The Emergence of Visual and Conceptual Perspective-Taking Abilities in Three and Four-Year-Old Children

Alisa Gabbe
Carnegie Mellon University

Catherine Marquis
Carnegie Mellon University

Follow this and additional works at: http://repository.cmu.edu/shr

Part of the Child Psychology Commons

Published In
The Sloping Halls Review, 3.
The Emergence of Visual and Conceptual Perspective-Taking Abilities in Three and Four-Year-Old Children

Alisa Gabbe and Catherine Marquis

Abstract

We investigated the gradual emergence of visual and conceptual perspective-taking between three and four-year-old children. We hypothesized that the ability to perform non-egocentrically on visual perspective-taking would emerge before the ability to perform non-egocentrically on conceptual perspective-taking. Furthermore, we believed that four-year-olds would respond less egocentrically on both tasks in comparison to three-year-olds. We created a visual perspective-taking task, which consisted of identifying the viewpoints of a stuffed bear from a colorful box with distinct sides, and a conceptual perspective-taking task, which consisted of choosing an item for their mothers between a child item and an adult item. We found no support for our hypothesis regarding differences in performance across both tasks between three and four-year-olds. However, according to a binomial test of significance, we found that visual perspective-taking does emerge before conceptual perspective-taking. Thus, it is conceivable that conceptual perspective-taking requires a higher level of cognitive understanding and reasoning than visual perspective-taking.

Egocentrism is a quality that is frequently displayed by young children. Most people who are familiar with young children can probably identify with a situation in which one child grabbed a toy from another child without considering or understanding that the other child may have wanted to play with the toy too. The child who grabbed the toy can be characterized as egocentric. Egocentrism can be defined in terms of children's inability to take the perspectives of others. It is important to understand how children view the world from an egocentric standpoint and how egocentrism declines. Evidence of its decline may be in children's awareness that other people may view the world from a different perspective from their own.

Not only is understanding egocentrism important for explaining children's behavior, but it is important for understanding the process of socialization, which is learning how to interact with others, and the develop-
ment of moral standards (Hetherington & Parke, 1993). Successful socializa-

tion requires being able to understand others’ feelings, perspectives, opin-

ions, motives, goals, or interests, especially if they are different from your

own. Developing moral standards involves concern for the welfare and

feelings of others. Children may act egocentrically because they do not have

the cognitive capabilities to take the perspectives of others and act in a non-

egocentric manner. Thus, the ability to take others’ perspective may emerge

over time through experience and growth.

According to Jean Piaget (1952), egocentrism manifests itself during the

preoperational period, which characterizes children from age two through

six. Children who are egocentric are usually unaware of others’ viewpoints

and believe that others think, feel, and see things the same way that they do.

He believed it is not until the period of concrete operations, which character-

izes children from age six or seven through eleven or twelve, that egocentrism

begins to decline. Piaget designed a study to measure children’s perspective-

taking skills involving models of three mountains that were clearly distin-

guishable from each other (Piaget, 1956). He placed a doll at various locations

around the mountains and asked the children to identify the doll’s perspec-

tive from a group of pictures of the mountains. He found that it was not until

age nine or ten that children could consistently take the perspective of the

doll.

However, studies since Piaget’s have found that children in the preopera-
tional period are, in fact, able to take on the perspectives of others. Verkozen

(1975) used a cardboard house with different colored sides. Children had to

identify cutouts that represented each side from their point of view, as well as

the experimenter’s points of view while the experimenter was

facing the three other sides at different times during the experiment. He

found that children as young as age three were able to take on the

experimenter’s visual perspective. In another study, Hobson (1980) had

subjects ranging in age from two and a half through seven years old play a

game involving pipe-cleaner men playing hide-and-seek around two match-

boxes. Hobson also found that young children were able to take the visual

perspective of others.

Although previous studies have shown that children in the preopera-
tional stage are able to take on the perspective of others (Hobson, 1980;

Knudson & Kagan, 1977; Light, 1983; & Verkozen, 1975), they have not

carefully examined its gradual emergence nor made distinctions between

different types of perspective-taking. In our study, we would like to investi-
gate how perspective-taking emerges. Our two main research questions are:

1) Does perspective-taking emerge gradually by age?; and 2) Is there an order

of emergence of different types of perspective-taking?

