YOUNG CHILDREN'S VULNERABILITY TO ACHIEVEMENT GOALS: A VALIDATION STUDY

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YOUNG CHILDREN'S VULNERABILITY TO ACHIEVEMENT GOALS: A VALIDATION STUDY

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YOUNG CHILDREN'S VULNERABILITY TO ACHIEVEMENT GOALS: A

VALIDATION STUDY

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Emily Harbison Cumbie, daughter of Richard Michael and Marie (Sandifer) Harbison, was born December 25, 1981, in Birmingham, Alabama. She graduated from Pinson Valley High School in 2000. She attended Auburn University in Auburn, Alabama, for three years, and graduated cum laude with a Bachelor of Science degree in Human Development and Family Studies. She then entered Graduate School, Auburn University, in August of 2003. She married J. Wesley Cumbie, son of Robert Cumbie and Patricia (Driggers) Cumbie, on May 8, 2004. Emily completed the Master of Science degree in Human Development and Family Studies in May, 2006.

THESIS ABSTRACT

YOUNG CHILDREN'S VULNERABILITY TO ACHIEVEMENT GOALS: A VALIDATION STUDY

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The purpose of this study was to explore validity of measures used to asses children as having a helpless or mastery oriented pattern of response to failure. Participants (N = 190) were part of a larger project, the Child Care Quality Enhancement Project. The participants in this study ranged in age from 36 - 67 months (M = 53.32). Males made up 51.9% of the sample and 57.9% were Caucasian. The children participated in a challenging task, and then rated on several indicators to assess achievement patterns. Results revealed that children's perceptions of ability was significantly lower after experiencing failure, and their affect was significantly higher while working on tasks that were simpler. Few group differences were found, though. Based on these findings, the discussion focused on appropriate methods for classifying children according to achievement motivations.

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I. INTRODUCTION

If at first you don't succeed, try, try again. This familiar saying implies that people should not give up in the face of failure; instead, they should persist. However, in reality is this how people actually respond? Research says it depends. There is a body of literature that looks at children's responses to failure that shows significant variation among children. In the face of failure, some children persist while others do not.

Dweck (Diener & Dweck, 1978; Dweck, 1991) has proposed that children operate according to one of two motivational patterns. Children can be characterized as helpless or mastery oriented by their cognitions, affect, and behaviors exhibited in response to failure. After failure, those with a helpless orientation express negative affect, make attributions for their failure focusing on low ability, and perform poorly on tasks previously completed successfully. Following such failure experiences, when asked to recall their performance on previous tasks, these children recall fewer successful tasks and more failed tasks than is accurate. Mastery-oriented children differ in almost every way. Following failure mastery-oriented children do not express negative affect, do not make attributions about the reason for failure, and do not attach any meaning to failing. Rather, they begin planning and developing strategies for solving the problem. After experiencing failure, mastery-oriented children still hold a positive view for future

success. They tend to maintain, or even improve, their problem-solving skills during a challenging situation, and appear to view challenge as an opportunity for learning (Dweck, 1991).

What makes children look at the same situation in such different lights? Dweck and colleagues propose that helpless and mastery-oriented children may be pursuing two different types of goals. Children who have *performance goals* are concerned with receiving positive judgments about themselves from others, while avoiding any negative judgments. Children who are driven by *learning goals* want to increase their knowledge through mastering challenging tasks. Although both of these goals are natural and can be adaptable at times, overemphasizing performance goals can lead to a helpless response to challenge (Dweck, 1991; Dweck & Leggett, 1988; Elliott & Dweck, 1988).

According to Dweck, goals emerge from theories about the nature of intelligence. Theories of intelligence have been the subject of study in both children and adults. Dweck says there are two prominent theories: entity and incremental. People holding an entity theory of intelligence view intelligence as a static and fixed trait over which the person has little or no control. People holding an incremental view, on the other hand, look at intelligence as a malleable quality that can be increased or developed through experience (Dweck, 1991; Hong, Chiu, & Dweck, 1995). It follows that people holding an entity view of intelligence may be more focused on performance goals because they believe that performance reflects ability. Therefore, any failure reflects lack of intelligence. People holding an incremental view of intelligence are more likely to pursue learning goals in an effort to increase their knowledge (Dweck, 1991).

Most of the research in the area of children's reactions to challenging situations and their motivational patterns has been done with children who are at least school age. Traditionally, researchers suggested that motivational patterns do not emerge until children are 10-years-old or older (Rholes, Blackwell, Jordan, & Walters, 1980; Ruble, Parsons, & Ross, 1976). However, some researchers have disagreed with this assumption, and have focused on studying preschool age children to determine when these patterns emerge, and if they are stable over time. There is a question as to whether 4- and 5-year-old children are able to give reliable and valid reports that reflect their thoughts and feelings, and from which we can draw sound conclusions. Smiley and Dweck (1994) were among the first to look at motivational patterns in children who are preschool and kindergarten age. These researchers sought to determine young children's motivational pattern (helpless versus mastery) by exposing them to failure and assessing their reaction. The children in their study were given a series of puzzles, three of which were unsolvable and one of which was solvable. They were also given an opportunity to choose one of the previously tried puzzles to work on again. Whether they chose an insolvable puzzle or the one solvable puzzle to work on again (*Task Choice*), and the reason they gave for their choice, were used as indices of their motivational pattern. Children's preferences for working on a successfully completed puzzle indicated a performance goal, and choosing a puzzle they could not complete signified a learning goal. After working on all of the puzzles, children were asked a series of questions intended to assess their cognitions and feelings during the task. In order to more closely monitor the children's cognitions during the task, spontaneous verbalizations made while working on the puzzles were recorded and coded. Smiley and Dweck found that children

classified as having performance goals reported more negative emotions during the task, rated their puzzle solving ability as lower after failure, and made more statements while working on the puzzle that reflected concern over their performance and a desire to disengage from the task.

These patterns appear to have some stability. Ziegert, Kistner, Castro, and Robertson (2001) conducted a longitudinal study beginning when children were in kindergarten and doing follow-ups one and five years later. Ziegert and colleagues' findings are consistent with Smiley and Dweck's findings, and further suggest that these motivational patterns do show some stability over time. Similar to Smiley and Dweck (1994), 43% of children were classified as helpless in kindergarten based on puzzles choice and reason. Ziegert et al. also created a composite measure of helplessness. They found that many indicators of helplessness were associated with each other. Results of the follow-up study conducted one year later found a modest correlation between children's composite scores of helplessness in kindergarten and first grade. Furthermore, children classified as helpless in kindergarten, using composite scores, were more likely to score as helpless on three of the four helpless measures taken in fifth grade. The authors suggest that individual differences exhibited by kindergarteners in response to challenge may be precursors to motivational patterns years later.

Although helpless and mastery orientations have been shown to emerge in preschool, the effects appear to manifest themselves differently in preschoolers than in older children and adults. Heyman, Dweck, and Cain (1992) found that preschoolers who exhibited many signs of helplessness tended to make global negative judgments of themselves following criticism, whereas older children do not generalize to other aspects

of the self. Young children tended to think that producing a bad product made them a bad person. There are other implications of these differing patterns, as well. Children with a higher sense of efficacy (who are also likely to be mastery oriented), are more likely to seek out difficult tasks, which increases the chance of achieving new knowledge and capabilities (Dweck & Bempechat, 1983). Thus, having a helpless orientation can be debilitating to achievement.

The motivational patterns discussed here have been operationalized and measured in various ways in older children. In younger children, however, motivational patterns have not been studied as extensively. The current study adapts methods used by other researchers (i.e. Dweck, Ziegert) to assess motivational patterns in young children. This study is part of a larger project, the Child Care Quality Enhancement Project (CQEP), whose focus is to examine children's adjustment in full day child care. Data for the current study were taken from one part of the CQEP, referred to as the Challenge Task. The Challenge Task consisted of a series of activities, but this study only focuses on the Puzzle Task. In the Puzzle Task, children were given three puzzles to work on. The first two puzzles were impossible to solve and the third one was solvable. We examined children's cognitions and feelings before and after failure by asking a series of questions about their thoughts, their perceptions of their own puzzle solving ability, and the way they felt while working on the puzzles. Children's confidence level was assessed by asking how many of the three puzzles they thought they could complete. The children reported how good they were at puzzles before and after working on the puzzles and also reported their feelings of happiness and sadness while working on each puzzle. Children were then asked if they thought they could finish the puzzle if given more time. The

answer to this question was used to assess their ability attributions. The children were then given an opportunity to choose one of the three puzzles to work on again and were asked to give a reason for that choice. The puzzle choice and reason were used to classify the children into helpless and mastery oriented groups, based on Smiley and Dweck (1994). A composite score of helplessness was also formulated based on procedures by Ziegert et al. (2001). Finally, any spontaneous verbalizations made by the child while working on the three puzzles were transcribed and coded.

The purpose of this study is to examine the validity of the measures used to assess helplessness in young children. Construct validity refers to the extent to which a measure accurately reflects the theoretical construct it is intended to measure. There are two components of construct validity: convergent and discriminant. This study will attempt to establish convergent validity for the measures of motivation taken during a challenging puzzle task, as a first step in establishing construct validity. Discriminant validity will not be discussed in the study. Convergent validity refers to the extent that two measures intended to tap the same construct are correlated with one another. It is important to establish the convergent validity of the measures used by Smiley and Dweck with the sample used by the CQEP prior to conducting further analyses with the motivational measures. While Smiley and Dweck's (1994) sample was predominately made up of middle- and upper-middle-class children attending a laboratory school, the sample of the CQEP is made up of middle- and low-income children in community childcare.

Establishing convergent validity in this study would require demonstrating the various measures of motivational patterns are associated. Specifically puzzle choice and puzzle reason, which will be one way used to classify children as helpless or mastery-

oriented, will be compared with other indicators of helplessness, such as decrements in perceptions of puzzle solving ability, affect reported by the child, observer rated affect, insufficient ability attributions, and helpless statements made spontaneously by the children while working on the puzzles. A second way children will be classified is by assigning children a value of helplessness based on a composite measure of helplessness formulated based on Ziegert et al. (2001). The composite measure of helplessness will consist of measures of *puzzle choice, reason for choice, insufficient ability attribution,* and decrement in *child reported affect.*

Based on the results from Smiley and Dweck (1994), we expect that children classified as helpless (based on their puzzle choice and reason given for choice) will make more performance concerning statements during the Puzzle Task, make more negative self-evaluations, make more disengaging statements, and will report more negative emotions following failure. Because of the children's young age, which may introduce unreliability into their reports, modest associations are expected among measures of motivational patterns. Based on Ziegert et al. (2001), we expect that the continuous measure will be correlated with other measures of helplessness, such as reporting being less happy while working on the unsolvable puzzles, observer reported affect while working on each of the puzzles, and spontaneous verbalizations that are reflective of a helpless orientation.

A second goal of this study is to look for ethnic differences within patterns of helplessness. To our knowledge, no study with sufficient sample size has looked specifically at this, therefore no hypotheses are proposed.

II. REVIEW OF LITERATURE

The purpose of this chapter is to review the research that has been done on motivational patterns and their implications. I will examine theories of intelligence, motivational goals, and the behavioral patterns that emerge as a result of personally held theories and goals. I will also look at studies that have helped to define helpless and mastery oriented behavior patterns, possible sources of these patterns, and studies that have tested children in order to classify them as one or the other.

For the past several decades, children's motivational patterns have been an area of research in education, child development and developmental psychology. These motivational patterns are indicated by specific behaviors exhibited by children under certain circumstances. Researchers want to know why some children seem to persist in the face of failure whereas others quickly quit trying. According to Dweck (1991), these differences in behavior have to be traced back to differences in goals and, ultimately, to differences in theories about intelligence.

Theories of Intelligence

Motivation researchers (e.g., Carol Dweck & Arden Miller) propose two opposing theories of intelligence. Because people do not usually spend time thinking about their definition of intelligence, how they view it, exactly what the word 'intelligence' means to them, or where they believe it comes from, they operate from their underlying assumptions. These underlying assumptions are what define, in this case, intelligence.

Although these assumptions are not in our conscious mind, Dweck (1991) suggests that they guide thoughts and behaviors. These assumptions are also referred to as implicit theories.

Hong, Chiu, and Dweck (1995) describe two implicit theories people hold regarding intelligence: the entity theory and the incremental theory. A person holding an entity view of intelligence thinks that intelligence is a fixed quality that cannot be changed, whereas a person with an incremental theory of intelligence views intelligence as being malleable and believes it may be increased through effort. Henderson, Dweck, and Chiu (1992; as cited in Hong et al., 1995) developed a questionnaire for measuring implicit theories of intelligence in adults. The questionnaire consists of only three items, and all three items reflect an entity view of intelligence. Adult participants show agreement and disagreement with the statements based on a 6-point Likert scale with the number one representing strong agreement and the number 6 representing strong disagreement. The questionnaire items are: (1) "You have a certain amount of intelligence and you really can't do much to change it;" (2) "Your intelligence is something about you that you can't change very much;" (3) "You can learn new things, but you can't really change your basic intelligence." Only three items are used for the scale because, according to the authors, all three are intended to have the same meaning, and continued repetition of the same idea would become boring to the participant. Although the number of items is small, internal reliability was high ($\alpha = 0.96$, $N = 50$). Test-retest reliability also proved high ($r = 0.82$, $N = 50$).

Because theories of intelligence are believed to ultimately affect behavior, researchers have been interested in explaining how these theories develop. Cain and

Dweck (1989) attempt to address the origin with a theoretical framework that focuses on how children come to understand intelligence and how children arrive at different conclusions. Cain and Dweck compiled previous studies of people's beliefs about what makes up intelligence. Although no one study answers the question of origin directly, results from several studies compiled together suggest that the majority of people consider intelligence as consisting of at least three variables: knowledge, capacity, and effort. These studies have also shown that by ages 11 and 12, children possess conceptions of intelligence that are similar to those adults possess. These older children's views have at least three components: knowledge and/or experience, reasoning ability or capacity, and motivational factors such as effort. Within a mature view of intelligence individuals may combine or weight the components in different ways resulting in one's personal view of what intelligence is.

Cain and Dweck (1989) attempt to explain the formation of the conceptions of intelligence in three steps. For step one to begin, children must be exposed to the achievement domain. The early childhood education setting is a likely place for this to occur. Children must realize that there are successes and failures, and that outcomes in achievement situations are contingent on their behavior. Also in step one, children realize differences in rates of success and failure among individuals. The acquisition of these concepts requires cognitive capacity possessed by preschoolers; thus, if in preschool a child's attention is turned to achievement situations, step one can occur. Once the three pieces of knowledge in step one have been acquired, a child can move on to step two. In step two, achievement outcomes are further conceptualized using a model, Outcome = f(Engage,Can). This model proposes that children come to believe

that in order to have a successful outcome, one must first turn his/her attention to a task (engage), and second, know how to complete the task (can). "Engage" is thought to be a precursor to a mature concept of effort, and "can" is thought to be a precursor to knowledge and capacity. Because step two doesn't accurately reflect the complexity of older children's conceptions of intelligence, children move to step three as they acquire more information about intelligence and try to explain the differences between individual successes and failures. In step three, the model of intelligence is Outcome = f(Effort, Knowledge, Capacity). In step three, intelligence is seen as a system that contains all three, or a subset of the three factors: effort, knowledge, and capacity. In this mature view of intelligence, the three components can be combined in different ways, and each component can be manipulated separately of the others. These components are viewed in more psychological rather than behavioral terms as the child matures. Also, as the child matures, so does his or her ability to manipulate components of intelligence to form a personal view of intelligence.

Motivational Goals

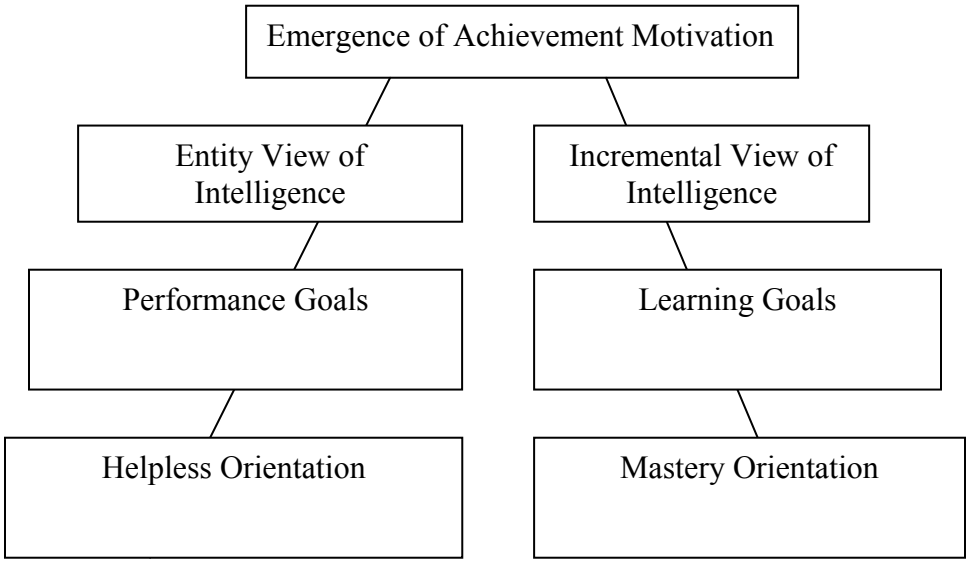
Some researchers believe the link between theories of intelligence and behaviors that reflect said theories may be mediated by internal motivational goals children possess. Dweck and Legget (1988) propose that children's individual interpretation of and reaction to achievement related events is based on different motivational goals, and children pursue these separate goals depending on their individual theory about the nature of intelligence. There are two classes of goals: *performance goals* and *learning goals*. Children with an entity view of intelligence tend to be oriented towards performance goals. These children are most concerned with doing well, performing adequately, and

gaining favorable judgments of themselves from others, while also avoiding negative judgments. That is, the belief that performance reflects intelligence (a stable personal attribute) as opposed to effort (a malleable factor) would motivate a person to appear smart by performing well, even if that meant avoiding difficult tasks. Children adopting an incremental view of intelligence tend to be oriented towards learning goals, in which focus is on mastering new tasks, gaining knowledge, and increasing competence. Dweck and Legget go on to say that these goals lead to different behavioral response patterns. Children holding a performance goal are more likely to respond to a challenging achievement situation with behaviors that are characteristic of learned helplessness, whereas children who possess a learning goal are more likely to be oriented toward mastery in achievement situations.

