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ATTENTION DEFICIT HYPERACTIVITY DISORDER

The Effects of Medication on the Attributional

Styles of Boys with ADHD

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Presentation for Honors Thesis, Louisiana State University

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### Abstract

Difficulties associated with ADHD are in the domains of academic, behavioral, and social functioning. Due to the nature of these problems, ADHD children are frequently exposed to failure in the classroom. Children who frequently face failure are at risk for developing a causal attributional style, in which they blame their failure on their lack of ability. Previous studies have used solvable and insolvable tasks (find a word puzzles with and without words) in order to examine ADHD participants attributional style (Carlson et al., 1993; Milich et al., 1991).

Attributions were evaluated after success or failure following each solvable and insolvable puzzle. This study intends to both replicate and increase the ecological validity of previous studies by giving math tests to students that they are likely to naturally encounter in the classroom. As in previous studies students will be given “easy” worksheets on which they can be expected to achieve greater than 90% accuracy. However, rather than providing task that are impossible to solve, as in all previous studies, students will be presented with difficult or challenging math problems. It can be expected that most students will at times encounter academic tasks at which they perform poorly. In fact most educators do not recommend 100% accuracy: that is some degree of failure may be necessary to facilitate learning. Students were three children between the ages of 6 and 9, with a prior diagnosis of ADHD. Participants were administered a force choice attribution questionnaire, similar to the ones used by Carlson et al. (1993) and Pelham et al. (1992), and a 100-mm visual analog for each attribution following each of the easy and difficult tasks. Students were also administered the Revised-Children’s Attributional Style Questionnaire (CASQ: Kaslow, Tannenbaum, & Seligman, 1978). The Revised-CASQ is a 24 item force choice measure of children’s attributional styles that separately assesses three dimensions for positive and bad outcomes (positive internal/external, positive global/Specific,

positive stable/unstable negative internal/external, negative global/Specific, negative stable/unstable).

## INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is the most prevalent psychological disorder of childhood. An estimated 3 to 5% of school age children are thought to have ADHD, males appear to be especially vulnerable (American Psychological Association, 1994; Lorys-Vernon, Hynd, Lyyntined, 1993). Parents of children with ADHD often notice excessive motor activity when their child is a toddler; however, most children are not diagnosed until the elementary school years (American Psychological Association, 1994).

Children with ADHD differ from controls in several levels of academic performance, including at least cognitive functioning and social play (Alessandri, 1992). The disorder appears to be biologically based, although current diagnosis relies on behavioral observations. The DSM-IV recognizes three subtypes of the disorder; 1) Attention Deficit/ Hyperactivity Disorder, Combined Type which is diagnosed if at least six of the symptoms for inattention and six of the symptoms of hyperactivity-impulsivity persist for six or more months; 2) Attention Deficit/Hyperactivity Disorder, Predominantly Inattention Type which is diagnosed if at least six symptoms of inattention (but less than 6 symptoms of hyperactivity-impulsivity) persist for 6 or more months; and 3) Attention Deficit/Hyperactivity Disorder, Predominantly Hyperactivity-Impulsive which is diagnosed if at least six symptoms of hyperactivity-impulsivity (but less than six symptoms of inattention) persist for six or more months. It is not clear as to whether the three subtypes are three forms of a single disorder, or represent three distinct disorders. For expositional clarity, the three subtypes are considered as a single disorder in this article.

### **Attributional Style of Children With ADHD**

#### Why study the attributional style of children with ADHD?

Attention Deficit Hyperactivity Disorder (ADHD) is characterized by problems with sustaining attention, ignoring distracting stimuli, impulsive responding, and excessive activity. (Whalen, 1989). Given these patterns, children with ADHD are constantly being faced with negative feedback and failure both in and out of school. These problems are arguably most salient in the classroom. Children with ADHD often are unable to finish tasks, typically achieve below expected academic levels, and have a high rate of concurrent learning problems. Children with ADHD are at high risk for school failure and increased risk of retention (Whalen, 1989). In addition the children's impulsiveness and behavioral difficulties often produce high levels of peer rejection (Milich & Landau, 1982), as well as negative feedback from parents (Barkley & Cunningham, 1979), teachers ( Whalen, Henker, & Dotemoto, 1981), and peers (Cunningham, Siegel, & Offord, 1985).

Frequent exposure to failure experience often leads to adverse cognitive, behavioral, and motivational effects. The model of learned helplessness attempts to explain the mechanisms by which these negative outcomes are produced (Licht & Kistner, 1986). The learned helplessness model suggest that children who are continuously faced with failure are at risk for developing a causal attributional style, in which they blame their failure on their lack of ability. This attributional style may lead to the children giving less effort when difficult tasks arise, so that these children are less likely to persist on a task. (Butkowsky & Willows, 1980; Diener & Dweck, 1978).

Evidence exists that suggest children with ADHD are at heightened risk for the development of a learned helplessness response style. First, some children often have difficulty sustaining effort when confronted with difficult tasks (Douglas, 1983). Second, evidence suggests that children with ADHD are more likely than others to give up on effortful task (August 1987, Borcharding et al., 1988). Finally, there is evidence that attributional retraining may have a positive impact on the behavior and attributions of children with ADHD (Reid & Borkowski, 1987). The accumulated evidence that suggest children with ADHD are at a risk for the development of a learned helplessness attributional style requires further examination to determine if children with ADHD may benefit from the development of a more adaptive attributional style.

#### Nonreferred versus children with ADHD's Attributional Style

Children with ADHD have been found to have a unique attributional style in comparison to nonreferred children. Milich and Okazaki (1991) compared the attributional styles of 22 ADHD boys to 23 nonreferred boys. Participants attempted to solve two different sets of 16 find a word puzzles, one set following exposure to solvable puzzles and one set following exposure to insolvable puzzles. After completing each set of find a word puzzles, participants were given a self-evaluation questionnaire and an attribution questionnaire. Dweck and Leggett's (1988) characteristics of helpless children attributional style was used to compare the performance, attributions, and self-evaluations made by referred and nonreferred boys. According to Dweck and Leggett (1988) the characteristics of children with a helpless attributional style are: (1) they report negative self cognition, including personal inadequacy; (2) they express pronounced negative affect, including boredom or anxiety; (3) they engage in task irrelevant verbalizations; and (4) they express negative self cognition. In the Milich & Okazaki (1991) study, ADHD participants clearly met two criteria of the characteristics of helpless children and indirectly may

have met a third. ADHD participants met the first criteria as they reported significantly more frustration with difficult task than did controls on a self evaluation questionnaire. Boys with ADHD quit earlier and more frequently than the nonreferred students during insolvable conditions, expressing negative effect, but only when it followed a solvable condition. They also were more likely to express a negative effect during the solvable condition. It was suggested by the authors that boys with ADHD perceived themselves to have already invested enough effort in the first set of solvable puzzles, such that when they were exposed to repeated failure they decided to quit as early as they were given that opportunity. The combination of the events may have proved overwhelming to the participants with ADHD, causing them to quit at higher frequency than nonreferred participants (Milich & Okazaki, 1991). Milich and Okazaki could not provide evidence that participants with ADHD met the third characteristic, as they did not record verbalizations. However, the ADHD boys did initially report greater optimism regarding their upcoming performance in comparison to control boys. The authors stated that this potentially could have been an attempt to bolster their self image by exaggerating their competency. However, the initial optimism quickly dissipated into a defeated approach to the task, as indicated in their high rate of giving up and reports of frustration. Milich and Okazaki did not find evidence that the children with ADHD expressed negative self-cognition. This lack of evidence may however be due to the fact that there was only one question, an ability attribution question, that directly addressed this issue. Therefore, it cannot be certain that the children with ADHD do not make negative self cognitions when confronted with failure or whether the study did not utilize measures sensitive enough to explore this point (Milich & Okazaki, 1991).

Overall the results of Milich & Okazaki (1991) suggest that when boys with ADHD are confronted with failure experiences, they exhibit a pattern of response that is compatible with that



exhibited by helpless children. However it is important to note that not all the results from this study are consistent with the characteristics of helpless children, as described by Dweck and Leggett (1988). For instance, the children with ADHD became frustrated when exposed to both solvable and insolvable conditions. In fact, Douglas (1983) found that children with ADHD did not invest sufficient effort on academic like tasks, and that is the reason they tend to give up too readily and not because the tasks are difficult. Milich and Okazaki (1991) suggest that although children with ADHD exhibit characteristics of helpless children as described by Dweck and Leggett (1988), they believe that ADHD boys may have a unique style of responding to challenging tasks that is not completely comparable.

Hoza et al. (1993) gave both children with ADHD and nonreferred children a series of tests to measure their self-perceptions and attributions. The first test was the Self Perception Profile for Children (SPPC; Harter, 1985) it measures domain specific self perceptions of scholastic competence, social acceptance, athletic competence, physical appearance, behavioral conduct and global worth. The Peer Social Attribution Questionnaire (PSAQ; Hoza et al., 1990) was also administered. The PSAQ uses eight vignettes to consider eight possible attributions (luck, task difficulty, other's mood, own mood, effort, ability, own personal qualities, other's personal qualities) for success and failure in social situations. Results from the SPCC and PSAQ indicated that the ADHD participants, compared to nonreferred boys, viewed social success and failure much as they do academic success and failure. The ADHD boys were significantly more likely to attribute positive social outcomes to their own personal qualities, and negative social outcomes to external reasons. Even though there was a significant difference found between attributions of children with ADHD and the control group's, no difference was found between their self perceptions as determined by the SPCC. Hoza et al. (1993) proposed two possible

explanations. The positive self image held by ADHD boys, despite their frequent exposure to academic and social failure, could be reflective of an adaptive “positive illusory bias” that is associated with positive behavioral changes in ADHD boys (Pelham et al., 1992). A positive illusion attributional style is one in which internal attributions are made for success and external attributions are made for failure. A second possible explanation was that their positive self perception may reflect a distorted perception and an unhealthy, unrealistic appraisal of their own functioning. It is plausible that the inaccurate self reports protect their self image in the face of academic and social failure.

#### Implications of medication on attributional style

The behavior problems that characterize children with ADHD can often be improved with treatment by stimulant medication. Academically, when on medication as compared to placebo children with ADHD complete more school work with greater accuracy (Pelham, Bender, Caddell, Booth, Moorner, 1985). Socially, the interactions of children with ADHD with their peers (Pelham, McBurnnett, et al., 1990) parents (Barkley & Cunningham, 1979) and teachers (Whalen et al. 1981) often improves on medication as compared to placebo. Although medication does not give children with ADHD new skills, it may enable them to persist at task when they are having difficulty and thus acquire more new skills (Milich Carlson, Pelham, & Licht, 1991). These new skills could potentially lead to a decrease in exposure to failure experiences.