Most previous studies have examined visual perspective-taking, which

required the subjects to take the visual perspective of a object, such as a doll,
or another person in the room, such as the experimenter. We believe another
type of perspective-taking, which is more abstract, is conceptual perspective-
Visual and Conceptual Perspective-Taking Abilities

taking. Conceptual perspective-taking would require a higher level of cognitive skills. In order to take perspectives of others conceptually, one must be able to represent complex ideas and concepts in one’s memory, such as what another person’s favorite things may be and why, especially if they are different from your own favorite things. Visual perspective-taking also requires cognitive representation, but we feel it is at a lower level since the visual objects are usually present and thus, reinforce and aid in the symbolic representation. Thus, we think physical presence is crucial in aiding visual perspective-taking.

In our study, we created two types of tasks: a visual perspective-taking task and a conceptual perspective-taking task. For our visual perspective-taking task, instead of using a colorful house similar to Verkozen, we used a box with different colored sides and a different shape in the center of each side. Children had to identify their viewpoint, as well as that of a stuffed bear from pictorial representations of the sides. For our conceptual perspective-taking task, we created a “shopping game,” in which children had to pick what they wanted, as well as what they thought their mothers would like from a choice of two objects—one very child-like and one very adult-like.

We hypothesized that visual perspective-taking would emerge before conceptual perspective-taking, which would be displayed by the children’s ability to answer non-egocentrically more for the visual task than the conceptual task. We also hypothesized that three-year-olds would display egocentrism more than four-year-olds on both tasks because they are younger in age and have not yet acquired higher-level cognitive skills. We believed that egocentrism would be manifested by children choosing the picture that represents their point of view when asked what the bear sees or choosing the child item when asked what their mothers would want. Three-year-olds are in the heart of the preoperational period and further away from the concrete operational period, in which, according to Piaget, children begin to be able to take on the perspectives of others.

We feel that this study is of value because it is important to understand the emergence and development of perspective-taking skills, as well as understanding the decline of egocentrism with age. Better understanding this will help us to understand the development of cognitive skills, such as the ability to make symbolic representations in the preoperational stage. This will also have implications for children’s level of social abilities and the development of moral reasoning in the preoperational stage.

Method

Participants

Our participants consisted of sixteen children randomly selected by stratas of age and gender from the Carnegie Mellon University Children’s School in Pittsburgh, Pennsylvania. Our sample comprised of eight three-
year-olds, four females and four males and eight four-year-olds, four females and four males. We did not discriminate by race or ethnicity, although the Children’s School is primarily Caucasian. The sixteen participants who were solicited all agreed to participate and remained in the study until completion. They were not forced to participate, but simply asked if they would like to play a game. They were not observed without their knowledge and were free to withdraw at any time during the experiment. To our knowledge, none of our participants experienced embarrassment or discomfort as a result of participating. In fact, most of them found the experiment fun.

Their parents consented to their participation based on the approval of the Director of Children’s School. Upon reviewing our proposed study, the Director did not find any part of our experiment to be threatening to the children in any way. For participating in our study, the children received a sticker at the end of the experiment that they could wear at school the whole day and that clued their parents in on their participation. In order to protect the children’s confidentiality, we only used their initials on our datasheets and did not specify any names in our report or discussion of the study. They were randomly assigned to one of six task, question, and picture orders which was due to counterbalancing effects.

Design

Our study was a simple 2X2 factorial design with the levels of age as the between-subjects factor, and type of perspective-taking task as the within-subjects factor. The independent variables of age and task type comprised of three and four-year-olds and visual and conceptual tasks, respectively. The dependent variable was the performance on the conceptual perspective-taking task and the performance on the visual perspective-taking task. Performance was measured based on coded responses to the visual and conceptual perspective-taking tasks. In the visual task, it was based on the participants’ picture choice. In the conceptual task, it was based on their item choice.