Behavioral Patterns: Learned Helplessness and Mastery-Orientations

Children can be classified as having a helpless or mastery-oriented response to challenge by looking at their assessing their cognitions, emotions, and behaviors during the challenging situation. Children who are classified as helpless tend to express more negative affect during the task, attribute failure to low levels of ability, and experience performance decrements after failure, and do not recall rates success accurately. Alternately, children with a mastery-orientation maintain positive affect when faced with challenges, rather than making attributions for failure, these children develop strategies for improving their performance. Instead of experiencing performance decrements, mastery-oriented children tend to maintain, or even improve in the face of failure (Dweck, 1991; Smiley & Dweck, 1994).

Figure 1: Proposed Theoretical Links



Helplessness as a Function of Socialization

One goal of the study is to examine differences in helpless reactions among children in different ethnic groups. Previous research has looked at achievement beliefs cross-culturally, and has found that ethnic groups differ in the extent to which they endorse effort versus ability as explanations for academic success and failure, with Asian children and parents giving greater weight to effort as an explanation for success in achievement situations (Chen & Stevenson, 1995; Stevenson, Lee, et al., 1990). Chen and Stevenson compared high school students' mathematic ability and motivation between four ethnic groups: Asian Americans, Caucasian Americans, Chinese, and Japanese. The students were given a mathematics test, and a questionnaire that asked about reasons for studying hard, beliefs about the importance of effort in achievement, attitudes toward mathematics, daily use of time, beliefs about peer norms, and self-reports of psychological well-being. Results showed that Asian Americans scored significantly higher on the math test than did Caucasian Americans, but both groups were

significantly lower than both the Chinese and the Japanese students. Several different aspects of motivation and beliefs were assessed. In relation to the standard that students hold for themselves, and the standard that parents hold for students, Asian American students tended to hold standards for themselves that were above Caucasian American students, but below the standards held by Chinese and Japanese students. Asian Americans scored higher than all the other groups on standards they perceived their parents held for their educational attainment. When asked about what was the most important factor that influences math performance, Chinese and Japanese student reported that studying hard was the most important whereas the two American groups reported that having a good teacher was most important. This study illustrates some of the cultural differences seen in the area of motivation. It is interesting to note that the Asian American students tended to stand between the Caucasian American students and the East Asian students. They scored higher on the test, and they placed more emphasis on effort than the Caucasian Americans, but they scored lower than the East Asian children. It seems that acculturation is affecting their belief systems, lending more credence to the idea that motivation is socially constructed.

Effects of Beliefs on Performance

Studies with school-age children. Diener and Dweck (1978) attempted to determine the nature and timing of cognitive motivational factors by having children express their thoughts aloud while working on a difficult task, thus allowing the researchers to record what the children where thinking, and at what point during the tasks these thoughts were occurring. Furthermore, because after experiencing failure helpless children tend to experience decrements in performance, the researchers wanted to track

the nature of the performance change by examining the hypotheses the children voiced and the strategies they attempted during failure. The sample for this study was made up of 70 fifth graders (equal numbers of males and females) from a semi-rural community. Children were classified as helpless or mastery oriented based on responses to the Intellectual Achievement Responsibility (IAR) Scale in which items describe positive or negative achievement experiences that children frequently encounter. Each item was followed by two alternative explanations. One attributed the experience to someone else in the child's environment and the other to his or her own behavior. A subset of the questions specifically focused on assessing whether or not the child attributed failure to lack of effort. Children were split at the median into two groups. Children scoring 7 or below were classified as helpless and those scoring 8 or above were classified as mastery oriented.

Results of the Diener and Dweck (1978) study revealed striking differences in the patterns of performance and the nature of verbalizations made by the helpless and mastery oriented children. While working on the difficult problems in which consistent feedback that their answers were wrong was being presented, helpless children showed a steady decline in the use of effective strategies, with almost 40% of them completely abandoning useful strategies by the last problem. Comparatively, mastery oriented children did not show declines in the use of strategies while working on these same problems; in fact many of them formulated more sophisticated strategies as they received feedback on their failures. While experiencing failure, the helpless children made attributions to uncontrollable factors, but the mastery oriented children made no attributions. Rather, they verbalized solutions for solving the task, such as self

instruction and monitoring. Therefore the authors speculate that differences between mastery and helpless children may lie in the emphasis placed on the cause of failure versus a solution to failure.

Diener and Dweck (1980) went on to examine differences in helpless and mastery oriented children's beliefs about success, rather than only studying beliefs about failure. The sample of participants was made up of 112 fourth through sixth graders. Children in this study were given a series of success problems and a series of failure problems (the same used in Diener & Dweck, 1978). The children were asked questions intended to tap their beliefs about prior success and future success. Half of the children were asked the questions after completing the success problems and before being exposed to failure problems. The other half of the children were asked the same questions after completing the set of successful problems followed by a set of problems that were unable to be solved, or failure problems. Performance on the success problems was the same for children in the helpless and mastery oriented groups. The two groups differed, however, on their perception of success as well as on their performance on the failure problems.

Diener and Dweck (1980) found that after only being exposed to success, when asked how many problems they thought they had gotten right so far, mastery oriented children tended to be quite accurate, whereas helpless children greatly underestimated the number of successes. Another difference found between the two groups after only being exposed to success was in their perceptions of how well they had done compared to others. When asked how well most children would do on the same task, helpless children's responses indicated that they felt most children would do quite well, whereas mastery oriented children felt most children would perform adequately. Helpless

children also did not view their present success as a predictor of future success. After completing eight tasks successfully, when asked how many of 15 similar problems they could solve, helpless children predicted that they would only be able to solve about half. The difference in predictions of future success could be based on their attributions for success. Helpless children are more likely to attribute success to factors such as the ease of the task, or being lucky. Mastery oriented children, on the other hand, are more likely to attribute success to more enduring factors, such as being smart or good at solving problems.

Once failure was experienced, helpless children's expectations for future performance became even lower still. Although they did not view previous success as a predictor for future success, they did view failure as likely to lead to additional failure. Also, when asked how many problems they thought they had missed, they overestimated the number, whereas once again, mastery oriented children were quite accurate.

These two studies conducted by Diener and Dweck (1978; 1980) paint a picture of the patterns of thought experienced by children with differing motivational patterns. Mastery oriented children have a positive view of challenges. They seek them out and are undaunted by failure. Helpless children are avoidant of failure. Not only do they try to avoid it, failure causes a change in their perception of their own abilities. Success does not predict future success in the minds of helpless children, but failure predicts future failure.

The research on these motivational patterns is of particular interest because of the effects each pattern can have on children's actual performance. These differing patterns can cause substantial differences in school performance. It has been found that operating

according to the learned helplessness pattern can reduce the ability to learn new material in situations where confusion or failure is encountered (Licht & Dweck, 1984). Helpless and mastery oriented children are found to have equal scores on achievement tests in grade school, yet still perform differently during challenging tasks. Dweck proposes that grade school doesn't present enough challenge to result in differing achievement scores. She likens grade school to the initial success problems in the Diener and Dweck research (Henderson & Dweck, 1990).

To test the hypothesis that motivation begins to influence achievement in junior high, Henderson and Dweck (1990) followed children through the transition from grade school to junior high. At the beginning of the seventh grade, children were given a test to assess their theory of intelligence as well as their confidence levels regarding achievement. Groups were then compared according to theory of intelligence held, confidence level, and performance on achievement tests in 6^{th} grade and then in 7^{th} grade. Henderson and Dweck found that children with an incremental theory of intelligence who had been high achievers in 6^{th} grade scored as well if not better on achievement tests in 7^{th} grade. Interestingly, children with an incremental view of intelligence, who also had low levels of confidence in their ability and who had not done particularly well in grade school scored among the highest in seventh grade. This group showed the greatest gains in achievement. In contrast, among children holding an entity view of intelligence, those who had done poorly in the past continued to do poorly and those who had done well in the sixth grade were among the lowest scoring in the seventh grade. The children with entity views of intelligence and high confidence in their ability showed the most dramatic decrease in actual performance. Although children have similar levels of ability, these

studies show that having a debilitating achievement orientation (such as learned helplessness) can cause poor performance regardless of ability.

Studies with preschool and kindergarten children. The studies presented thus far have shown that in older children, motivational patterns are present, and the effects of these patterns are reflected in school performance. Some researchers (Miller, 1985; Rholes, Blackwell, Jordan, & Walters, 1980) suggest that children younger than 10 are not vulnerable to helpless and mastery oriented patterns of behavior. Evidence for this is that young children tend to not express negative affect while experiencing failure or performance decrements. Other researchers who compared preschool with school-age children indicate that preschool children don't make attributions for failure in the same way that older children do. These data lend support to the notion that young children are incapable of possessing achievement goals (Stipek, 1984; Stipek, Roberts & Sanborn, 1984). In contrast, when preschool children are compared with each other, striking differences have been found in response to failure situations, with a substantial portion demonstrating behaviors characteristic of helplessness and others exhibiting behaviors characteristic of mastery orientations. One source of disagreements among researchers may lie in methods used to assess children's orientations. When measurement techniques such as stories, scenarios, or role playing are used, along with feedback given on performance that is salient, preschoolers can show signs of helplessness (Kamins & Dweck, 1999). Methods used by Smiley and Dweck (1994) were designed to be meaningful and easy to understand for preschoolers. Results from that study lend support for using methods that provide clear success and failure outcomes, and for studying children's thoughts and feelings about the task at hand.

Smiley and Dweck (1994) studied young children's performance on challenging tasks. This study attempts to show that differences in task preference following failure can be used as an index of achievement goals for young children and can predict achievement-related cognitions and emotions. Furthermore, this study tests a goal-confidence-behavior model by assessing achievement goals as well as task confidence and using these things to predict the behavior exhibited during failure experiences. Subjects for this study were 78 children (40 girls and 38 boys) from nursery and kindergarten classes at the laboratory schools at the University of Chicago. The children came from middle- and upper-middle-class families. The ethnic makeup of families consisted of 83% White, 10% African American, 5% Asian American, and 1% Hispanic. Subjects ranged from 47 months to 74 months in age.

The children were seen in two sessions. In session one, the child was asked about his/her overall puzzles solving ability ("Are you good at puzzles or not so good at puzzles?"). The child was then shown a Xerox copy of the age-appropriate puzzle he/she was to complete. The Xerox picture was taken away and the child was presented with the actual puzzle and asked to solve it. The child was allowed to work on the puzzle until it was complete and the amount of time it took to finish was recorded. This puzzle was intended to establish a baseline measure for overall puzzle solving ability. In session two, the children were again shown Xerox copies of the four puzzles they were going to be asked to solve, and were asked how many of the puzzles they thought they could complete. This served as the measure for confidence level. The pictures were taken away and the child was presented with one puzzle at a time. The first three puzzles were impossible to solve and the fourth puzzle was solvable. The child was only given three

minutes to work on the unsolvable puzzles so he/she would not realize that the puzzles were impossible to finish. After three minutes, the researcher said, "Let's go on to the next puzzle," and placed the puzzle the child had been working on along with any pieces that had been correctly placed on the table where the child could see it.

After working on all four puzzles, the child was asked a series of questions about emotions during the puzzle task, expectation for future success on the task, and was once again asked to rate overall puzzle solving ability. The child was asked to report the emotion felt while working on each puzzle by pointing to one of a series of five smiling/frowning faces. Expectation for future success was then assessed by asking the child, "If you had a lot of time right now, do you think you could finish any of these puzzles (pointing to the three unsolvable ones)?" Last, the child was asked again to rate his/her overall puzzle solving ability in the same way as in Session 1. After the series of questions, the child's tendency to seek or avoid challenges was measured by giving the child an opportunity to work on one of the four puzzles again (it was noted whether the puzzle chosen was the solvable or an unsolvable one) and the child was asked why he/she chose the particular puzzle. If the child chose an unsolvable puzzle, the correct pieces were given so it could be completed. After the chosen puzzle was complete, the child was asked once again to choose a puzzle he/she would like to work on again and to give a reason for their choice. Any spontaneous verbalizations made by the child during the puzzle task were tape recorded.

A measure of *achievement goal* was made based on children's preference for working on a solvable or unsolvable puzzle after experiencing failure in combination with the reason given for their choice. Children who chose to work on the solvable

puzzle were considered to hold a performance goal because their choice ensured success. According to the Dweck model, this choice would demonstrate the child's competence and avoiding a chance of showing incompetence. Children who chose an unsolvable puzzle but provided a reason that reflected the child's belief that the puzzle could be easily solved were also classified as having performance goals because they expressed a clear desire to perform adequately. The rest of the children who chose to work on one of the unsolvable puzzles and gave reasons that reflected a desire to master the challenging task were considered to have a learning goal. Two measures of *emotion* were developed. The first consisted of the mean of the three emotions reported while working on the unsolvable puzzles, and the second was the lowest, or most negative, emotion reported. *Task performance* was measured by the number of pieces correctly placed in the unsolvable puzzles. *Post task decrement* was measured by comparing the amount of time it took to complete the puzzle in Session 1 with how long it took to complete the solvable puzzle in Session 2. *Self-evaluation of ability* was measured by comparing the child's answer to how good they were at doing puzzles in Session 1 and the answer after experiencing failure in Session 2. *Task specific confidence* was assessed after experiencing failure by asking the children if they thought they could solve the puzzles they had not been able to finish before if they were given more time. *Overall puzzle solving ability* was measured by how long it took the child to do the puzzle in Session 1. *Reason for puzzle choice* was coded into four categories: Challenge, Want/Like, No Challenge, and No Reason. Last, all spontaneous verbalizations made by the children while working on the puzzles were coded into one of eight categories: performance

concern, disengaged, negative self-evaluations, strategy, task appropriate difficulty, task appropriate solutions, task irrelevant, and ambiguous.

The authors found significant differences in children's reactions to failure, indexed by their choice to rework a solvable or insolvable puzzle and the reason for their choice, their confidence for future success, and self reports of emotions while working on the puzzles and puzzle solving ability. Fifty-eight percent of children chose to rework an unsolvable puzzle, and the remaining 42% chose the solvable one. Reason for choice was examined to determine whether or not task choice is a sufficient indicator of whether or not children were seeking or avoiding challenge. Of the children who chose to rework an unsolvable puzzle, most were likely to produce a challenge-seeking (referred to by the authors as a challenge reason) (40%) or a Want/Like (29%) response, indicating an interest in a difficult task, or at least having positive feelings towards that task. Of the children who chose to rework the solvable puzzle, none produced a challenge-seeking reason. Sixty-seven percent of them produced a challenge-avoidant reason (referred to by the authors as a no challenge reason), such as, "because I already know how to do it," indicating a desire to duplicate a good outcome. Also, there were seven children who chose to rework an unsolvable puzzle, but offered a challenge-avoidant reason, such as, "It's the next easiest." The authors interpret this as indicating that these children were interested in achieving a positive outcome rather than seeking a challenge. Therefore, by considering both puzzle choice and reason, two goal orientation groups emerged: those children who chose an unsolvable puzzle and expressed a desire for mastery ($n = 38$) were classified as having learning goals, and the children who chose the solvable puzzle and gave a reason of wanting to repeat a successful outcome ($n = 33$), or chose an

unsolvable one but still expressed a desire for successful outcome (n = 7) were classified as holding performance goals. When a discrepancy between puzzle choice and reason existed, reason was the ultimate criterion for category assignment. Ninety-one percent of children were consistent with their puzzle choice and reason for choice. No sex or age differences were found between these two groups, nor were any differences found in initial puzzle solving ability.

To examine the differences between the two groups on thoughts and feelings, children's spontaneous speech while working on the puzzles and self-reported emotions after the task were examined. Children's spontaneous speech was coded into one of eight categories: performance concern, disengaged, negative self-evaluations, strategy, task appropriate difficulty, task appropriate solutions, task irrelevant, and ambiguous. The categories were then clustered into "goal relevant," "task relevant," and "irrelevant or uncodable." Seven of the 78 children produced no spontaneous speech, therefore analyses were done with 71 participants. Age was not related to the total number of utterances nor the frequencies of any goal relevant comments. Also, total number of utterances did not differ between groups, so differences found would not be a result of group differences in talkativeness.

Children in the performance group produced more performance concern statements (M = 3.55 for performance goal group and M = 1.36 for learning goal group) and more disengaged statements (M = 1.21 for performance goal group and M = .52 for learning goal group) than those in the mastery group. Negative self-evaluations were more frequent among performance goal children, (M = 1.76 for performance goal group

and $M = .76$ for learning goal children). There were no differences found between groups for the categories of strategy, task appropriate solutions, or task appropriate difficulty.

Children were asked to rate their emotions on a five-face emotion scale for each of the difficult puzzles. Results of the self-reported emotions were consistent with those from the spontaneous speech data. Analyses are based on 72 participants. The means of the three emotion ratings differed for the learning and performance groups (learning goal $M = 3.80$; performance goal $M = 3.14$), one-tailed $t\ (70) = 3.01$, $p < .01$, with the learning goal group reporting more positive feelings. Lowest reported emotion across the three puzzles was also examined as an index of discouragement during the task. Performance goal children ($M = 2.22$) reported significantly sadder emotions than did learning goal children ($M = 3.09$).

Children were asked to report how good they were at doing puzzles before any puzzles were attempted and again after working on all of the puzzles. Before any puzzles were presented, 88% of those with performance goals and 88% of those with learning goals judged themselves as good at puzzles. After failure, only 55% of performance goal children, but 78% of learning goal children still felt they were good at puzzles.

Finally, to assess confidence for future success, children were asked whether they thought they could complete the unsolvable puzzles with unlimited time. Learning goal children were significantly more likely to express confidence in future success. Seventy-nine percent of learning goal children thought they would be able to complete the unsolvable puzzles, whereas only 50% of performance goal children thought they would be able to.

