Young Children’s Comprehension Of Pictoral Humor As Related In False Belief Understanding

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ABSTRACT
The purpose of this literature review is to examine previous research on children’s theory of mind and children's comprehension of humor. The literature regarding children's understanding of false belief, children's ability to distinguish between another person's belief and desire, and children's understanding of humor will be reviewed. Suggestions for future research designed to examine the relationship between young children's developing theory of mind and their understanding of humor are proposed.

Introduction
“It is widely accepted that the two mental states of belief and desire are the most important ones for the explanation and prediction of human action,” (Ziv & Frye, 2003, p. 859). To make sense of others’ actions, we first need to know something about their desires and beliefs. The ability to understand the beliefs and desires of others is collectively known as a theory of mind. Children younger than 4 years are just beginning to develop a theory of mind. One aspect of a theory of mind is recognizing that people act on the basis of what they believe to be true, even when those beliefs are false. A false belief can be defined as a misconception based on false knowledge or incorrect reasoning. False belief tasks are widely used to test children to determine whether children understand that people act on the basis of what they believe to be true (Ziv & Frye, 2003; Saltmarsh & Mitchell 1998; Robinson & Mitchell, 1994; Robinson, Riggs & Samuel, 1996).

As children age, there are developmental changes in their thinking as shown by their performance on a variety of theory of mind tasks including false belief tasks (Carlson, Moses, & Hix, 1998). To understand that someone has a false belief, we need to be able to take their perspective or to “know” what they know. We need to be able to recognize the intentions of the other person to understand the what and the why of their belief. Therefore, it would appear that our ability to understand the beliefs of others goes hand in hand with our ability to recognize the intentions of another.

One means by which researchers can understand the young child's developing theory of mind is by examining their understanding of communicative processes which require an understanding of false belief and intentionality. For example, previous research has focused on children's understanding of intention as it relates to comprehending the distinction between lies and mistakes (See Lee, 2000 for review) and children's understanding of promising (Maas, manuscript in preparation).

Clearly, understanding false belief and intentionality are crucial to effective communication. It would be informative for researchers to examine the relationship between false belief understanding, intentionality and other forms of communication. One communicative process that is not well understood is children's comprehension of humor. How a child responds to humorous language or humorous pictures can reveal much about their understanding of theory of mind. Humor comprehension has been explained as a recognition of a violation of expectations, as a recognition of an unexpected element of incongruity (Pien and Rothbart, 1976). For a child to be able to understand the incongruent aspects involved in humor, they need to be able to know the other person's intentions and to be able to take another's perspective to realize the speaker's humorous intent. To date there is little research designed to examine the
communicative and cognitive process involved in comprehending humorous communicative exchanges.

Humor is recognized as the ability to invoke feelings of amusement. The reaction to the humorous component can be measured by the amount of laughter or smiling that is noticed (McGhee, 1976). In the past, there have been several researchers that have looked at humor from a developmental and cognitive process perspective (Shultz, 1972; Pien & Rothbart, 1976; Sinnott & Ross, 1976, McGhee, 1971), but to date, there has been very little published research that has examined the relationship between children's understanding of false belief and their ability to comprehend humorous intentions.

**Children's Understanding of Theory of Mind**

Previous research exploring children's understanding of false belief has examined a wide range of topics including false belief understanding within naturalistic play (Szarkowicz, 1999), the relation of desire and false belief (Ziv & Frye, 2003), interpretation of messages (Robinson & Mitchell, 1994), the role of siblings in understanding beliefs (Ruffman, Naito, Perner, Parkin & Clements, 1998), 3-year-olds reasoning for their actions (Atance & O'Neill, 2004), as well as acknowledgement of false belief when dealing with acts of deception (Saltmarsh & Mitchell, 1998; Carlson, Moses & Hix, 1998).

There are several types of false belief tasks that have been used in the study of theory of mind. Two examples include the standard task and the state change task (Saltmarsh & Mitchell, 1998). In the state change task, the children are first shown a box, for example, a pencil box, and asked what they believe is inside. Next, the researcher opens the box, revealing its contents to be what the child should predict—pencils. As the child looks on, the researcher then exchanges the contents for another uncharacteristic content, such as candy. The child is then asked what they thought was in the box originally. If the child has an understanding of false belief, the correct response is “pencils.” If a child lacks an understanding of false belief, they will say that they originally thought that there was candy in the pencil box.