Materials

For our study, we used a quiet room with a square table and four chairs. For our visual task, we used a rectangular box with four different colored sides each with a different shape in the center of the side, a stuffed panda bear, and identical cutouts representing the four different sides of the box (see Appendix A). The colorful box was made by simply gluing different colored construction paper to each side of the box. We considered this to be a simplified version of Verkozen’s cardboard house with different colored
sides (Verkozen, 1975). We added different shapes at the center of each side to further distinguish the sides. Because we felt that Piaget’s use of a doll in his study (Piaget, 1956) may have created a gender bias, we used a neutral stuffed panda bear.

For our conceptual task, we used: 1) a newspaper and a colorful children’s book; 2) a plant and a panda bear; and 3) a fancy pen and a box of crayons (see Appendix A). We chose these items based on whether they would be considered an “adult” item or a “child” item. The newspaper, plant, and fancy pen are what we considered adult items and that children will not be likely to choose for themselves, but would choose for a parent. The children’s book, panda bear, and box of crayons are what we considered child items that would be desirable to our subjects (see Appendix A).

We also constructed a data coding sheet that was used during data collection by the recorder (see Appendix B). On this sheet, we noted the child’s name, age, and gender, as well as their responses to each task, counterbalancing effects, and codes.

**Procedures**

The participants were led into a room by the experimenter and were asked to sit in an orange chair. A recorder remained in the room during the whole experiment silently recording the participants’ responses. Our two experimental comparison groups were formed randomly by stratas of age and gender. All the participants were randomly assigned to a task order. Half the participants were shown the visual task first and half were shown the conceptual task first. This counterbalancing effect was to increase internal validity and control within the study by eliminating potential biases inherent in specific orders.

In the conceptual task, the participants were told that they would be playing a “shopping game.” They were shown three sets of a pair of items. Each set contained an “adult” item and a “child” item: 1) a newspaper and a colorful children’s book; 2) a plant and a panda bear; and 3) a fancy pen and a box of crayons. For each set of items, the participants were asked which item they would choose for themselves and which item they would choose for their mothers. The experimenter pointed to both the items simultaneously to deter leading the children to the desired response. The order in which these two questions were asked was also counterbalanced. By randomization, half the children were asked what they would choose for their mothers first and half the children were asked what they would choose for themselves first. They were also asked *why* they chose that particular item for their mothers. Verbatim transcripts were transcribed to support their item choice and to ensure that they understood the question. Codes were assigned to each response.
In the visual task, participants were shown a colorful box and were escorted around the table by the experimenter to carefully view each of the different sides of the box. After the children viewed all four sides, they were asked to sit back in their orange chair. The children were then shown cutouts representing the sides of the box and asked to identify their view of the box. We then placed a panda bear on the chair to the child’s right and asked them to identify the panda’s visual perspective from the cutouts. We repeated this step for the two other sides of the box that were not the children’s view and placed the panda in the corresponding seats in front of each side. The participants were randomly assigned to one of two picture orders. In one picture order, the picture of the children’s view was shown first followed by the pictures of the three other views. In the other picture order, the picture of the children’s view was shown last after the pictures of the three other views. This was also to increase the internal validity and control of our study. Codes were assigned to each response.

At the end of the experiment, the participants were given a special sticker about the task saying, “Ask me about shopping and a panda.” They were then thanked and escorted back to their classroom (see Appendix C).

Coding

The participants’ responses to questions reflecting another person’s perspective on both the conceptual and visual task were coded. Specifically, we coded the items the children chose as the mother’s gift and the view the children identified as the bear’s in the different positions. The following criteria were used:

Egocentric (E): This response displays an inability to recognize another person’s perspective. This would be illustrated in the conceptual task by the participants choosing the child-oriented object for their mothers. An example of egocentricity in the visual task would involve choosing the picture corresponding to the participant’s own view to identify the view of the bear.

Non-egocentric (N): This response displays the ability to realize that their mothers’ point of view is different from their own. An example of non-egocentricity in the conceptual task would be if the children chose the adult object for their mothers and the child object for themselves. Likewise, an example from the visual perspective-taking task would be if the children chose the correct picture to identify the perspective of the bear.