The results of Smiley and Dweck (1994) show that with appropriate methods of assessment, many significant differences emerge between children with learning goals compared to those with performance goals, even at the age of four. Measures used by Smiley and Dweck seem to be consistent with one another. Children classified as helpless made more negative statements while working on the task, reported more negative emotions, were significantly more likely to rate their puzzle solving ability following failure as lower than they had prior to experiencing failure, and were less likely to have positive expectations for future success.

Ziegert et al. (2001) conducted a series of three studies in order to replicate previous findings of Dweck (Cain & Dweck, 1995; Hebert & Dweck, as cited in Dweck, 1991; Smiley & Dweck, 1994),regarding helpless and mastery oriented young children, and then to extend these findings by assessing the stability of kindergartners' responses to challenge. Participants in Study 1 were 237 kindergartners from middle-class families. Each participant in Study 1 participated in three sessions. In session one, easy practice puzzles were administered, as well as an age appropriate, but moderately difficult puzzle to obtain a baseline measure of puzzle solving ability. During session two, children were asked to report on their expectancy for success on the puzzles, and on their affect. They reported affect by choosing one of five faces, ranging form very happy to very sad. Children were then given four puzzles to work on, one at a time. Children had two minutes to work on each puzzle. The first three puzzles were unsolvable, and the fourth was solvable. Between the third and fourth puzzle, the measure of affect was readministered. Following the fourth puzzle, children's expectation for future success was assessed by asking how well they would do if given four similar puzzles to work on.

The children were then presented with the four puzzles they had just worked on and asked which one they would like to work on again if they had extra time, and why. Finally the children were asked about ability and effort attributions. Examples of questions asked to assess attributions are, "If you had lots of time right now, do you think you could finish the rest of the puzzles, or are you just not good enough at solving puzzles?" and "If you tried very hard right now, your very hardest, do you think you could solve the rest of these puzzles? Yes or No?" (p. 611).

Following criteria used by Dweck and colleagues (Smiley & Dweck, 1994), Ziegert et al. classified children as helpless if the child selected a success puzzle, or if the child selected a failure puzzle but provided a challenge-avoidant reason for the puzzle choice. A composite score of helplessness was formed to reflect children's tendencies to respond to challenge in a helpless manner. Responses to the following six measures were included in the composite measure of helplessness: puzzle choice, reason for choice, insufficient ability attribution, effort attribution, expectations for future success, and affect decrement. Although some of the indicators are expected reactions to failure, the authors suggest that the more indicators exhibited, the closer a child is to having a helpless orientation.

Ziegert et al. (2001) had results consistent with those found by Dweck and colleagues (Cain & Dweck, 1995; Hebert & Dweck, as cited in Dweck, 1991; Smiley & Dweck, 1994) with 43% of children being classified as helpless according to the Smiley and Dweck system. Indicators of helplessness were associated with each other; children who chose to repeat a successfully completed puzzle were also more likely to give a challenge-avoidant reason, attribute performance to lack of ability, say that performance

would not improve despite an increase in effort, and were more likely to report feeling sadder after experiencing failure. The amount of time needed to solve the baseline ability puzzle was positively associated with helpless responses on puzzle choice, ability attributions, and effort attributions. Also, a greater number of children classified as helpless needed help solving the fourth, solvable puzzle. Two explanations for these findings are offered by the researchers. One is the notion of self-perpetuating failure cycles, meaning that children with lower levels of ability are more likely to have a history of failure, which has been shown to lead to helplessness. Another explanation is that the helpless response causes children to perform below their ability level. This finding of lower overall ability in children classified as helpless has not been found in previous studies of this nature. The authors of this study suggest that the strength of the relationship between ability and helplessness is modest enough to suggest that ability is neither necessary nor sufficient to explain individual differences found among young children.

Ziegert et al. (2001) conducted a second, follow-up study, with the primary goal to assess stability of helplessness over a one-year interval. An additional goal of Study 2 was to further examine the relationship between helplessness and ability. Participants for this study consisted of 70 children who were a subgroup of participants in Study 1. The same tasks used in Study 1 were readministered approximately one year later. This time, only 10% of children chose to rework the success puzzle, and all of these provided a challenge-avoidant reason. An additional 28% of the children chose an unsolvable puzzle, but provided a challenge-avoidant reason. Based on Dweck's criteria for classifying children as helpless (i.e. reporting a challenge-avoidant reason, regardless of

puzzle selected), 38% of the children in study two were considered helpless, as opposed to 43% in Study 1. The helpless children required longer to complete the prefailure puzzles than the children classified as mastery-oriented. In regards to the stability of children's responses to challenging situations, a modest correlation was found, $r(68) = .41$, $p < .01$, based on the composite scores of helplessness developed in study one. Thirty-percent of children classified as mastery in kindergarten were classified as helpless in first grade. Alternately, 57% of children went from a helpless classification in kindergarten to a mastery classification in first grade. When assessing helplessness based on Dweck's criteria, helplessness in kindergarten was not significantly related to helplessness assessed in the one year follow-up, $p > .20$.

The findings of the follow-up study conducted by Ziegert et al. (2001) suggest some stability in individual differences in regards to young children's reactions to challenging situations. Results also suggest that assessing helplessness with multiple indicators may be more appropriate than the method used by Dweck and colleagues. By having six indicators of helplessness, rather than two, a more reliable measure should be established. Using a composite measure is consistent with the view that children's responses to failure are on a continuum with helplessness and mastery-orientation on either end, rather than being an all or nothing concept. Although a correlation was found between the composite scores of helplessness in study one and study two, the moderate magnitude of this correlation suggests that children's responses have the capacity to experience great change. About one-third of the children became more helpless, going from a mastery-orientation in kindergarten to a helpless pattern of response in first grade. On the other hand, a little over half of children who were classified as helpless in

kindergarten were no longer falling into this category in first grade. The authors suggest that these changes may be the result of a change in the environment experienced in kindergarten and that in first grade. Last, the moderate association with between ability and helplessness (.28 to .40) in this study suggest that the stability of helplessness in not simply a result of low ability. In fact, helplessness is stable over time, even when ability was controlled for.

Ziegert et al. conducted a third study to assess predictive links between young children's responses to challenge and their responses to challenge in the fifth grade. Children who had participated in study one who could be located were invited to participate in study three. Of the 170 children who were located, 99 children participated. Teacher data were obtained for 82 of the children. Study three consisted of two sessions, separated by two weeks. The first session collected information on baseline performance on the tasks. During session two, manipulations were introduced. Teachers were also asked to complete the Student Behavior Checklist to provide teachers' evaluations of children's helplessness. Measures of helplessness for this study were developed based on conceptual similarity with the kindergarten measures of helplessness, correspondence with measures previously used to assess achievement-based helplessness in 10-year-olds, and consistency with theories of achievement motivation.

During each session, the children were given a block design task and a geometric jigsaw puzzle. During session one, children were first given several practice block designs, and then were given the baseline design to complete. They were also given several practice puzzles, followed by three puzzles to establish baseline puzzle solving ability. During session two, four unsolvable block designs were administered, followed

by three solvable designs. Children were asked to rate their expectancy for future success before working on each block design by pointing to a number on a card containing an 11-point Likert scale. Children were then presented with two unsolvable puzzles and were told to work on the puzzles in the order in which they were given, but that they could choose to stop working on a puzzle at any point, and move on to the next one, but they couldn't go back to a puzzle they had quit. After two minutes of working on a puzzle, the researcher prompted the child to move on, so the child would not realize the puzzles were unsolvable. The children were also instructed that at any point they could stop participating in the task altogether, if they choose. After working on the first set of unsolvable puzzles, children were asked if they would like to work on another set of similar puzzles or if they would rather go on to a different activity. Those who chose to work on the second set of puzzles were given the same rules, and allowed to work on each of the new puzzles for two minutes. After working on the second set of puzzles, children were asked again if they would like to work on another set of similar puzzles or if they wanted to move to a different activity. In the interest of time, children were not given a chance to work on the third set of puzzles, even if they chose to do so. At whatever point children chose to stop working on the puzzles they were asked to give a reason for their choice. Children who chose to persist through the entire task were asked their reason for choosing to continue. These reasons were coded as challenge-avoidant or mastery-oriented statements. All children participated in a final mastery experience.

The results of study three lend support to the belief that individual differences in kindergarteners' responses to failure reflect precursors to helplessness in older children. Composite scores of helplessness taken in kindergarten were predictive of three of the

four grade-5 helplessness measures. Children who exhibited helpless tendencies in kindergarten were less likely to persist when faced with challenge, reported lower expectations for future success after experiencing failure, and were rated as more helpless by teachers. These results, like those of study two, lend support for using composite scores of helplessness.

These studies replicate and extend findings by Dweck (Cain & Dweck, 1995; Hebert & Dweck, as cited in Dweck, 1991; Smiley & Dweck, 1994) in showing comparable proportions of young children identified as having a helpless pattern of response in challenging situations. Furthermore, additional evidence was provided for the associations between cognitive, behavioral, and affective indicators of helplessness. By examining the stability of young children's responses to challenge, previous findings were extended. This series of studies not only lends support to the belief that individual differences in achievement orientations exist among children as young as five, but also provides some evidence that these patterns are somewhat stable, and are predictive of responses to challenging situations in later elementary school. By using a continuous measure of helplessness, rather than the dichotomous measure used by Dweck, a more predictive measure of the trait can be formed.

Heyman, Gee, and Giles (2003) report results from three studies designed to examine children's differentiation of trait concepts using measures of beliefs about the relation between academic and social domains. The results provide evidence that children as young as preschool have systematic beliefs about ability and that those beliefs affect their recall of tasks as well as their reasoning about ability. This paper describes three studies done with preschoolers. In study one, participants were 60 children (30

boys and 30 girls) with a mean age of 4 years 7 months, recruited from two Head Start Centers that serve ethnically diverse, low-income families. The participants were 40% Hispanic, 8% Asian, 17% Caucasian, and 35% African American.

Participants were interviewed individually and presented with a number of scenarios. The first set of scenarios tapped participants' *reasoning about ability in relation to perceived difficulty.* Participants were shown a puzzle box and were presented with descriptions of two characters; for example, "Kayla and Jennifer both finished this puzzle, Kayla thought it was easy but Jennifer thought it was hard, do you think one of them is smarter?" If the child answered yes, they were asked which character was smarter. Results from this scenario showed that all children identified one of the two characters as smarter on each of the scenarios, with the majority (78%) identifying the character who though the puzzle was easy as smarter. Thus, participants used information about perceived difficulty to make inferences about the ability of others, and they associated perceptions of task ease with being smart.

The second set of scenarios was *reasoning about effort and outcome information.* Participants were presented with four scenarios that included information about a character's level of effort in an academic situation and the resulting outcome; the scenarios contained each possible combination of effort (high and low) and outcome (positive and negative). For example, one scenario was, "Eva worked really hard on her schoolwork and got everything wrong." Children were then asked, "How smart is Eva? Is she very smart, a little bit smart, or not very smart?" In order to see if the participant had better recall for the stories that matched (high effort with positive outcome) than those that mismatched, children were then asked, "Did Eva work very hard or not hard at

all," and "Did Eva get everything right or everything wrong?" Children were significantly more likely to be accurate on scenarios that matched in valence (high effort with positive outcome) as compared with scenarios that mismatched in valence (high effort with negative outcome). Also, children made more errors recalling effort than outcome, suggesting that to a preschooler outcome information may be more salient and relevant when judging an individual's ability than is effort information.

The third set of scenarios was *reasoning about intellectual ability and social traits*. In each scenario a character was described as having a positive characteristic on one dimension and a negative characteristic on the other dimension. For example, "I know a girl named Sarah, Sarah is smart – she knows how to read books. Sarah is also mean – she throws rocks at dogs; do you want to be friends with Sarah?" Children's memory of the scenario was tested by asking, "Is Sarah smart or not so smart; is Sarah mean or nice?" The majority of children misremembered the scenarios, inaccurately reporting that the characteristics matched in valence (nice and smart or mean and not so smart). More errors were made in recalling intellectual ability information than the social trait information, consistent with the possibility that a social-evaluative dimension is primary in young children's thinking about people. Children were also presented with questions to see if they thought an individual could hold traits of conflicting valence. For example, "some people are smart, are any smart people mean?" Most participants agreed that it was possible for people to hold conflicting social and intellectual traits.

Results of study one show that preschool children are sensitive to information about perceived difficulty when judging level of ability; specifically, children who found a task easy were considered smarter. Also, children tend to see high effort and positive

outcomes as being positively correlated, thus if you work hard, you should do well. Heyman et al. (2003) suggest that because young children expect social traits and intellectual ability to match in valence, this could have negative implications for children who work hard and do not have positive outcomes, possibly leading to a reduction in effort to match the outcomes being experienced.

Study two was conducted to attempt to replicate the findings of study one with a different population of preschoolers and to further validate the findings by making procedural changes that would help rule out alternative explanations for some findings. Participants in study two were 55 children (24 boys and 31 girls, mean age 5 years, 2 months) recruited from two preschools that serve predominantly white, middle- and upper-middle-class families. The participants were 5% Hispanic, 13% Asian, 80% Caucasian, and 2% African American. All of the major findings of study one were replicated using this new sample.

Study three was conducted to see to see if patterns of reasoning would persist into later childhood (9 - 10 year olds), and to see how the perceived difficulty findings of studies one and two would extend to the notion of required effort (how much effort was required for the task as opposed to how difficult the task was perceived to be). Participants consisted of 40 preschoolers (25 boys and 15 girls, mean age 4 years, 9 months) and 40 elementary students (23 boys, 17 girls, mean age 9 years 10 months) recruited from schools that served ethnically diverse, middle class families; participants were 41% Hispanic, 14% Asian, 39% Caucasian, and 6% African American. The procedure was different in that a new set of scenarios were added to assess children's reasoning about required effort. These scenarios were identical to the perceived

difficulty scenario except the way effort was described; the character either "had to try really hard to finish the puzzle," or "hardly had to try at all to finish the puzzle." The majority of children still said that the character who thought the puzzle was easy was smarter, but interestingly only 47% of the younger children and 45% of the older children said that a character who hardly had to try at all was smarter. The results of this third study seem to conflict with results from the previous studies as well as results found in study three. One possible explanation of this inconsistency may be confusion over using words that sounded similar like "hard" and "hardly."

These three studies taken together suggest that across populations and age groups children, even as young as four, have conceptions about intelligence and use information about perceived task difficulty to make judgments about ability. These beliefs can contribute to children's conceptions of intelligence and/or their motivational patterns and goals. One finding that is particularly strong for the young children is that preschoolers tended to misremember the scenarios in which a negative intellectual trait and a positive social trait were presented, and vice versa. They tended to remember these scenarios as matching. They were also more likely to misremember the intellectual information and replaced it with information that matched the social trait information. As others have suggested (Benenson & Dweck, 1986; Heyman et al., 1992), social traits may tend to be primary in young children's thinking. Because of this, young children who perceive low ability often generalize this to being a bad person, which could have negative consequences for peer relationships, as well as images of self.

The literature reviewed here lends support to the belief that children as young as four respond to challenging situations with different behavioral patterns. The differing

patterns may stem from different motivational goals: a goal of gaining knowledge versus a goal of appearing competent. By using methods appropriate for assessing younger children, such as presenting tasks that are meaningful and providing salient feedback, clear differences can be seen in their reactions. This study attempts to further examine methods previously used to assess motivational patterns in young children in order to examine the convergent validity of these measures. This proposed study attempts to replicate and extend the findings of Smiley and Dweck (1994) using a larger and more diverse sample. A composite score of helplessness will also be formulated based on Ziegert et al. (2001) in order to help validate the measures of helplessness.

The following specific research questions and hypotheses are proposed:

1) Do children classified as helpless using Smiley and Dweck's (1994) dichotomous category system score higher on number of helpless spontaneous verbalizations, report more negative affect, receive ratings by observers as showing more negative affect, experience a decrement in perception of puzzle solving ability from pre- to post-failure, attribute failing to insufficient ability, more frequently than mastery-oriented children?

2) Are continuous ratings of helplessness, similar to those used by Ziegert et al. (2001), correlated with number of helpless spontaneous verbalizations, negative affect as reported by observers, and a decrement in perception of puzzle solving ability from pre- to post-failure?

3) Are there any group differences in confidence levels before failure is experienced?

4) Although there are no specific hypotheses, we will examine data for sex differences.

III. METHOD

Overview

The data for this study were gathered as a part of the Child Care Quality Enhancement Project (CQEP) with funding provided by a grant from the National Science Foundation (NSF # 0126584 to J. Mize). The CQEP collected data over the course of 1 ½ years, from each of 3 cohorts. The aim of the larger project was to examine factors, such as child care and family influences, that lead to school readiness. Specifically, the CQEP looks at how a child's cognitive, social, and physiological processes are related to kindergarten competence and adjustment. The approval for this study is IRB #05-133 EX 0506. As mentioned, data were collected from three cohorts of 4-year-olds enrolled in childcare, with follow up data being collected while the children were in kindergarten. Data for this study were taken from all three cohorts. This study utilizes children's responses to a staged puzzle failure situation similar to those used by Dweck (Smiley & Dweck, 1994) that was part of a procedure referred to as the Challenge Task. Children participated in the Challenge Task while enrolled in childcare in the year prior to kindergarten entrance.

Participants

Fourteen childcare centers were originally identified for participation in our study based on their previous participation in a community based program aimed at improving the quality of childcare. After contacting and informing the 14 centers of the nature of

this study, directors of the centers provided letters expressing their intention to participate. Due to distances over 30 miles from the university, two centers were not selected to participate in the study. The criterion for classroom participation was that the majority of children in the classroom would be entering kindergarten the following year. There were 17 classrooms included in Cohort 1, 16 in Cohort 2, and 14 in Cohort 3. In each year, only a subset of classrooms participated in the Challenge Task. The children from these classes are referred to as the focus sample. Selection and description of focus sample will be described in a subsequent section.