Milich et al. (1991) examined the cognitive-motivational effects of treatment with stimulant medication. Specifically, they examined the effects of Methylphenidate (MPH) on the task persistence of 21 ADHD boys after exposure to two different sets of 16 find a word puzzles, one set following exposure to solvable puzzles and one set following exposure to insolvable puzzles. Following the solvable condition there were no differences found between the

attributions the boys made on medication as compared to placebo days. However, following the insolvable conditions participants made fewer internal attributions and more external attributions on medication relative to placebo (see Milich & Okazaki, 1991 and Carlson, Pelham, Milich, & Hoza, 1993 for similar results). In replication, Carlson et al. (1993) found that participants on medication were four times as likely to make effort attributions for success following solvable conditions as compared to following insolvable tasks, and were more than two times as likely to choose external attributes following failure than success. In both Milich et al. (1991) and Carlson et al. (1991) boys on medication were more likely to report that the task they performed was easy and that they were good at the task. Additionally, just as boys in the Milich & Okazaki (1991) study were more likely to quit than nonreferred boys after exposure to failure, participants on medication in Milich et al. (1991; Carlson et al., 1993) were less likely than participants on placebo to quit. Taken together, these findings indicate that medication has a positive effect on children's persistence in the face of failure.

Other studies examining the effects of medication on attributional styles in situations besides those following solvable and insolvable task have found similar results to Milich et al. (1991). For example, ADHD participants who performed a continuous performance task, in Milich et al. (1989), were significantly more likely to attribute their perceived good performance to external factors (ease of the task) when they were on placebo than when they were on medication. At a summer training program ADHD boys assessed their daily behavior in an experiment conducted by Pelham et al. (1992). While on and off medication participants made significantly more effort and ability attributions on days in which their behavior was rated positive and significantly more external attributions on negative behavior days. However, more negative days were reported on off medication days than while on medication. It appears that the unique

attributional style of children with ADHD is not situationally specific to solvable and insolvable task, as they apply the same style to their performance on tasks that do not assure failure or success, as well as their own behavior.

### Positive Illusory versus Helpless Attributional Style

Milich et al., (1991) suggest that medication may have a “normalizing” effect on the attributions of children with ADHD by leading them to adopt a positive illusory attributional style, which healthy adults display (Taylor & Brown, 1988). A positive illusory attributional style is one in which internal attributions are made for success and external attributions are made for failure. This style is potentially adaptive as it may prevent the boys from internalizing the failure experience, so that they are more likely to persist at subsequent task. However, there is no consensus about what is the healthiest attributional style (Kaslow & Rehm, 1985). Dweck and Leggett (1988) argue that a mastery oriented response that makes effort attributions for failure is healthier. Milich and Okazaki (1991) results support this suggestion as the normal boys in their study made effort attributions for failure, and this was associated with greater task persistence. However, the children with ADHD who attributed failure to effort were associated with a helpless attributional style. Milich et al. (1991) argue that an internal attribution for success, and an external for failure is an appropriate style for children with ADHD, who are constantly receiving negative feed back despite the extended effort which they exert on task. It may be that the best ways for children with ADHD to remain confident in their endeavors is not to blame themselves for failure. Thus, it may be that an attributional style that is healthy for normal boys may not be for ADHD boys.

There are two possible explanations given by Milich et al. (1991) for why participants on medication compared to placebo were more likely to adopt a positive illusory style. First, it is

possible that performance may have mediated these attributions, as participants performed better after failure while on medication than on placebo. It is possible that they may have believed they tried harder while on medications. Therefore, it was less likely for them to attribute their failure to effort while medicated. A second plausible explanation is that medication could have increased their attention and decreased their impulsivity, causing them to be more accurate judges of both their own behavior and the difficulty of the task demands. Boys on medication possibly could make more accurate assessments of what success they could take credit for and what factors could have accounted for the difficulties they experienced. Milich, Licht, Murphy, and Pelham (1989) suggested a comparable explanation of why medication in their study increased the correspondence between ADHD boys' performance on a Continuous Performance Test and their self evaluations, in comparison to a placebo condition. They attributed the increased correspondence while on medication to better attending behavior, more reflective responding by the participants, and the possibility that boys were more invested in the task and therefore were more concerned about having their self evaluations accurately assess their performance. A negative perspective is given by Hoza et al. (1993), who suggest that participants may attribute their failure to the fact that they have ADHD, a medical problem for which they are not responsible, and that makes positive outcomes more difficult to achieve, therefore they take credit for the success.

#### Possible negative aspects of medication.

There are concerns that medication may have a negative impact on the cognitive motivational state of children with ADHD (Whalen & Henker, 1991). Case studies (Rosen, O'leary & Conway, 1985) argue that children may attribute their behavior to external factors (the medication), therefore viewing their own effort as relatively insignificant. Amirkhan (1982) found

that teachers and students attributed the success of hypothetical medicated children with ADHD primarily to medication, and the successes of hypothetical unmedicated children with ADHD primarily to high effort. A similar study (Henker & Whalen, 1980) found that when children with ADHD, who were receiving medication treatment, were questioned about their problems on a general level they responded that their problems were physiologically based and that medication helped control their behavior. For example, children reported that their medication kept them from "being dumb," acting "wacko," or being kicked out of school. Henker and Whalen (1980) suggest that children might learn to give such explanations so that others do not expect too much from them or so that they are not blamed for failures.

Carlson et al. (1993) examined the possible negative cognitive emotional impact that medication may have upon boys with ADHD. The results indicated that any impact MPH may have on children's attributions and self evaluations are associated with its active components, rather than with the placebo effects associated with taking a pill. Further evidence that medication does not have a negative cognitive emotional impact was reported by Pelham et al. (1992). Participants attended a summer treatment program and daily assessed their attributions for and evaluations of their behavior. In experiment one participants received either a high or low dose of MPH or a placebo and in experiment two participants received either a 0.3 mg/kg dose of MPH, a placebo, or no pill. In conjunction, the experiments found a relationship among attributions, medication, and success and failure. As a whole, no evidence was found that psychostimulant medication produced deficient attributions in children with ADHD. The boys blamed failure on external factors (the pill) and attributed success to internal factors (their ability). Whalen et al. (1991) found that medication may enter attributional matrices of children with ADHD, but was not able to draw conclusions as to whether the effects were beneficial or

disadvantageous. Overall, no empirical evidence exists that has demonstrated a negative cognitive emotional impact of psychostimulant medication. Rather current research (Carlson et al., 1991; Milich et al., 1991; Pelham et al., 1992) contradicts anecdotal reports (Rosen & O'Leary, 1985) and theoretical speculations (Henker & Whalen, 1980) that medication may have negative cognitive motivational effects. The attributions for medication which have emerged in studies which allow participants to spontaneously give attributions have not been attained when structured formats such as forced choice attribution questionnaires are used (Whalen, Henker, Hinshaw, Heller, Dressler, 1991).

### Summary of Attributional Research

The implication of attributional research is that psychostimulant medication generally leads to a positive illusory attributional style in children with ADHD. While on medication ADHD boys' attention levels are increased causing them to perform better on their task, increasing their chances of experiencing success. With this heightened attention level, the children feel as if they have placed effort into the task and therefore are worthy of credit for the success. If they do not experience success while on medication, they still are more likely to acknowledge the effort that they placed into the task, so they assume the lack of success must be due to some external reason. On the other hand, it is possible that when children are not on medication they believe just the opposite, that they did not give enough effort so they are to blame for the failure. Regardless, the question remains whether taking credit for success and attributing failure to external reasons is the healthiest attributional style. Further research needs to be conducted in order to answer this question. Concern must however be given to the possible negative impact that attributing failure to internal causes might have to the self esteem of children with ADHD who frequently experience failure. Considering the possible negative effects it seems plausible that the positive

illusory style, although associated with a learned helpless attributional style for the nonreferred child, may be adaptive to the ADHD boy who so often faces academic and social failure.

The purpose of this study was to both replicate and extend current research on the effects of stimulant medication on the attributional style of children with ADHD. In order to extend current research, the tasks (difficult and easy math tasks) which participants performed and made their performance attributions towards were more ecologically valid than previous tasks (solvable and insolvable find a word puzzles). Current research was further extended as participants' attributions were measured on three levels of medication plus a placebo and by the use of a small n design, to allow for individual differences to be exhibited. An additional purpose of this study was to determine if participants are capable of discriminating when they are on and off medication. The latter provides both a procedural integrity check for the placebo condition and provides information about the discriminative stimulus properties of MPH.

## Study 1

### Method

#### Participants

Participants in the study required an independent evaluation and prior confirmation that the child met criteria for a DSM-IV diagnosis of ADHD based on parent interview, a score of at least two standard deviations above the mean on the ADHD Rating Scale (DuPaul, 1990), and on a domain of hyperactivity or attention problems on the Child Behavior Checklist (Achenback & Edelbrock, 1983). Each participant also met diagnostic criteria for a Combined subtype of ADHD (DSM-IV, American Psychiatric Association). All participants were developmentally normal and of at least average intellectual functioning. Each participant had received medication



(MPH) prior to participation in the program and each child's physician prescribed a double-blind placebo controlled course of medication to be received during the course of this study.

Peter was a 7 year old male entering second grade. A curriculum based assessment of academic achievement indicated that he was performing at grade placement in math. George was an 8 year old male who was expected to enter first grade in a regular education classroom. George was also diagnosed with a speech delay and previously had been placed in a non-categorical special education classroom. Academic assessment indicated that he was performing at a primer level in math. James was a 10 year old male entering fourth grade and was performing at grade level in math.

### Setting

The setting for study 1 was in a classroom at a University Laboratory School each weekday morning between 8:30 and 11:30 for a three week ADHD Summer Program. The staff included three doctoral students in school psychology supervised by school psychology faculty. Other graduate and undergraduate students assisted as volunteers on a daily basis.

Independent Variables Independent variables were medication status and task difficulty. Each participant's prescribing physician was informed of the purposes and procedures of research, and the physicians cooperation and informed consent was obtained. Participants were given either a placebo or their dosage of MPH. George was receiving 20 mg and James was receiving 5 mg. The participants were only informed that they would be receiving two different varieties of pills, which looked identical but were either "real pills" or "fake pills." Pills were administered by the guardian prior to the child arriving at school. Each session was conducted between 60 and 180 minutes after capsule ingestion. This slot of time was chosen as the effects of MPH begin to be observed between 30 - 90 minutes after ingestion and reach their peak approximately two hours

post ingestion. The effects of medication generally increase over the first two hours and decrease in a curvilinear shaped form thereafter (Pelham, 1993). An alternating schedule of medication and placebo was provided to each parent prior to the commencement of the Summer Program.