Wrong (W): A response would be coded as “wrong” if it neither displayed egocentricity nor was correct. For example, in the visual task, this code would include incorrectly identifying the bear’s view with another view, as long as this other view is not that of the participant’s. This would show a memory lapse, not egocentricity. In the conceptual task a “wrong” code would be used when the children identify the child-oriented object as a gift.
for their mothers, but choose the adult-oriented object for themselves. Although the participant would not have chosen the expected object for their mothers, they would have shown an understanding that their mothers would not choose the same gift as they would for themselves.

Irrelevant (I): A response unrelated to the question at hand, such as “I don’t want to play anymore,” would be coded as “irrelevant.”

Don’t know (D): The participants were assigned this code when after a couple of prompts, they said that they did not know what they would choose for their mothers or did not know which cutout represented the bear’s perspective. Indicating that they did not know through body language, such as shrugging their shoulders, was also given this code.

No response (Z): The participants were assigned this code if they did not respond to a question after a couple of prompts in either task.

Uncodable (U): The participants were assigned this code when their responses in either task were uncodable, possibly because the experimenter or recorder could not understand them.

Reliability

To assess reliability, we each examined the raw data for the same five participants and independently coded each participant’s overall performance on the visual task and overall performance on the conceptual task. We then compared our results and found that we had 100% reliability in our coding of the visual task and 100% reliability in our coding of the conceptual task.

Summary

In general, this study was designed to test the performance abilities of three and four-year-olds on visual and conceptual perspective-taking tasks. In order to measure perspective-taking abilities, we created both a conceptual perspective-taking and a visual perspective-taking task. The conceptual task included the participants differentiating between what would be a desirable gift for them and what would be desirable for their mothers. The visual task involved the participants examining a colorful box and differentiating between what they saw and what someone in a different position saw. By looking at the results of these procedures we hope to find that, due to a gradual disappearance of egocentricity, four-year-olds would display less egocentricity on both tasks than three-year-olds. Furthermore, we hope to find an order of emergence where participants display non-egocentricity in visual perspective-taking tasks before they are able to perform non-egocentrically on the conceptual task. This would be shown if participants only displayed non-egocentricity on both tasks, or only the visual task.
Results

For each task, we coded the raw data into one of two overall categories: egocentric or non-egocentric based on the individual codes to the three responses to each task. If at least one of the three participants’ responses on each task was coded as non-egocentric and the other two responses were coded as wrong, uncodable, irrelevant, don’t know, or no response, we gave them the benefit of the doubt assuming that they are able to take the perspective of others and gave them an overall code of non-egocentric for that task. If at least one of the three participants’ responses on each task was coded as egocentric and the other two responses were coded as wrong, uncodable, irrelevant, don’t know, or no response, we gave them an overall code of egocentric for that task, based on the assumption that they are not fully capable of taking the perspective of others.

Originally, we had two egocentric categories: 1) if they had at least one egocentric response; and 2) if they had more than one egocentric response. Because we only had two participants who had more than one egocentric response on a task, which was not a very high number, we collapsed both egocentric categories into one. We did not formally analyze the participants’ verbatim responses on why they chose the item they chose for their mothers in the conceptual task because in reviewing the responses, we found that most the responses supported the item choice. This showed that most of our participants understood the question that was asked. By informally reviewing our data, we found that our control procedures, such as randomization and counterbalancing were effective because there were no apparent effects, such as order effects. Thus, we assume that our control procedures eliminated any potential effects. The data were analyzed to test significant relationships between age and task type and our order of emergence theory by using chi-squared analysis and the binomial test of significance.

We predicted that there would be a significant relationship between the participants’ age and their performance on the conceptual perspective-taking task. In other words, we believed that four-year-olds would perform less egocentrically on the conceptual perspective-taking task than three-year-olds. This hypothesis would be evident if more four-year-olds differentiated between the child and adult items by choosing the correct adult item for their mothers and the correct child item for themselves than three-year-olds. Chi-squared analysis showed that there was no significant relationship between the participants’ age and their performance on the conceptual perspective-taking task \( (\chi^2(1) = .3, p > .05) \). However, by calculating direct proportions of non-egocentric responses between ages, we found that more four-year-olds (75%) performed non-egocentrically than three-year-olds (63%). Thus, there is an apparent relationship between participants’ age and performance on the conceptual perspective-taking task, although it is not statistically significant.