All children in the four-year-old classrooms of participating centers were eligible to be participants in the study. No differences in race or sex characteristics were found between those who chose to participate versus those who didn't. The majority of classrooms had high levels of participation, with an average rate of 81%; three of the classrooms had 100% of parents agreeing to allow their child to participate. Only one classroom had poorer participation of 44%. This classroom was not selected to be part of the focus sample.

Informed consent letters were signed by center directors and teachers, in which they agreed to participate in the study. To encourage participation, each center was offered $5 for every family and child that completed the study in full. This monetary incentive was earmarked to be used to purchase materials for the participating classrooms. For classrooms with participation rates over 75%, an additional monetary incentive was offered. Teachers were given $20 for completing questionnaires about their background, education, experience, and teaching philosophy. In addition, the teachers were given $5 for filling out each packet of questionnaires about a participating

child. Teachers were also asked to participate in a portion of the videoed Challenge Task, and were given $5 for each time they did that.

Focus sample. Due to constrains of the budget, as well as lack of staff and time, a smaller focus sample was selected from which more in-depth data could be collected that related to some of our specific research goals. Specifically, the budget did not allow for assaying of cortisol samples for all of the children and staff time did not permit conducting Challenge Tasks with all children each year. For Cohort 1, six classrooms were chosen for the focus sample, and 5 classrooms were chosen for each of Cohorts 2 and 3. The number of classrooms represented one-third of the total sample of classes participating each year. The total number of participants in the focus sample was 203 (77 in Cohort 1, 71 in Cohort 2, and 55 in Cohort 3). Out of the total number of potential participants, six children who were only enrolled at their centers in the afternoon hours and were thus unable to participate in the Challenge Task (which was conducted in the morning) were eliminated from the sample for this study. Seven children either moved out of the area or changed centers during the year before participating in the Challenge Task. After eliminating these 13 children, the final sample of Challenge Task participants included 69 in Year 1, 66 in Year 2, and 55 in Year 3 (total Challenge Task participants = 190). Children in the sample were a little over 4 years old (M = 53 months, SD = 4.25, range 36 – 67). Boys and girls were almost equally represented, with 97 boys and 86 girls. The majority of children in our sample (N = 121 or 64%) were European Americans; 24% (N = 45) were African American, and 9% (N = 17) were classified into other ethnic group.

Measures

Puzzle Task. The Puzzle Task was administered as part of a series of tasks referred to as the Challenge Task (for details of the entire Challenge Task procedure, see Appendix A). Children from the focus sample participated in the Challenge Task individually. The children were chosen to participate in the order they appeared on the list of participating children in each classroom. About 20 minutes before the Challenge Task was to begin, the child was approached and told that it was his/her turn to come and play the games, and he/she was given water to cleanse the mouth (this was to reduce contamination of the saliva samples). The child was then escorted to an area designated by the center director for the tasks to take place, usually an unused classroom. There was a table and two chairs set up for the child and the experimenter. There was a digital video camera on a tripod 8 to 10 feet away from the table which recorded all of the Challenge Task activities.

Once child was brought into the room, the experimenter explained that they would be making a movie of the child playing some games. Several tasks, in which the child won prizes, were administered before the Puzzle Task. Children were told that they could win another prize for playing the puzzle game. A *pre-puzzle perception of ability* estimate was obtained by asking the child how good they were at doing puzzles. Children were presented with a series of five cards, each with a different number of pennies glued on. The cards were described as ranging from "not good at all" at doing puzzles (represented by no pennies), to "very, very good" (represented by the card covered with pennies). Children responded by pointing to one card. The child was then shown photocopies of each of the three puzzles and was asked how many puzzles he/she

thought that he/she would be able to complete. This constituted the measure of *confidence level*. The child was then given the three puzzles to work on, one puzzle at a time. For each puzzle, the child had two minutes to work. The first two puzzles given were unsolvable, due to pieces being missing and pieces from different puzzles being substituted. After the second unsolvable puzzle, the child was given the solvable one, and was allowed to work on it until it was completed. After completing the third puzzle, all three were placed on the table in front of the child and the child was shown the penny cards again and asked how good he/she was at doing puzzles. This answer was used as the *post-puzzle perception of ability* measure. After answering, the child was shown a series of five faces, ranging from one with a big frown to one with a big smile. The child was asked how he/she had felt, while working on each of the puzzles. The child's answers were used as measures of happiness: *happy 1, happy 2* and *happy 3* for response in reference to puzzles 1, 2, and 3 respectively. The child was then asked, "If you had a lot of time now, could you finish either of these (unfinished) puzzles?" as the experimenter pointed to the two unsolved puzzles. Responses to this were coded as 0 if the child responded "no" and 1 if the child responded "yes." This answer was used as a measure of *insufficient ability attribution.* After the child responded, he/she was told that he/she could work on one of the three puzzles again, and asked which he/she would like to choose. The answers were coded as puzzle 1, 2, or 3. Puzzle choice was also recorded later by video coders, as either 1 or 2, for choosing the unsolvable or solvable puzzle, respectively. Only one child refused to choose a puzzle to work on again. There was 100% agreement between the Challenge Task researchers and the video coders, so the measure of *puzzle choice* that was used for analyses came from the video coding. After

choosing a puzzle, the child was asked to give a reason for his/her choice. This response was recorded and coded during the video coding to be used as a measure of *puzzle reason.* After providing the reason for their puzzle choice, the child was given the puzzle he/she chose to work on again. If the child had chosen an unsolvable puzzle, it was explained that an adult must have gotten the pieces confused, and the correct pieces were provided in order for the child to successfully complete it. After the child completed the puzzle, he/she was told that the prize bag would be put with their things to take home. After the Puzzle Task, children participated in one final activity with their teacher, and were then escorted back to their classroom.

For this study, children were classified as helpless or mastery-oriented based on the Smiley & Dweck (1994) procedures, as well as the Ziegert et al. (2001) criteria. In line with Smiley and Dweck, children were classified as helpless based on *puzzle choice* and *puzzle reason.* Children choosing to rework the solvable puzzle and who gave a challenge-avoidant reason were classified as helpless. Those who chose the unsolvable puzzle and gave a challenge-seeking reason or a want/like reason were classified as mastery. Ninety something percent of children gave responses that matched the aforementioned patterns. If a child's puzzle choice did not match the reason they gave, puzzle reason was used to classify the child, over puzzle choice. In addition to this dichotomous classification system, based on Ziegert et al. (2001), a continuous measure of helplessness was formed. This continuous measure allows children to be assigned a value ranging from 0 to 4, based on helpless characteristics expressed during the puzzle task. Variables used to compute this continuous measure were *puzzle choice, puzzle reason, insufficient ability attributions,* and decrement in *perception of puzzle solving*

ability from pre- to post-failure. Decrement was computed by subtracting children's pre-puzzle perception of ability from their post-puzzle perception of ability.

Puzzle Task Coding. Video tapes of the Puzzle Task were later watched and coded for several things: spontaneous verbalizations, puzzle choice, reason for puzzle choice, whether the child realized the puzzles had been manipulated, and observer rating of enjoyment and frustration during each puzzle. Reason given for puzzle choice was not written down at the time the Challenge Task was administered, so coders transcribed the reason given, and then coded reasons into one of five categories: (1) *challenge-seeking* if it showed persistence ("I think I can finish this one with a little more work"); (2) *challenge-avoidant* if puzzle was chosen due to ease of task ("Because I already know how to do it"); (3) *want/like* ("I like puppy dogs"); (4) *no reason given*; or (5) *ambiguous* if the reason contained conflicting pieces of information ("I want to try this one again because it's easy now.") The five reason categories were coded and used as the measure of *puzzle reason*. Later a new reason variable, *Dweck group,* was created to replicate Smiley and Dweck's (1994) classification system. Children who gave a challenge seeking or a want/like reason were classified as mastery and those children who gave a challenge avoidant reason were classified as helpless. The rest of the children either refused to give a reason for their choice or they gave reasons that were unclear, so they were counted as missing.

All verbalizations the children made during the Puzzle Task were coded using a system adapted by the author from Smiley and Dweck (1994). For the full coding system, see Appendix B. Each verbalization made by the child during the length of the Puzzle Task was transcribed by the coder and then assigned to one of 11 categories. *Performance Concern Statements* included remarks that reflected the child's concern with adequately

completing the puzzle, concerns over amount of time left, and snap judgments about the task such as, "I bet this one's hard," when the puzzle is presented or, "I have only gotten two pieces in so far." Two categories captured negative emotions: *Disengaged*, included trying to withdraw from the activity and/or suggesting an alternative activity such as, "I don't want to do this puzzle any more; do you want to play a different game?" and *Negative Self Evaluations* included the child's perception that he/she doesn't possess the skills to complete the task, "I don't think I'll be able to do this puzzle because of all these pieces." *Positive Self Evaluations* reflected pride or confidence in self, such as, "I'll be able to get the next one I think." The *Strategy* category included verbalizations in which the child formulated hypotheses or tactics to finish the puzzle such as, "I will put the orange pieces in first," or "This is Mickey's foot, so I'll put it at the bottom." This category also included self-motivating statements such as, "I think I know a way to fix this." The categories *Task Appropriate Difficulty* and *Task Appropriate Comments* included statements that are to be expected from a child working on a challenging task. *Task Appropriate Difficulty or Frustration* included statement such as, "this puzzle is tough," and one word interjections like "Darn." *Task Appropriate Comments and Solutions* included "I wonder where this piece goes," or "There," when fitting a piece appropriately. Comments preschoolers are expected to make that are irrelevant to the task at hand were classified as *Task Irrelevant*. This category included comments such as, "My birthday party is going to be Barbie," or "I'm hot." Utterances that could not be understood were classified as *Ambiguous*. Any instance of a child directly seeking help with the puzzle from the researcher was coded as *Seeking Help*. Some children realized that the pieces they were given were not the correct pieces for the puzzle. Each statement made that reflected the fact the child knew this was coded as

Realizes Puzzles Are Mixed Up. Coders noted whether or not the child realized the puzzles had been manipulated to be unsolvable, assigning a value of 1 if the child did know, and 2 if the child did not know.

Coders also rated children's affect on two different scales during each of the three puzzles. Children were rated on a scale from 0 to 2 on *Enjoyment* and from 0 to 2 on *Frustration.* For each scale, 0 represented no enjoyment/frustration was expressed while working on the puzzle, 1 represented some enjoyment/frustration was expressed, and 2 represented significant enjoyment/frustration was expressed.

Coder Training and Reliability. The first author and another graduate student, Robin Putnam, were responsible for coding the videos. Training began by first studying the coding manual and becoming familiar with the coding categories and the definitions of each. Three Challenge Task videos were watched together by the coders in order to practice using the coding system and identify potential sources of ambiguity. Firm rules for coding were established based on the three criterion tapes. Coders were then assigned five randomly selected videos to code independently. After coding each video, coders compared results and reached a consensus regarding any disagreements. Additional randomly-selected sets of tapes were assigned until agreement on each variable reached a criterion level of $\geq$ 80% agreement on categorical variables and r = .80 for continuous variables. A post-doc student, Jared Lisonbee, periodically performed reliability checks on randomly selected tapes to ensure reliability remained at or above the established criteria. The videos were divided evenly between each coder, with a little over 20% (N = 42) of the tapes randomly selected by Jared Lisonbee to be reliability tapes and were coded by both coders. The coders were blind to which tapes were reliability tapes. Seven of the 190 videos were unable to be coded due to

problems with the tapes, including lack of picture and lack of sound, therefore analyses were conducted with 183 children. Reliability was computed as agreement between raters on the number of each type of statement made by each child during the task. Agreement on codes ranged from adequate to excellent. The categories of disengaged, task irrelevant, and frustration 1 were lower than desired.

Table 1

Reliability of Spontaneous Statements

Spontaneous Statements	*r*	*p*	*K*
Performance Concern Statements	.89	.93	
Disengaged Statements	.46	.62	
Negative Self-Evaluation Statements	.97	.97	
Positive Self-Evaluation Statements	.82	.89	
Strategy Statements	.75	.86	
Task Appropriate Difficulty	.88	.93	
Task Appropriate Comments	.86	.90	
Task Irrelevant Statements	.55	.66	
Ambiguous Statements	.74	.84	
Help Seeking statements	.83	.85	
Realized Puzzles were unsolvable	.91	.95	
Total number of statements made	1	1	
Reason Code	.81	.89	.82
Frustration 1	.65	.77	
Frustration 2	.83	.90	
Frustration 3	.81	.82	

IV. RESULTS

Overview

Results from the analyses will be presented in 5 sections. Descriptive analyses will be presented first with subsequent sections addressing research questions posed by the study.

Descriptive Findings and Changes Across Time

Children's Elicited Responses. Data were examined and descriptive statistics were computed for each variable; these are reported in Table 2. As can be seen in Table 2, children's average perceptions of their ability were quite high before experiencing failure, indicating that they were either "very good" (4) or "very *very* good," (5) but declined after working on the three puzzles, indicating that they were between "pretty good" and "very good," on average $F(1, 188) = 57.55$, $p < .01$. Seventy-two children (about 40%) rated themselves as being less good at puzzles after than before the puzzle task. Another notable pattern in children's elicited responses was in regards to their reports of affect. On puzzles 1 and 2, children rated themselves as being somewhere between "just ok" and "a little bit happy." On puzzle three, children rated themselves between a "little happy" and "very happy." Children reported that they were significantly happier while working on puzzle three than they had been when working on puzzles one or two $F(1, 376) = 47.55$, $p < .01$.

More than half of the children (N = 109) chose to rework one of the unsolvable puzzles when given the opportunity to work on any of the three again. Slightly fewer chose to rework the solvable puzzle (N = 74). When asked to give a reason for their choice, 43 (or 25%) gave a reason coded as a challenge-seeking reason, whereas an equivalent number (N = 43) gave a challenge-avoidant reason. The remainder of the children gave a reason that could not be clearly coded as challenge-seeking or challenge-avoidant. When asked whether or not they could complete the unsolvable puzzle if they had more time, most (N = 159, about 87%) said yes. See Table 3.

Table 2

Descriptive Statistics for Responses Elicited During the Puzzle Task

Elicited Responses	*M*	*SD*	Minimum & Maximum	*N*
Pre-Puzzle Perception of Ability [a]	4.14	.85	1 – 5	189
Post-Puzzle Perception of Ability[a]	3.49	1.24	1 – 5	190
Confidence Level[b]	2.42	.81	1 – 3	190
Happy 1[c]	.87	1.38	-2 – 2	190
Happy 2[c]	.70	1.44	-2 – 2	189
Happy 3[c]	1.70	.82	-2 – 2	190

Notes:

[a] Response to the questions "How good are you at solving puzzles?" before and after task

[b] Response to question "How many puzzles do you think you can complete?"

[c] How happy children reported being while working on puzzles 1, 2, & 3, respectively

Table 3

Numbers and Percents of Children as a Function of Group Membership

	N	%
Puzzle Choice		
Unsolvable	109	57
Solvable	74	39
Original Reason Code		
Challenge-Seeking	43	23
Challenge-Avoidant	43	23
Want/Like	47	26
Ambiguous	8	4
No Reason	29	16
Ability Attributions		
Could Do With More Time	159	84
Could Not Do With More Time	31	16
Dweck Group Reasons		
Challenge-Seeking or Want/Like	90	49
Challenge-Avoidant	43	23

Children's Spontaneous Verbalizations. Table 4 shows that there was significant variation in the amount of children's spontaneous speech during the puzzle task. Some children (20 or about 10%) said nothing during the course of the task, whereas approximately 10% made 50 or more statements. Almost half of the statements were coded as being task appropriate comments, such as "I wonder where this piece goes."

Table 4

Descriptive Statistics for Children's Spontaneous Verbalizations During the Puzzle Task

Spontaneous Statements	*M*	*SD*	Minimum & Maximum
Performance Concern Statements	1.39	2.39	0 – 15
Disengaged Statements	0.34	1.98	0 – 22
Negative Self-Evaluation Statements	1.89	3.68	0 – 32
Positive Self-Evaluation Statements	1.21	2.03	0 – 10
Strategy Statements	0.91	2.15	0 – 16
Appropriate Difficulty	1.42	2.81	0 – 20
Task Appropriate Comments	6.93	10.34	0 – 74
Task Irrelevant Statements	0.77	1.73	0 – 12
Ambiguous Statements	1.47	2.26	0 – 11
Help Seeking Statements	1.44	2.45	0 – 15
Realized Puzzles were Unsolvable	0.81	1.63	0 – 8
Total Number of Statements Made	18.59	20.32	0 – 100

Note: Means are the average number of verbalizations of a given category made by children while working on the puzzles

Most children ($N = 127$) made no statements to indicate that they realized the puzzles were unsolvable due to missing or incorrect pieces, but coders judged that 33 children clearly caught on or were aware of the deception. Analyses were done to determine whether children differed on any other study variables as a function of whether

or not they realized the puzzles had been manipulated to be unsolvable. These analyses revealed few significant differences. The 33 children who were classified as having caught on made more spontaneous statements during the Puzzle Task that indicated awareness of the manipulation than did those who were not classified as having caught on (*M*s = 1.40 and 1.75, respectively, $t(180) = 2.03$, $p < .05$). Those who were classified as having caught on were more likely to give a challenge-seeking rather than challenge-avoidant reason for their choice $X^2(1, N = 133) = 4.50$, $p < .05$), and they also tended to complete the third puzzle in less time than it took those who didn't catch on (*M*s = 1.40 and 1.75, respectively, $t(180) = 16.18$, $p < .05$). There were no other differences found as a function of realizing the puzzles were unsolvable.

Sex, Race, Age, and SES Effects

Data were examined for sex and race differences and for associations with age and SES. Only two sex differences was found, with boys making more performance concern statements than did girls (*M*s = 1.75 and .87, respectively, $t(181) = 2.61$, $p < .05$) and being rated as being more frustrated on puzzle two than were girls (*M*s = .33 and .16 for boys and girls, respectively, $t(181) = 2.26$, $p < .05$).

