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ABSTRACT

The purpose of this study was to determine age-related differences in preschoolers' emerging awareness of the human mind's functions. The study predicted that preschoolers are gradually becoming aware of their own mind functions and those of others. Forty children (mean age in months = 54.1; mean age in years = 4.51) were observed and questioned while playing three games with their caregivers. The children were evaluated on their total responses in each game situation and on each question to determine why there were significant differences as the children's ages increased by month and significant differences when comparing age groups. Regression and analysis of variance comparing the children by age in months and comparing the responses of the three age groups to the dichotomous questions in each situation indicated that preschoolers are expressing an emerging awareness of the human mind's functions. The younger children were more often in the value-sensing rather than intellectual mode of development, which explains the gradual increasing of the regression line and the significant difference between the three age groups. The transcribed and coded video/audiotaped data also suggested how preschoolers develop their awareness of the human mind's functions by being attuned to, attending to, remembering, reflecting, inferring, and being introspective about their environment. (Contains 18 references.) (Author/EV)

PRESCHOOLERS' EMERGING AWARENESS OF THE HUMAN MIND'S FUNCTIONS: WHEN? WHY? AND HOW?

ABSTRACT

The purpose of this study is to determine age related differences in preschoolers' emerging awareness of the human mind's functions. It was predicted that preschoolers are gradually becoming aware of their own and other people's mind's functions. Forty children (mean age in months = 54.1; mean age in years = 4.51) were observed and questioned while playing three games with their caregivers. The children were evaluated in the three different game situations on their total responses in each game situation and on each question to determine why there were significant differences as the children's ages increased by month and significant differences when comparing age groups. Regression and analysis of variance comparing the children by age in months and comparing the responses of the three age groups to the dichotomous questions in each situation indicated that preschoolers are expressing an emerging awareness of the human mind's functions. The younger children are more often in the value sensing mode of development which explains the gradual increasing of the regression line and the significant difference between the three age groups. The transcribed and coded video/audio taped data also suggest how preschoolers develop their awareness of the human mind's functions by being attuned to, attending to, remembering, reflecting, inferring and introspecting about their environment.

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Theoretical Background

The desire to know more about the functions of the human mind is not new. Franz Brentano a nineteen century philosopher, Oswald Kulpe a nineteen century psychologist, and Edward Tolman, an early twentieth century experimental psychologist were all concerned with the internal workings of the mind (Hothersall, 1995). William James (1890/1952, p.154) also philosophized concerning the awareness people have of their continuous thinking ability. He identified his concept as the "stream of consciousness". However, Piaget and Vygotsky were two of the first psychologists to empirically study when and how children develop a folk psychology of "theory of mind". They were especially intrigued with when thought and language influence children's comprehension of the mind's functions. Piaget (1959) posited that thought preceded language, and Vygotsky (1934/1986) posited that language and thought converged to help illuminate childrens' thoughts.

Resent research aimed at discovering when preschool children develop an awareness of their own and other people's minds begins with the notion that preschool children are developing a theory of mind (ToM). Gopnik and Wellman (1992) propose that there is a change from one mentalistic psychological theory somewhere between 2 1/2 and 4 years of age. The change is not a simple all-or-none, but rather involves a more gradual transition from one view of the mind to another. Perhaps young preschoolers move through an implicit "theory theory" of the mind (Fodor, 1992) which is an innate structure and an explicit "simulation theory" of the mind (Perner & Davies, 1991) acquired through interactions with their environment. The difference between "theory theory" and "simulation theory" is when the preschoolers are utilizing the "theory theory" they begin to reflect on what they are thinking and doing, and what other people might be thinking and doing. However, when they are utilizing the "simulation theory", preschoolers recognize the phenomena of the centrality of their own mind in regards to an understanding of the minds of others, and they are able to relate the functioning of their minds to those of other people.

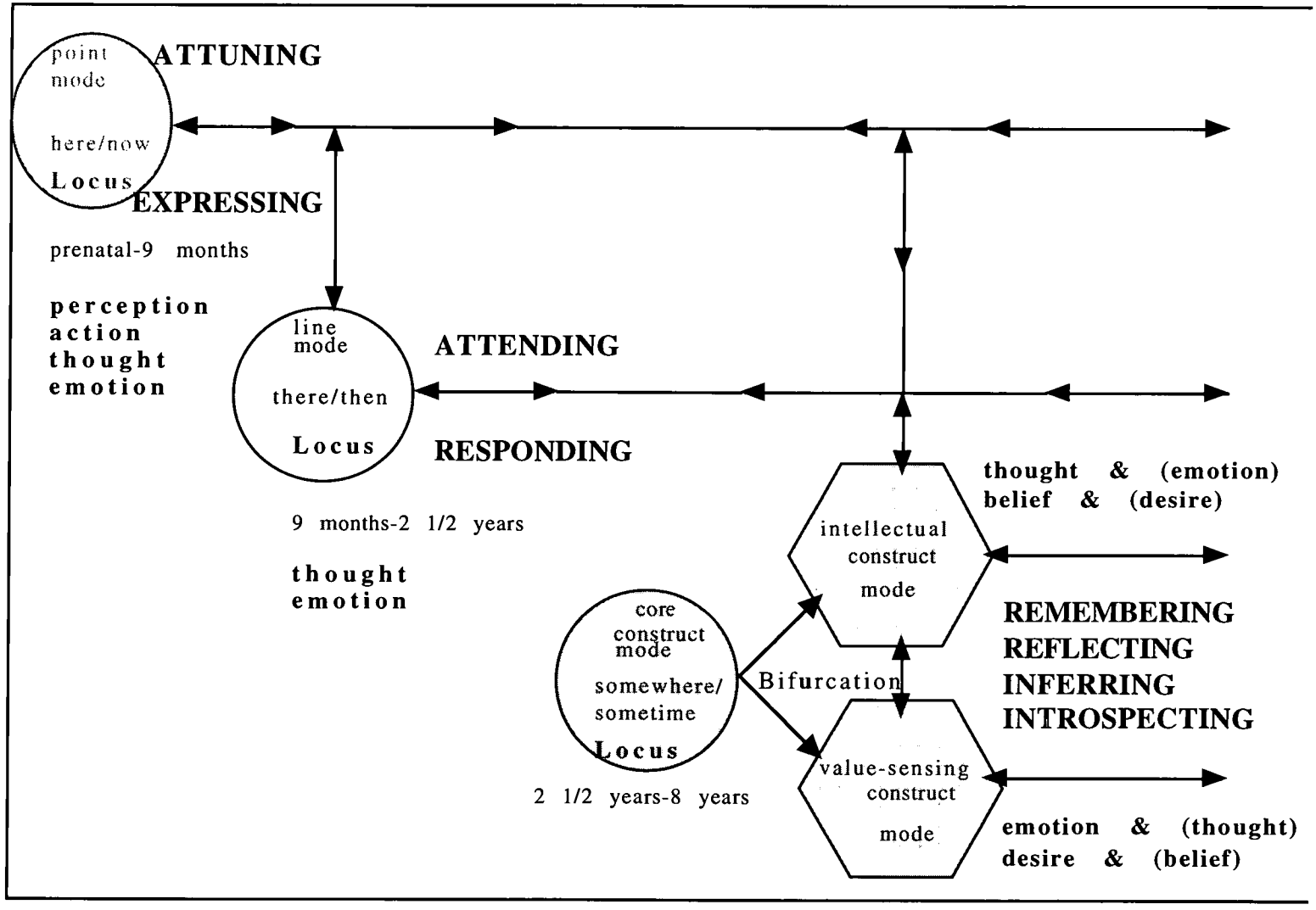
Theory

Transitionary Modes and Loci diagram encompasses Margaret Donaldson's theory of human minds (1992), Karen Bartsch & Henry Wellman's theory of children talk about the mind (1995), and John Flavell & Patricia Miller's theory of children as mind readers (1993).

