



Attention and the Comprehension of Subject and Object WH-Questions

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ABSTRACT

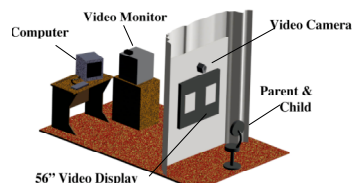
- To comprehend a wh-question, one needs both to understand linguistic principles and to possess a requisite level of cognitive capacity to process actions and scenes. We tested 15- and 20-month-olds' comprehension of wh-questions to see when and in what order these abilities develop.
- Experiment 1 examined when infants acquire the grammar to be able to understand subject and object wh-questions. Our principal finding was that infants could comprehend simple matrix *wh*-subject questions by 15 months and object by 20 months.
- Experiment 2 examined the limits on this understanding by increasing the cognitive load. The results indicated that there is an attentional component to question comprehension. When three objects were moving on the screen, infants had more difficulty visually parsing and encoding the scene. This was not a memory difficulty: infants responded the same way, even when given a second chance to view the scene after hearing the question.
- These results suggest that while grammatical processing of wh-questions may be fully developed at 20 months, infants' ability to make use of that information when visually parsing a complex scene is limited.

INTRODUCTION

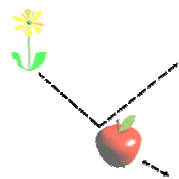
- Although children begin to produce questions by 20.5 months (Stromswold, 1995), comprehension of complex grammar is often found before production (Brown, 1973; Hirsh-Pasek & Golinkoff, 1996; Naigles, 1996; Shady, 1996; *inter alia*).
- Can children younger than 2 years comprehend wh-questions? If so, what are the limitations on this comprehension?

PROCEDURE

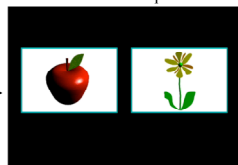
Infants were tested using the Splitscreen Preferential Looking Procedure.



First, the infants were shown a video of a hitting action:



Then, they were shown the objects involved and asked a question:



Subject-question: "What hit the apple?"
Object-question: "What did the flower hit?"
Where-question: "Where is the flower?"

Targets were: apple, flower, book, and keys. These objects and their labels should be known by 13 months, according to the MacArthur Communicative Development Inventory norms (Fenson et. al., 1994).

EXPERIMENT 1

Participants:

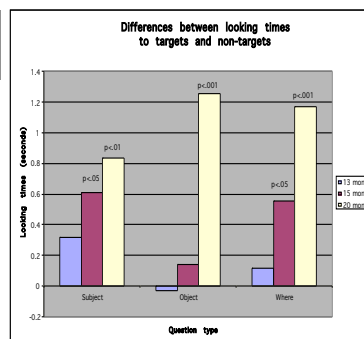
- A total of 60 infants were tested: 20 each of 20mos, 15mos, and 13mos.

Trial Order:

Trial	Video	Audio
Beginning	Sunset	-
Training trial1 (x2)	Apple hits flower	-
Test trial1 (x2)	Split screen of apple and flower	"What did the apple hit?"
Training trial2 (x2)	Book hits keys	-
Test trial2 (x2)	Split screen of book and keys	"What hit the keys?"
Training trial3 (x2)	Apple hits flower	-
Test trial3 (x2)	Split screen of apple and flower	"What hit the flower?"
Training trial4 (x2)	Book hits keys	-
Test trial4 (x2)	Split screen of book and keys	"What did the book hit?"
Test trial5 (x2)	Split screen of apple and flower	"Where is the apple?"
Test trial6 (x2)	Split screen of book and keys	"Where is the book?"
Test trial7 (x2)	Split screen of apple and flower	"Where is the flower?"
Test trial8 (x2)	Split screen of book and keys	"Where are the keys?"

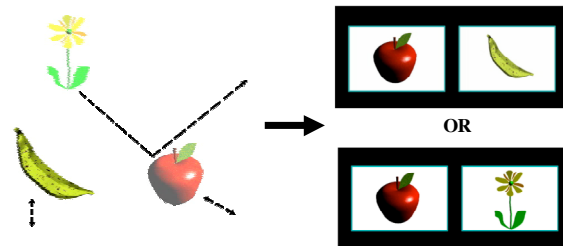
RESULTS

20-month-olds looked significantly longer to the target for all three question types; the 15-month-olds for only the *subject* and *where* questions; and the 13-month-olds for none of the questions.



EXPERIMENT 2

In Experiment 2, we added a distractor object to the animated scene -- in motion, but unconnected to the hitting action: a banana, for the apple and flower, or a ball, for the book and keys. Other changes include: elimination of the *where* questions.



Participants:

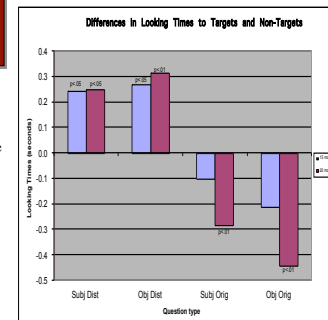
- A total of 96 infants were tested: 48 20-month-olds and 48 15-month-olds. Half of each age group saw the target and distractor in the test trials, while the other half saw the original two objects (see above diagram).

Trial Order:

Trial	Video	Audio
Beginning	Sunset	-
Training trial1 (x2)	Apple hits flower	-
Test trial1 (x2)	Split screen of apple (or banana) and flower	"What did the apple hit?"
Training trial2 (x2)	Apple hits flower	-
Test trial2 (x2)	Split screen of apple (or banana) and flower	"What did the apple hit?"
Training trial3 (x2)	Book hits keys	-
Test trial3 (x2)	Split screen of apple and flower (or ball)	"What hit the keys?"
Training trial4 (x2)	Book hits keys	-
Test trial4 (x2)	Split screen of book and keys (or ball)	"What hit the keys?"
Training trial5 (x2)	Apple hits flower	-
Test trial5 (x2)	Split screen of apple and flower (or banana)	"What hit the flower?"
Training trial6 (x2)	Apple hits flower	-
Test trial6 (x2)	Split screen of apple and flower (or banana)	"What hit the flower?"
Training trial7 (x2)	Book hits keys	-
Test trial7 (x2)	Split screen of book (or ball) and keys	"What did the book hit?"
Training trial8 (x2)	Book hits keys	-
Test trial8 (x2)	Split screen of book (or ball) and keys	"What did the book hit?"

RESULTS

Both the 15- and the 20-month-olds looked significantly longer to the target when presented with the choice between the target and the distractor. On the other hand, both groups looked longer to the *non*-target when presented with the choice they saw in Experiment 1, between the target and the active non-target.



CONCLUSIONS

- Experiment 1 indicated that infants' ability to understand wh-questions increases with age, and by 20 months, infants can comprehend *what* questions of both subjects and objects.
- Experiment 2 explored the attentional component of question comprehension. When a distractor object is added to the scene, the infants were overloaded and could not process the entire scene (Cohen, 1998; Bates & Goodman, 1997). They were able to separate the objects involved in the hitting action from the distractor, which allows them to choose the target when presented with the target and distractor.
- However, the infants' processing capabilities are limited: they cannot differentiate which of the two active objects was the actor and which was the patient. Therefore, when presented with the choice between actor and patient, they revert to looking at the object overtly mentioned in the question; in this experiment, that object is always the non-target.
- Thus, even though 20-month-olds may be grammatically capable of comprehending wh-questions, limited cognitive and attentional processing prevents them from consistently demonstrating this comprehension.

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