Several associations were found with age. Older children made more statements indicating awareness that the puzzles were unsolvable ($r = 0.17$, $p < .05$), but fewer negative self-evaluation comments ($r = -.17$, $p < .05$), fewer statements or questions seeking help from the researcher ($r = -0.16$, $p < .05$), and fewer statements coded as task appropriate difficulty ($r = -.17$, $p < .05$). Older children were less frustrated relative to younger children while working on puzzle three, according to video coders ($r = -0.16$, $p < .05$).

Ethnic group differences were found for only two measures: pre-puzzle perception of ability $F(2,179) = 7.18$, $p < .01$, and post-puzzle perception of ability $F(2,179) = 8.40$, $p < .01$. Post hoc tests revealed that African Americans rated themselves as significantly better at doing puzzles before and after the puzzle task (*M*s = 4.55 and 3.98, respectively) than did European American children (*M*s = 4.06 and 3.32, respectively) and children in the other ethnic-group category (*M*s = 3.53 and 3.06, respectively). European American children rated themselves higher than children in the other ethnic group category at pre, but not post-puzzle perceptions of ability. Children from lower SES families rated themselves as better at doing puzzles both at pre-puzzle assessment $r = -.31$, $p < .001$, and at the post-puzzle assessment, $r = -.21$, $p < .05$. Because SES was associated with ethnic group, an analysis of covariance was computed to determine the potential ethnic differences in perceptions of puzzle solving ability while controlling for SES, $F(2,136) = 20.54$, $p < .001$. There was still a significant effect for ethnic-group membership $F(1,112) = 6.99$, $p < .01$, on pre-puzzle perception of ability, but not on post-puzzle perception of ability $F(1,112) = 1.97$, ns.

Associations Among Measures

Associations Among Spontaneous Verbalization Codes and Frustration Ratings

Individual types of spontaneous verbalizations were modestly to moderately correlated (See Table 5). Correlation coefficients ranged from -.04 to .47, with a median of .21. Of the 55 possible associations among the individual spontaneous verbalization codes, 37 were statistically significant. Based on rational considerations, the pattern of intercorrelations, and internal consistency checks, a composite was computed to provide a more reliable index of children's verbalized concern about the puzzles or performance

on the task. This composite consisted of the sum of spontaneous verbalizations coded as performance concern, disengaged, negative self, task appropriate difficulty, and seek help ($\alpha = .61$). The variable *percent negative statements* was computed by dividing this sum by the total number of statements made. The individual spontaneous verbalization codes also were retained for analyses.

Ratings of frustration also tended to be positively associated with the individual spontaneous verbalization codes. This is understandable given that the same coders were responsible for both sets of judgments. Of 33 possible correlations between frustration ratings and individual spontaneous verbalization codes, 19 were significant; most of the significant associations between frustration rating and verbalization codes (12 of 19) were with codes reflecting concern about performance.

Associations Among Elicited Responses

As can be seen in Table 6, children's reports of how happy they felt while working on each of the puzzles were significantly intercorelated, as were their reports of how good they were at puzzles prior to and after working on the puzzles. Children's reports of happiness and reports of how good they were at puzzles were not significantly associated, with one exception; children who were happier during puzzle three reported being better at doing puzzles at the post-puzzle probe. Children's pre-puzzle confidence level (predictions of how many puzzles they could complete) also were not correlated with reports of happiness or how good they were at doing puzzles, with one exception; children who reported more confidence prior to doing the puzzles said they were happier while completing puzzle three.

Table 5

Correlations Among Spontaneous Verbalizations and Ratings of Frustration

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. PC	-	.19*	.31**	.36**	.38**	.23**	.41**	.16*	.34**	.25**	.01	.59**	.18*	.11	.33**	.18*
2. Dis		-	.11	.04	.00	.12	.02	.15*	.10	.38**	-.02	.24	.18*	.17*	.19*	.36**
3. NgSlf			-	.10*	.20**	.28**	.26**	.10	.21**	.32**	.10	.51**	.31**	.25**	.26**	.20**
4. PsSlf				-	.38**	.16*	.39**	.33**	.36**	.26**	.15*	.55**	-.06	-.14	.04	-.04
5. Strat					-	.17*	.61**	.17*	.42**	.22**	.14	.67**	-.08	.09	.17*	.07
6. AppDff						-	.14	.08	.31**	.22**	.09	.41**	.31**	.34**	.38**	.44**
7. AppCm							-	.25**	.46**	.27**	.16*	.85**	-.15*	.06	.18*	.16*
8. Irr								-	.47**	.43**	.04	.43**	-.04	.05	.01	-.01
9. Ambig									-	.36**	.18*	.66**	-.04	.21**	.29**	.19*
10. Help										-	-.04	.54**	.29**	.12	.19*	.34**
11. Rlz											-	.24**	-.11	.08	.12	.07
12. TtlNm												-	.06	.20**	.33**	.30**
13. PctNg													-	.27**	.25**	.24**
14. Frus 1														-	.59**	.32**
15. Frus 2															-	.52**
16. Frus 3																-

* $p < .05$, ** $p < .01$

PC – Performance Concern; Dis – Disengaged; NgSlf – Negative Self Evaluations; PsSlf – Positive Self Evaluations; Strat – Strategies; AppDiff – Task Appropriate Difficulties; AppCm – Task Appropriate Comments; Irr – Task Irrelevant; Ambig – Ambiguous; Help – Seeking Help; Rlz – Realized Puzzles were Mixed Up; TtlNm – Total Number of Statements Made; PctNg – Percent of Negative Statements; Frus 1 – Rated Frustration on Puzzle 1; Frus 2 – Rated Frustration on Puzzle 2; Frus 3 – Rated Frustration on Puzzle 3

Table 6

Correlations Among Elicited Responses During Puzzle Task

	1	2	3	4	5	6
1. Happy 1[a]	--	.43**	.19*	-.07	.07	-.02
2. Happy 2[a]		--	.19*	-.02	.03	.02
3. Happy 3[a]			--	.03	.22**	.17*
4. Pre-Puzzle Ability[b]				--	.41**	.07
5. Post-Puzzle Ability[b]					--	.02
6. Confidence Level[c]						--

Notes:

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

a How happy children reported being while working on puzzles 1, 2, and 3

b How good children reported being before and after failure

c How many puzzles children said they could complete before the task began

Table 7

Means of Variables Based on Dweck Groups

Variables	Helpless[a] n = 43	Mastery[b] n = 90
Elicited Responses		
Pre-Puzzle Perception of Ability	4.21	4.20
Post-Puzzle Perception of Ability	3.47	3.64
Confidence Level	2.51	2.50
Happy 1	0.58	0.87
Happy 2	0.67	0.59
Happy 3	1.77	1.69
Insufficient Ability Attribution	0.81	0.82
Puzzle Choice	1.95	1.21
Spontaneous Verbalizations		
Performance Concern	1.63	1.34
Disengaged	0.02	0.51
Negative Self Evaluation	1.70	2.10
Positive Self Evaluation	1.65	1.31
Strategy	0.98	1.16
Task Appropriate Difficulty	0.98	1.40
Task Appropriate Comment	5.49*	9.38*
Task Irrelevant	0.88	0.90
Ambiguous	1.37	1.63
Seeking Help	1.34	1.87
Realized Puzzles Were Manipulated	0.72	1.00
Total Number of Statements	16.58	22.64
Percentage of Negative Statements	0.35	0.32
Frustration Ratings		
Frustration 1	0.21	0.20
Frustration 2	0.26	0.24
Frustration 3	0.02*	0.18*

Note: Means in the row are significantly different

[a] Helpless group includes all children who gave a challenge-avoidant reason

[b] Mastery group includes all children who gave a challenge-seeking *or* a want/like reason

Do children classified as helpless and mastery-oriented by Dweck procedures differ on responses to challenge?

In order to replicate the procedures of Smiley and Dweck (1994), we categorized children's responses to the question, "why did you choose that puzzle?" into two categories: mastery-oriented and helpless. This variable became *Dweck group.* Following Smiley and Dweck, the mastery-oriented category consisted of children who gave a clear challenge reason and children who indicated their choice was based on wanting or liking the particular puzzle ($N = 90$, see Table 2). The helpless category consisted of children who gave a clear no challenge response ($N = 43$). Children who gave no response to the question or whose reason was ambiguous were not included in this set of analyses. *T*-tests and X^2 analyses were computed to examine differences on spontaneous verbalizations and elicited responses as a function of membership in the Dweck groups. Means were computed for elicited responses, spontaneous verbalizations, and frustration ratings by mastery-oriented and helpless groups and are presented in Table 7. Two significant differences, barely more than would be expected by chance, were revealed. Mastery-oriented children who gave a challenge reason made more task appropriate comments, $t(124.37) = 2.20$, $p < .05$, and were rated as more frustrated during puzzle three by the video coders, $t(123) = 2.98$, $p < .01$. Finally, Table 8 shows that children who were classified as mastery-oriented were more likely to have chosen one of

the unsolvable puzzles when given a chance to work on one puzzle again X^2 (1, N = 133) = 64.77, $p < .001$.

Table 8

Dweck Group by Puzzle Choice

	Puzzle Choice		
Dweck Groups	Unsolvable	Solvable	Total
Mastery-Oriented	71	19	90
Helpless	2	41	43
Total	73	60	133

X^2 (1, N = 133) = 64.77, $p < .001$

Note: Mastery-Oriented children are those who gave a challenge-seeking or a want/like reason; Helpless children are those who gave a challenge-avoidant reason

To determine whether or not children classified as mastery-oriented or helpless differed in the pattern of self reports of how good they were at doing puzzles and self reports of how happy they were while doing each of the three puzzles, repeated measures multivariate analyses of variance were computed in which the Dweck reason served as the between-subjects factor. Replicating effects reported previously, in both analyses there was a main effect for time of assessment; however, there was no time by reason interaction. Children reported that they were less good at doing puzzles at the second probe than on the first probe $F(1, 131) = 39.65$, $p < .01$, but this pattern did not differ for children who were classified as mastery-oriented compared to children classified as

helpless by the Dweck criteria $F(1, 131) = .84$, ns. Similarly, children's happiness varied over the three happiness probes $F(2, 130) = 41.88$, $p < .01$, but the pattern did not differ as a function of Dweck group membership $F(2, 130) = 1.13$, ns. Specifically, children reported significantly greater happiness while doing the third puzzle than while doing puzzles one or two. See Table 2.

Associations with Continuous Measure of Helplessness

To examine whether our continuous measure of helplessness, based on Ziegert et al., was associated with children's spontaneous verbalizations and negative affect as reported by the coders, Pearson product-moment correlations were computed. It may be recalled that a composite continuous measure of helplessness based on the Ziegert et al. procedures was computed from children's puzzle choice, puzzle reason, insufficient ability attribution, and decrement in perceptions of puzzle solving ability. Specifically, children were assigned one point for each one of the following four conditions that they met: (a) they chose to work on the solvable puzzle; (b) their reason for choice was coded as no challenge; (c) they reported that they would not be able to complete the unsolvable puzzles if given more time; and (d) they reported being less good at puzzles at the second probe than they had on the first probe. Scores on the continuous measure ranged from 0-4, with a mean of 1.20, $SD = 1.11$. Over 1/3 of the children (34%) had scores of 0, with more than half having scores of 1 or less (62%). Only one significant correlation was found, with children who had higher scores on the continuous measure of helplessness making fewer task appropriate comments $r = -.12$, $p < .05$. Analyses of using perceptions of ability, puzzle choice, puzzle reason and attributions were not appropriate because each of these variables had been used to create the composite.

Explorations Using Different Bases of Grouping

Because neither the Smiley and Dweck method nor the Ziegert et al. method of identifying children as helpless or mastery-oriented resulted in strong patterns of differences, we examined other ways of classifying children. All children could be classified based on their puzzle choice and on their responses to the question "Could you do the (unsolvable) puzzles if you had more time?" We conducted analyses using these two grouping systems.

Differences as a function of puzzle choice. Tables 9 presents results of X^2 analyses of reason as a function of puzzle choice, and Table 10 presents X^2 analyses of attributions as a function of puzzle choice. Table 9 shows that children who chose to rework the unsolvable puzzle were more likely to give a challenge-seeking reason than were children who selected the solvable puzzle. Table 10 shows that children who chose an unsolvable puzzle were highly likely (nine times more likely) to say that they could finish the unsolvable puzzles if given more time. Children who selected the solvable puzzle were only somewhat more likely (about two and a half times as likely) to say they could finish the unsolvable puzzles if given more time.

Table 9

Children's Reason for Puzzle Choice as a Function of Puzzle Choice

	Puzzle Choice		
Reason	Solvable	Insolvable	Total
Challenge Seeking	1	42	43
Challenge Avoidant	41	2	43
Want/Like	18	29	47
Other	14	36	50
Total	74	109	183

X^2 (3, N = 183) = 83.06, p < .001

Table 10

Children's Attributions for Failure as a Function of Puzzle Choice

	Puzzle Choice		
Insufficient Ability Attributions	Unsolvable	Solvable	Total
Could not do with more time	11	20	31
Could do with more time	98	54	152
Total	109	74	183

X^2 (1, N = 183) = 8.98, p < .01

Note: Attributions were indexed by children's reports of whether they could finish unsolvable puzzles if given more time.

A series of *t*-tests examined differences on children's spontaneous verbalizations, video coders' ratings of frustration, and elicited responses to the researchers' probes (happy ratings and ratings of how good they were at doing puzzles) as a function of puzzle choice. No significant difference were found on any spontaneous verbalization, but differences were found on happiness ratings for puzzle one $t(181) = 2.23$, $p < .05$ and on frustration during puzzle three $t(181) = 2.13$, $p < .05$. Children who selected one of the unsolvable puzzles were rated as being more frustrated on puzzle three than were children who selected the solvable puzzle. However, children choosing an unsolvable puzzle reported being happier while working on puzzle one than did children who selected the solvable puzzle. See Table 11.

Table 11

Means of Variables Based on Puzzle Choice

Variables	Unsolvable n = 109	Solvable n = 74
Elicited Responses		
Pre-Puzzle Perception of Ability	4.11	4.15
Post-Puzzle Perception of Ability	3.50	3.40
Confidence Level	2.43	2.45
Happy 1	1.06*	0.63*
Happy 2	0.72	0.68
Happy 3	1.66	1.71
Spontaneous Verbalizations		
Performance Concern	1.50	1.09
Disengaged	0.31	0.34
Negative Self Evaluation	2.00	1.50
Positive Self Evaluation	1.14	1.30
Strategy	0.97	0.81
Task Appropriate Difficulty	1.64	1.08
Task Appropriate Comment	7.76	5.55
Task Irrelevant	0.62	1.00
Ambiguous	1.46	1.36
Seeking Help	1.43	1.45
Realized Puzzles Were Manipulated	0.77	0.88
Total Number of Statements	19.65	16.36
Percentage of Negative Statements	0.32	0.34
Frustration Ratings		
Frustration 1	0.21	0.18
Frustration 2	0.28	0.20
Frustration 3	0.17*	0.05*

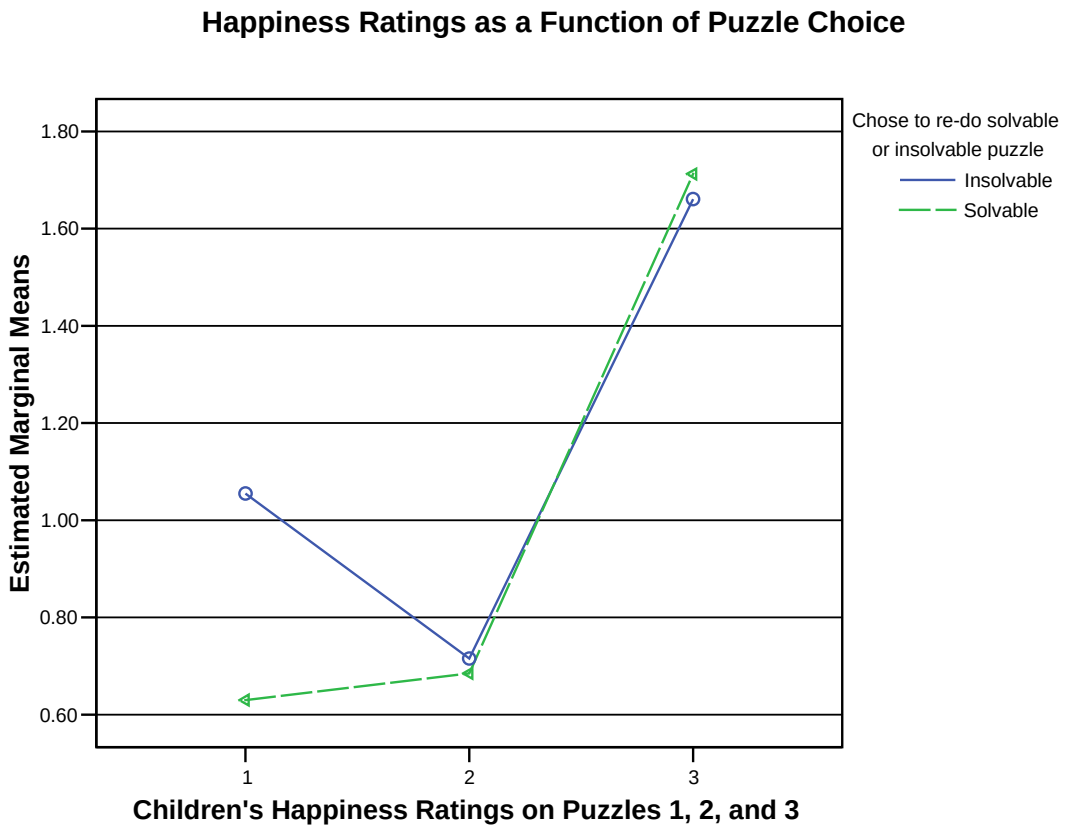
Note: Means in the row are significantly different at $p < .05$

To determine whether or not children who selected an unsolvable puzzle versus the solvable puzzle differed in the pattern of change on self reports of how good they were at doing puzzles and self reports of how happy they were while working on each of the three puzzles, repeated measures multivariate analyses of variance were computed in which puzzle choice served as the between subjects factor. Replicating previously reported results, there was a main effect of time of assessment on children's ratings of perception of puzzle solving ability $F(1, 180) = 58.13$, $p < .001$, but no effect of puzzle choice or puzzle choice by time of assessment interaction. Children rated themselves as being better at doing puzzles before than after puzzles (see Tables 2 and 11).