The Transitionary Mode & Loci diagram illustrates when, why and how children are developing an emerging awareness of the human mind's functions or ToM as shown in Figure 1.

Figure 1

Transitionary Modes & Loci



It begins with the point mode where young infants locus of concern is the here and now, and the development of their perception, action, thought and emotion are not discernible. However, they are attuning to their environment and developing their ability to express themselves.

Older infants through toddlers are developmentally prepared to demonstrate their ability to proceed through the line mode where their locus of concern is the there and then, and their perceptions and actions are fully developed and observable, but their thoughts and emotions are not discernible. They are attending to and developing their ability to respond to their environment.

By approximately 2 1/2 years, preschoolers are developmentally prepared to proceed through the core construct mode where their locus of concern is somewhere and sometime induced by their attuning and attending to their environment. The core construct bifurcates into the intellectual and value-sensing construct at this age. This bifurcation becomes observable and discernible through the children's actions and words when responding to their environment. Preschoolers' emotions and desires are more noticeable in the value-sensing construct, and their thoughts and beliefs are more salient when they are in the intellectual construct. They are developmentally prepared to demonstrate the bifurcation into value sensing and intellectual constructs by remembering, reflecting, inferring and introspecting. Preschoolers are beginning to be able to express their emerging awareness of the human mind's functions. The data from this study has to do with the bifurcation of the core construct into the intellectual and value sensing modes of human minds. Notice the arrows oscillating between these two constructs.

The primary purpose of this study is to determine when, why and how preschool children develop a conscious awareness of their own and other peoples mental operations. The secondary purpose of this study is to determine whether preschoolers are beginning to express an emerging awareness of a "stream of consciousness."

Methods

To address the questions that guided this research, video and audio taped data of forty preschool age children, 3 through 5, interacting with their caregivers (cgs) and an experimenter were transcribed, coded and analyzed using both quantitative and qualitative procedures. An interrater also transcribed and coded 4 of the childrens' videos. The interrater reliability was 95.8%. The quantitative strategies used were regression and ANOVA analyses. The qualitative analysis followed a quasi-grounded theory approach.

The children played three games with their cgs after the pretraining, and they were asked 33 dichotomous quantitative questions and 22 qualitative questions by the experimenter. The three games included a Picture Recognition, Hide-and-seek and Matching card game.

Picture Recognition Game Situation

The picture recognition game included a picture in a clear plastic frame 18 cm in length, 3.3 cm in width and 13 cm in height that the children could easily pickup or move as shown in Figure 2.

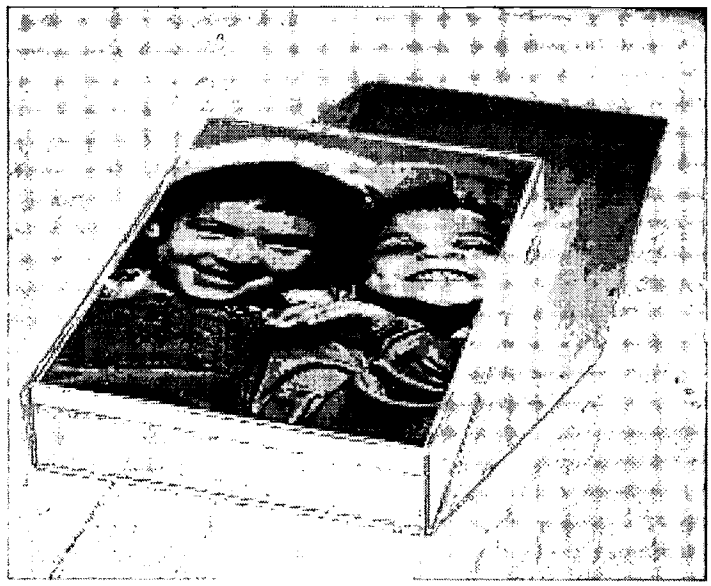


Figure 2. Picture recognition game situation picture.

The preschoolers were asked to show the picture to their cgs (Lemper, Flavell & Flavell, 1977). They were then asked the "seeing", "hearing", "remembering" and "thinking" questions. The obvious "seeing" and "hearing" questions were included to determine whether the preschoolers were answering all the questions "yes." Next, the picture was turned over so the preschoolers and their cgs could not see the picture, and then the experimenter continued to ask the children the "seeing", "hearing", "thinking" and "remembering" questions.

The cgs were then asked to turn around so that the preschoolers could not see their cgs' eyes (Barhon-Cohn & Cross, 1992). The cgs sat quietly with the their backs to the preschoolers while the preschoolers were asked the "seeing", "hearing", "thinking" and "remembering" questions about the picture. The preschoolers were then asked whether they thought their cgs' minds were doing nothing, doing something and what they thought their cgs' minds were doing. They were also asked whether they thought their cgs' minds and their own minds were thinking and remembering all the time, and the "why" or "why not" questions depending on their previous responses. These continually thinking and remembering questions were not counter balanced. They were more general repeated measures questions about the mind's continually thinking and remembering function, and these questions did not necessarily pertain to any specific game situation. They were considered as trial questions at the end of each game situation.

Hide-and-Seek Game Situation

A hide-and-seek game was the next game (e.g., Hughes & Donaldson, 1979) the preschoolers played with their cgs. A partition was assembled consisting of two white foam boards 76 centimeters in length, 1 centimeters in width and 51 centimeters in height as shown in Figure 3.

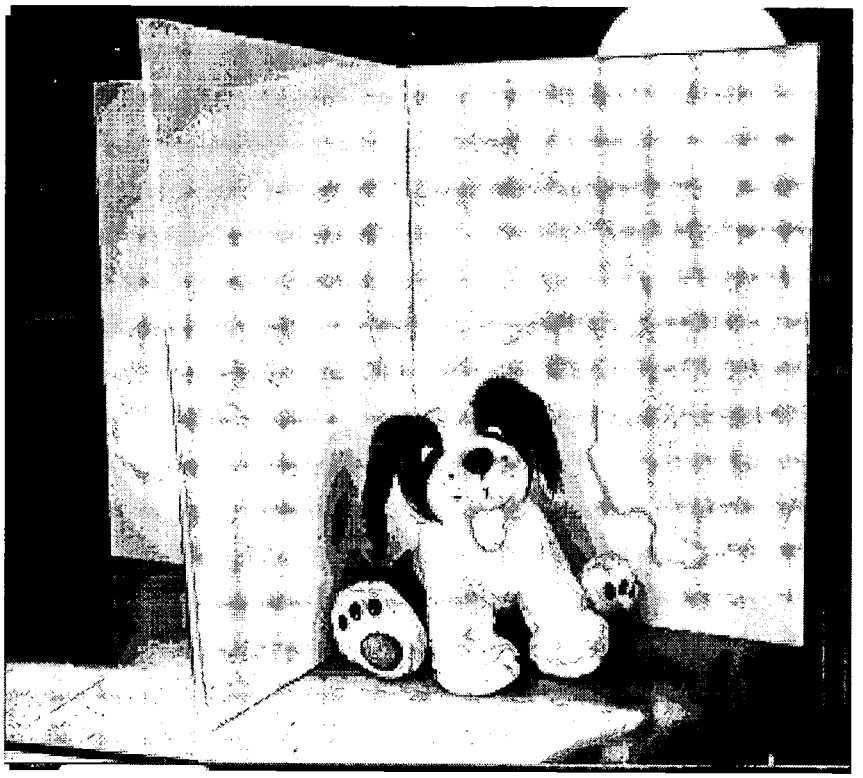


Figure 3. Hide-and-seek game situation partition and puppy.