Participants received both the easy and difficult math task each day. A curriculum based assessment (Gickling & Thompson, 1985) of math skills was conducted for each participant. Standardized math worksheets were identified at different grade levels as “difficult” or “easy” for each participant. Difficult task were worksheets which participants completed with less than 50% accuracy and easy task were worksheets which participants completed with greater than 90% accuracy. Both tasks were given while students were on placebo and MPH.

Dependent Variables Participants received a forced choice attribution questionnaire, similar to the ones used by Carlson et al. (1993) & Pelham et al. (1992). The complete questionnaire is in Appendix A. This questionnaire was used to assess whether different levels of medication was related to participants attributional styles. After completing a math task, participants were given an attribution questionnaire for success or failure according to the task level of their worksheet. If they completed a difficult worksheet they were given a questionnaire for performing the task unsuccessfully and if they completed an easy math task they were given a questionnaire for performing the task successfully. The attributional choices of the forced choice questionnaire for performing the math tasks successfully were effort (“You tried hard”), ability (“you’re good at this task”), task (“The task is easy”), and medication (“The medication you took helped you”). The choices after performing unsuccessfully were effort (“You did not try hard”), ability (“You are not good at this task”), task (“The task is too difficult”), and medication (“The medication you took is not helping”). Attributions were pitted against each other in random order, with all possible pair-wise comparisons presented. Children could pick each attribution

from zero to three times. This forced choice method has previously been used successfully in experiments with ADHD participants (Carlson et al, 1993; Milich et al. 1989, 1991). All questions were read by trained research assistants to ensure that children's answers were not effected by any reading difficulties.

To determine if children with ADHD can distinguish between different dosages of medication, participants were requested to indicate which medication they believed they had taken that morning. Participants were told that they had received either a "fake pill" or "real pill" and that no one but them could know which they had taken. Participants were told they may be able to tell by the way the pill made them feel or behave. Twice a day participants indicated which medication they believed to have taken by pointing to and reading one of two cards which had either the words "real pill," or "fake pill" printed on the card, participants were also given the option to choose a card stating "do not know."

### Design

The participants underwent a randomized, double blind, placebo-controlled, within-participant medication assessment. There were four separate conditions (placebo-easy task, placebo-difficult task, medication easy task, medication difficult task). Each condition was replicated a minimum of three times. Both participants and experimenter were unaware of what dosage the participant had been administered. Medication was randomized daily and each condition occurred weekly. The order of the force choice attribution questionnaire was randomized.

### Procedures

Each day of testing was identical, in that all procedures conducted the first session were replicated across sessions and participants. Medication was given to the participants by a parent

or guardian, prior to the children's arrival at the Summer Program. Children received the medication in a randomized order, and each level of medication occurred at least once a week. Testing began 60- 90 minutes after ingestion. Participants were first given 10 minutes to complete the math task. After completion of the task participants, were given the appropriate force choice attribution questionnaire. When participants performed the easy task they were read the causal attribution questionnaire for explaining success, when they performed the difficult task they were read the causal attribution questionnaire for explaining failure. Both the easy and difficult procedures were completed each day in a counterbalanced order across days.

Twice a day participants were asked to indicate which dosage of medication they believed to have taken that morning, or indicate that they did not know by pointing to one of three cards (real pill, fake pill, or do not know). This procedure was conducted once before 9:00 A.M. and once between the times of 11:00-11:30 A.M. On each occasion they were explained that sometimes they were given a "fake pill" and other times a "real pill." They were also told that they could not tell by the way which the pill looked, but by the way it made them feel and/or behave.

### Results

Overall the results from study one were highly variable and none of the participants were consistent in their choices of attributions following success or failure. Peter did not tend to attribute his success or failure to any certain attribution. There appeared to be no substantial differences in Peter's attributions following success as compared to failure. Peter distributed his attributions equally across internal (i.e. effort and ability) and external (i.e. medication and task) attributions after both easy and difficult tasks. There was a tendency for George to choose medication after both difficult and easy tasks substantially more often than to any other

attribution, both while on and off medication. After easy tasks there was no difference in the number of external attributions as compared to internal attributions, across medication. James only made attributions for medication after a difficult task and seldomly chose medication after easy tasks, regardless of medication status. He chose a task attribution as the cause of his success substantially more often following an easy task, but rarely chose a task attribution after difficult tasks. After both easy and difficult tasks James distributed his attributions equally across external and internal attributions.

The results comparing easy and difficult task for all three participants are of uncertain validity as the participants rarely completed either of the assigned tasks. Thus, the participants' responses to the questionnaires were based on the content of the questionnaires regarding the level of difficulty of each task (i.e. "Did you do well because" "Did you not do well because"). As there were no clear differences in performance across easy and difficult instructions, task conditions were subsequently combined in order to compare effects across medication status.

Figure 1 shows the average number of times each participant chose each attribution, across all tasks when receiving medication as compared to placebo. Each participant could choose an attribution three times. The results represent an average across 8 total sessions on placebo and 9 on medication for Peter, 7 sessions on placebo and 9 on medication for George, and 8 sessions on placebo and on medication for James. No substantial differences were found for any participant when comparing attributions made while on medication as compared to placebo. There was however a substantial difference across attributions for George regardless of medication status. George tended to attribute task outcome to medication more than any other attribution. James and Peter did not tend to attribute the task outcome of his work to any one attribution substantially more than the others.

An additional part of study one was determining if participants could successfully identify when they were on and off medication. Participants were not able to successfully determine their medication status as correct responses were below chance level. Peter selected “real pill” on every occasion. George correctly chose “fake pill” on five of fourteen occasions, and correctly chose “real pill” nine of twelve occasions, and chose “don’t know” once on a placebo day. James correctly chose “fake pill” on two of fourteen occasions, “real pill” seven of twelve occasions, and “don’t know” ten of fourteen placebo days and two of twelve medication days.

### Discussion

The purpose of study one was to replicate past studies of attributional styles of children with ADHD, while increasing the ecological validity by giving participants easy and difficult math tasks rather than find a word puzzles. There are three major points to be taken from study one. First, there were no substantial differences in attributional choices when receiving medication as compared to placebo. This finding is consistent with past group studies of the attributional styles of children with ADHD. Second, there was a clear difference between the four attributions for only one participant (i.e. George chose medication most frequently). The number of occasions the other participants chose each of the four attributions did not differ substantially. A third finding is that for George medication was the most frequently chose regardless of actual medication status. This result is not consistent with previous group studies, which suggested that medication is not likely to change children’s attributions.

Unlike previous studies none of the participants’ attributional styles reflected that of a positive illusory attributional style (i.e. the participants did not make more internal than external attributions after an easy task). George’s attributional style was the closest to a positive illusory style. After difficult tasks he tended to attribute the outcome to external attributions more so than

internal; and after easy tasks he attributed the outcome equally to external and internal attributions. In previous studies there was a tendency for the participants to make more internal attributions after solvable task and more external attributions after insolvable task. George's attributional style is also reflective of anecdotal reports (Rosen & O'Leary, 1985), which state that medication may have a negative cognitive motivational effect, since he frequently made attributions for medication following easy tasks. There is a chance that George's attributions toward medication could be a result of being reminded that he was taking medication, as he was asked twice daily whether he believed he had taken a "real pill" or "fake pill." There is however other evidence supporting Rosen and O'Leary (1985). Pelham et al. (1992) found that there was considerable variation in children's attributions towards their medication, when individual, rather than group, results were examined there were some participants who attributed tasks outcomes to medication. The present results are consistent with Pelham et al., and support the use of a small n design to study the attributional styles of children with ADHD. It has been noted by Weary et al. (1989) that studying the attributional styles of individual children with ADHD is an important direction for future research.

As the participants frequently did not complete the easy and difficult tasks and, thus, did not directly experience success or failure, study 3 was conducted using the same methods but participants were required to complete all tasks. The purpose of study three was to compare the attributions made by participants after directly experiencing success and failure, on an ecologically valid task.

## Study 2

The purpose of study two was to evaluate the knowledge and superstitions that children with ADHD may have about their medication and ADHD.

### Setting and Participants

The setting and staff of study two was identical to that of study one. Seven students from the Summer Program between the ages of seven and ten participated in the study. James age ten, Brian, Carl, Paul, and Charles, all age nine, George age eight, and Peter age seven took MPH three times daily. Peter, George and James were participants in study one.

### Procedure

On the first day of the Summer Program participants were given a baseline questionnaire to assess their knowledge and superstitions of their medication, its effects on them, the reason that they take MPH, and whether or not they were in favor of taking MPH. The complete questionnaire is in Appendix B. The questionnaire was read to all participants by a staff member. Staff allowed participants to talk freely about their medication and ADHD after each question, and recorded all information given by participants. After participants gave a name for their medicine, the name given or "pill" was used in order to question their knowledge about their medication. When participants were asked if they knew what ADHD was, and if they had it, both initials and the representative words were used.

### Results

All participants were aware that they were taking medication and had some understanding of why they were taking medication. The majority of participants (4 of 7) were not accurate in the number of times they took their pill each day. Four of the participants said that they were taking their medication only twice a day, in the morning and the afternoon. The participants were



actually taking Ritalin three times a day, and appeared to be forgetting the dose of medication they were receiving at night time. On the other hand one participant, James, was well aware of the type of medication he was taking, as he knew that he had recently changed medication and he believed the new medication was “working better.” Brian mentioned that it took a half an hour for his medication to begin working. However, Brian and Carl did not know the name of the medication they took and George claimed he was taking “Bozac.” The other four participants were correct in saying that they took “Ritalin.”

Most participants (5 of 7) knew the reason they were taking medication. James and Charles said it was because they were overly active. Peter and Paul said they took their pills to help them concentrate and Brian said his pill helped him calm down and listen. George did not know why he was taking medication. Carl was the only participant who gave a reason for taking medication which was not correct. Carl believed he was taking medication because he could not eat sugar and cinnamon, which made his stomach upset and made him “go nuts.” He also believed the medicine made him behave and “act better,” especially after he ate sugar or cinnamon. Carl said that he did not take his medication on the weekend unless he “goes some place nice and mom wants me to behave.” Reports to specific questions are given in Table 1.

Five of the seven students (Brian, Paul, Charles, Peter, and George) liked taking their medication and four of those would not stop taking their medication if given the choice. Peter said that he would not stop taking the pill, because without his pill he would not concentrate. Brian said that without his medication he would misbehave, he said the medication helped him from hitting people. George claimed that he liked taking his medication but would stop if given the opportunity; however, he did not say why he would stop taking his medication. Neither Carl nor James liked taking medication and both would quit taking their medication if given the choice.

Carl's reason was that he disliked the taste and that the pills often got stuck in his throat. However, Carl said that without his medication he would probably "get crazy" and no one could "control" him. When James was questioned if he would stop taking his medication if permitted he said "Yes, Because I don't like it. It makes me tired and drowsy." James also mentioned that if he stopped taking his medication that he would probably be calmer, because it sometimes makes him nervous.