In the standard task, the box contains the uncharacteristic content from the beginning, for example, candy in a pencil box. Each child is shown a box, and asked what he or she believes is inside. The child is shown the contents and is asked “What did you think was in the box in the beginning?” If the child understands the concept of false belief, the correct response will be “pencils” to show that they understood that they had first believed pencils to be in the box, when instead, it contained candy. If a child lacks an understanding of false belief, they will say that they originally thought that there was candy in the pencil box.

Saltmarsh & Mitchell (1998) used video presentations of the state change task and the standard task to assess children's understanding of false belief. Children between the ages of 3 years 1 month and 4 years 9 months watched two videos. One video depicted a state change task the other, the standard task. Each video was followed by two questions: “Jon hasn't looked inside the box, what does he think is inside?” and “What's inside really?” Saltmarsh & Mitchell (1998) found that children were more likely to correctly answer the questions after the state change trial than in the standard trial. Saltmarsh & Mitchell (1998) suggest that the state change task “offers powerful evidence in support of younger children's (< 4 years) specific deficit in understanding about beliefs” (p. 5) because children are biased to report what they knew about reality instead of the false belief.

Another false belief task is the message-desire discrepant task (Robinson & Mitchell, 1994). Participants in this study were between the ages of 2 years 11 months and 6 years 1 month. In this task, two figures representing “Mom” and “Jane,” put a bag of material in a red drawer and another bag of a different material in a blue drawer. After Mom leaves the room, Jane switches the bags. Mom, from another room calls out to Jane that more material is needed and to grab the bag in the red drawer. The children are then asked what bag Mom really wants. A correct response to this question demonstrates an understanding that Mom's intention is that she will
receive the bag that had been switched to the blue drawer. That is, children who have a firm theory of mind understanding will recognize that her intended desire differs her actual message. The results suggest that children between the ages of 2 years 11 months and 3 years 6 months have an equal chance of success: about 50% (Robinson & Mitchell, 1994). They concluded that children can acknowledge false belief at a earlier age, saying that “early acknowledgement of false belief seems to occur when the child is offered protection form the salience of reality” (Robinson & Mitchell, 1994, 72). This research demonstrates that children can have an understanding of the beliefs and/or desires conveyed within a message at an earlier age than was previously reported (Robinson & Mitchell, 1992).

Ziv & Frye (2003) discussed the connection between belief and desire, saying that a three-year-old is just beginning to understand belief but the desires of the child still override this understanding. To determine whether desire influenced the children's response, a new question about desire was added at the end of the stories (change-of-location, change-of-content, and representational change). Six stories were read to each child - 2 stories each for change-of-content stories, change-of-location stories, and representational change stories. Each story was followed by two questions. One question was designed to examine the children's understanding of the character's belief, the other, to examine the children's understanding of the character's desire.

Results from this study show that in all three age groups (3-, 4- and 5-year-olds), there was a significantly higher than chance rate (80%) in number of correct responses on the desire question. Compared with the false belief questions, “3-years olds score significantly lower than chance on each of the three tasks (z < -2.61, p < .01), 4-year-olds' scores did not differ form chance, and 5-year-olds scored significantly higher than chance on each (z > 3.9, p < .01)” (Ziv and Frye, p. 863). These results indicate that children as young as three can distinguish between a speaker's belief and desire, but it is not until age five that children do so on a more consistent basis.

Other studies have used different tasks and methods to determine false belief understanding. Szarkowicz (1999) used a play task and a traditional task to assess children's understanding of false belief. The play task consisted of a game of hide and seek, using eight of the children's peers as helpers. Two children at a time participated, with one being a peer helper. Each child got to participate once as a hider and once as a seeker, with the peer helper acting as the hider first. The researcher and the hider gave the seeker hints until the object was found. The traditional task in this study consisted of showing the children a candle that looked like cake. The children were asked “what do you think this is?” and were then allowed to handle the candle, letting them realize that it was not a cake. They were then asked “What do you know this is really?”

During the play task, Szarkowicz (1999) found that children, age 3 years 1 month, would give more incorrect answers to the questions when they were the seekers at odds of 8.9:1 compared with children age 4 years 4 month (odds .96:1) and children age 5 years 7 months (odds .1:1). When the children were the hiders, the odds dropped to 5.17:1 for age 3 years 1 month, .36:1 for age 4 years 4 months and .02:1 for age 5 years 7 months. However, significantly more children of all ages were able to show an understanding of false belief in the play task then in the traditional task (Szarkowicz, 1999). The researcher concluded that this was due to the child's degree of control and the active role in participation in the play task when compared to a role that was mainly observational as was the case in the traditional task. These results suggest that young children are more likely to demonstrate an understanding of false belief when they are engaged in an activity that requires them to use that knowledge.

