A Thesis

Entitled:

Oblivious to the Obvious:

An Interhemispheric Interaction Approach

to Judgments of the Self and Others

by

Michael Douglas Lanning

Submitted to the Graduate Faculty as partial fulfillment of the requirements for

the Master of Arts Degree in Psychology

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An Abstract of

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How accurate are we in our judgments of the self versus others? Two experiments were designed to investigate strength of handedness as a moderator of these judgments using the Attitude-Attribution paradigm of Jones and Harris (1967) and the above and below average effects (Kruger, 1999). The results of the Attitude-Attribution experiment found no strength of handedness effects on casual attributions of behavior. The above and below average effects were investigated using 20 easy or hard trivia questions to elicit these opposite effects. The results showed that, in support of the hypothesis, strong handers showed the above and below average effect to a greater degree than did mixed handers, whom did not exhibit the below average effect. Results are explained using an interhemispheric interaction approach with greater access to right hemisphere processes resulting in better accuracy when comparing the performance of the self to others.

Acknowledgments

This thesis and my graduate education would not be possible without the love and undying support from my mother and to the inspiration and guidance I have received from my mentor, Dr. Stephen Christman. I remember telling my mother at 6 years old that I wanted a medical degree and a Ph.D. I spent much of my early education focusing on biology and chemistry and then I took my first psychology class and realized that I also wanted a degree in psychology because of its importance to the medical field and my life. I came to realize after taking a class with Dr. Christman that I found my true calling and reaffirmed that realization during the many hours of conversation I had outside of class with Dr. Christman. I should have known that my academic future was in psychology considering most of my childhood I spent watching a physically and mentally abusive relationship take place in front of me. So with the experience of my childhood and the understanding of how important and mysterious the mind is I finished my bachelor's degrees in biology and psychology with my sights set on psychology for graduate school, which I applied to my undergraduate alma mater the University of Toledo.

I will never repay the debt of gratitude that I have to Dr. Christman and the other professors, like Dr. Alice Skeens, that have given such invaluable guidance, but I will try my best to utilize all of the guidance towards the further understanding of the mind and how it makes us who we are.

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List of Abbreviations

EHI…….Edinburgh Handedness Inventory
FAE……Fundamental Attribution Error
LH……..Left Hemisphere
RH……..Right Hemisphere

Chapter One

Judgments of the Self Versus Others: Attribution and Social Comparisons

What causes certain human behavior to occur; is it the internal disposition of the person, is it the situation that drives it, or is it a combination of the two factors? How well can a person take the perspective of another person when comparing behavior of one's self versus another person, either a specific target or the average person? Both of these are important questions to ask when trying to understand how a person evaluates oneself versus others. There is often a significant difference between explaining self-behavior compared to explaining the behavior of others. When making causal judgments of behavior, people are more likely to blame another person's behavior on the disposition of that person instead of causally linking that behavior to the situation. Although not investigated here, an opposite imbalance of explaining the behavior of others is also seen in explaining self-behavior, with explanations citing situational causes more than dispositional causes in many situations, especially those with negative results.

The biases (i.e. dispositional versus situational bias) in causal explanations of behavior have led researchers to develop theories that account for the occurrence of such phenomena. The fundamental attribution error (FAE) is the tendency for people to overestimate the influence of dispositional factors while underestimating the influence of situational factors when determining the cause of other people's behavior. The fundamental attribution error is also more modernly referred to as the correspondence bias. The correspondence bias is the tendency to conclude that a person has a disposition that corresponds to his or her behavior even when the behavior is attributable to the situation (Gilbert, 1994). The fundamental attribution error (FAE) and the

correspondence bias refer to judging others behavior but another attribution bias also occurs. The actor-observer bias is a bias towards attributing self behavior to the situation and attributing another person's behavior to the disposition, especially in situations with negative results as will be discussed briefly on the following page.

Jones and Harris (1967) developed the attitude-attribution paradigm to study people's attributions of behavior based on dispositional and situational factors. The behavior that was used was an essay exhibiting either the low probability behavior of taking a pro-Castro stance or the high probability behavior of taking an anti-Castro stance. The manipulation of choice involved two conditions; one where the subject was told that the essay they were going to read was written by a student that was asked to write an essay as the opening argument for the debate team that was in a pro or anti-Castro stance and the other condition involved the essayist having a choice to write in either stance. Subjects were given an instruction sheet describing a variation of the conditions described above. There were asked to read an essay and estimate to what extent the essay was reflective of the essayist's true beliefs. The results showed that in the free choice condition, subjects attributed the pro and anti stance to the disposition of the essayist. In the no choice condition, regardless of stance, subjects still attributed the essayist's stance to dispositional factors instead of attributing the essayist's stance to the situational constraint of no choice.

Jones and Harris (1967) found that the variability in the no choice/pro condition was over ten times larger than any other condition. In the three other conditions, subjects were in agreement that the essayist's behavior was reflective of his/her true beliefs; therefore subjects attributed the essayist's behavior to their disposition as was reflected

by the low variability in their responses. The large increase in the variability in the no choice/pro condition, compared to the other conditions, would indicate that some subjects were adjusting their attributions to account for the influence of the situation and not just disposition. This is the key condition and past research has not been able to explain why subjects in this condition are so variable in their attributions of behavior. The large variability suggests that some subjects are able to take the perspective of the writer and appreciate situational constraints, which suggests that individual differences may be a strong component in the fundamental attribution error.