For the multivariate analysis of happiness ratings there was not a significant effect of puzzle choice on happiness ratings $F(1, 180) = .98$, ns. Consistent with previous analyses, there was a significant linear $F(1,180) = 59.37$, $p < .001$ and a significant quadratic $F(1, 180) = 31.86$, $p < .001$ effect of time of assessment, as seen in Figure 2. Of more interest, there also was a significant linear puzzle choice by happiness ratings (on puzzle 1, 2 and 3, the slopes of the lines were significantly different for the children who chose the solvable versus unsolvable puzzle) interaction, $F(1, 180) = 4.97$, $p < .05$. Follow-up contrasts indicated that there were significant within-subject effects of puzzle (puzzle on which happiness was rated) for both groups, for children who selected the solvable puzzle $F(2, 144) = 21.97$, $p < .01$ and for children who selected one of the unsolvable puzzles $F(2, 216) = 24.44$, $p < .001$. Children who selected the solvable puzzle reported being significantly happier during puzzle three than during puzzle one, $F(1, 72) = 30.25$, $p < .001$, or puzzle two $F(1, 72) = 35.13$, $p < .001$, but there was no difference between their reported happiness during puzzles one and two $F(1, 72) = .09$,

ns. Children who selected one of the unsolvable puzzles reported being happier during puzzle three than during puzzle one, $F(1, 108) = 24.80$, $p < .001$, or puzzle two $F(1, 108) = 40.48$, $p < .001$, and also reported being significantly less happy during puzzle two than during puzzle one, $F(1, 108) = 5.94$, $p < .05$. Mean happiness ratings as a function of puzzle choice are presented in Table 11 and are displayed graphically in Figure 2.

Figure 2



Differences as a function of insufficient ability attributions. The final way we examined children's responses to failure was by grouping them according to whether or not they blamed their failure to complete the unsolvable puzzles on lack of ability or not.

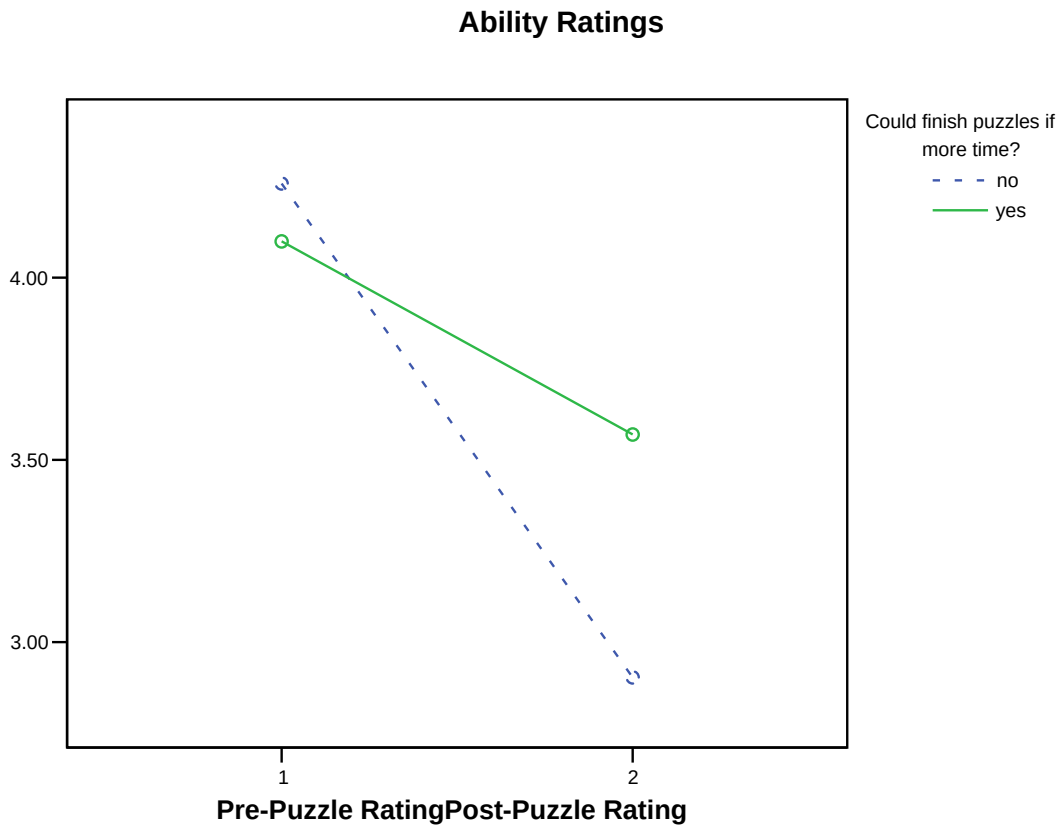
This was operationalized by asking the children, "If you had a lot more time right now, do you think you could finish either of these two (unfinished) puzzles?" A "yes" response was interpreted as indicating that children did not attribute failure to insufficient ability. The children who did not think they could finish the puzzles with more time (n = 31) were assumed to believe they were not good at doing puzzles, and those children were classified as helpless. It would be reasonable to assume that children who caught on to the deception would answer that they could not complete the puzzles if given more time. We conducted a chi-square analysis to examine this possibility. There was no association (X^2 (1, N =183) = .09) between children's attributions and whether or not they caught on. Of the 33 children who caught on to the deception, 28 said they could complete puzzles if given more time, whereas 5 (15%) said they could not. This is comparable to the proportion of children in the sample, as a whole, who said they could not complete the unsolvable puzzles if given more time (17%).

Several significant differences were found as a function of children's attributions, see Table 12. After experiencing failure, the 31 children who said they could not finish the unsolvable puzzles if given more time reported being significantly less good at doing puzzles than the children who said they could (Ms = 2.90 and 3. 61, for helpless and mastery kids, respectively, $t(181) = 2.95$, $p < .01$, and were less happy on puzzle one $t(181) = 2.59$, $p < .05$.

Changes in happiness ratings over the three puzzles and in ability ratings before and after the puzzles were explored using repeated measures analyses of variance in which attributions served as the between group factor. Consistent with previous analyses, there was a significant within subjects effect on ability ratings, F (1,180) = 69.47, $p <$

.001 but here was no between group effect, F (1, 180) = 13.31, $p < .001$. As shown in Table 12, and figure 3, the 31 children who attributed failure to low ability (i.e., said they could not finish puzzles with more time) on average dropped in ratings of ability by over one scale point, whereas children who did not make low ability attributions dropped in their ratings of ability by only about half a point, on average.

Figure 3



For the analysis of happiness ratings, mirroring previously reported results, there was a main effect of puzzle (i.e., which puzzle children rated, see Table 2). There also was a main effect for group, F (1, 180) = 5.75, $p < .02$, with children who said they could not complete an unsolvable puzzle with more time being, on average, less happy than

children who said they could complete puzzles with more time (see Table 12). There was neither a linear, F (1, 180) = 2.34, *ns*, nor a quadratic, F (1,180) = .79, *ns*, puzzle by group interaction, however.

Attributions group effects on spontaneous verbalizations were examined with *t*-tests and these revealed only one effect. Children who attributed failure to low ability (said they could not finish the puzzles with more time) made fewer than half as many positive self statements as did children who said they could finish the puzzles with more time $t(80.46) = 2.63$, $p < .05$.

The attribution groups also differed in puzzle choice, as reported in the previous section on puzzle choice. Children who attributed failure to low ability were more likely to choose to do the solvable puzzle (see Table 9). There was no association between children's attributions and the reason they gave for puzzle choice, classified according to the Dweck reason group, X^2 (1, N = 133) = .01, *ns*.

Table 12

Means of Variables Based on Ability Attributions

Variables	Perceived Low Ability n = 31	Perceived High Ability n = 159
Elicited Responses		
Pre-Puzzle Perception of Ability	4.26	4.11
Post-Puzzle Perception of Ability	2.90*	3.61*
Confidence Level	2.42	2.44
Happy 1	0.29*	0.98*
Happy 2	0.48	0.74
Happy 3	1.45	1.74
Spontaneous Verbalizations		
Performance Concern	1.29	1.41
Disengaged	0.77	0.25
Negative Self Evaluation	2.29	1.81
Positive Self Evaluation	0.61*	1.33*
Strategy	0.84	0.92
Task Appropriate Difficulty	1.32	1.44
Task Appropriate Comment	5.39	7.25
Task Irrelevant	0.61	0.80
Ambiguous	1.03	1.56
Seeking Help	1.39	1.45
Realized Puzzles Were Manipulated	0.77	0.82
Total Number of Statements	16.35	19.04
Percentage of Negative Statements	0.33	0.32
Frustration Ratings		
Frustration 1	0.16	0.20
Frustration 2	0.32	0.24
Frustration 3	0.19	0.12

Note: Means in the row are significantly different at $p < .05$

Summary of Findings

Four methods were used to classify children into helpless and mastery-oriented groups. The associations with achievement orientation as defined by these four methods are summarized in Table 13. Table 14 shows the overlap of children classified by each group.

Table 13

Effects of Helpless and Mastery-Orientations Using Four Systems of Identifying Achievement Orientations

Dweck Group[1]	Ziegert/Continuous Helpless Score[2]	Puzzle Choice[3]	Ability Attributions/ More Time[4]
M > H task appropriate comments	M score correlated with task appropriate comments	M > H challenge reason	M > H Ability Ratings at Post
M > H frustration 3		M < H inability attributions (could not finish with more time)	M > H Happy 1
M > H select unsolvable puzzle		M > H frustration 3	M > H positive self statements
		M > H Happy 1	M < H select solvable puzzle
		M Happy 1 > Happy 2	
		M Happy 3 > Happy 2 or Happy 1	
		H Happy 3 > Happy 2 or Happy 1	

[1] Dweck Groups: Mastery – gave a challenge-seeking or a want/like reason; Helpless – gave a challenge-avoidant reason

[2] Ziegert/Continuous Helpless Score: Received 1 point (range from 0-4) for each: puzzle choice, reason, insufficient ability attributions, and decrement in perception of puzzle solving ability from pre- to post-failure; higher scores indicate more helpless

[3] Puzzle Choice: Mastery – choosing to rework the unsolvable puzzle; Helpless – choosing to rework the solvable puzzle

[4] Ability Attributions/More Time: When asked "Could you finish the (unsolvable) puzzles with more time?" Mastery – children said "yes;" Helpless – children said "no"

M = Mastery Orientation

H = Helpless Orientation

Happy 1,2, and 3 reflects how happy children reported being while working on puzzles 1, 2, and 3, respectively

Frustration1, 2, and 3 reflects coders report of how frustrated children were on puzzles 1, 2, and 3, respectively

Ability Ratings at post is how good children said they were at doing puzzles

Table 14

Overlap Between Four Classification Systems

Dweck Reason			**Ziegert Helplessness Ratings**					
Challenge or Like/want	**Puzzle Choice**	**More Time**	0	1	2	3	4	**Row Totals**
	Insolvable	Could do with more time	44	18	0	0	0	62
		Could not do with more time	0	2	7	0	0	9
	Solvable	Could do with more time	0	9	3	0	0	12
		Could not do with more time	0	0	5	2	0	7
Avoid Challenge	Insolvable	Could do with more time	0	1	1	0	0	2
		Could not do with more time	0	0	0	0	0	0
	Solvable	Could do with more time	0	0	20	13	0	33
		Could not do with more time	0	0	0	5	3	8
		Column Totals	44	30	36	20	3	Grand Total = 133

V. DISCUSSION

This study provides evidence that 4-year-old children from a wide range of backgrounds vary in their responses to challenging situations. After experiencing failure, many children responded by electing to continue working on one of the puzzles they had been unable to solve, minutes earlier. However, a significant proportion, about 40%, made the choice to rework the puzzle they had already completed successfully. Children who elected to rework the easy puzzle, that they already knew they could complete, were likely to explain their choice as being based on a desire to avoid failure. A common reason given by children who chose the solvable puzzle was, "because I already know how to do that one," or "because those two (indicating the unfinished puzzles) are too hard." These children were also more likely to attribute their failure on the unsolved puzzles to low ability, as evidenced by reporting they would not be able to complete the unsolvable puzzles even if they were given more time to work on them. It is notable to add that no differences in confidence level were found before experiencing failure, so any associations found do not reflect differences in expectations for success.

Although two other studies have identified helpless patterns in young children, this study is notable for at least two reasons. First, children in this study were younger than those in previous studies. The children studied by Smiley and Dweck (1994) were 5-years old (average age 60 months) and children studied by Ziegert et al. (2004) were almost 6 (average age 70 months). The children in this study, however, were just over 4-

years-old (average age 53 months). Also unlike the other studies, which included mainly children from middle- and upper-middle-class European-American families, this study included substantial numbers of low-income families of European-American, African-American, and other ethnic backgrounds. The current study suggests that patterns of helpless and mastery orientation can be found in children from a wide range of backgrounds.

This study also suggests, however, that there may be ethnic group differences in how young children see themselves in achievement situations. We found that African Americans tended to view themselves as better at doing puzzles both before and after experiencing failure than did European American children and children of other ethnic groups. This difference remained at pretest, even after controlling for SES. In contrast, Smiley and Dweck (1994) and Ziegert et al. (2004) report no ethnic group differences on any measure, perhaps reflecting the lack of diversity within their samples. Our study is consistent with some other research showing that African American youngsters rate their own abilities highly (Stevenson, Chen, & Uttal, 1990) and have optimistic views of their life chances (Steinberg, Dornbusch, & Brown, 1992).

We did not examine changes from pre- to post-failure as a function of ethnic group differences, however. To our knowledge, no study with a sufficient sample size to detect potential ethnic group differences has yet conducted such analyses. Cross cultural studies suggest that ethnic groups differ in the extent to which they endorse effort versus ability as explanations for academic success and failure, with Asian children and parents giving greater weight to effort as an explanation for success in achievement situations (Chen & Stevenson, 1995; Stevenson, Lee, et al., 1990). According to Dweck's theory of

achievement beliefs, Asian students should be less likely to give up and should experience a less precipitous decline in perceptions of ability following failure than either African American or European American children.

Our data were not coded in such a way to make it possible for us to identify Asian children, although it is believed that most children coded as "other" were Asian. Future work with these data should more precisely identify ethnic group membership and conduct analyses of changes in happiness and ability ratings as a function of ethnic group.

This study also demonstrated that children had wide variation in their levels of spontaneous speech during the puzzle task and that individual categories of spontaneous verbalizations were associated with one another. Children's spontaneous speech tended to reveal a particular pattern of thinking. Some children clearly expressed many thoughts of concern over their performance or their ability where other children seemed to be unconcerned about the outcome of the task. Individual codes were associated with coders' ratings of children's frustration during the task, with children expressing more concern over their performance also being rated as more frustrated. However, there were few differences in spontaneous speech codes as a function of helplessness regardless of which system of identifying helpless children was used. Two differences as a function of spontaneous speech were found. Mastery children, as define in the Dweck system and in the continuous/Ziegert system, made more task appropriate comments, a pattern that is perhaps due to chance. A more meaningful difference in spontaneous verbalizations was found when ability attributions were used as the discriminator. Mastery-oriented children

(i.e., children who said they could finish the puzzles with more time) made more positive self statements while working on the puzzles than the helpless children did.

Determining the Most Appropriate Means of Classification

The primary purpose of this study was to examine convergent validity among measures used to identify achievement orientations in young children in order to identify the most meaningful way of classifying, or of scoring, children on helpless and mastery-orientations. Two classification systems that had been used in previous research and two new systems were explored. The new systems were based on (1) puzzle choice and (2) children's attributions for their failure. The following sections will discuss study findings according to each system and will speculate on reasons for differences found.

Smiley and Dweck (1994) used children's explanation for their puzzle choice to classify them into groups that reflected achievement orientations. Those children who gave a challenge-seeking reason or a want/like reason for their puzzle choice were considered to be mastery-oriented, and those who gave a challenge-avoidant reason were classified as helpless. In this study, when we classified children using puzzle reason we found that 24% were classified as helpless, in contrast to previous research which found between 43% and 47% (Smiley & Dweck, 1994; Ziegert et al., 2004). Consistent with Smiley and Dweck's findings, children classified as mastery-oriented were more likely to choose to rework the unsolvable puzzle and rated their puzzle solving ability as higher than did the helpless children after experiencing failure. Smiley and Dweck found that children classified as helpless reported being less happy during the puzzles. Although we found no differences in child reported happiness while working on the puzzles, coders did rate the mastery-oriented children as being more frustrated while working on the third

puzzle than they rated helpless children. Although this finding at first seems counter intuitive, considering one of the findings presented by Ziegert et al. may provide a partial explanation. Ziegert et al. found that mastery-oriented children tend to have higher levels of initial puzzle solving ability. Although we did not examine differences in levels of initial ability, it may be that those same patterns exist in our sample. If so it may be that those children are accustomed to success, and after experiencing two failures in a row the mastery children may become more frustrated than the helpless children.

The fact that children in our study who were classified as helpless using puzzle reason, like Smiley and Dweck (1994), were more likely to select the solvable puzzle offers some convergent validity for children's reasons as a measure of achievement motivation. On the other hand, the failure to replicate many of the differences observed by Smiley and Dweck undermines confidence in this system of classifying children. Specifically, unlike Smiley and Dweck, we found no difference in happiness ratings, ability ratings post failure, no changes over the course of the puzzles in happiness or ability ratings, no meaningful differences in spontaneous verbalizations, and no differences in attributions. The fact that only 15% of Smiley and Dweck's sample could not be classified based on puzzle reason, whereas 27% of our children could not lends credence to this interpretation.