Ruffman, Naito, Perner, Parkin & Clements (1998) examined whether having siblings facilitates understanding of false belief. They found that having an older sibling did have a positive effect on false belief understanding while having younger siblings did not. Seventy-eight children ages 3 years 1 month to 4 years 9 months participated in this study. Each child was read one false belief story and the researchers used two dolls to act out the story. Each child was
grouped according to the number of siblings he or she had, and whether the siblings were older or younger. For example: “A child who had two younger siblings was counted as having two younger siblings, no older sibling, and two siblings in total. A child who had two older siblings was counted as having no younger siblings, two older siblings, and two sibling in total” (p. 163).

Ruffman, et al (1998) found that having younger siblings did not have an effect on belief understanding, X2 (1, N = 76) = 0.62, p > .42, but that having older siblings did, X2 (1, N = 76) = 5.80, p > .42. The authors suggest that because younger siblings tend to “observe, imitate, and seek assistance” (p. 161) from older siblings, that the older siblings help assist the younger siblings when they are unaware of certain facts that aid in false belief understanding.

Atance and O'Neill (2004) used children's (age range = 3 years 1 month to 3 years 11 months) explanations of belief to determine “how children perform when the action pertains to the self and not to another person,” (p. 954). An example of this is shown in the questions that were asked of the children during the trials. Participants were asked what was in a box (example: a crayon box) and then their attention was directed to a piece of paper on the floor. The experimenter then suggested that the child get the paper so that they could draw. The box was then opened up revealing candles. The child was then asked a standard “what did you think was inside” question. If they answered the question incorrectly with “candles,” the child was asked to explain why they had retrieved the paper. If children had some understanding of false belief, their justifications should have indicated that their false belief about the contents of the box led them to retrieve the paper so that they could draw with the crayons that they believed were in the box.

Atance and O'Neil (2004) found a significant correlation between the performance on the task and the ability to explain why they had retrieved the paper: r (61) = .32, p = .012. That is, being able to correctly respond to the “what do you think was inside” question was related to being able to correctly justify their actions. These data suggest that children under 4 years old are able to demonstrate an understanding of false belief when their own false belief is the intention behind their actions.

In sum, previous research suggests that 3- to 5-year-olds are making developmental strides in their theory of mind understanding. While some research suggests that children younger than the age of four cannot unequivocally demonstrate a theory of mind understanding (Saltmarsh & Mitchell, 1998). Other research, however, suggests that younger children have some false belief understanding as demonstrated in their ability to understand beliefs and desires within messages (Robinson & Mitchell, 1994; Ziv & Frye, 2003), their ability to demonstrate a false belief understanding when the experimental tasks are more ecologically valid (Szarkowicz, 1999; Ruffman, Naito, Perner, Parkin & Clements, 1998) and when their false belief understanding pertains to their own actions (Atance and O'Neill, 2004). Aside from the research examining children's understanding of belief contained in messages, very little published research has examined the relationship between false belief understanding and communicative exchanges. There is, therefore, a need for future research on 3- to 5-year-old children's developing understanding of false belief as it relates to communicative exchanges.

**Comprehension of Humor**

Pien and Rothbart (1976) suggested that there are two things that are needed for an element to be considered humorous incongruity and resolution. Incongruity is necessary for all forms of humor (Pien and Rothbart, 1976). For something to be incongruent, the person has to have certain expectations of the stimuli that are presented and when those expectations are not met, it causes cognitive dissonance that needs to be resolved. Cognitive processes help to resolve the incongruous component within a picture, cartoon or linguistic joke. The child must be able to use available cognitive processes to understand that there is a joke being made. When the presence of an unexpected element is discovered, the person has to find a reason for it to be included. That is, in order for someone to comprehend whether an utterance or picture is
humorous, he or she must possess a theory of mind in order to determine whether the incongruous element was intentional or unintentional.