Six of the participants reported at least one negative aspect about taking their medication. Carl reported that it gave him head aches. James reported that it sometimes gives him stomach aches. Brian said that it made him eat more. Peter said that it makes him more sensitive. Charles reported no negative effects. All of participants said that their peers did know that they took medication. When Paul was asked if his friend knew he took a pill he said "Yes, they see me leave. They know I take a pill." When Paul was asked if he cared, he replied "No, it's just not their business." Both George and Peter said that they cared that their peers knew they took a pill; however, neither gave any further explanation.

James was the only participant who seemed to know what Attention Deficit Hyperactivity Disorder is. James reported that it is a disorder and the person is "hyper" and "active." However, James said that he did not have ADHD. Paul said that he did not know what ADHD was, but that he had Attention Deficit Disorder. Paul said that he did not know what Attention Deficit Disorder was, he stated "I don't know what it is. I guess it is when your parents get divorced." All the other participants said that they did not know what it was and that they did not have ADHD.

### Discussion

Results from study two indicate that the participants had a general understanding of their medication, but did not understand the term Attention Deficit Hyperactivity Disorder. The responses to the general questions presented to the participants indicate that they believed they were taking medication in order to help them concentrate, and prevent them from being overly active. The participants indicated that medication did help them with their school work and social skills. When asked what would happen if they would stop taking their medication, the participants' responses reflected that of past case studies, which found that children with medication viewed their problem as physiologically based and corrective with medication (Henker & Whalen, 1980). Participants generally believed they would not be able to concentrate or behave and that "no one could control them." As demonstrated by Rosen and O'Leary (1985) such attributions towards medication, rather than to personal/social factors, may impede the process of medication withdrawal. There was not however any participant who mentioned that their grades would worsen or that they may lose their friends, in the event that they would stop taking their medication. Overall, the participants responses seem to be reflective of what they may have heard from parents, teachers, and others of the effects of medication. These anecdotal results emphasize that parents and teachers need not credit the positive effects of medication to the "magic pill," as suggested by Whalen & Henker (1991). Rather the more adaptive view emphasizes that medication is only a tool to help the child concentrate, sustain his/her effort so that they may learn effectively and behave according to social situations.

### Study 3

The purpose of study three was to determine if the attributional styles of children with ADHD differ after easy and difficult math tasks, as well as while on medication as compared to placebo and different levels of medication.

### Participants and Setting

Two of the participants in study one (George & James) also participated in study three. Peter's parents declined to participate further. An area of each participant's regular academic classroom was set aside for testing. Experimenters included one doctoral and one undergraduate student in school psychology, who were trained and supervised by school psychology faculty. Sessions were conducted each morning between 8:30 and 11:30. Due to scheduling conflicts George was not available on Thursdays, but testing was conducted on every other day of the week for three weeks. Testing occurred for James on twelve consecutive week days.

### Measurement

Participants were administered the Children's Attributional Style Questionnaire (CASQ: Kaslow, Tannenbaum, & Seligman, 1978). The complete questionnaire is in Appendix C. The CASQ-Revised is a 24 item forced choice measure of children's attributional styles that separately assesses three dimensions for positive and negative outcomes (positive internal/external, positive global/specific, positive stable/unstable, negative internal/external, negative global/specific, negative internal/external). A total score for positive outcomes and a total score for negative outcomes can also be computed, collapsed across dimensions. A high positive total score (high internal, stable, global) is indicative of an adaptive attributional style for positive outcomes. For negative outcomes a high score (negative internal, stable, global) is indicative of a maladaptive attributional style for negative outcomes. The CASQ-Revised has been used successfully as a baseline attributional style predictor of actual performance and performance attributions of children with ADHD (Carlson et al. 1993).

Independent Variables Independent variables were medication status and task difficulty. Each participants physician was once again informed of the purposes and procedures of the

experiment, and gave informed consent. George was give three different levels of medication 20 mg, 15 mg, or 7.5 mg. James was given three levels of medications, 10 mg, 7.5 mg, and 5 mg, or a placebo. Each different dosage of medication was represented by a different colored pill. All experimenters, participants, and participant's family were unaware of the color representations. Guardians were given a schedule, formulated in a randomized fashion by a pharmacist, of which color pill to give to the child each morning of the study. The participants were only informed that they would be receiving different strengths of medications. Medication was administered by the guardian prior to the child arriving at school. Each session was conducted between 60 and 180 minutes after capsule ingestion.

Participants received both the easy and difficult math task each day and task difficulty was counterbalanced across days. Easy and difficult task was determined by Curriculum Based Measurement (Gickling & Thompson, 1985). The easy math tasks allowed participants to score 75 percent or better. On difficult math tasks participants scored 50 percent or below; however, participants never scored below 25% correct on the difficult math task. Difficult and easy math tasks were given while students were on each level of medication. Medication dosage was randomized across days.

Dependent Variables Participants received the same forced choice attribution questionnaire as in experiment 1.

To determine if children with ADHD can distinguish between different dosages of medication, participants were requested to indicate which medication they believed they had taken each morning. Participants were told that they would receive different strengths of pills and that the pill would be different colors, but the color did not represent a certain strength. They were also told that no one could tell which strength of pill they took except them and the way that they

could tell is by the way the pill made them feel or behave that morning. Participants indicated which medication they believed to have taken by pointing to and reading one of two cards which had either the words “real pill,” or “fake pill” printed on the card, participants were also given the option to choose a card stating “do not know.” This was chosen as the last dependent measure to be administered, in order that medication could approach its peak effect. Additionally, it was believed participants may be better at assessing their medication status after having completed a math task, in which they were required to concentrate.

### Design

The participants underwent a randomized, double blind, placebo-controlled, within-participant medication assessment. There were six separate conditions for George (20 mg dose-easy task, 20 mg dose-difficult task, 15 mg dose-easy task, 15 mg dose-difficult task, 7.5 mg dose-easy task, 7.5 mg dose-difficult task), easy and eight for James (10 mg dose-easy task, 10 mg dose-difficult task, 7.5 mg dose-easy task, 7.5 mg dose-difficult task, 5 mg dose-easy task, 5 mg dose-difficult task, placebo-easy task, placebo-difficult task,) and each condition was replicated three times. Both participants and experimenters were unaware of what dosage the participant had been administered. Medication was randomized daily and all conditions of medication occurred weekly. The order in which participants performed the two math tasks levels was counterbalanced, so that each task occurred first an equal number of times.

### Procedures

Each day of testing was identical, in that all procedures conducted the first session were replicated across sessions and participants. Medication was given to the participants by a parent or guardian, prior to the children’s arrival at school. Children received the medication in a randomized order, and each level occurred once a week. Testing began 60 to 90 minutes after

ingestion. Participants were first given one minutes to complete a math task. After completion of the task participants were given the appropriate force choice attribution questionnaire. When participants performed well they were read the causal attribution questionnaire for explaining success, when they performed poorly they were read the causal attribution questionnaire for explaining failure. This procedure was then replicated with the opposite math task level. Finally, participants were asked to either indicate whether they believed to have taken a placebo drug, a dosage of Ritalin or that they did not know what they had taken by pointing to the appropriate card ("real pill," "fake pill," or "do not know").

### Results

In study three, unlike in study one, participants did experience success when given an easy task and failure when given a difficult task. However, there were still no differences in attributions across placebo and medication conditions for James. Such a comparison could not be made for George as he did not have a placebo condition. Study three did however allow for the comparison of attributions across levels of medication. The results of both participants indicated that there were no substantial difference across medication dosages for either participant, as illustrated in Figure 2 and 3. There was a slight tendency for George to choose an effort attribution on a moderate as compared to a high or lose dose.

Figure 4 and Figure 5 shows the number of times a participant chose each of the attributions after each easy task (upper panel) and the second graph shows the number of times a participant chose the attributions after a difficult task (lower panel) across each level of medication. Each attribution could be chosen a maximum of three times. Figure 5 illustrate that James' attributions only differ across easy and difficult task in how much he attributes task outcomes to the effects of his medication and his ability. He attributes the ease and difficulty of

the task to his success and failure an equal amount, and believes this is the main cause of his success and failure. The amount he attributes ability to his success and failure also does not differ substantially. In rank order form task difficulty and his ability do not differ following difficult and easy task, with task always being first and ability being the second. The rank order of effort and medication reverse following difficult as compared to easy tasks. This is displayed in Figure 5, as medication is never chosen after an easy task and effort is never chosen after a difficult task. On easy tasks the rank order is in the order task, ability, effort, medication. On difficult tasks, the rank order is task, ability, medication, effort.

Figure 6 and Figure 7 illustrates the average number of times the respective participant chose each attribution across easy and difficult sessions. There is a substantial difference in the number of times George chose ability as the cause of his success relative to his failure, as indicated by the downward trend from easy to difficult task in Figure 6. The downward trend of ability is countered by a moderate upward trend of both task and effort from easy to difficult task. While on low and moderate doses of medication, George chose medication slightly more often after a difficult task. These upward and downward trends from easy to difficult task result in different rank orders for the attributions following success and failure. After an easy task George attributed his success in the order of ability, ease of task, medication, and finally to effort. After a difficult task he attributed his failure to the difficulty of the task, the medication not working and his lack of effort, and finally to his lack of ability.

There was a trend for George to choose external attributions a greater number of times following difficult task as compared to following easy task, and to choose internal attributions a greater number of times following an easy task as compared to a difficult task. After difficult task George chose external attributions as the cause of failure substantially more often than internal



attributions. However, on easy task he did not tend to choose either internal or external attributions a greater number of times. James also chose external attributions moderately more often after having performed a difficult task as compared to an easy task, and chose internal attributions moderately less often after having performed a difficult task as compared to an easy task. He tended to choose external and internal attributions an equal number of times after having performed easy tasks.

In study three neither participant was able to differentiate whether or not they were on medication, or the level of medication they were on. There were six of ten occasions when George believed he had taken a fake pill, when in fact he never took a fake pill during study three. James chose the “don’t know” card eleven out of twelve occasions. On the occasions that he did not choose the “don’t know” card he chose “fake pill” and was on 5 mg of MPH.

Results from the CASQ are in Table 2. The results indicate that George has a slight maladaptive attributional style for negative outcomes, and an overall depressive attributional style. James appeared to have an adaptive attributional style for positive outcomes and an overall positive attributional style.

### Discussion

Unlike study one, study three was successful in having participants experience success when given easy tasks and failure when given difficult tasks. Study three was consistent with past studies in finding that medication did not have a negative effect for either of the two participants. James’ attributional styles did not differ on medication as compared to placebo and neither participants’ attributional style differed across dosages of medication.