We found that almost all children who gave a clear and precise reason for their choice also chose the puzzle that matched their reason. For example, most children who chose the solvable puzzle gave a reason such as "because it's the easiest" or "I already know how to do it." On the other hand, for children who chose the unsolvable puzzle, their reasons were along the lines of "because I almost had it; I just need a little more

time." This pattern is similar to that observed by Smiley and Dweck, who also report a high degree of consistency between puzzle choice and these reason. Almost half (47%) of the children in our sample gave a clear challenge-seeking or challenge-avoidant reason for their choice. The remainder of the children gave less precise reasons. Almost 26% of our sample gave reasons such as "because I like Mickey Mouse" or "because I want to." The children in our sample who gave a reason along these lines, a want/like reason, were almost evenly split between the two puzzle choices. The children in Smiley and Dweck's sample who gave a want/like reason, on the other hand, almost always chose the unsolvable puzzle (13 of 19).

As can be seen by looking at patterns of puzzle choice in regards to the want/like reason in our sample, using puzzle reason may not have been the best method of classification. Children in our study who gave a want/like reason for their choice may have been inaccurately classified as mastery-oriented, when in actuality they may have been a mix of helpless and mastery-oriented children. The children in our sample, being younger, may have been less able to articulate the basis of their choice or were not able to give reliable reasons.

Judging by the associations with other measures, the Ziegert/continuous measure may be even less useful for classifying children. It must be remembered, however, that the four most powerful indicators were used to form the Ziegert composite, leaving only happiness ratings, frustration ratings, and spontaneous verbalizations to examine as possible correlates. It also should be remembered that Ziegert et al. used the continuous measure as a predictor of future helplessness, and did not report concurrent associations. Future research with this data set should examine the Ziegert/continuous scores of

helplessness as predictors of adjustment to kindergarten and stress responses to the challenge task.

Using puzzle choice as an alternative classification system yielded more significant associations with other indicators. Using puzzle choice as the discriminator, mastery-oriented children (those who chose an unsolvable puzzle) were more likely to offer a challenge-seeking explanation for their choice, reported being happier while working on puzzle one, received higher frustration ratings on puzzle three, and were less likely to attribute their failure to low ability (i.e. were more likely to say they could finish the unsolvable puzzles with more time). These associations with puzzle choice provide some evidence of convergent validity. In particular, the associations with reason and ability attributions provide some evidence of convergent validity for puzzle choice as an index of achievement orientation.

Mastery and helpless children also evidenced different patterns of change in feelings of happiness across the three puzzles. Helpless children reported being relatively unhappy while working on puzzles one and two, but became significantly happier on puzzle three. Mastery-oriented children, on the other hand, showed a distinct curvilinear pattern. They reported moderate happiness on puzzle one, significantly less happiness on puzzle two, and then reported being happiest on puzzle three. It is possible that helpless children were quickly discouraged (i.e., felt unhappy after just one failed puzzle) whereas it took two failures to discourage the mastery children.

Puzzle choice has the advantage of offering an unambiguous way to classify virtually all participants. Although children may not be able to articulate a reason for their choice, the choice of a puzzle that would assure success, versus the choice of a

puzzle that risks failure may, according to Dweck (1991), reflect underlying performance goals and beliefs that ability is an unchangeable attribute.

The most stringent system for identifying helpless children used children's responses to the question of whether they could complete the unsolvable puzzles if given more time. According to Ziegert et al. (2004), an answer of no to this question reflects attributions that failure was a result of low ability, and an answer of yes to this question reflects attributions that failure was due to a lack of time, and with more effort they could succeed. A small proportion of children (31 children or 17%) indicated that they could not finish with more time and were classified as helpless. These 31 children reported being less good at doing puzzles at the post-failure assessment, they reported being less happy while working on puzzle one, they were more likely to select a solvable puzzle, and they made fewer positive self statements than the mastery-oriented children.

Two of the differences found using ability attributions as the discriminator were particularly powerful due to the fact that they had not been found using any other identification system. The first is that mastery-oriented children tended to make more positive self evaluations while working on the task. They praised themselves for getting pieces in and for finishing the puzzles more often than did the helpless children. The other difference that emerged is that children who attributed failure to insufficient ability rated themselves as being significantly less good at doing puzzles after experiencing failure than did those who attributed failure to lack of time. Specifically, on average, children who said they could finish with more time rated themselves as being "very good" or "very, very good" before the puzzles, and rated themselves "pretty good" or "very good" after failure, declining slightly. On average, children who attributed failure

to low ability also rated themselves as "very good" or "very, very good" before the puzzles, but then rated themselves as somewhat less than "pretty good" after failure. Failure clearly affected those 31 children's perceptions of themselves, making them feel less competent. Children who said they could not complete the puzzle even with more time may be on the most extreme end of the helpless continuum.

Although there was a much smaller percentage of children classified as helpless when this system was used, more powerful differences between groups seemed to emerge. This seems to indicate that young children vary on their levels of helplessness, and that those children who feel they are unable to succeed on a task, due to low ability, are going to exhibit the most helpless behaviors.

This study shows that young children vary in their responses to failure. Moreover the patterns of associations among indicators of helplessness indicate that these indicators some validity as reflections of belief systems and motivational goals. The choice children made as to which puzzle they would like to work on further seems to be a particularly useful indicator or helplessness. About 90% of the 109 children who selected an unsolvable puzzle were highly likely to attribute failure to lack of time rather than low ability. They also were likely to give a challenge-seeking reason for that choice. Using children's attributions yielded a small number of helpless children who may have been the most extreme cases of helpless. The choice of which of these two systems is most useful may depend on the purposes. Possible uses of knowledge of children's helpless or mastery-orientations will be considered in the next section.

Implications

Future Directions. This study has shown that there are significant differences in how children respond to failure, but the best way of classification is still unclear. It appears that one way that is effective for classifying children is by giving them dichotomous choices, rather than free response items. Young children may not be able to accurately report on their thoughts or feelings if they are not given clear and simple choices. In the future, studies should develop a line of questions where patterns of response to dichotomous or simple questions with clear choices are more likely to accurately reflect the child's thoughts about the task. Another suggestion for future direction is asking questions immediately following the task to reduce confusion on the child's part. For example, children in this study were asked to report how they were feeling on each of the puzzles after completing the entire task. This may lead to confusing past feelings with present feelings. Rather, asking the child about their feelings before going on to the next puzzle may result in a more valid means of measurement.

Practical Implications. Knowing that children begin to develop different views of themselves in relation to competency and ability in early childhood, and that these patterns are likely to be stable over time, raises questions about what can parents and teachers do to help children develop constructive, resilient motivational patterns. Li (1995) proposes that motivational patterns are not innate, but are shaped by the environment. In particular, cultural values are thought to shape achievement motivation and beliefs. American students have long been criticized for their lack of academic achievement compared to Chinese and Japanese students. Some of these differences

seem to arise from the emphasis that is placed on learning in the varying cultures. Preschoolers in the U.S. are taught to be independent and creative, whereas Japanese children are taught to be diligent and persistent. These relative emphases reflect, at least in part, beliefs regarding the nature of intelligence. Asian mothers and children usually include effort and hard work as part of the definition of an intelligent child; working hard is seen as an indication of ability. American mothers and children, in contrast, tend to see effort and intelligence as negatively correlated; working hard is evidence of low ability (Chen & Stevenson, 1995; Dweck, 1991; Stevenson, Lee, et al., 1990).

Type of schooling may be one factor that effects the development of these achievement beliefs. There is a constant debate over which type of instructional approach is best for children's learning and children who are more motivated to learn are going to do better in school. Stipek, Feiler, Daniels, and Milburn (1995) examined children in child-centered versus didactic, academic-focused classrooms, and found many differences among children's behaviors and motivations. Children in child-centered classrooms rated themselves as more competent, had positive views for future academic success, were more likely to choose a challenging versus an easy task, were more independent, and exhibited more pride in their accomplishments. Giving children a sense of control about their learning by providing a child-centered curriculum, allows children to feel more invested in their education, which in turn appears to boost motivation.

Another practical implication that parents and teachers can consider when thinking of ways to encourage mastery-orientations in children is the effects of praise. Kamins and Dweck (1999) examined the effects of praise on helplessness, and found that children who were praised for traits or abilities were more likely to express helpless

cognitions, affect, and behavior when faced with failure. In contrast, when the processes children engaged in were praised, they did not express helplessness in the face of failure. Although it is counter to most parents' and teachers' instincts, this study suggests that in order to promote resiliency in the face of failure, adults should avoid attributing children's success to their ability. Rather, parents should attempt to reinforce hard work and the processes experienced.

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APPENDICES

Appendix A

Challenge Task Protocol

Research Assistant 1

RA1: Pre-challenge task procedures.

With RA2, go through checklist of items needed for the entire challenge task procedure to ensure that all props and materials are ready to use. Position table, chairs, and video camera in appropriate places in the room where the challenge task procedure will take place. Identify the children who will participate in the challenge task that day and be sure that they have rinsed out their mouths following eating. Both RA1 and RA2 have scoring sheets to record child's prize choice, child's perception of puzzle competence, and Slow Down Motor times.

Props List

1. Prize selection: Tray with 6 prizes.
2. Bear Drop game: "Mountain", Cave bucket, five small plastic bears, timer.
3. Disappointment: 1 broken toy [RA2], emotion faces [RA1], prize bag with the child's name.
4. Puzzle Task: Penny cards with 0, 2, 4, 6, and 8 pennies glued on, three puzzles with photocopy of each puzzle, strip of 5 faces ranging from very sad to very happy.
5. Delay Challenge: "prize bag" with tissue paper covering prize.
6. Slow Down motor activity: Two double-sided squirrel pages [or 1 single sided and one double sided] and two double sided turtle pages; colored marker, prize.

7. Post challenge saliva collection: Latex gloves, cup, vial, some food pictures.

8. Block design teaching game: Blocks in tray with picture of pattern to be made.

9. Book reading task: One Frog Too Many book.

Procedure

With the teacher's help (if necessary) approach the first child and invite him or her to play a game.

If necessary, work with the "in class" person to collect a saliva sample using the saliva collection protocol. The person who collects the pre-challenge saliva sample starts a Challenge Task Coding Sheet for the child by putting the child's name, saliva collection start and end time and vial number in the appropriate spaces on the coding sheet. If other members of the research team are taking care of the saliva collection, you may use this time to make sure that the challenge task room, video equipment, and props are all in order.

RA1 and RA2 usher the child into the challenge task room and helps the child be seated at the small table. RA1 brings in the prize tray and sits next to the child while RA2 checks the *camera position* and *sound,* starts the camera, and leaves the room to get the Bear Drop game.

RA1 CARD 1: Selection of Prizes to be Won.

When RA1 and the child are seated and RA2 has ensured that the camera and microphone are working, begin showing the child the prizes. Put the tray on the table in front of the child and say to the child:

RA1: *"We want to play a game with you today and you can win a prize by playing this game.*

First you and I will look at the prizes and we will decide which is your most favorite prize that you want to win."

Show each prize to the child individually and tell the child what each one is. Ask the child: *"Which one of these prizes would you like to win?"*

RA1: *"OK. So this (object name) is your most favorite prize. OK. Let me show you the game that you can play to win your prize."*

RA2 will bring in the Bear Drop game and take out the tray with the prizes, noting which prize the child selected on the recording sheet.

RA1 then *explains to the child how to play the Bear Drop Game* [next card].

RA1 CARD 2: Bear Drop Game

Place the Drop Game stand on the table in front of the child. Situate the stand so that it is not directly between the camera and the child so that the child's face can be seen clearly in the camera. Place the canister with the hole in the lid (the bear's cave) under the stand, but off-center so the child has to adjust the drop accordingly. When the game is set up, say to the child:

RA1: *"This game is called 'the Bear Drop Game.' The bears are going for a walk up on top of the mountain. The bears say : 'Oh!, I'm tired, I want to jump back down into my cave to take a rest.' Your job is to see if you can drop these bears into their cave from the top of the mountain through this hole [hold a bear in your hand over the top of the 'mountain']. But it's no fair putting your hand inside the*

mountain [hold a bear in your hand inside the 'mountain'] because that's cheating. If you can get all five bears into the 'cave,' by the time I get back, you win. Okay, I'll be right back."

[Set the timer for two minutes]

Leave the child alone in the room for two minutes. Return after the time is up.

A. If the child got all five bears into the 'cave,' say:

RA1 "Good job. I will go get your prize."

Leave the room and signal RA2 to take in the disappointing prize

B. If the child has not been able to get the bears in the cave, say:

RA1: "You know, I think I made a mistake. This isn't supposed to have a lid on it like this. [remove lid] Here, try it again with the lid taken off."

Let the child drop the bears until all five bears are in the bucket. When the child has successfully dropped the bears into the "cave" say:

RA1: "Great job! I will go get your prize for you."

Leave the room and start timing when RA2 takes the disappointing prize into the room.

RA1 CARD 3: Disappointment Prize. *Remember props–emotion faces.*

Wait outside as RA2 gives the disappointing prize to the child. Although RA2 will be timing the different parts of the disappointment portion, time the task also as a "back-up" to ensure that time limits are adhered to. After RA2 has been in the room for 60 seconds then the child has been alone for 60 seconds, go into the room and ask with flat affect:

RA1: *"Did you play with (RA2's name)?"*

Child responds

"Did you get a prize? [response] *What prize did you get?* [response]*"*

"Is this the prize you wanted?" [response]

[if the child hesitates to answer this for a long time, ask: *"I thought you wanted the (good prize) instead of the (disappointing prize)."*]

Ask the child *"How did you feel when you got the broken comb instead of the (first choice prize)?"*

Verify the answer that they gave (if an answer is given).

Show the pictures of the emotion faces and say: *"I have some pictures of faces here that show some of the ways that we feel sometime."* Place the faces on the table in front of the child and name each emotion. *"Will you show me which face shows how you felt when you got the broken comb instead of [the child's choice]"* If the child still does not respond, say in a heartfelt way: *"Tell me how you felt, I'd really like to know."*

RA1: *"Did (RA2's name) know that you felt (emotion reported)?"*

[response]

If child says YES, say: "How did (RA2) know?"

If child says NO, say: "How did you keep (RA2) from knowing?

[response]

Finally, tell the child:

RA1: "Go ahead and play with your toy for a while, I will be right back."

Leave the child alone in the room for one more minute. When the minute has passed, return with the toy that the child originally selected and the child's prize bag and say:

RA1: *"You know, I think there must be some mistake. Would you like to trade that prize for the prize that you first chose?."*

Give the correct prize to the child and let the child hold the good prize for a moment while RA2 brings in the materials for the puzzle task. RA2 then brings in the materials (Puzzles and Penny Cards) for the Puzzle Failure task. Set the child's toy and prize bag down on the floor away from the child, and explain that they can keep the toy in the prize bag to take home at the end of the day.

RA1 Card 4: Puzzle Task

When RA2 has brought in the three puzzles–two with pieces mixed up and one solvable–say to the child:

RA1: "We have another game for you to play and you can win another prize. This game is a puzzle game. Do you like to make puzzles? [child responds]

First, I want you to tell me how good you are at puzzles. [showing penny cards] Are you not good at all, a little bit good, pretty good, very good, or very, very good at putting puzzles together." [The child points to the corresponding number of pennies. Repeat what the child says *clearly* so that the microphone on the video camera will capture what the child said]

Then say to the child:

RA1: "I have pictures of three puzzles here [show photocopied pictures] that I want you to do. How many of these puzzles do you think you can do?"

[child responds] RA1 repeats what child says.

Give the child the first (unsolvable) puzzle and say:

RA1: "Here is the first puzzle. You have two minutes to finish it. Ready, go."

[Start timer]

When the time has expired, remove the puzzle from the child. Give the child the second (unsolvable) puzzle and say:

RA1: "Okay, let's try another one. You have two minutes to make this puzzle. Ready, Go."

When the time has expired, remove the puzzle from the child. Give the child the solvable puzzle and say:

RA1: "Okay, let's try one more. You have two minutes. Ready, Go."

After two minutes, all three puzzles are placed in front of the child, and the child is again shown the penny cards and say:

RA1: "Now that you have worked all of these puzzles, show me on these cards how good you are at puzzles. Are you very, very good, very good, pretty good, a little bit good, or not good at all?"

[Repeat the child's response so that it is clear for the camera to record]

Show the child the series of smiley/frowny faces and say:

RA1: "When you were working on this first puzzle, how did you feel, very happy, a little happy, okay, a little sad, or very sad?" [child responds–repeat child's response]

RA1: "When you were working on this second puzzle, how did you feel, very happy, a little happy, okay, a little sad, or very sad?" [child responds–repeat child's response]

RA1: "When you were working on this third puzzle, how did you feel, very happy, a little happy, okay, a little sad, or very sad?" [child responds–repeat child's response]

Point to all of the puzzles and ask:

RA1: "If you had a lot of time now, could you finish either of these (unfinished) puzzles?"

[child responds, repeat child's response]

RA1: "You can do one of these puzzles again. Which one do you want to do?"

[child responds, repeat child's response]

RA1: "Good choice. Why did you choose this puzzle again?"

[child responds, repeat child's response]

Remove the two puzzles which were not selected and let the child work the puzzle until he or she is finished.

RA1: "Go ahead and work on that puzzle and we will get a prize for you when you are finished."

Sit next to the child while the child completes the puzzle. Meanwhile, RA2 removes the other two puzzles and puts a prize in the prize bag and covers the prize with a piece of tissue paper. RA2 returns with the prize bag and when the child finishes the puzzle, puts the prize on the table and removes the third puzzle.

[Go to Delay Task]

RA1 CARD 5: Delay Challenge

Place the bag (from completing the puzzle task) in front of the child and say:

RA1: "You did a great job, (child's name)! Here is your prize in this bag. But, oh, before you look in the bag, we need to go see if [child's teacher] is ready to play some games with you, too. Please wait until we come back to look at your prize, because we want to see if you like it. We will be back soon. Remember, don't peak in the bag until we get back. Alright?"

Leave the room with RA2. Start the stopwatch as soon as you leave the room and time for two minutes while the child is in the room alone. Return with the teacher and say:

RA1: "OK, you can look in the bag and get your prize now. Do you like your prize? Would you like to win another prize?"