We also predicted that there would be a significant relationship be-
tween the participants' age and their performance on the visual perspective-taking task. In other words, we believed that four-year-olds would also perform less egocentrically on the visual perspective-taking task than three-year-olds. This hypothesis would be evident if more four-year-olds differentiated between their viewpoint and the panda's viewpoint by choosing the correct cutout when asked which represented their viewpoint and which represented the panda's viewpoints. Chi-squared analysis showed that there was no significant relationship between the participants' age and their performance on the visual perspective-taking task ($\chi^2 (1) = 0, p > .05$). By calculating direct proportions of non-egocentric responses between ages, we found that both four-year-olds and three-year-olds performed at the same level in terms of responded non-egocentrically (both at 88%). Thus, this shows that there is virtually no relationship between participants' age and performance on the visual perspective-taking task.

We also predicted that there would be an order of emergence between the two types of perspective-taking. We believed that children learn how to take the visual perspective of others' before they learn how to take the conceptual perspective of others. Thus, between both age groups, if children were able to respond non-egocentrically on the conceptual perspective-taking task, we assumed that they would also respond non-egocentrically on the visual perspective-taking task. In addition, if they responded non-egocentrically on only one task, we expected it to be the visual perspective-taking task. Chi-squared analysis showed that there was no significant relationship between the two types of perspective-taking tasks ($\chi^2 (1) = .433, p > .05$). However, to test our order of emergence theory more precisely, we performed a binomial test of significance on the five participants who showed a disassociation between their responses in the two tasks. As Figure 1 reveals, among the five children whose performance differed across the two tasks, four made egocentric judgments on the conceptual task and non-egocentric judgments on the visual task, and only one showed the reverse pattern ($p<.20$, Binomial Test). This suggests that children understand visual perspective-taking before they understand conceptual perspective-taking evident through being able to identify the visual perspective of others' before being able to identify others' perspective conceptually.

**Discussion**

It is important to relate these results back to our original hypotheses. Our first hypothesis was that there is a gradual disappearance of egocentricity, which would be illustrated by an increase in perspective-taking ability from the age of three to four. Our results did not support this hypothesis. We found no relationship between age and visual perspective-taking ability, or between age and conceptual perspective-taking ability. Thus, there was not a significant increase in participants who performed non-egocentrically on
The sloping Halls Review—1996

these tasks between the ages of three and four. This does not necessarily mean that there is not a gradual disappearance in egocentricity. It is possible that the ages we examined were simply too close together to show a relationship between age and perspective-taking ability. The ages three and four are only a year apart and the difference may be even smaller if our participants were all old three-year-olds and young four-year-olds. Perhaps studying two and five-year-olds would have yielded results supporting a relationship where egocentricity gradually disappears with increased age. Thus, although our study did not provide support for the hypothesized relationship between age and perspective-taking ability, where ability increases with age, a sample more varied in age may yield different results.

Although we were unable to find support for our first hypothesis, our results do provide support for our hypothesis that visual perspective-taking ability appears before conceptual perspective-taking ability. Despite the finding that there is not a significant relationship between performance on the two types of perspective-taking, the results did support the specific relationship that when performance differed among the two tasks, more participants performed non-egocentrically on the visual perspective-taking task than on the conceptual perspective-taking tasks. The lack of a general relationship between ability on the two tasks may have been due to the small sample size. Using a larger sample may illustrate a relationship and provide further support for our hypothesis that visual perspective-taking emerges before conceptual perspective-taking ability.

In addition to providing support, or lack of support for our hypotheses, our results also relate to the previous work done on the emergence of perspective-taking. By finding that all but one of our subjects displayed non-egocentricity on at least one of the two tasks, our study supports the findings of Verkozen, Knudson and Kagan, and Hobson that children are capable of non-egocentric behavior before age six, as designated by Piaget. Our result that there is no relationship between age and performance ability is inconsistent with previous findings which show that perspective-taking emerges at a particular age. However, as previously mentioned, this result could be due to our weak manipulation of the independent variable age. In regard to our finding that visual perspective-taking emerges first, this is the first study designed to examine the relationship between ability on two types of perspective-taking ability. Furthermore, it is the first study we have seen distinguish between visual and conceptual perspective-taking. Thus, while some of our results can be tied back to previous research, some of our findings are the first of their type.