The partition fit together perpendicularly by sliding the two foam boards together through 2 slits, 26 centimeters in length and 2 centimeters in width. The experimenter placed the partition on the table between the preschoolers and their cgs so that the cgs could only see two of the openings in the partition. The cgs were asked to turn around so that their backs were facing the partition. After the cgs turned around, the experimenter gave the preschoolers a brown and white spotted puppy with a pink tongue approximately 25 centimeters in length, 25 centimeters in width and 21 centimeters in height. The preschoolers were told they could get up from the chair to show the puppy to their cgs. After the preschoolers showed the puppy to their cgs, they were asked to hide the puppy in one of the four sections of the partition so that when their cgs turned around they could not find it. The experimenter pointed to each of the four openings, counting one, two, three, and four. The preschoolers hid the puppy in one of the four sections of the partition or where they thought their cgs could not find it when their cgs turned around facing the partition. They were then asked the "seeing", "hearing" and "thinking" questions after their cgs where told to turn around and face the partition. After the preschoolers answered these questions, the cgs were asked to find the puppy and give it to the preschoolers so they could give it to the experimenter. The preschoolers gave the puppy to the experimenter. The experimenter put the puppy in a suit case so that the preschoolers could not see it when asked the following questions. The cgs were asked again to turn around so that the preschoolers could not see their eyes. After the cgs turned around, the children were asked the next set of questions. The "doing nothing", "doing something", "seeing", "hearing", "thinking" and "remembering" questions were counter balanced to prevent a carry over effect between the two game situations. However, the "continually thinking and remembering" questions were not counter balanced. They were asked as trial number two questions at the end of

this game situation.

Matching Card Game Situation

The next game the preschoolers played with their cgs was a matching card game. The experimenter showed them twelve cards, 5.5 x 5.5 centimeters, with very different colored pictures and designs on one side (Lindsay, Johnson, & Kwon, 1991) and the same black and white design on the other side as shown in Figure 4.

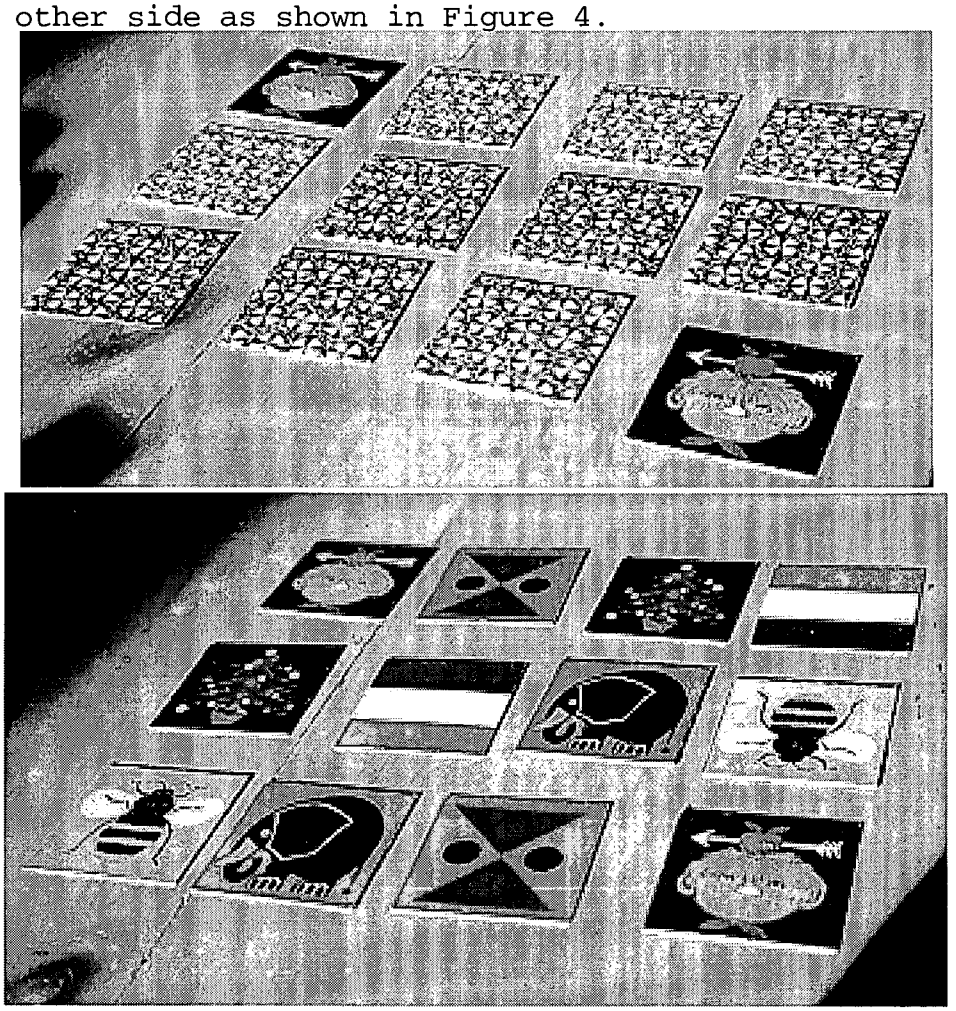


Figure 4. Matching card game situation cards.

There were six matching pairs of cards. The experimenter demonstrated how to play the game by putting the side of the cards with the black and white design turned up in three rows and four columns on the table between the preschoolers and their cgs. The same two cards at opposite corners were designated by the experimenter to match for all the children in each session. The experimenter turned over these two cards first. The preschoolers were then asked if the cards looked alike or if they matched. They were then told if they looked alike, or matched, they could put them aside, and they could have another turn by turning over two more cards. The experimenter then turned over two other cards in the top row that did not look alike or match. The experimenter told the preschoolers if the cards did not look alike they would be turned over and their cgs would have a turn to play the game. The preschoolers were asked if they understood how to play the game. If they said "no", the experimenter demonstrated how to play the game by turning over two more cards, and asked the children if they understood how to play. Most of the preschoolers understood how to play the game

after the first demonstration. The preschoolers were then asked the "seeing", "hearing" and "thinking" questions before they played the game with their cgs. The preschoolers were told they could go first, and they proceeded to play the matching card game with their cgs. When they were finished playing the game with their cgs, the preschoolers were asked to give the cards to the experimenter. The experimenter stacked the cards turning them face down so that the top card showed the black and white design. The preschoolers were then asked the "remembering" and "how" questions. The cgs were asked to turn around so that the preschoolers could not see their eyes. The experimenter asked the preschoolers the "doing something", "doing nothing", "what", as well as, the "continually thinking and remembering" questions. The preschoolers and their cgs were thanked for participating in the study. The video camera was turned off.

