

Children's Evaluation of the Certainty of Inferences by Self and Other

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Introduction

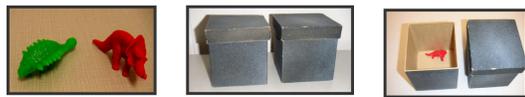
Reflecting upon one's own reasoning and evaluating the reasoning of others are important abilities for critical thinking, logical reasoning, understanding science, and social understanding. A series of studies investigated the development of children's evaluations of their own or another person's inferences. The goals of these studies were (a) to assess children's recognition that inferences are different from guesses, (b) to assess children's recognition of differences among different types of inferences, and (c) to compare children's ability to evaluate their own inferences with children's ability to evaluate another person's inferences. Children from kindergarten to fourth-grade either made simple inferences or guesses, or observed someone else do so, and then rated their own certainty or another person's certainty, using a five point rating scale.

Study 1

Evaluation of deductions, inductions, and guesses

Participants rated their certainty about their own deductive inferences, inductive inferences, and guesses:

Deductive Inference: The child was shown two toys of different colors. After the toys were hidden in separate containers, the child looked into one of the containers, and was asked to name the color of the toy hidden in the other container.



Strong Inductive Inference: The child was shown a large brown bear and told that the bear had two babies, one in each of two containers. The child looked into one container and saw a smaller, but otherwise identical bear, and then was asked about the color of the bear in the other container.



Weak Inductive Inference: The child was shown three containers. The child was told that each container held a dinosaur. After looking into two of the containers and seeing two dinosaurs of the same color, the child was asked the color of the third dinosaur.

Random Sequence: The child was shown a toy horse and told that there was a horse in each of two containers. After looking at one of the hidden horses and seeing that it was different from the first horse, the child was asked the color of the third horse.

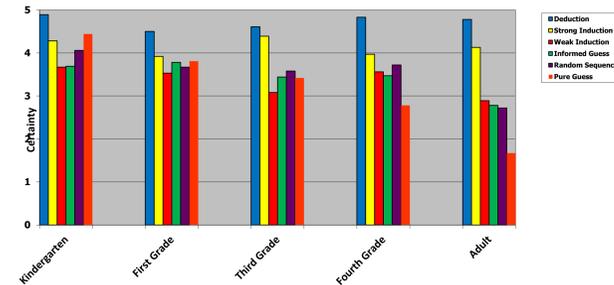
Informed Guess: The child initially saw two toys. After the toys were hidden in separate cans, the child was asked about the color of one of the hidden toys, but did not look into either can.

Pure Guess: The child was shown two containers, told that there was a marble in each, and asked the color of one of the hidden marbles.



Results

Study 1: Mean Certainty Ratings



Kindergarten: Children rated the Deductive Inference as more certain than the Weak Induction or the Informed Guess.

First-grade: Children rated Deductive Inference as more certain than Weak Induction.

Third-grade: Children rated Deductive Inference and Strong Induction as more certain than Weak Induction, Informed Guess, Random Sequence, or Pure Guess.

Fourth grade: Children rated Deductive Inference as more certain than Strong Induction, Weak Induction, Informed Guess, or Random Sequence, which were rated as more certain than Pure Guess.

Adult: Adults rated Deductive Inference and Strong Induction as more certain than Weak Induction, Informed Guess, or Random Sequence, which were rated as more certain than Pure Guess.

Study 2

Evaluations of deductions and guesses by self and other

Using procedures similar to Study 1, participants evaluated their own deductive inferences and guesses. To evaluate another person's deduction, participants watched a puppet make a deduction and then rated the puppet's level of certainty.

Self Condition:

Deductive Inference: The procedure was the same as in Study 1.

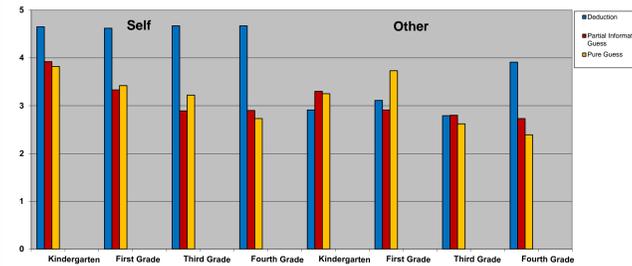
Partial Information Guess: The child was shown three toys of different colors. Each toy was hidden in one of three plastic cans. Then the child looked into one of the cans and was asked about the color of the toy in one of the other cans.