As in previous studies in which participants performed artificial solvable and insolvable task, the attributions participants made in study three differed when comparing the attributions

participants made following easy and difficult tasks. Both participants made more external attributions (medication, task difficulty) after experiencing failure than success. For George the increase in external attributions after failure is the result of choosing both the difficulty of the task and the failure of the medication more often than choosing the ease of the task and medication as related to success. Whereas the increase in external attributions by James after difficult tasks was not related to an increase in attributions for tasks, but rather by choosing medication as related to failures. James chose the external attribution of task on all possible occasions after easy tasks and did not choose task on only three occasions after difficult tasks. He never attributed his success to the effects of medication.

George and James attributed success to internal attributions (effort and ability) more often than they did their failure. However, George attributed his failure to a lack of effort more than he did his success to proficient effort. It is the substantial change in how he attributes his ability to the outcome of a task that makes internal attributions less frequent following difficult tasks. George believed his ability was the main cause of success on all but three occasion, twice when it ranked first with the ease of the task, and once when it ranked first with the effects of medication. George never attributed his failure to a lack of ability. James attributed his ability and lack of ability equally for success and failure. His internal attributions changed due to different attributions for effort. James believed that his failure was due less to a lack of effort than his success due to proficient effort. However, it was informally observed that James did not place much effort in to difficult tasks, as he would often not attempt to perform the more difficult problems and completed all the problems of the easy task. After performing difficult tasks, James would attribute his failure to a lack of ability rather than the failure of the medication, but not over the difficulty of the task. This is considered a causal attributional styles and may be looked upon

as unhealthy. This type of attributional style may lead to James giving less effort when difficult tasks arise, making him less likely to persist on a difficult task. (Butkowsky & Willows, 1980; Diener & Dweck, 1978). However, when looking at the individual math tasks, James could discern which he had the ability to perform and those that he could not. Therefore, when James was given the choice of the task being too difficult he would choose that attribution, but on other options he appeared to realize he did not have the ability to perform the task.

Both participants made more external attributions than internal attributions after experiencing failure and an equal number of internal attributions and external attributions after experiencing success. The fact that an equal number of internal to external attributions were made after experiencing success misrepresents the attributions made by the participants as there are substantial differences in the individual attributions. The equal number of internal and external attributions after experiencing success by George results from choosing one internal attribute (ability) at an extreme high rate and the other (effort) at an extremely low rate and choosing the two external attributions at a moderate rate. The equal number of internal and external attributions after experiencing success by James results from choosing one external attribute (task) at an extreme high rate and the other (medication) at an extremely low rate and choosing the two internal attributions at a moderate rate.

This study does not replicate some past studies in that there was not a difference in effort attributions when on medication as compared to placebo. The fact that James attributed his success so highly to task and that external and internal attributions were chosen an equal number of times after easy tasks is also not congruent with past studies. It is important to note that medication did not have negative cognitive emotional effects; however, it also did not change participants' attributional style to one of a positive illusory attributional style. The differences

could be due to the fact that small n designs show individual differences or because participants were exposed to ecologically valid math tasks that were easy and difficult rather than solvable and insolvable find a word puzzles.

A second part of study three was to determine if the participants could discriminate when they were on medication. Results from study three are consistent with those from study one. Although George never took a placebo, so therefore never took a “fake pill,” he was still questioned whether he believe he had taken a “fake pill” or “real pill.” George chose “fake pill” numerous times and while on each level of medication. James chose the “don’t know” card all but on one occasion, on which he was not correct in choosing “fake pill.” James choosing “don’t know” emphasizes that he cannot recognize the effects of his medication. During study three a medication assessment was being conducted on both participants. There was a difference in George’s and James’ behavior and academic performance on the various levels of medication, as well as on and off medication for James. The 20 mg dosage of medication was ideal for George’s behavior while the 15 mg dose of medication was ideal for academic performance. James responded best both behaviorally and academically to the 10 mg dose. Even though there were demonstrated differences in academic performance and behavior, the participants were not aware of the changes.

### Conclusion

Overall, the three studies found that medication does not have a negative cognitive emotional effect on participants’ attributional style. However, results differ across studies. In study one George attributed both his success and failure to medication. However, in study two when George was asked what his medication did for him, he initially reported that it only made him feel better, and subsequently George said that medication helped him with his class work and

to pay attention after being asked specifically. Further in study three, George did not make as many attributions towards his medication after experiencing success or failure, and made the attribution towards medication more often after failure than success. Unlike, previous studies that hypothesize that it is not until participants are reminded of more conventional attributions that they will choose conventional attributions before medication, it seems George must be reminded that he can attribute an outcome to medication.

In study one James rarely chose medication as a cause for his success and in study three he never chose medication as the cause to his success. When James was asked in study two what his medication did for him he reported that it helped him stay on track. When asked what it was suppose to do for him he reported that it was suppose to help him concentrate on his work. James also said that he would stop taking his medication if he could because it made him tired and drowsy. However, he also reported that if he would stop taking the medication he would “probably be calmer” because it makes him “nervous.” Also, James reported that the medication did help him with his school work and to pay attention. James did however choose medication not functioning as related to his failure over all attributions other than effort in study one, and in study three he only attributed his medication not working as the cause to his failure over it being caused by a lack of effort. As a whole the three studies suggest that James feelings towards his medication are all negative and therefore are never related to his success.

Study one and three are unique in four aspects. First, previously there has been no small n designs used to study the attributional styles of children with ADHD. Second, the study used easy and difficult ecologically valid math tasks rather than solvable and insolvable find a word puzzles. Third, except for Pelham et al. (1992) which examined participants’ attributions about their behavior, no study has compared children’s attributions for tasks outcomes on different

levels of medication. Fourth, two studies also evaluated if the participants could discriminate if they were on or off medication. The second study is unique in that there has not previously been a study which conducted anecdotal research on participants whose attributional style has also been examined through a forced choice attribution questionnaire, allowing for the two to be compared.

The major findings of these studies that replicate those of past studies are: 1) medication does enter the attributional matrices of children with ADHD, 2) medication generally does not have a negative cognitive motivational effect, and 3) children with ADHD make more external attributions after failure as compared to success. The areas in which these studies do not replicate past studies are: 1) there were no differences between the attributions made while on medication as compared to on placebo (e.g., no more effort attributions were made following success while on medication as compared to placebo), and 2) internal attributions were not made more frequently than external attributions on easy task across medication. Past studies have found that more attributions towards effort are made while on medication as compared to placebo after easy task.

An important finding in study one and three that has not been examined in past attribution studies is that the participants were not able to discriminate when they were on and off medication. Therefore there is reason to question why there should be differences in attributions toward medication while on an off medication. Rather than actual medication status, it is possible that differences may be related to instructions or prior information regarding medication.

A major limitation of study one is that participants rarely completed tasks given to them, therefore the only difference between results from the easy and difficult tasks is the content of the force choice questionnaires read to them. However, this was addressed in study three. The

limitations of studies one and two are caused by their unique qualities. One limitation is that James could recognize when a task was difficult or easy, perhaps influencing him to make attributions towards the level of the task at a high rate. While this is a limitation, it would be difficult to ensure that a participant would experience success or failure with having task difficulty being near the same level of difficulty. Additionally, setting a score which is not an extremely poor score could cause problems as a poor grade for one participant may be average or above average for another. Although the experimenter did realize the limitations caused by making a task which ensured a participant would score at or below 50%, it was deemed necessary to ensure the participants experienced a clearly different rate of success. A second limitation of this study is the number of times participants were asked to answer the force choice questionnaire. Results from study one, made it appear that participants' attributions were not stable; however, their attributions in study three proved to be more stable. A final limitation is that when given two choices on the force choice questionnaire, there were occasions when participants did not want to choose either of their choices, putting into question the validity of a force choice questionnaire. Unfortunately, time constraints prohibited a self evaluation questionnaire to be given to participants with which attributions could have been rated on a likert scale. One limitation of study two is that when asking participants questions in an anecdotal fashion it is difficult to quantify their response. This could possibly be overcome by putting together multiple common responses by children with ADHD to the questions posed and then give the questions with answers in a multiple choice fashion.

Future directions for the study of the attributional styles of children with ADHD is to test their attributions after they have taken tests assigned by their teacher and which they reviewed in class and were to have studied for at home. Although, these test could not ensure success or

failure the results would give a more accurate view of their attributional style. Participants' success or failure would be determined strictly by each participant and not the experimenter. Another direction for research is to form a method to study and report the knowledge children with ADHD have of their medication and its effects and their knowledge of ADHD, without giving limited choices. A final direction is to further explore the experimental and practical implications of the findings that they did not discriminate when on and off medication. For example, determine if children with ADHD can be taught to discriminate when they are on and off medication.



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## **Appendix A**

Attribution Questionnaire To be given after an easy task

- 1) Did you do well because A) you tried hard or because B) you are good at this work?
- 2) Did you do well because A) your medicine helped you or because B) you are good at this work?
- 3) Did you do well because A) you tried hard or because B) this is easy work?
- 4) Did you do well because A) this is easy work or because B) your medicine helped you
- 5) Did you do well because A) you are good at this work or because B) this is easy work?
- 6) Did you do well because A) your medicine helped you or because B) you tried hard?

Attribution questionnaire to be given after a difficult task

- 1) Why did you not do well, because A) you are not good at this work or because B) this work is hard?
- 2) Why did you not do well, because A) this work is hard or because B) you did not try hard?
- 3) Why did you not do well, because A) your medication did not help you or because you B) are you are not good at this work?
- 4) Why did you not do well, because A) you are not good at this work or because B) you did not try hard?
- 5) Why did you not do well, because A) you did not try hard or because B) the pill/medication you took this morning did not help you
- 6) Why did you not do well, because A) this work is hard or because B) the pill/medication you took this morning did not help you?

## Appendix B

1) Do you normally take any pill or medication?

- a) How often do you take the \_\_\_\_\_?
- b) At what times in the day do you take the \_\_\_\_\_?
- c) How much/many \_\_\_\_\_ do you take?

2) What is the real name of \_\_\_\_\_?

3) Why are you taking \_\_\_\_\_?

4) Do you like taking \_\_\_\_\_?

5) What does \_\_\_\_\_ do for you (to you)? What is it suppose to do for you (to you)?

- a) Does it help you pay attention to the teacher? *yes* \_\_\_\_\_ *no* \_\_\_\_\_  
     class work *yes* \_\_\_\_\_ *no* \_\_\_\_\_    games you play *yes* \_\_\_\_\_ *no* \_\_\_\_\_
- b) Does \_\_\_\_\_ help you to stay calm? *yes* \_\_\_\_\_ *no* \_\_\_\_\_  
     remain seated *yes* \_\_\_\_\_ *no* \_\_\_\_\_    to walk rather than run *yes* \_\_\_\_\_ *no* \_\_\_\_\_  
     from jumping around *yes* \_\_\_\_\_ *no* \_\_\_\_\_    to be patient *yes* \_\_\_\_\_ *no* \_\_\_\_\_  
     from fighting *yes* \_\_\_\_\_ *no* \_\_\_\_\_    get along with friends *yes* \_\_\_\_\_ *no* \_\_\_\_\_  
     to be friendly (nice) *yes* \_\_\_\_\_ *no* \_\_\_\_\_

6) When you take \_\_\_\_\_ is there anything you dislike about the way it makes your feel or act?