Before we can be certain of whether our results support our hypotheses, or previous research, we need to consider possible threats to validity. This study poses three threats to validity. As discussed earlier, our small sample size and our weak manipulation of the independent variable age pose a threat of low statistical power. Had we manipulated age differently, yielding a
greater variance, and increased our sample size we may have obtained different results. The second threat is that of an interaction of selection and treatment. Our results may be limited to the sample used because the participants all share the common features associated with attending the Carnegie Mellon Children's School. This includes the fact that these students often participate in experiments and may have experienced one similar to ours. This experience may have altered our results. The final threat to validity is that of mono-method bias. We only used one method of testing each of our hypotheses (i.e. one visual task and one conceptual task), which means our results may be due to the specific tasks used. Future studies should attempt to control for these threats to validity. By eliminating the threats caused by sample size and weak manipulation of the age variable, future studies may answer the unanswered questions of whether there really is a gradual disappearance of egocentricity and whether there is a general relationship between visual and conceptual perspective taking abilities. Until then, these questions remain unanswered.

Despite all of these potential threats to validity, we feel that our study made an important contribution to cognitive understanding. Our study was the first of its kind to differentiate between different types of perspective-taking. In addition, our results did support our order of emergence theory. Since conceptual perspective-taking may involve higher levels of cognitive reasoning, the education system should implement a curriculum for young children that focuses on developing cognitive skills. Further research should be done to replicate our findings using a bigger sample size and investigating why exactly children may learn visual perspective-taking before conceptual perspective-taking.

References


Appendix A

Materials

• quiet room with a square table and four chairs—one orange chair (the child’s chair) and three blue chairs
• a rectangular colorful box with four different colored sides each with a different shape in the center: a yellow side with a black square, a blue side with a black star, an orange side with a black circle, and a green side with a black triangle
• 4 identical cutouts representing the four different sides of the colorful box
• 1 genderless panda bear
• 1 newspaper
• 1 children’s book with lots of colors (a Sesame Street book)
• 1 potted plant
• 1 fancy pen
• 1 box of crayons
• coding sheets

(Note: the panda bear can be used in both tasks.)

Appendix B

Coding Sheet

Child’s Name: Experimenter:
Child’s Age: Recorder:
Child’s Gender: Time:
Date:
Comments:

counterbalance: conceptual task first
visual task first

Conceptual Task:

kid Q first mom Q first

***point to both items simultaneously

“If you were going shopping, which of these 2 things would you buy for yourself?”

1) newspaper children’s book
2) plant bear
3) fancy pen box of crayons

“If you were going shopping for your Mommy, which of these 2 things would you buy for her?”

1) newspaper children’s book
2) plant bear
3) fancy pen box of crayons
1) “Why would you choose this for your mommy?” (verbatim transcript)

Code: E N D Z U I W

2) “Why would you choose this for your mommy?” (verbatim transcript)

Code: E N D Z U I W

3) “Why would you choose this for your mommy?” (verbatim transcript)

Code: E N D Z U I W

Visual Task:
counterbalance: child’s viewpoint picture first (A, B, C, D)
child’s viewpoint picture last (B, C, D, A)

“Now you can sit back in the orange chair. Now I am going to show you 4 pictures of the box. Tell me which one looks like what you see?”

A B C D

“Now Panda will sit in this seat. What picture looks like what Panda sees?” (B)

A B C D

Code: E N D Z U I W

“Now Panda will sit in this seat. What picture looks like what Panda sees?” (C)

A B C D

Code: E N D Z U I W

“Now Panda will sit in this seat. What picture looks like what Panda sees?” (D)

A B C D

Code: E N D Z U I W

Appendix C

Protocol

• Have the room and stimuli in order for the experiment. One person will serve as the main experimenter and one person will serve as the recorder for each subject. The experimenter and recorder will alternate positions.