Pure Guess: The procedure was the same as in Study 1.

Other Condition: Similar procedures were followed for each of the three trials in the Other condition; however, children observed a puppet receive information about the hidden toys. The puppet made a statement about the color of one of the toys. Then children rated the puppet's certainty.

Results

Study 2: Mean Certainty Ratings



Self: When judging their own certainty, children in first grade and older rated deductive inferences as more certain than guesses.

Other: When judging the puppet's knowledge, children did not distinguish valid deductive inferences from guesses until fourth grade.

Study 3

Evaluations of another observer's inductions and guesses

The third study assessed (a) children's recognition that another person's feelings of certainty about an inductive conclusion may vary according to the strength of the supporting evidence, and (b) children's understanding that another person's level of certainty may contrast with what the child knows to be true, i.e., a person might feel certain of a false belief or uncertain about a true belief.

The child and a puppet saw three containers, with a toy in each container. The child and puppet viewed the first two toys. Then the puppet made a statement about the color the third toy, which remained hidden. Participants rated the puppet's certainty about the color of the hidden toy. There were three types of trials:

Strong Induction: After seeing a brown mother bear, and a brown baby bear, the puppet said that a hidden baby bear was also brown.

Weak Induction: After seeing two yellow cars, the puppet said that the third car also was yellow.

Random Guess: After seeing a yellow block, and then a blue block the puppet said that a third block was green.

These three type of trials were presented in each of three conditions:

No Windows: The containers were entirely opaque. To view the hidden toy, the lid had to be removed. Because the lid remained on the third container, neither the child nor the puppet could see what was inside.

Windows Match: The containers had small windows facing the child. The lids were lifted so that the puppet could see the first two toys, but only the child could see into the third container. The puppet stated a correct belief about the color of the hidden toy.

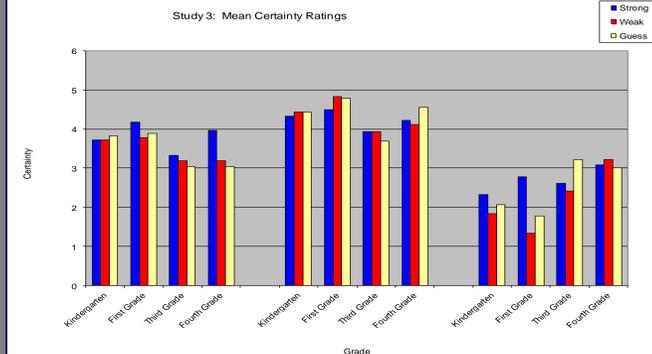


Windows Mismatch: The containers had windows facing the child, but the puppet stated an incorrect belief about the third toy.



When asked to rate the puppet's certainty in the Windows Match and Windows Mismatch conditions, children might base their ratings on the correctness of the puppet's statement, rather than the strength of the evidence that puppet had seen. In these two conditions, to base their ratings on the puppet's perspective, children had to ignore their own knowledge about the hidden toy.

Results



In general, children of all ages based certainty ratings on the correctness of the puppet's belief. They gave high ratings in the Windows Match condition and low rating in the Windows Mismatch condition. Children seemed to overlook the evidence the puppet had been given about the kinship and the color of the first two items.

Fourth grade children differentiated the strong induction from the random guess only in the No Windows condition, where they shared the puppet's perspective. The other age groups did not differentiate at all.

Summary

Kindergarten and first-grade children rate their own deductive inferences as more certain than guesses or inductive inferences based on weak evidence.

Fourth-grade children begin to differentiate among their own inductive inferences by rating inductions based on stronger evidence as more certain than inductions based on weaker evidence.

Children recognize differences among inferences and guesses later when judging another person's perspective than when rating their own perspective.

Children's own knowledge about the truth of a conclusion often interferes with their ability to evaluate another person's perspective.

Conclusion

These studies focused on children's ability to evaluate a simple inferences in isolation. In academic settings, children often may need to evaluate of inferences in larger contexts, such as considering the relation between a scientific theory and empirical evidence, monitoring children's own reasoning when constructing arguments from evidence, or critically evaluating the evidence and reasoning supporting another person's argument in persuasive or expository text. Consideration of children's ability to evaluate inferences may inform pedagogy in scientific and critical thinking, as well as epistemological development.

References

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