecile McKee. 1985. The acquisition of structural restrictions on anaphora. In *Proceedings of NELS 16*, ed. by S. Berman, J. Choe, and J. McDonough, 94-110. GLSA, University of Massachusetts, Amherst.

Crain, Stephen, Rosalind Thornton, Carole Boster, Laura Conway, Diane Lillo-Martin, and Elaine Woodams. 1996. Quantification without qualification. *Language Acquisition* 5: 83-153.

Crain, Stephen, Rosalind Thornton, and Kumiko Murasugi. 1987. Capturing the evasive passive. Paper presented at the 12th Annual Boston University Conference on Language Development, Boston.

de Villiers, Jill G. 1984. Learning the passive from models: Some contradictory data. Paper presented at the 9th Annual Boston University Conference on Language Development, Boston.

de Villiers, Jill G. and Peter A. de Villiers. 1978. *Language Acquisition.* Cambridge, Mass.: Harvard University Press.

Fox, Danny and Yosef Grodzinsky. 1998. Children's passive: A view from the *by*-phrase. *Linguistic Inquiry* 29:311-332.

Fox, Danny, Yosef Grodzinsky, and Stephen Crain. 1995. An experimental study of children's passive. In *MIT working papers in linguistics 26. Papers on language processing and acquisition*, 249-264. MITWPL, Department of Linguistics and Philosophy, Cambridge, Mass.

Gordon, Peter and Jill Chafetz. 1990. Verb-based versus class-based accounts of actionality effects in children's comprehension of passives. *Cognition* 36: 227-254.

Hamburger, Henry and Stephen Crain. 1982. Relative acquisition. In *Language development: Syntax and semantics*, ed. by S. Kuczaj. Hillsdale, N.J.: Lawrence Erlbaum.

Hirsch, Christopher and Kenneth Wexler. 2004. Children's passives and their *resulting* interpretation. Ms., MIT.

Hirsch, Christopher and Kenneth Wexler. 2005. By the way, children don't know *by*. Paper presented at the 30th Annual Boston University Conference on Child Language Development, Boston.

Horgan, Diane. 1978. The development of the full passive. *Journal of Child Language* 5: 65-80.

Israel, Michael, Christopher Johnson, and Patricia J. Brooks. 2000. From states to events: the acquisition of English passive participles. *Cognitive Linguistics* 11:103-129.

Jaeggli, Osvaldo. 1986. Passive. *Linguistic Inquiry* 17:587:-622.

Maratsos, Michael, Dana Fox, Judith Becker, and Mary Anne Chalkley. 1985. Semantic restrictions on children's passives. *Cognition* 19:167-191.

MacWhinney, B., & Snow, C.1985. The Child Language Data Exchange System. *Journal of Child Language* 12:271-296.

Pinker, Stephen, David Lebeaux, and Loren Ann Frost. 1987. Productivity and constraints in the acquisition of the passive. *Cognition* 26:195-267.

Wells, G. 1979. Variation in child language. In *Language acquisition*, ed. by P. Fletcher and M. Garman. New York: Cambridge University Press.

Wexler, Kenneth. 2004. Theory of Phasal Development: Perfection in Child Grammar. *MIT Working Papers in Linguistics* 48:159-209.