• Locate the child you need.

“[Name] it’s your turn to come play my game now.”

• Inform the teacher that you are taking the child.

• Take the child into the experiment room keeping the door open and showing the child where to sit.

“You can sit on the orange chair.”
Note: There will be 2 task orders that the participants will be randomly assigned to. In the first task order, the participants will have to complete the conceptual task first. In the second question order, the participants will have to complete the visual task first.

Conceptual Task

"We are going to play a shopping trip game."

Set 1:

- Place the newspaper and the children's book on the table.
  "If you were going shopping, which of these 2 things would you buy for yourself?"
- When asking this question, point to both items simultaneously.
  "If you were going shopping for your Mommy, which of these 2 things would you buy for her?"
- When asking this question point to both items simultaneously.
  "Why would you choose this for your mommy?"
- Put the newspaper and children's book out of the child's view.

Set 2:

"Now let's play again."

- Place the plant and the panda bear on the table.
  "If you were going shopping, which of these 2 things would you buy for yourself?"
- When asking this question, point to both items simultaneously.
  "If you were going shopping for Your Mommy, which of these 2 things would you buy for her?"
- When asking this question point to both items simultaneously.
  "Why would you choose this for your mommy?"
- Put the plant and panda bear out of the child's view.

Set 3:

"Now let's play one more time."

- Place the fancy pen and the box of crayons on the table.
  "If you were going shopping, which of these 2 things would you buy for yourself?"
- When asking this question, point to both items simultaneously.
  "If you were going shopping for Your Mommy, which of these 2 things would you buy for her?"
- When asking this question point to both items simultaneously.
  "Why would you choose this for your mommy?"
- Put the fancy pen and box of crayons out of the child's view.

Note: There will be 2 question orders for this task that the participants will be randomly assigned to. In the first question order, the participants will be asked which item they would choose for themselves first. In the second question order, the participants will be asked which item they will choose for their mothers first.
Visual and Conceptual Perspective-Taking Abilities

Visual Task

“Now we are going to play a game with the panda bear and a colorful box.”

• Place the box in front of where the child is sitting with the yellow side facing the child.

“Let’s walk around the table and look at the box from all different sides.”

• Guide the child around the table making sure they stop at each of the 4 sides of the table to view the box.

“Now you can sit back in the orange chair. Now I am going to show you 4 pictures of the box. Tell me which one looks like what you see?”

• Show the child each picture one at a time to make sure that the child pays attention to each picture.

• After the child responds, place the panda bear on the chair that is to the child’s right.

“Now Panda will sit in this seat. What picture looks like what Panda sees?”

• Show the child each picture one at a time. Use the same picture order across all fours questions for 1 subject.

• After the child responds, place the panda on the chair that is directly across from the child.

“Now Panda will sit in this seat. What picture looks like what Panda sees?”

• Show the child each picture one at a time, again in the same order.

• After the child responds, place the panda on the chair that is to the child’s left.

“Now Panda will sit in this seat. What picture looks like what Panda sees?”

• Show the child each picture one at a time, again in the same order.

Note: There will be 2 picture orders for this task that the participants will be randomly assigned to. In the first picture order, the participants will be shown their viewpoint of the box first. This order will remain the same throughout all the questions. In the second picture order, the participants will be shown their viewpoint of the box last. This order will also remain the same throughout all the questions. The pictures will be labeled A, B, C, & D on the backs for our purposes.

* With all the counterbalancing effects, children were randomly and equally assigned to one of six orders.

• At the end of the tasks, the participants will be given their sticker about the task saying, “Ask me about shopping and a panda.” They will then be thanked and escorted back to their classrooms.

“Thank you [Name] for playing those games with me today. Here’s a special sticker for you. You did such a great job!”
Figure 1
Combined Codes for Performance on Visual and Conceptual Perspective-Taking Tasks

![Bar chart showing the number of participants for different combinations of codes EE, EN, NE, NN for Visual and Conceptual perspective-taking tasks.](chart)

Number of Participants (n=16)

VISUAL, CONCEPTUAL