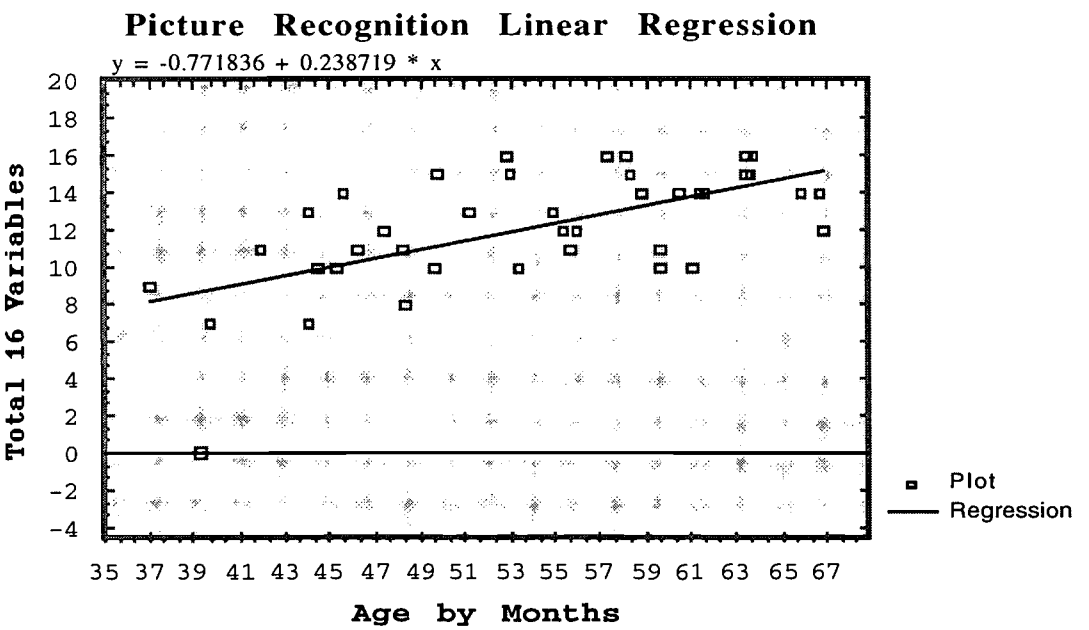
Results

Evidence will be presented from this study of <u>when</u> preschoolers are becoming aware of the human mind's functions, <u>why</u> a significant age difference occurs and <u>how</u> preschoolers become aware of the human mind's functions. The first illustrations are regression and ANOVA analyses related to <u>when</u> preschoolers become aware of the human mind's functions.

When Preschoolers Become Awareness of The Human Mind's Functions

Regressions

In the regression analyses, the x axis is the independent variable which is the children's ages by months. The y axis is the dependent variable which is the total of the responses for each child. The slope is increasing significantly as indicated by the dichotomous data from the picture recognition game situation. However, one 3-year-old child did not desire to respond in this situation. There is a significant positive correlation coefficient of **.62** in Figure 5.



<u>Figure 5.</u> The dependent variable (i.e., y axis) is the response to the picture recognition game plus the total of appropriate responses to the 15 dichotomous questions, and the independent variable (i.e., x axis) is the children's ages by month.

The slope is increasing and approaching significance as indicated by the dichotomous data in the hide-and-seek game situation. This analysis indicates there was more variability in the preschooler's responses in this situation. However, all of the preschoolers responded appropriately to some of the dichotomous questions during the hide-and-seek game situation. There is a positive correlation coefficient of **.47** in Figure 6.

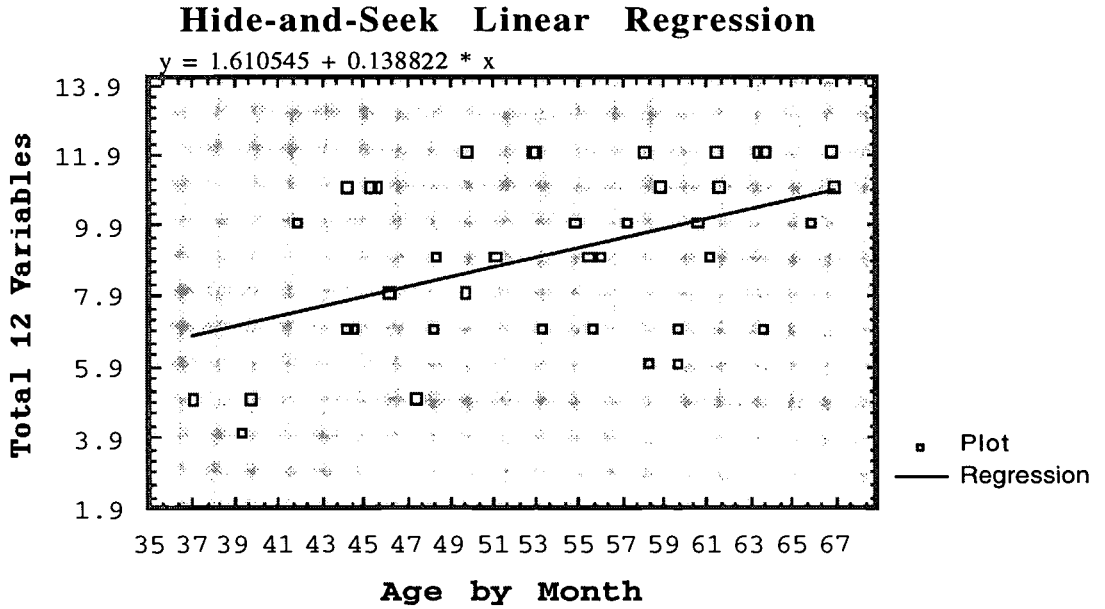


Figure 6. The dependent variable (i.e., y axis) is the response to the hide-and-seek game plus the total of appropriate responses to the 11 dichotomous questions, and the independent variable (i.e., x axis) is the children's ages by month.

The slope is increasing significantly in the matching card game situation. However, one 3-year-old child did not respond appropriately in this situation. There is a positive correlation coefficient of **.66** in Figure 7.

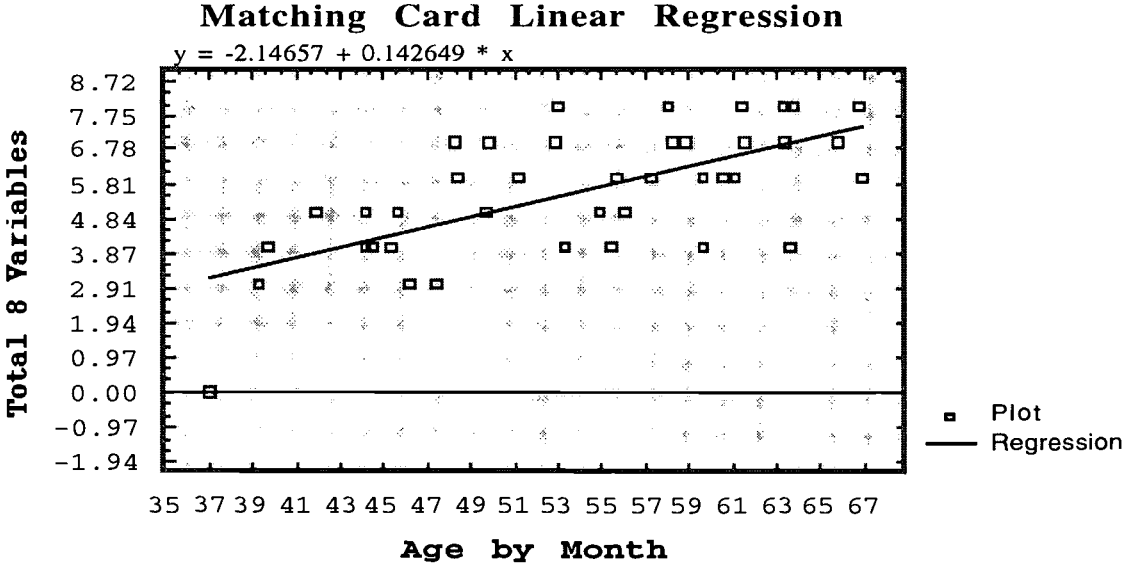


Figure 7. The dependent variable (i.e., y axis) is the response to the

matching card game plus the total seven dichotomous questions, and the independent variable (i.e., x axis) is the children's ages by month.

The slope is increasing and approaching significance.In the combined 6 "doing something/nothing" and 6 "thinking and remembering all the time" questions. There is a positive correlation coefficient of **.42** in Figure 8.