- a) Does it ever make you too slow?
- b) Does it ever make it harder for you to have fun (play)?
- c) Does it ever make you feel sick?

7) If you could stop taking \_\_\_\_\_ would you (why / why not)?

8) What would happen if you stopped taking \_\_\_\_\_?

9) Do your friends know that you take \_\_\_\_\_?

- a) Do you care if they know that you take \_\_\_\_\_?

10) Do you know what Attention Deficit Hyperactivity Disorder is? What is it? Do you have it?

1. You get an "A" on a test.
  - A. I am smart.
  - B. I am good in the subject that the test was in.
2. Some kids that you know say that they do not like you.
  - A. Once in a while people are mean to me.
  - B. Once in a while I am mean to other people.
3. A good friend tells you that he hates you.
  - A. My friend was in a bad mood that day.
  - B. I wasn't nice to my friend that day.
4. A person steals money from you.
  - A. That person is not honest.
  - B. Many people are not honest.
5. Your parents tell you that something that you make is very good.
  - A. I am good at making some things.
  - B. My parents like some things I make.
6. You break a glass.
  - A. I am not careful enough.
  - B. Sometimes I am not careful enough.
7. You do a project with a group of kids and it turns out badly.
  - A. I don't work well with the people in that particular group.
  - B. I never work well with groups.
8. You make a new friend.
  - A. I am a nice person.
  - B. The people that I meet are nice.
9. You have been getting along well with your family.
  - A. I am usually easy to get along with when I am with my family.
  - B. Once in a while I am easy to get along with when I am with my family.



10. You get a bad grade in school.

- A. I am not a good student.
- B. Teachers give hard tests.

11. You walk into a door and you get a bloody nose.

- A. I wasn't looking where I was going
- B. I have been careless lately.

12. You have a messy room.

- A. I did not clean my room that day.
- B. I usually do not clean my room.

13. Your mother makes you your favorite dinner.

- A. There are a few things that my mother will do to please me.
- B. My mother usually likes to please me.

14. A team that you are on loses a game.

- A. The team members don't help each other when they play together.
- B. That day the team members didn't help each other.

15. You do not get your chores done at home.

- A. I was lazy that day.
- B. Many days I am lazy.

16. You go to an amusement park and you have a good time.

- A. I usually enjoy myself at amusement parks.
- B. I usually enjoy myself in many activities.

17. You go to a friend's party and you have fun.

- A. Your friend usually gives good parties.
- B. Your friend gave a good party that day.

18. You have a substitute teacher and she likes you.

- A. I was well behaved during class that day.
- B. I am almost always well behaved during class.

19. You make your friends happy.
- A. I am usually a fun person to be with.
  - B. Sometimes I am a fun person to be with.
20. You put a hard puzzle together.
- A. I am good at putting puzzles together.
  - B. I am good at doing many things.
21. You try out for a sports team and do not make it.
- A. I am not good at sports.
  - B. The other kids who tried out are very good at sports.
22. You fail a test.
- A. All tests are hard.
  - B. Only some tests are hard.
23. You hit a home run in a ball game.
- A. I swung the bat just right.
  - B. The pitcher threw an easy pitch.
24. You do the best in your class on a paper.
- A. The other kids in my class did not work hard on their papers.
  - B. I worked hard on the paper.

# Table 1

## Participants Belief of the Effects of Their Medication

	Yes	No
Does your pill help you pay attention?	6	1
Does your pill help you with class work?	6	1
Does your pill help you with games you play?	3	4
Does your pill help you stay calm?	6	1
Does your pill help you remain seated?	5	2
Does your pill help you from jumping around?	4	3
Does your pill help you to keep from fighting?	4	3
Does your pill help you to be friendly?	6	1
Does your pill help you to walk rather than run?	5	2
Does your pill help you to be patient?	4	3
Does it help you to get along with friends?	6	1

Table 1: Number of participants who answered "Yes" and "No" to the specific questions on the questionnaire assessing their knowledge of their medications and ADHD

Table 2

	Internal Score Positive Event	Stability Score Positive Event	Global Score Positive Event	<i>Composite Score Positive Event</i>	Internal Score Positive Event	Stability Score Negative Event	Global Score Negative Event	<i>Composite Score Negative Event</i>	<i>Overall Composite Score</i>
Range	0 - 4	0 - 4	0 - 4	0 - 12	0 - 4	0 - 4	0 - 4	0 - 8	-8 - 8
George	2	2	2	6	1	2	1	4	2
James	3	2	3	8	0	2	0	2	6

Composite Score Positive Event (CP) = The sum of the score on the Internality, Stability, and Globablity Scales for Positive Events. The higher the score, the less depressive the attributional style.

Composite Score for Negative Events (CN) = The sum of the scores on the Internality, Stability, and Globablity Scales for Negative Events. The higher the score, the more depressive the attributional style.

Overall Composite Score = CP - CN The lower the score, the more depressive the attributional style.

Table 2: Ratings from the Children's Attributional Style Questionnaire

# Figure 1

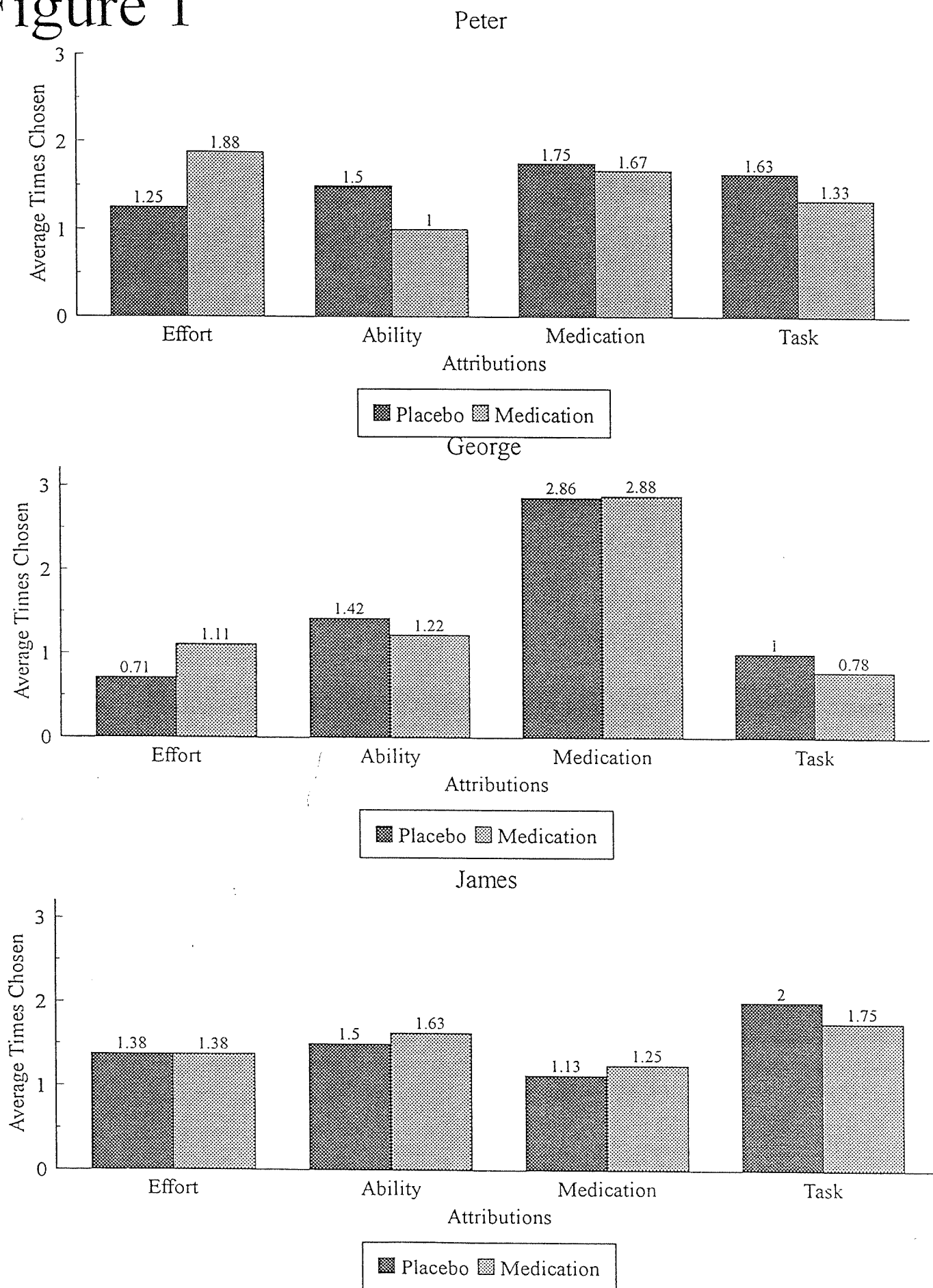


Figure 1 : Compares the effects of medication on the attributions made by each participants by averaging the attributions made after all tasks, while on placebo and medication.