McGhee (1971) investigated the relationship between humor and level of cognitive functioning. In this study, ninety boys broken into three age groups (5-, 7-, and 9-year-olds) were tested. Twenty humor stimuli, divided into 5 different classes, were used. Two classes consisted of cartoons without captions, two with verbal jokes and one of cartoons with captions. Four tasks developed by Piaget were used to determine the level of the child's cognitive development. The Piagetian tasks were conservation of mass, conservation of weight, class inclusion and lateral discrimination. After each humor stimulus, the child was asked to identify the aspect of the cartoon or joke that made it funny. They were also asked how the cartoon or joke could be changed so that it wouldn't be funny anymore. McGhee (1971) used Person correlation coefficients to determine if there was a correlation between level of cognitive development as shown by the scores on the Piagetian tasks and the scores on the humor tasks. McGhee found that humor comprehension depended on the type of humor (5 different classes were used) and the child's age, with the only significant findings at age 7 in the two incongruity classes of humor (.548 and .377). These results suggest that children under the age of 7 do not grasp the notion that humor often hinges upon the intentional presentation of incongruous language or pictures.

McGhee (1976) also investigated whether there were any gender differences when it came to understanding and using of humor. Two age groups of children participated – nursery school children (ages 3 years 1 month to 5 years 9 months) and an older group (6- to 11-year-olds). Each group was observed and their humor-related behaviors were rated. The ratings were based on the following factors: 1. frequency of laughter in social interaction, 2. frequency in behavioral attempts to initiate humor, 3. frequency of verbal attempts to initiate humor, and 4. amount of hostility in attempts to initiate humor (McGhee, 1976). In attempts of using humor, McGhee found that there doesn't seem to be a difference between boys and girls at the nursery school level (ages 3 years 1 month to 5 years 9 months). However, there did seem to be a difference with the older children in regards to gender, where boys more frequently engaged in laughter, attempts at humor and getting others to laugh. These results suggest that younger boys and girls do recognize the importance of incongruity in humor as they employ incongruity in their humorous interactions.

Shultz (1972) suggest that humor resolution requires two shared characteristic (two incongruent elements share an important feature), physical analysis (a physical factor such as distance, size, etc was the reason for the incongruity), motivational conflict (where conflicting elements cause incongruity), participant misapprehension (incongruity is due to a misunderstanding or a mistake) and personal deviance (incongruity due to individual differences) are the types that are mentioned (p 458-59). To be able to understand the humor involved, a subject must have the cognitive ability to find the incongruity and separate it from the rest of the picture. Resolution of the incongruity in humor requires being able to understand the reason why something is considered humorous.

Shultz (1972) used cartoons to assess the role of incongruity and resolution in humor. Two versions of each cartoon were used and consisted of the original cartoon containing the humor component and a modified cartoon with incongruity-removed component removed. 30 boys from second grade and 30 boys from sixth grade were compared. To assess humor understanding, three measures were recorded for each child: the mirth response, a funniness rating and a funniness ranking. The mirth response was determined by the experimenter by assessing the child's initial reaction and the funniness rating chosen by the child according a five point scale. After the ratings were recorded, each cartoon was shown again and the child was asked to explain the joke and why it was considered funny. In the third measure, the cartoons were laid out and the child was asked to pick the one that was liked the most. The experimenter continued the process until all the cartoons had been ranked. As shown by the main effect of grade ($F (1,58) =33.88$ p< .001) second graders rated the cartoons as funnier than the sixth
graders, with the main effect of the cartoon form \( F (1,58) =12.19, p < .001 \) showing that the
original form was considered funnier than the incongruity-removed form. Shultz (1972)
concludes that the findings suggest that “incongruity and resolution were additive rather than
multiplicative in their effects on humor appreciation,” (p. 475).

In sum, previous research that has examined the development of humor comprehension
as it relates to cognitive development suggests that children under the age of seven do not grasp
the importance of the intentional presentation of incongruity in language or pictures humor often
hinges upon the intentional presentation of incongruous language or pictures (McGhee, 1971,
Shultz, 1972). However, preschool aged children recognize the importance of incongruity in
humor as they employ incongruity in their humorous interactions (McGhee, 1977).

**Summary**

Taken together, the previous research suggests that preschool aged children have a
beginning, yet fragile, understanding of false belief understanding and a beginning understanding
of how incongruity is used in humor. The ability to recognize incongruity and humorous intention
are cognitive processes that are required to recognize when a humorous attempt has been made
and to understand and appreciate those humorous attempts. But when do these cognitive abilities
develop? Do these abilities develop in a parallel fashion? To date, there is no published research
examining the relationship between children's developing theory of mind and their understanding
of humor. An important future direction for research should be an examination of how these two
areas of development change in relation to one another. Such research would contribute not only
to our understanding of the developmental steps that children take in acquiring a theory of mind,
but would also contribute to our understanding of how children acquire an understanding
humorous communicative exchanges.
Works Cited