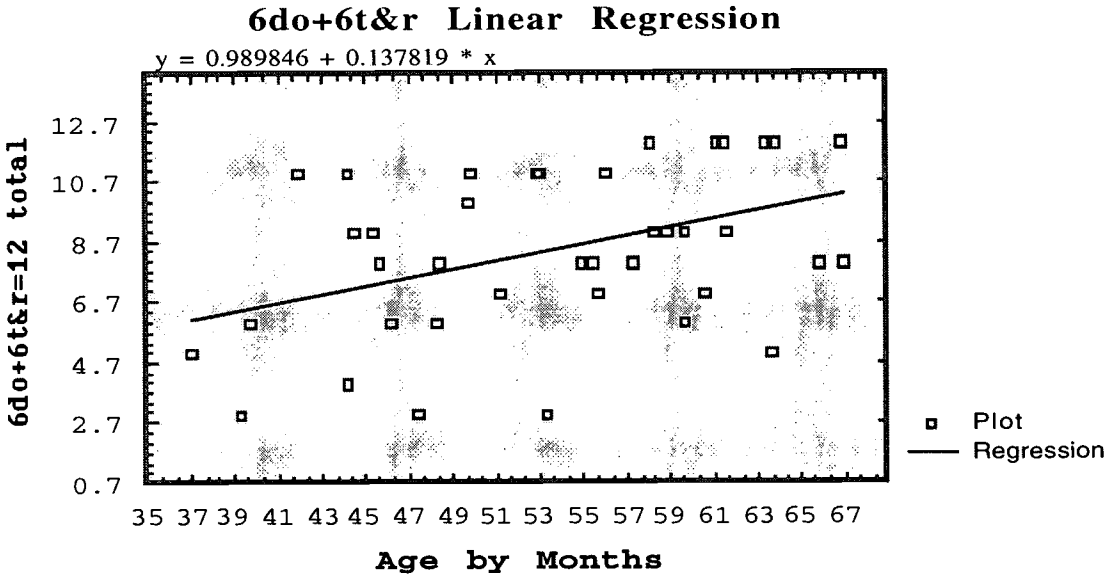


Figure 8. The dependent variable (i.e., y axis) is the combined total twelve responses to the "doing something/nothing" and the "thinking and remembering all the time" questions in the three situations, and the independent variable (i.e., x axis) is the preschooler's ages by month. Furthermore, all of the preschoolers responded appropriately to some of these repeated measures dichotomous questions in all three situations.

ANOVAS

There is a significant difference between the three age group's responses to the dichotomous questions in the picture recognition ($p < .01$), hide-and-seek ($p < .05$) and matching card ($p < .001$) game situations as shown in Figures 9, 10, 11.

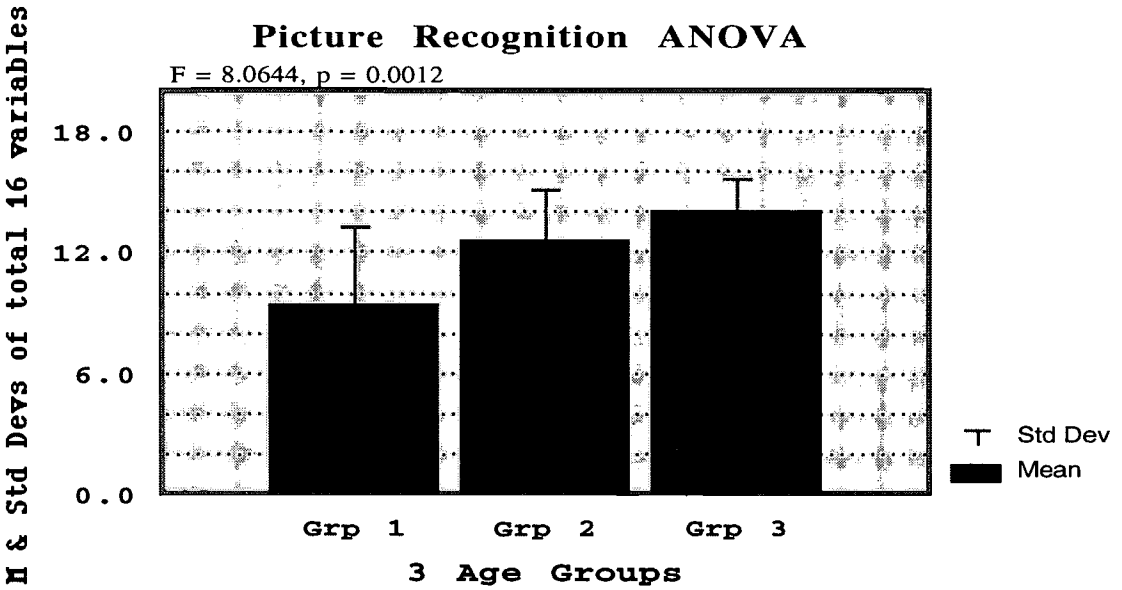


Figure 9. The fifteen responses to the dichotomous questions plus performance during the picture recognition game comparing 3, 4 and 5-year-olds: n(3) = 11, n(4) = 18, n(5) = 11.

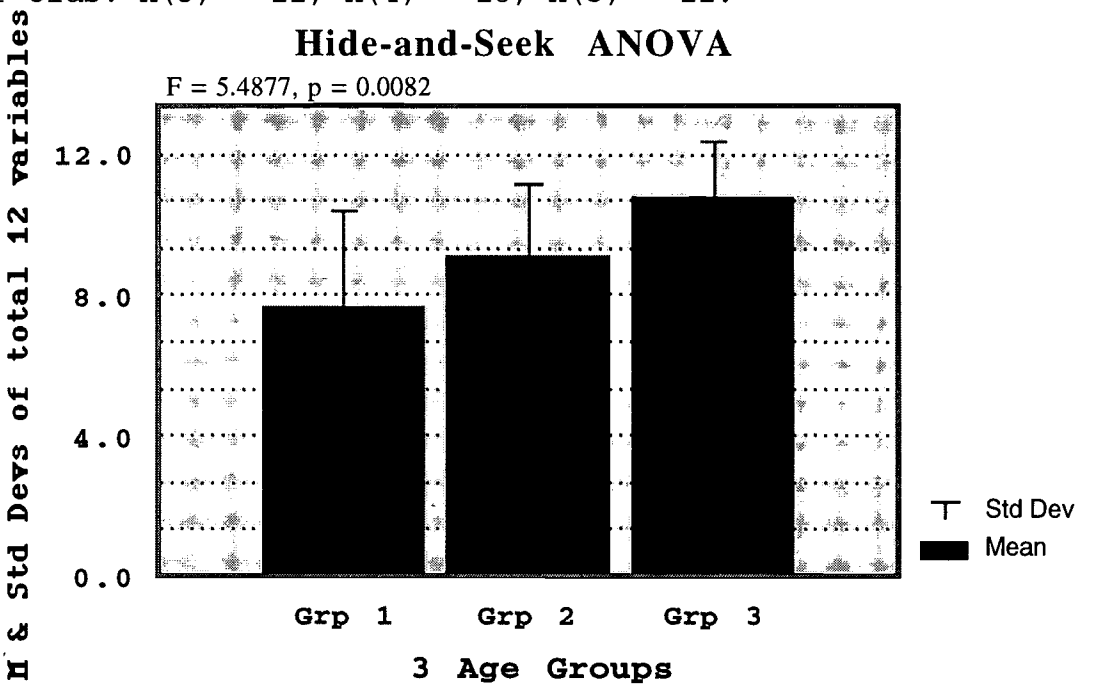


Figure 10. The eleven responses to the dichotomous questions plus performance during the hide-and-seek game situation comparing 3, 4 and 5-year-olds: n(3) = 11, n(4) = 18, n(5) = 11.