George

## Figure 2

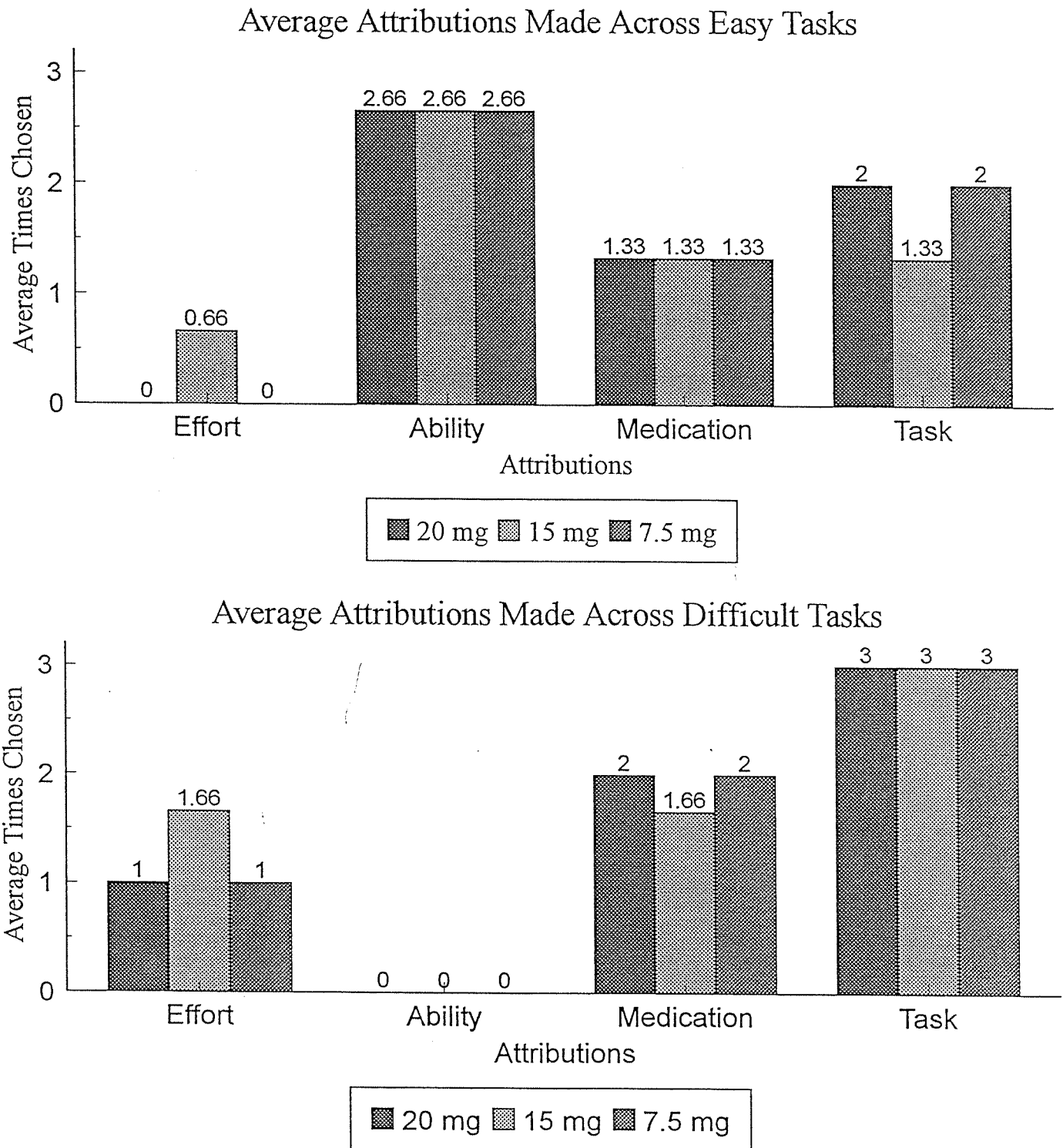


Figure 2: Compares the effects of medication on George's attributions by averaging the individual attributions made after 3 easy and 3 difficult task.

James

## Figure 3

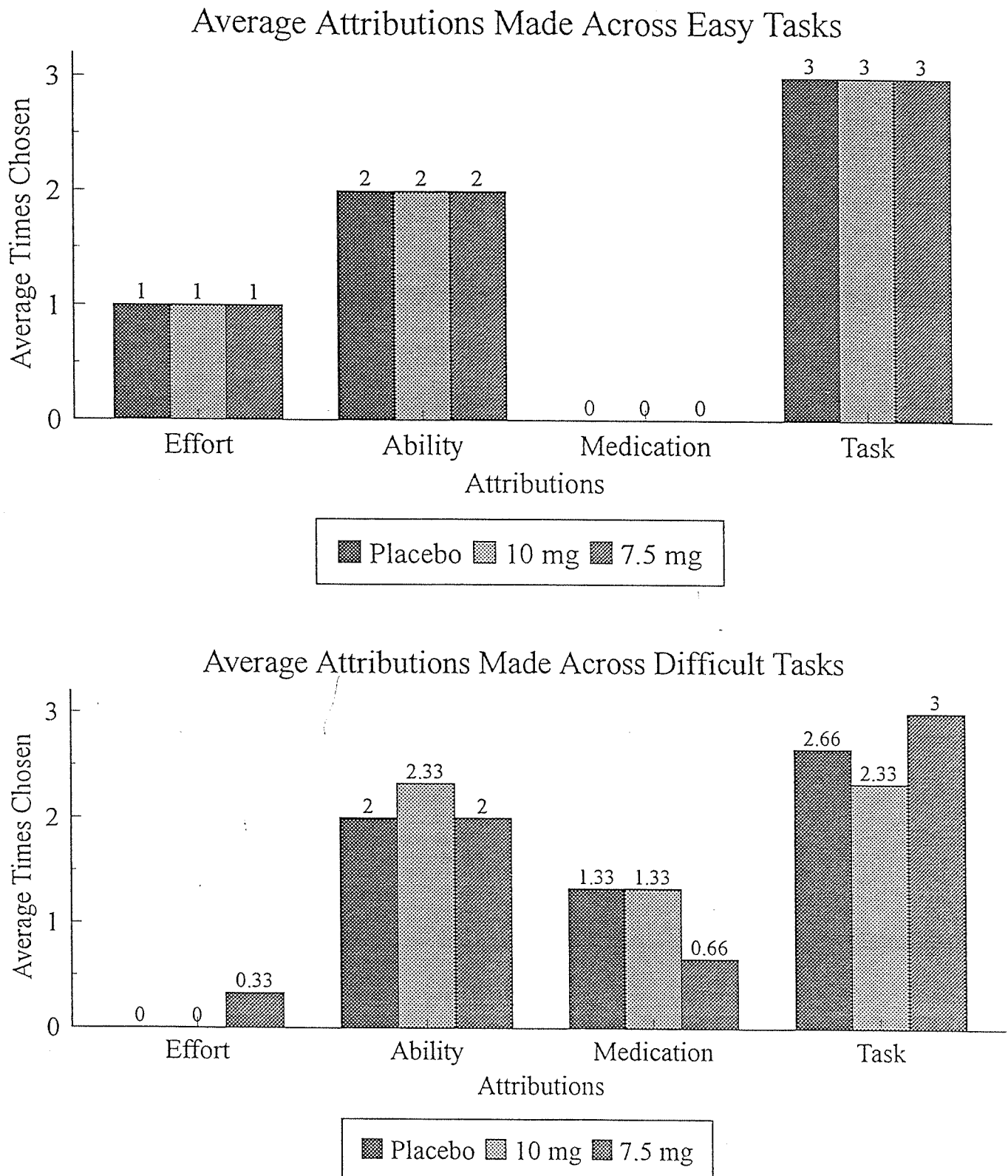


Figure 3: Compares the effects of medication on James's attributions, by averaging the individual attributions made after 3 easy and 3 difficult task.

George

# Figure 4

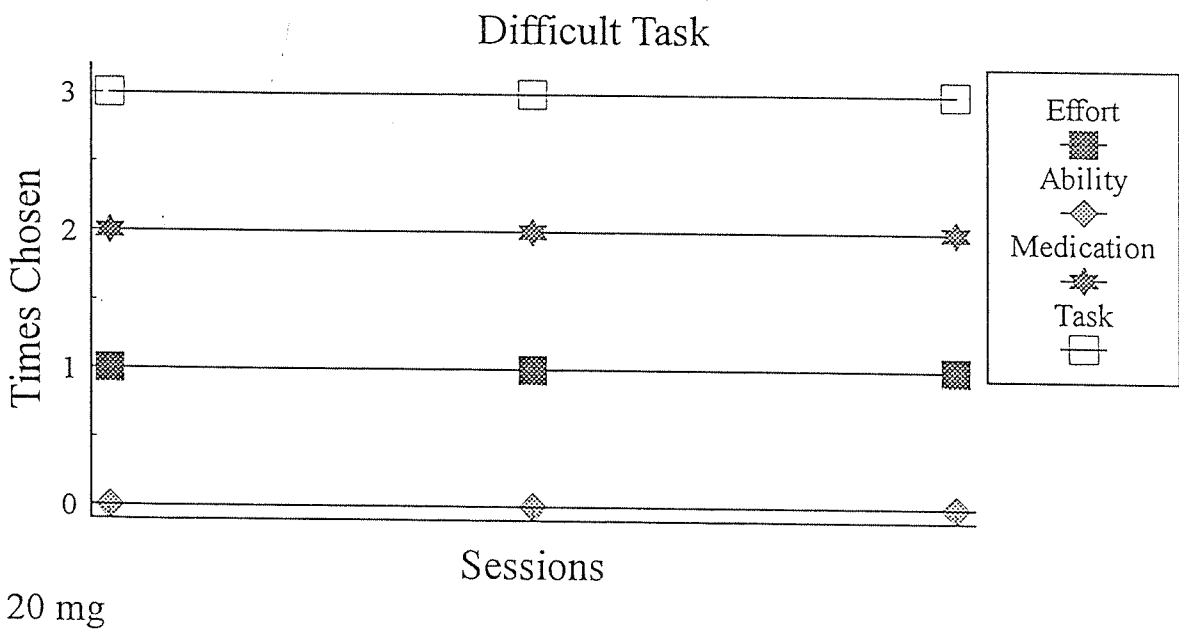
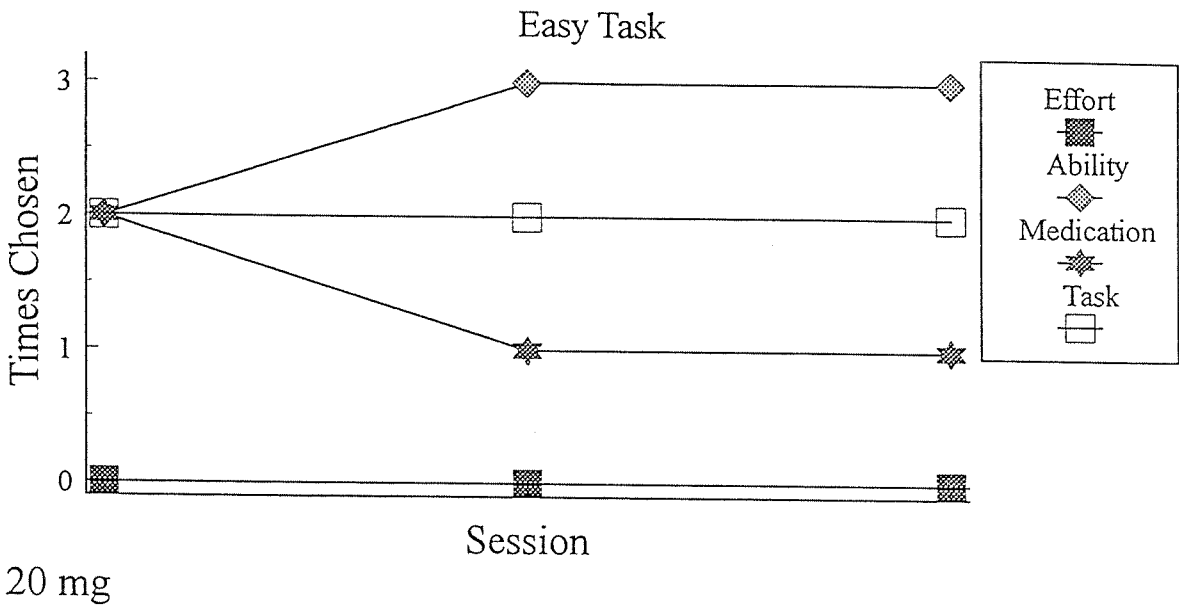