Put the prize in the bag and then put the bag off of the table.

RA1 CARD 6a: Slow Down Motor Activity1–Squirrel

Sit down by the child and give the child a marker and the first "squirrel" page. Say to the child:

RA1: *"Here are two telephone poles. A squirrel is playing on this one here and decides that it wants to run over to the other pole. Will you draw a line between these polls for the squirrel to run across?"*

Prepare your stopwatch to time and be sure that RA2 is ready to time. When you, RA2, and the child are ready, say: *"Ready. Go"* [child draws] *"Stop"* [When the child finishes]. Record the time on your scoring sheet. RA2 does the same on a separate scoring sheet.

Turn the "Squirrel" sheet of paper over to side 2.

RA1: *"That was great! Here are two more telephone poles for you to connect with wires for the squirrel to play on. This time, can you draw the telephone line as <u>fast</u> as you can?"*

Prepare your stopwatch to time and be sure that RA2 is ready to time. When you, RA2, and the child are ready, say: *"Ready. Go"* [child draws] *"Stop"* [When the child finishes]. Record the time on your scoring sheet. RA2 does the same on a separate scoring sheet.

Give the child the second "Squirrel" sheet of paper.

RA1: *"Good job. Here is one more for you to draw. This time, draw the telephone wire as <u>slowly</u> as you can."*

Prepare your stopwatch to time and be sure that RA2 is ready to time. When you, RA2, and the child are ready, say: *"Ready. Go"* [child draws] *"Stop"* [When the child finishes]. Record the time on your scoring sheet. RA2 does the same on his/her sheet.

RA1 CARD 6b: Slow Down Motor Activity2–Turtle

Give the child the first "turtle" paper.

When the child has the first "Turtle" page, say:

RA1: *"Here is a little pond where a family of turtles live. First, I want you to draw a path around this pond starting from this dot [point to the dot]. Go ahead and draw in the path around the pond."*

Prepare your stopwatch to time and be sure that RA2 is ready to time. When you, RA2, and the child are ready, say: *"Ready. Go"* [child draws] *"Stop"* [When the child

finishes]. Record the time on your scoring sheet. RA2 does the same on a separate scoring sheet.

Turn the "Turtle" sheet of paper over to the second side.

RA1: "*Great! Now, I want you to help a turtle find its way around the pond, will you draw a path for this turtle to use to get around the pond. If this turtle were in a hurry, how fast could he go? Make him go as fast as you can this time."*

Prepare your stopwatch to time and be sure that RA2 is ready to time. When you, RA2, and the child are ready, say: *"Ready. Go"* [child draws] *"Stop"* [When the child finishes]. Record the time on your scoring sheet. RA2 does the same on a separate scoring sheet.

Give the child the second "Turtle" sheet of paper.

RA1: "But, turtles go slowly. This time, go as slowly as you can because turtles move very slowly."

Prepare your stopwatch to time and be sure that RA2 is ready to time. When you, RA2, and the child are ready, say: *"Ready. Go"* [child draws] *"Stop"* [When the child finishes]. Record the time on your scoring sheet. RA2 does the same on a separate scoring sheet.

Turn the second "Turtle" sheet of paper over.

RA1: "That was great, can you make another slow path for the turtle around the pond as slowly as you can again?"

Record the time on your scoring sheet and have RA2 do the same on a separate sheet.

RA1: "OK, now I'm going to get your prize, then, you get to play the 'spitting game' again!"

RA1 Card 7: [POST-TEST SALIVA COLLECTION]

RA1 and RA2 work together to collect a saliva sample from the child following the saliva collection protocol. When the saliva collection procedure is nearly completed, either RA1 or RA2 [whoever is most available to go] leaves to get the teacher for the block design game.

RA1 CARD 8: Block Pattern game

After the saliva collection has been completed, the teacher is brought in to the room and is seated next to the child. RA2 removes the saliva collection supplies and takes the saliva vial to put in the cooler. RA1 brings in the tray of pattern blocks and a design for the child to replicate with the blocks. RA1 then says:

RA1: [to the teacher] "Here is a picture that can be made with these blocks. Your job is to help the child make the picture whatever way you would like to help. I will be back in 5 minutes."

Leave the room and time the task.

RA1 Card 9: <u>One Frog Too Many</u> book reading

Bring in the *One Frog Too Many* book and say:

RA1: [to the child]"Good job at working on making that picture. [to the teacher] Here is a book for you to read with [child's name]. It doesn't have any words so you can make up whatever words you would like for the story. Go ahead and read the

book and come get me when you are finished. Do you have any questions? [response] Okay, I will be right outside."

Leave the teacher alone with the child. While the teacher is 'reading' the book to the child, RA2 should go to the classroom to help the person in the classroom begin collecting a saliva sample from the next child.

When the teacher comes out to let you know that she or he is finished, say:

RA1: [to the child] "You did a great job with all of our games today. You are all done. Thank you for your help." [Also thank the teacher for his or her help]

Escort the teacher and the child back to the classroom and get the next child on the list.

Research Assistant 2

RA2: Pre-challenge task procedures.

With RA1, go through checklist of items needed for the entire challenge task procedure to ensure that all props and materials and ready to use. Position table, chairs, and video camera in appropriate places in the room where the challenge task procedure will take place. Identify the children who will participate in the challenge task that day and be sure that they have rinsed out their mouths following eating. Both RA1 and RA2 have scoring sheets to record child's prize choice, child's perception of puzzle competence & emotion, and Slow Down Motor times.

Props List

1. Prize selection: Tray with 6 prizes.
2. Bear Drop game: "Mountain", Cave bucket, five small plastic bears, timer.

3. Disappointment: 1 broken toy [RA2], emotion faces [RA1], prize bag with the child's name.
4. Puzzle Task: Penny cards with 0, 2, 4, 6, and 8 pennies glued on, three puzzles with photocopy of each puzzle, strip of 5 faces ranging from very sad to very happy.
5. Delay Challenge: "prize bag" with tissue paper covering prize.
6. Slow Down motor activity: Two double-sided squirrel pages [or 1 single sided and one double sided] and two double sided turtle pages; colored marker, prize.
7. Post challenge saliva collection: Latex gloves, cup, vial, some food pictures.
8. Block design teaching game: Blocks in tray with picture of pattern to be made.
9. Book reading task: <u>One Frog Too Many</u> book.

<u>Procedure</u>

If necessary, work with the "in class" person to collect a saliva sample using the saliva collection protocol. The person who collects the pre-challenge saliva sample starts a <u>Challenge Task Coding Sheet</u> for the child by putting the child's name, saliva collection start and end time and vial number in the appropriate spaces on the coding sheet. If other members of the research team are taking care of the saliva collection, you may use this time to make sure that the challenge task room, video equipment, and props are all in order.

RA1 and RA2 usher the child into the challenge task room and helps the child be seated at the small table. RA1 brings in the prize tray and sits next to the child while RA2

checks the *camera position* and *sound,* starts the camera, and leaves the room to get the Bear Drop game.

RA2 CARD 1: Selection of Prizes to be Won.

While RA1 goes through the prizes to be won with the child, RA2 gets the Bear Drop Game materials ("mountain," 5 bears, and bucket with lid in place). When the child has selected the prize that he or she wants to win, bring in the Bear Drop materials, help arrange them on the table, and remove the prize tray. Note on the scoring sheet which toy the child selected for reference in the dissapointment procedure.

RA2 CARD 2: Bear Drop Game

While the child is playing the Bear Drop Game, get the broken comb prize ready to take into the room for the Disappointment Prize procedure.

RA1 CARD 3: Disappointment Prize

When RA1 leaves the room to "get the prize," take the broken prize into the room, be sure that the prize is hidden in your hand out of the child's view. Stand next to the table (so you are not blocking the camera view) and in a flat voice say:

RA2: "Here is your prize."

Remain in the room with the child for one minute while the child examines the disappointing prize. During this time, RA2 should check the camera and the sound, then piddle around with papers and/or other materials, as if busy with other activities. Occasionally glance toward the child to indicate that it is ok for the child to speak (that is,

don't totally ignore the child). However, do not attempt to engage or interact with the child, but maintain a neutral demeanor in responding to the interaction attempts of the child. If the child asks a question or makes a statement, reflect the child's utterances. For instance, if the child says, "This is the wrong toy," you reply in a flat tone, "Oh, this is the wrong toy." If the child asks, "Where is [RA1]?" respond by saying, "Mmmm, you wonder where [RA1] is."

After the minute is up, say:

RA2: "I'll go get [RA1]."

Leave the room, leaving the child alone with the broken object for another minute. RA1 will then go into the room to interact with the child.

While RA1 is in the room with the child, collect the materials for the Puzzle Task [Three puzzles with the photocopied pictures of each, the penny strip, and the smiley face-frowny face strip]. When RA1 comes out to retrieve the correct prize (and leaves the child alone again for one minute) then goes back in with the correct prize, follow RA1 into the room with the Puzzle Task materials.

RA2 Card 4: Puzzle Task

Bring in the Puzzle Task Materials and record the child's response to how good they think they are at puzzles on your scoring sheet.

[This would be a good time to go back to the classroom to signal to do the follow-up saliva collection from the previous child (if 1/2 hour has passed from the post-challenge collection)]

When the child is nearly finished with the last puzzle (after the swithced puzzles peices have been corrected) leave the room to get the delay prize bag with a toy and tissue paper in it. Bring the bag into the room and remove the Puzzle Task materials.

RA2 Card 5: Delay Challenge

Leave the room with RA1 and wait while the child is left alone with the tempting prize bag. With RA1, collect a marker, the squirrel papers (three sheets) and turtle papers (four sheets) for the Slow Down Motor task.

Return to the room with RA1 and take the Delay Challenge gift bag out of the room while RA1 helps the child put his or her prize in the take-home bag.

RA2 Card 6: Slow Down Motor Activity–Squirrel and Turtle

Have your scoring paper, clipboard and stopwatch to time each trial. Record the time (along with RA1) on your coding sheet for each trial.

RA2 Card 7: [POST-TEST SALIVA COLLECTION]

RA1 and RA2 work together to collect a saliva sample from the child following the saliva collection protocol. When the saliva collection procedure is nearly completed, either RA1 or RA2 [whomever is most available to go] leaves to get the teacher for the block design game.

RA2 CARD 8: Block Pattern game

After the saliva collection has been completed, bring the teacher into the room and seat the teacher next to the child. Remove the saliva collection supplies and takes the saliva vial to put in the cooler. RA1 brings in the tray of pattern blocks and a design for the child to replicate with the blocks.

When RA1 leaves the room, leaving the teacher and the child alone to work on making the block pattern, time the interaction with RA1 [5 minutes]. RA1 and RA2 can use this time to prepare the props for the next challenge task procedure.

RA2 Card 10: <u>One Frog Too Many</u> book reading

While the teacher is 'reading' with the child, RA2 should go to the classroom to help the person in the classroom begin collecting a saliva sample from the next child. When the teacher is finished with 'reading' the book to the child, and RA1 has escorted them back to the classroom, escort the next child to the challenge task room with RA1.

Appendix B

Coding of Task Choice Reason

When the experimenter says: "You can do one of these puzzles again. Which one do you want to do?"

Record whether they chose and insolvable one (1 or 2) or the solvable one (3)

1 – Insolvable Puzzle chosen

2 – Solvable puzzle chosen

Experimenter will then say: "Good choice, Why did you choose this puzzle to work on again?"

Record the child's answer word for word

Then classify it as 1,2,3,4 or 5

1 – Challenge

- Includes reasons referring to the child's positive interest in trying to solve an insolvable puzzle or to the small amount that had been accomplished
    - Ex: "Because I want to see if I can try him again" or "Because there's just one piece in it" or "Because I didn't do hardly any of them"

2 – Want/Like

- Referred simply to the child's desire to work on a particular puzzle or a preference for a certain puzzle, making no reference to difficulty, motivational goals, achievement, or performance concern
    - Ex: "Because I want to" or "Because I like Mickey Mouse"

3 – No Challenge

- Referred to the ease of the task or to the belief that he or she could easily complete it
    - Ex: “Because he was the easiest” or “Because I already know how to do it”

4 – No Reason

- If the child refuses to give an answer or something like:
    - Ex: “I don’t know” or “Just because”

5 – Ambiguous

- If the reason given contains statements about the ease of the puzzle as well as statements about wanting to try it again, or is otherwise ambiguous to the point that a clear code cannot be given
    - Ex: “I want to do that one because it is easy now; I want to try it again”

Affect Coding

For each puzzle, between when the researcher says “go” and “stop” rate the overall affect expressed by the child. Rate how much enjoyment was expressed by the child, as well as separately how much frustration was expressed.

0 – there was no sign of enjoyment/frustration while working on the puzzle

1 – some enjoyment/frustration was expressed

2 – the child expressed significant enjoyment/frustration while working on the puzzle

If the child showed significant frustration but also showed significant enjoyment, give them a 2 on each scale. If some enjoyment was shown, but significant frustration was shown give a 1 on the enjoyment scale and a 2 on the frustration scale

Coding for Verbalizations

When the experimenter says "go" for the child to begin working on the first puzzle, begin writing down every verbalization made by the child. Write down what was said, as much as can be understood, or so we understand the gist of what is said. Put each statement on a different line. Write beside each statement the number of the category in which you think it belongs or an abbreviated version of the name of the category.

Ex: Kid says: "This puzzle is really really hard; I can't figure out where this one goes; is this the puppy's bone?"

You write: puzzle is hard; where does this go; is this the bone

In the "Event Marker" column, record when "go" is said for each puzzle and "stop" for each puzzle. Use SP1 for start puzzle 1, EP1 for end puzzle 1, etc.

When the researcher begins to ask "how good are you at doing puzzles" after the third puzzle is completed, stop coding. Go back and look at all the statements made, and on the recording sheet, write the total number of comments made in each category beside the appropriate category.

1 - Performance Concern

- Remarks about ensuring an adequate performance
    - Snap judgments about aspects of the task that may enable or prevent an acceptable outcome (no judgments making reference to self are counted here), counting the number of pieces done so far, and comparisons to others' performance; also includes comments indicating concern about time; ex: "How many more minutes do I have?"

- Ex: as soon as the puzzle is presented, saying “I bet this one is going to be hard too” (snap judgment) or “I only got one in” (counting pieces) or “Did Matthew get this one in?” (comparing)

2 - Disengaged

- Included expressions of withdrawal from the task or suggestions of a more appealing task; attempts to distract
  - Ex: “I don’t want to do this puzzle anymore; I’m tired” or turning over a puzzle piece and asking the experimenter “can you guess which piece this is?”

3 – Negative Self-Evaluations

- Clear statements about lacking the skills or knowledge required for the task;
- Generally indicated by referring to self, using “I” or “Me”
- “I” statements take precedence over other categories where the statement could also fit
  - Ex: “I don’t think I’ll be able to get this puzzle at all” or “You shouldn’t have mixed up all the pieces because then I never know how to do it”

4 – Positive Self-Evaluations

- Statements reflecting pride or confidence in self; generally indicated by referring to self using “I” or “Me”
  - Ex: “I think I will be able to get this one” or “I am going to be good at this puzzle

5 – Strategy

- Planful, positive task engagement and includes puzzle-solving plans, hypotheses about where certain pieces go, hypotheses referring to descriptions of the pieces themselves, and self motivating statements
    - Ex: “I match things that are the same” or “Where’s the second piece of this rope?” or “I know a way to fix it”

6 – Task Appropriate Difficulty or Frustration

- Remarks appropriate during a challenging task; comments about the puzzle being hard, , or that the child is having trouble; also includes one word interjections (i.e. shoot, darn, barnacles); does not include statements that are negative of self or personal ability; includes comments about missing puzzle pieces on the solvable puzzle
    - Ex: “This is a little bit hard” or “Oh, that’s backwards”

7 – Task appropriate comments or solutions

- Remarks that normally accompany searches, fitting or not fitting a piece
- Comments made in response to the researcher.
- Comments about the puzzle that are not reflecting any of the other categories
    - Ex: “Where does this piece go?” (talking to oneself; not researcher) or “There; I got it” or “Yeah!”

8 – Task irrelevant

- Comments preschoolers might be expected to make about the immediate environment , free associations to particular puzzles, or comments about their personal lives

- Ex: “It’s hot in here” or “What’s that noise?” or “Mickey Mouse is my favorite” or “I’m having a birthday on Sunday”

9 – Ambiguous

- Statements that are unclear, as in cannot be heard or clearly understood; Sentence fragments that don’t provide enough information to provide a code or agreement on the code could not be made

10 – Seeking Researcher Help

- Asks for help from the researcher
  - Ex: “Where does this go?” or “Is this the tail?”

11 – Realizes the puzzles are mixed up

- If a child catches on that the puzzle is missing pieces or has wrong pieces, tally each comment made about it.
- Only applies to puzzles 1 and 2, that are mixed up. Ex: “This piece doesn’t go with this puzzle” or “This puzzle is missing some pieces”

ID #_____

Coder # _____

Statement Record

Event Marker	Statement	Verbal Code

ID # _____

Coder # _____

	Code	Total Number of Statements
1	Performance Concern	
2	Disengaged	
3	Negative Self-Evaluations	
4	Positive Self-Evaluations	
5	Strategy	
6	Task Appropriate Difficulty or Frustration	
7	Task appropriate comments or solutions	
8	Task irrelevant	
9	Ambiguous	
10	Seeking Help	
11	Realizes the puzzles are mixed up	
	Total Number of Statements	

Puzzle Choice: Circle one

1 – Insolvable puzzle was chosen (puzzle 1 or 2)

2 – Solvable puzzle was chosen (puzzle 3)

Record reason given for choice: _____

Code for reason; refer to coding sheet (circle one) 1 2 3 4 5

Did the child realize that the puzzles had been manipulated to be insolvable?

Yes or No

Affect Coding

	Puzzle 1:	Puzzle 2:	Puzzle 3:
Enjoyment:	0 1 2	0 1 2	0 1 2
Frustration:	0 1 2	0 1 2	0 1 2