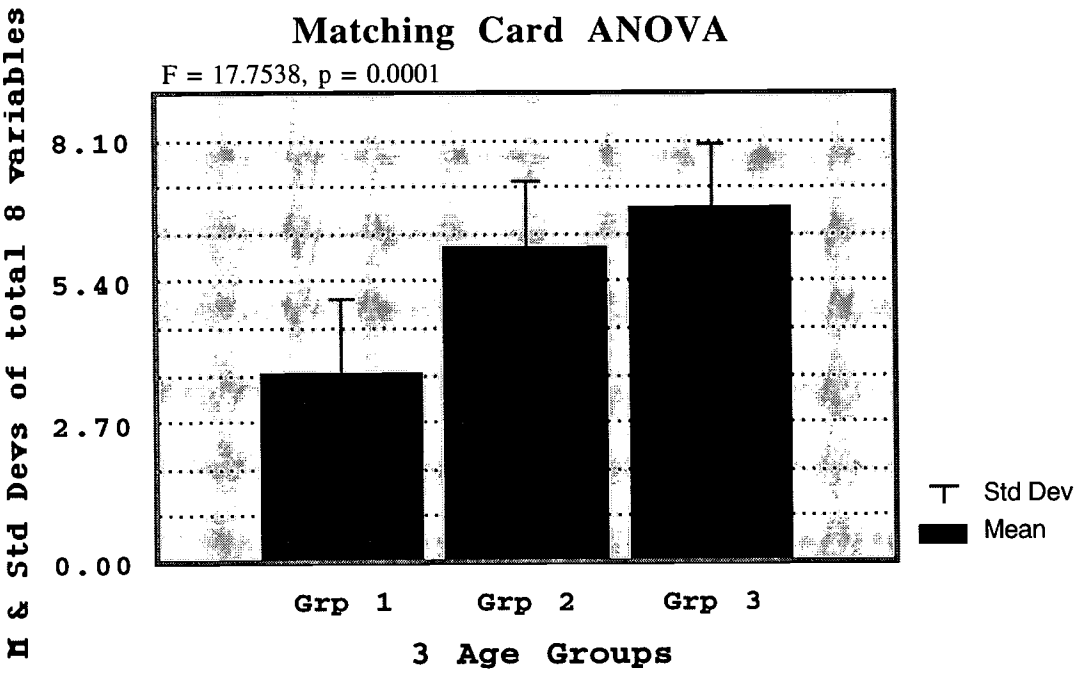


Figure 11. The seven responses to the dichotomous questions plus performance during the matching card game situation comparing 3, 4 and 5-year-olds: n(3) = 11, n(4) = 18, n(5) = 11.

There is also a significant difference between the three age group's responses to the dichotomous combined 6 "doing something/nothing" and the 6 "thinking and remembering all the time" questions ($p < .05$) as shown in Figure 12.

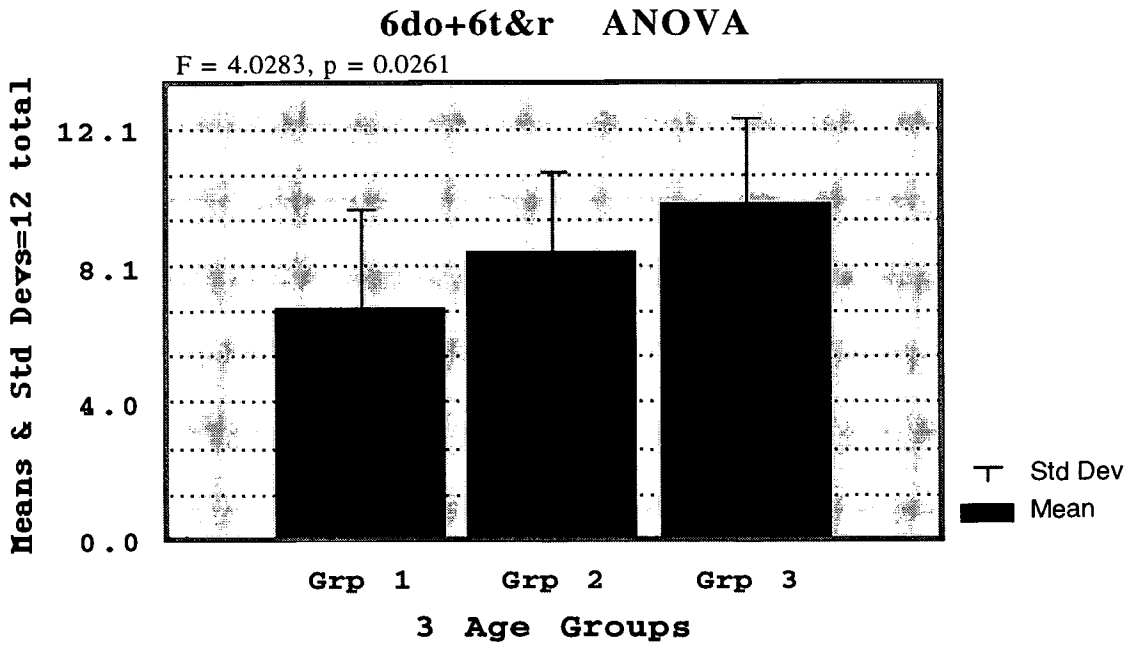


Figure 12. The twelve dichotomous responses to the "doing something/nothing" and the "thinking and remembering all the time" questions compared to the 3, 4 and 5-year-olds: n(3) = 11, n(4) = 18, n(5) = 11.

Origin of **Why** There is an Age Difference of Preschoolers Emerging Awareness of The Human Mind's Functions

To help understand **why** there is a significant difference between the three age groups data for the three game situations, ANOVAS were calculated for the children's performance during the games and for each dichotomous question comparing the 3, 4 and 5-year-olds, the 3 and 5-year-olds and the 3 and 4-year-olds. There were no significant differences for any of the variables between the 4 and 5-year-olds in any of the three situations as shown in Table 1, 3 & 5.

Table 1.

Picture Recognition Summary of Age Group Differences for Combined Similar Dichotomous Variables

Question	3, 4, 5, sig.	3, 5, sig.	3, 4, sig.
pr game	p > .05	p > .05	p > .05
s2	**p < .05***	**p < .05***	**p < .05***
h3	**p < .01****	**p < .01****	**p < .01****
t4	p > .05	p > .05	p > .05
s2a	**p < .05***	**p < .05***	**p < .01****
h3a	p > .05	**p < .05***	p > .05
t4b	p > .05	**p < .05***	p > .05
r5	p > .05	p > .05	p > .05
s2b	**p < .05***	p > .05	**p < .05***
h3b	**p < .05***	**p < .05***	**p < .05***
t4d	p > .05	**p < .05***	p > .05
r5b	p > .05	p > .05	p > .05
don6	p > .05	p > .05	p > .05
dos7	p > .05	p > .05	p > .05
t&r9	p > .05	p > .05	p > .05
t&r10	p > .05	p > .05	p > .05

As you can see in the picture recognition game situation there is not a significant difference between any of the groups when comparing the children's performance while playing the picture recognition game. The 3-year-olds turned the picture around 64% of the time; the 4-year-olds turned the picture around 73% of the time; and the 5-year-olds turned the picture around 64% of the time.

However, there is a significant difference of the first "seeing" and "hearing" questions for all the comparison age groups (i.e., 3, 4 and 5-year-olds, 3 and 5-year-olds and 3 and 4-year-olds). The appropriate response for these two questions was positive for the "seeing" and negative for the "hearing" question. Some of the 3-year-olds would tap on the picture to make a sound when desiring to answer positively to the "hearing" question. There is a significant difference between the next "hearing" question and between the 3 and 5-year-olds "thinking" question when the children could not see their cgs' eyes.

The appropriate response for all the "hearing" questions was negative in all three situations. The appropriate response for the "doing nothing" questions was also negative in all of the three game situations, but the appropriate response for the "thinking", "remembering" and "doing something" questions was always positive for all three game situations. The appropriate response for the "thinking and remembering all the time" questions in all three game situations was also positive.