Figure 4: Compares the attributions made by George after each easy and each difficult task



James

# Figure 5

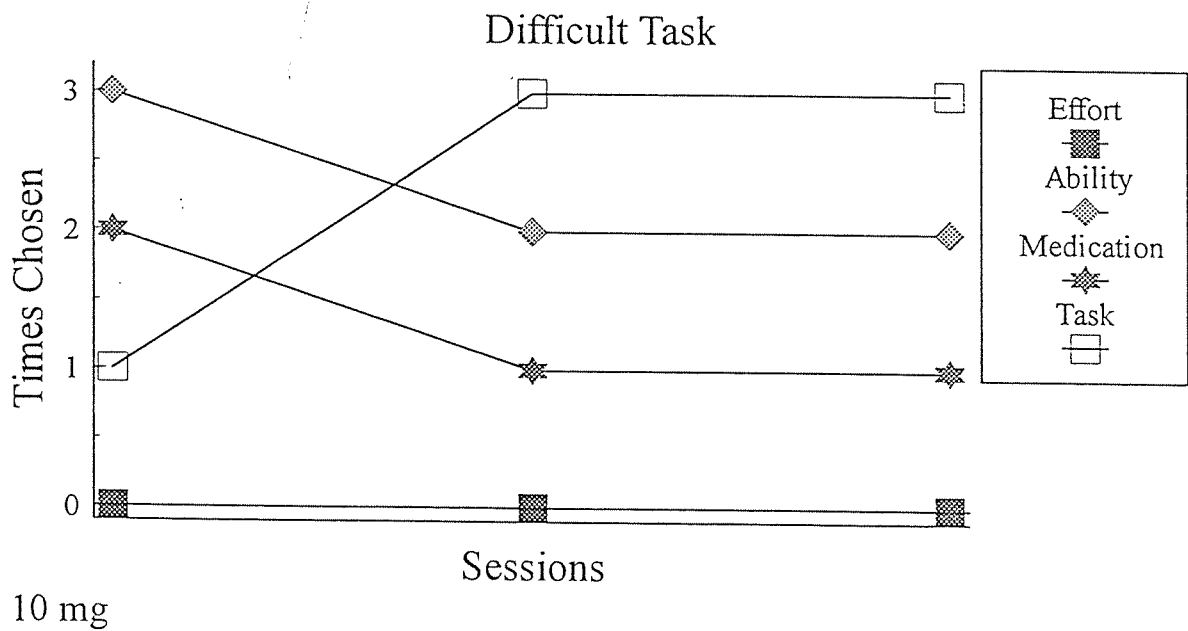
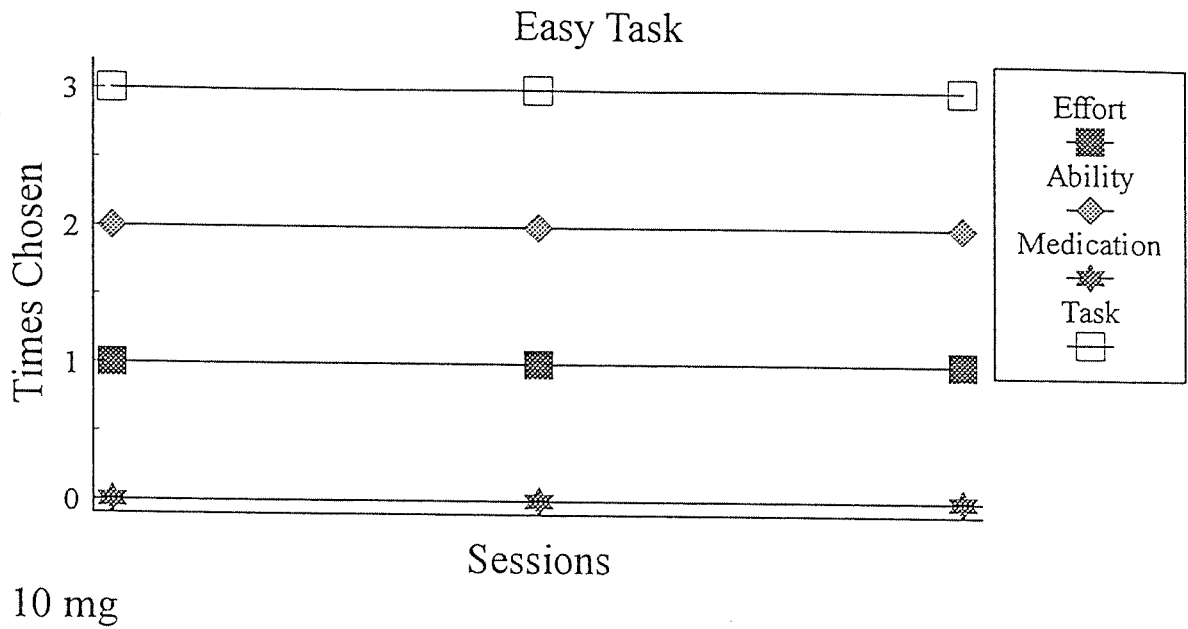


Figure 5: Compares the attributions made by James after each easy and each difficult task

# George Figure 6

Average Across 3 Easy and 3 Difficult Sessions

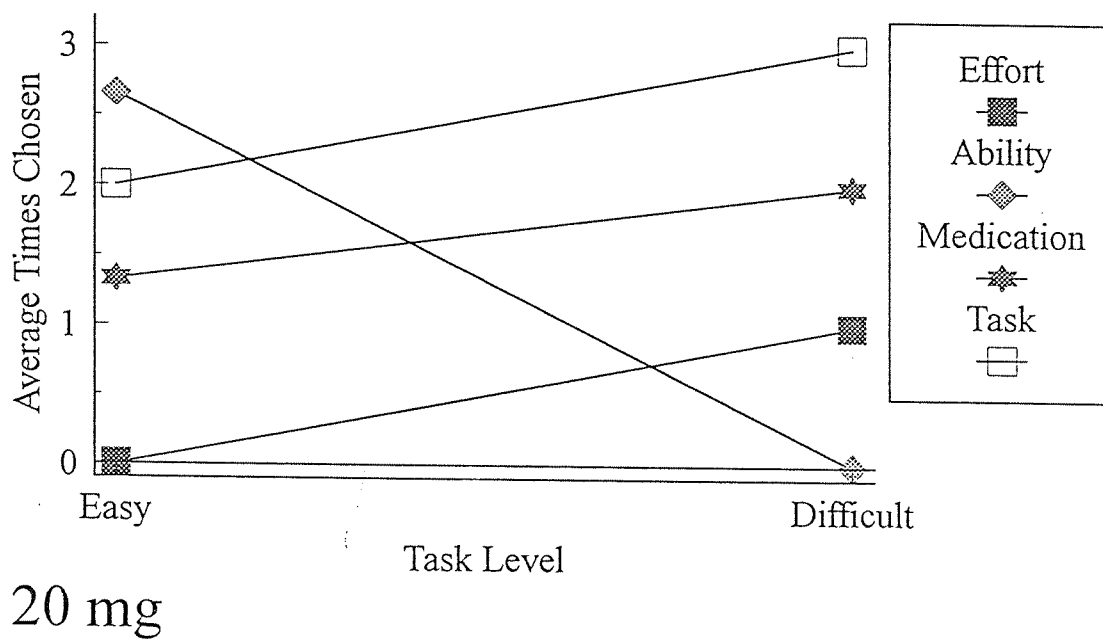


Figure 6: Average number of times George chose each attribution after 3 easy and 3 difficult tasks

# James Figure 7

Average Across 3 Easy and 3 Difficult Sessions

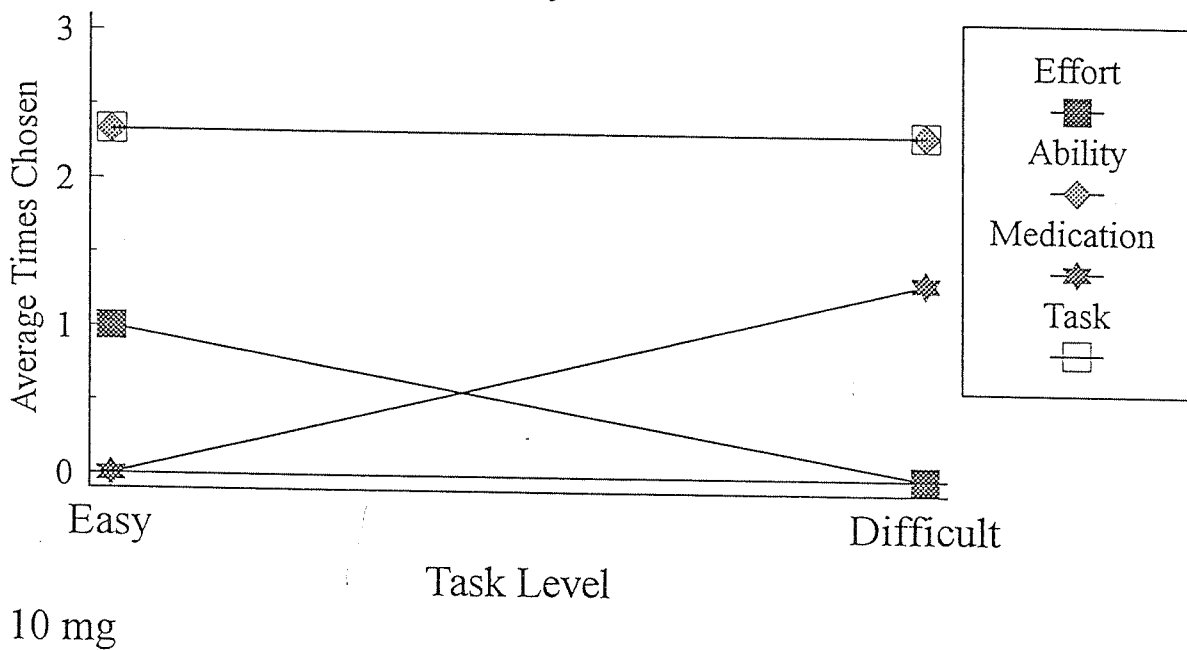


Figure 7: Average number of times James chose each attribution after 3 easy and 3 difficult tasks