Furthermore, when combining the similar variables in the picture

recognition situation one can see an even larger significant difference for the "seeing" and "hearing" combined questions for the three comparison age groups as shown in Table 2.

Table 2.

Picture Recognition Summary of Age Group Differences for Combined Similar Dichotomous Variables

Questions	3,4,5, sig.	3,5, sig.	3,4, sig.
3s	**p < .01****	**p < .01****	**p < .01****
3h	**p < .01****	**p < .01****	**p < .05***
3t	p > .05	p > .05	p > .05
2r	p > .05	p > .05	p > .05
2 do	p > .05	p > .05	p > .05
2 t&r	p > .05	**p < .05***	p > .05

Statistical Significance = p < .05*, p < .01**.

There is even a significant difference between the combined "thinking and remembering all the time" questions when comparing the 3 and 5-year-old's responses, but not when comparing the 3 and 4-year-olds responses or all three age groups.

All forty children in the hide-and-seek game situation played the game appropriately and answered some of the questions appropriately. They hid the puppy in one of the two sections of the partition so that when their cgs were asked to turn around and look at the partition they would not be able to see the puppy. However, there was a significant difference between age groups for the first and second "hearing" question, but interestingly there is only a significant difference for the second "hearing" question between the 3 and 5-year-olds when the children could not see their cgs' eyes and not a significant difference the first "hearing" question when the children could see their cg's eyes as shown in Table 3.

Table 3.

Hide-and-Seek Summary of Age Group Differences for Each Dichotomous Variable

Question	3,4,5, sig.	3,5, sig.	3,4, sig.
h&s game	p > .05	p > .05	p > .05
s12	p > .05	p > .05	p > .05
h13	**p < .05***	p > .05	**p < .01****
t14	p > .05	p > .05	p > .05
don15	p > .05	p > .05	p > .05
dos16	p > .05	p > .05	p > .05
h13a	**p < .01****	**p < .01****	**p < .01****
s12a	p > .05	p > .05	p > .05
t14b	p > .05	p > .05	p > .05
r18	p > .05	p > .05	p > .05
t&r19	p > .05	p > .05	p > .05
t&r20	p > .05	p > .05	p > .05

Statistical Significance = p < .05*, p < .01**.

Furthermore, when combining the similar variables in this situation there was a significant difference for the combined "thinking" variables between the 3 and 5-year-olds as shown in Table 4. In the first "thinking" question the children could see their cgs' eyes when responding to this question, but when they responded to the next "thinking" question the children could not see their cgs' eyes.

Table 4.
Hide-and-Seek Summary of Age Group Differences for Combined Similar Dichotomous Variables

Questions	3,4,5, sig.	3,5, sig.	3,4, sig.
2s	p > .05	p > .05	p > .05
2h	**p < .01****	**p < .05***	**p < .01****
2 t	p > .05	**p < .05***	p > .05
2 do	p > .05	p > .05	p > .05
2 t&r	p > .05	p > .05	p > .05

Statistical Significance = p < .05*, p < .01**.

Only two 3-year-olds (5%) did not find a match when playing the matching card game with their cgs. There is not a significant difference between any of the three comparison age groups when the children played the matching card game. However, there is a large significant difference between all three comparison age groups for the "seeing" variable and an even larger significant difference between all three comparison groups for the "hearing" variable when the children could see the cgs' eyes when responding to these questions as shown in Table 5.

Table 5.
Matching Card Summary of Age Group Differences for Each Dichotomous Variable

Question	3,4,5, sig.	3,5, sig.	3,4, sig.
s21	**p < .01****	**p < .01****	**p < .01****
h22	**p < .001****	**p < .001****	**p < .001****
mc24 game	p > .05	p > .05	p > .05
r25	p > .05	p > .05	p > .05
dos26	p > .05	p > .05	p > .05
don27	p > .05	p > .05	p > .05
t&r28	p > .05	p > .05	p > .05
t&r30	p > .05	p > .05	p > .05

Statistical Significance = p < .01**, P < .001**.

Some of the 3-year-olds would tape on the back of the cards when responding affirmatively to this question. As you can see when combining the two similar questions, there is not a significant difference between any of the three comparison age groups, but there is a significant difference when comparing the three groups of children and when comparing the 3 and 5-year-olds combined four repeated measures variables in this game situation as shown in Table 6.

Table 6.
Matching Card Summary of Age Group Combined Similar Dichotomous Variables

Questions	3,4,5, sig.	3,5, sig.	3,4, sig.
2 do	p > .05	p > .05	p > .05
2 t&r	p > .05	p > .05	p > .05
2do+2t&r	**p < .05***	**p < .05***	p > .05

Statistical Significance = p < .05*.

The previous results led me to investigate the six "doing something/nothing" and six "thinking and remembering all the time" variables by combining them to determine why there was a significant difference between these twelve combined variables for the 3, 4 and 5-

year-olds. These same questions where asked of the children in each of the 3 situations when the children could not see their cgs' eyes. As you can see the only significant difference is between the 3, 4 and 5-year-olds and the 3 and 5-year-olds for the the combined variables in the matching card game as shown in Table 7.

Table 7.

Comparing the Combined 6do+6t&r Variables of Different Group Comparisons for Each Situation

Table #s	F-Ratio	Probability	Significance
3, 4 & 5 ages			
pr2do+2t&r	1.469	0.2433	p > .05
hs2do+2t&r	1.8511	0.1713	p > .05
mc2do+2t&r	3.3942	0.0446	**p < .05***
3 & 5 ages			
pr2do+2t&r	2.7826	0.1109	p > .05
hs2do+2t&r	3.3333	0.0829	p > .05
mc2do+2t&r	6.4721	0.0198	**p < .05***
3 & 4 ages			
pr2do+2t&r	0.8498	0.3648	p > .05
hs2do+2t&r	0.3445	0.5621	p > .05
mc2do+2t&r	3.9633	0.0571	p > .05

Statistical Significance = p < .05*

However, when looking at the data more closely, we can see why there is a significant difference between age groups for these twelve combined variables across the three situations keeping in mind that the appropriate response for the "doing nothing" questions were negative, the appropriate response for the "doing something" and "thinking and remembering all the time" questions were positive.

The bold and underlined numbers are the preschoolers in each age group who responded appropriately to the six "doing something/nothing" and six "stream of consciousness" repeated measures questions in the three situations as shown in Table 8.

Table 8.

Preschoolers Who Appropriately Responded to The Combined Repeated Measures Questions in The Three Situations

								Percentage	
3-year-olds									
pr	4	6	9					27.3%	
h&s	4	6	8					27.3%	(2/11=18.2%)
mc	none (no one answered these correctly)								(**0%**)
4-year-olds									
pr	15	17	21	23	24	**25**	29	38.9%	
h&s	15	17	18	20	**25**	27		33.3%	(3/18=16.7%)
mc	14	18	22	23	**25**			27.8%	(**1/18=5.6%**)
5-year-olds									
pr	**31**	**32**	**34**	**35**	**37**	**39**		54.5%	
h&s	**31**	**32**	**34**	**35**	**37**	**39**	40	63.6%	(6/11=54.5%)
mc	**31**	**32**	**34**	**35**	**37**	**39**		54.6%	(**6/11=54.5%**)

As you can see **0%** of the 3-year-olds responded appropriately to all twelve dichotomous questions, **5.6%** of the 4-year-olds responded appropriately to all twelve questions and **54.5%** of the 5-year-olds responded appropriately to all twelve questions or 1/2 of the 5-year-olds.

Furthermore, evidence of **why** a significant difference occurred

between the younger and older preschoolers can be seen by looking at the means and variabilities for each situation and the combined six "doing something/nothing" and six "stream of consciousness" repeated measures variables as shown in Table 9, 10, 11 and 12.

Table 9.
Picture Recognition Means and Variability Within Groups

Group	Means (16)	Variability Within Groups
1(11)	9.46	14.67
2(18)	12.67(3.21)	6.12(8.55)
3(11)	14 (1.33)	3 (3.12)

Table 10.
Hide-and-Seek Means and Variability Within Groups

Group	Means (12)	Variability Within Groups
1(11)	7.64	7.46
2(18)	9.06(1.42)	4.53(2.93)
3(11)	10.73(1.65)	2.62(1.91)

Table 11.
Matching Card Means and Variability Within Groups

Group	Means (8)	Variability Within Groups
1(11)	3.64	2.05
2(18)	6 (2.36)	1.65(.40)
3(11)	6.82(0.82)	1.56(.09)

Table 12.
6do+6t&r Means and Variability

Group	Means (12)	Variability Within Groups
1(11)	6.82	8.76
2(18)	8.56(1.74)	5.20 (3.56)
3(11)	9.91(1.35)	6.69(-1.49)

The values enclosed in the parentheses represent the number of children in the three age groups, the total number of possible responses and the differences between the previous group's mean and variability (i.e., 1 = 3-year-olds, 2 = 4-year-olds, 3 = 5-year-olds). As you can see, the means of appropriate responses in all four comparisons are increasing, and the variability within groups are decreasing. This is another indication that as the age of preschoolers increased in this study, the older preschoolers answered the dichotomous questions with more appropriate responses indicating less variability.

Evidence Related to **How** Preschoolers Become Aware of Human Mind's Functions

All of the children in this study were attuned to and attended to each situation enabling them to play the games and answer the questions if they **desired** to do so. Being attuned to and attending to the situations allowed the children to express their ability to play the games and respond to the experimenter by remembering, reflecting, inferring and introspecting.

The children, their cgs and an experimenter were video taped in an observation room near their preschool or in an experimental room near their preschool. Also, five children were video taped interacting with their caregivers and the experimenter in a home. Evidence of 3, 4 and 5-year-olds remembering, reflecting, inferring and introspecting is verified by their performance while playing the games and their responses to the qualitative questions.

REFLECTING

Rachel, 3 years and 10 months, when asked what she thinks her cg's remembers about the pictures begins to say, "She, I don't know." The child says, "I don't know. The last thing. The last thing." This child seems to be reflecting on what she thinks her cg remembers about the pictures. However, Rachel desires not to answer the "how" question.

INFERRING

When the 3-year-olds were asked what they thought their cgs' minds were doing they were more likely to infer or reflect when responding to this question in the matching card game situation. Ken, 3 years and 8 months, turns to look at the experimenter and says, "Um, think of things." Furthermore, the 3-year-olds seemed to be inferring and reflecting when responding to the "why" or "why not" questions after they were asked whether they thought their cgs' minds were thinking and remembering all the time, and whether their own minds were thinking and remembering all the time. Ken looks at the experimenter and says, "Because it just do."

Some of the most interesting responses came from the 4-year-olds when asked what they thought their cgs' minds were doing. Andy, 4 years and 5 months, begins to rock back and forth in his chair, looks at the mom's back, stops rocking, points to and looks at the cards on the table, looks at the experimenter and says, "Thinking about the cards."

INTROSPECTING

George, 4 years and 9 1/2 months, seemed to be introspecting when asked why he thought his cg's mind was thinking and remembering all the time. He leans back in his chair, plays with his fingers, looks down, looks at the experimenter and says, "Ya, I took off to see Grandma Patton and one day she died and past away." The child looks down with a very sad face.

Furthermore, George looks at the experimenter and says, "Can I say one thing?" The experimenter looks at the child and says, "Okay." The child sits up in his chair and says, "Sparky the sun devil is always the sun devil." The experimenter says, "Right." The child puts his left hand on the table looking at the experimenter, opens his eyes wide and says, "The sun devil underneath the street is bad, right?" The child taps his foot under the table. The experimenter shakes her head up and down and repeats, "Right." The child points up with his right hand, smiles and says, "But the one up in the sun is good."

Discussion

Preschoolers seem to be gradually expressing their emerging awareness of the human mind's functions as seen by the increasing regression lines, the positive correlations between the two variables (i.e., age and responses to the dichotomous questions in each situation) and the increasing significant differences between the three age groups. However, the younger preschoolers seemed to desire to answer the dichotomous questions with the same response more frequently, or desired not to respond, and the older preschoolers answered the questions the way they believed was appropriate with both positive and negative responses more frequently. The younger children were more often in the value sensing mode and the older children were more often in the intellectual mode when responding to the questions in each situation, but not when playing the games.

Furthermore, all of preschool children seem to be developing an emerging awareness of their own and other people's functions of the mind by attuning to, attending to, remembering, reflecting, inferring and introspecting when interacting with other people. All three age groups demonstrated to some extent their emerging awareness of the human mind's

functions when responding to the quantitative and qualitative questions about the human mind's functions after interacting with their cgs and the experimenter in different situations.

Conclusion

Experimenter and Caregiver Implications

Clearly, researchers in this area need to focus on identifying the cognitive, perceptual and emotional complexities involved in children's emerging awareness of the human mind's functions by encouraging and allowing them to express this knowledge. It is very important to attempt to investigate each component within a situation when comparing age and verbal or lack there of verbal responses of children.

- Experimental sessions with young children should be video taped allowing for a more complete analysis of situational factors.
- The investigator should be in a discovery mind set when transcribing and analyzing the data to recognize the dynamics in each situation.
- The investigator should recognize the variability of each child's data to be able to recognize the consistencies when determining the universals in the data.
- It is important that investigators design studies that use a methodology which enhances the analysis of the development of children's perceptual, cognitive and emotional abilities.

Furthermore, caregivers (cgs) and teachers should also take into consideration who, what, where, when, why and how when interacting and assessing children's perceptual, cognitive and emotional development (Zimiles, 1986).

- Cgs should observe children to determine what the children are attuned to and attending to in an effort to assess their ability to express and respond in different situations.
- Cgs should ask the children whether they are remembering and thinking when interacting with adults, other children and even when they are alone.
- Cgs should ask children whether they think their cgs are remembering and thinking in different situations.
- Cgs should encourage children to explain their responses by asking them "what", "why", "why not" and "how" questions.
- Cgs should also encourage children to explain why they think a cg or another child did and said something by asking them "what", "why", "why not" and "how" questions.

It is important that researchers and cgs do not underestimate preschoolers' remembering and thinking awareness. As Olson and Astington (1993) note, cgs need to pay close attention to how infants through preschoolers intend their actions and words to be interpreted, and cgs must help them to become more conscious of the force of their actions and utterances. Preschoolers should be encouraged to answer "why" questions about these same subjects because new information is not just to be learned, but also interpreted. A mutual understanding of remembering and thinking is important for both the cgs and children to correctly interpret each others actions and words. To assist preschoolers in this enterprise, cgs must learn to treat them as thinkers whose opinions count.

Moreover, children are continually trying to make sense of what they experience and observe in their environment, especially when they try to explain what is occurring. They are developing their innate scientific thinking ability to make hypotheses. The children's neurological functions are being stimulated to discover explanations of circumstances in their environment.

Paul L. Harris states in his commentary about "The Rise of

Introspection" after Flavell, Green, & Flavell's (1995) study: "that there is a sharp improvement during the preschool and early school years in children's introspective abilities. That rise is explained in a cogent and satisfying way by the proposal that young children are gradually acquiring and understanding of causal connectedness of the stream of consciousness." Harris is hopeful that young children's understanding of the relation between emotion, memory, and consciousness will also be explored. Perhaps using the microgenetic methodology in game situations and analyzing the transcribed data both quantitatively and qualitatively will enhance the exciting research of toddlers and preschoolers' emerging expressed awareness of the human mind's functions or the ToM (Brunner, 2000).

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