A related study by Ross et al. (1977) investigated attribution when the behavior of the target of attribution is directly observable. They used a quiz game paradigm, where a questioner would ask the contestant questions reflecting the questioner's personal and idiosyncratic knowledge. The questioners were instructed to generate questions that would not be easily answered by the contestant. They found that the contestants rated the questioners as being superior in knowledge while questioners rated contestants as being inferior. In a second experiment, third party observers were added to watch a simulation of the first experiment's questioner/contestant quiz sessions. The results showed that observers held the same attributions as the questioners. The questioners, contestants, and observers were all aware of the situational constraints placed on both the questioner and the contestant but did not adjust their attributions to the different situational constraints placed on the behavior of the questioner and contestant. Even when the behavior of the target of the attribution was directly observable by the subjects making the attributions, they were unable to assign, accurately, the amount of influence that the situation had on the behavior of both the questioner and the contestant. Whether

the behavior is observed being performed, as in Ross et al (1977), or just the result is seen, as in Jones and Harris (1967), subjects attributed behavior to dispositional factors and did not take into account situational constraints. The bias towards dispositional influences versus situational influences on behavior of the questioner and contestant attributions is an example of the actor-observer bias.

The tendency to attribute behavior to dispositional factors instead of situational factors is robust and pervasive. A review by Gawronski (2004) concludes that this tendency is resistant to many variables associated with subjects' perceptions as well as experimental manipulations. He points out that the correspondence bias is robust and independent of perceivers personal attitudes, level of generality of perceivers' inferences, order of essay and situational information, contradictory essays from the same author, explicit warnings of judgmental bias, different types of situational constraint information, artificial versus authentic essays, additional information about the essay writer, and cultural differences (for a full list, see Gawronski, 2004).

Biases in judgment are not limited to behavioral attribution, but are readily observed in studies investigating social comparison. Subjects in a comparative judgment experiment are asked to compare their ability on some task, such as juggling, driving a car, or answering trivia questions as examples, with that of the average person. This inaccuracy of comparing one's abilities or performance to the average person has been documented in numerous studies (Burson, Larrick, & Klayman, 2006; Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008; Krueger, & Mueller, 2002; Kruger, 1999; Kruger, & Dunning, 1999; Rose, Jasper, Corser, 2010). Kruger (1999) reported that when absolute abilities tend to be high (e.g. using a computer mouse or riding a bicycle),

an “above average” effect was observed but when absolute abilities tend to be low (i.e. juggling or programming a computer), a “below average” effect is observed. The “above average” effect is the finding that the majority of people rate themselves above average on easy tasks and the “below average” effect is tendency for people to rate themselves below average on difficult tasks. The above and below average effects are a result of the inability of people to accurately weight their performance relative to the average person on one task or ability, such as the examples listed above. Many researchers have tried to explain these biases and inaccuracies by manipulating situational variables, while relatively few have tried to explain these biases using individual differences variables, as will be shown in the literature reviewed on the following pages.

Chapter Two

Individual Differences in Attribution and Social Comparisons

Researchers investigating judgments of the self versus others, specifically the FAE and the above and below average effects have conducted little to no research on the effects of individual differences. The research that has been conducted provides evidence and support that individual differences moderate the inaccuracies in perception that occur when comparing oneself to others and arise from trying to take the perspective of others.

The review by Gawronski (2004) describes many variables of interest except for individual differences variables. Relatively few studies have investigated individual difference variables as moderators of biases in behavior attribution. One study by Forgas (1998) found that people who are in a happy mood exhibit the fundamental attribution error whereas people who are in a sad mood do not exhibit this error in attribution. A study by Robins et al. (1996) found that people who are extroverted were less likely to show the actor-observer bias in attribution, whereas introverted individuals were more likely to show this bias. This bias shown by introverted people may be a function of being focused primarily on the self instead of considering others' perspectives in addition to the self. Two studies found that older adults show the fundamental attribution error more extremely than young to middle aged adults (Blanchard-Fields & Horhota, 2005; Horhota & Blanchard-Fields, 2006). Of the studies investigating individual differences, no study has investigated handedness strength or direction as an individual difference variable and moderator of the biases in attribution.

Research has shown that in some cases individual differences do moderate the biases in both behavior attribution and comparative judgments. Recent research looking at strength of handedness as a moderator of self versus other comparative judgments has found a significant effect of strength of handedness across two experiments investigating the above and below average effect (Rose, Jasper, & Corser, 2010). In experiment 1 subjects were asked to rank their ability on easy (e.g. mouse usage) and hard (e.g. juggling) tasks. In experiment two subjects were asked to predict their performance and relative rank compared to the average student on easy and hard categories of trivia, without answer the questions. The results revealed that strong-handers showed the "above" (Kruger, & Dunning, 1999) and "below" (Kruger, 1999) average effect to a greater degree across both experiments, indicating that strength of handedness may be an important moderator in evaluations of the self and others. This thesis intends to show that not only does strength of handedness moderate comparative judgments, but it also moderates attributions of the behavior of others. Showing that strength of handedness significantly affect comparisons of the self and others will provide support for the hypothesis that mechanisms integral to the accuracy of judgments of the self and others reside in the right hemisphere. Having more access to these RH mechanisms would increase the accuracy of the comparison between the self and others.

Behavior attribution might not seem to be as related to evaluations of the self versus others as comparative judgments because the subject is not directly asked to evaluate the self-versus a target, but both clearly involve the consideration of others not just the self. Attribution of behavior involves being able to look at the other person's situation as if you were in that position to determine if the outcome that was observed is

due to dispositional or situational factors. Related research on taking another person's perspective has produced findings that showed strength of handedness being a significant moderator, which mixed handers are better at taking another person's perspective than strong handers (Sontam, Christman, & Jasper, 2005). By attributing behavior to internal dispositions and not evaluating the situational factors, an individual does not need to take the other person's perspective into account, therefore creating a difference in the attribution of behavior of the self and others as is the case with the actor-observer bias. The connections between evaluations of self and others in comparative judgments are more apparent than in behavior attribution due to subjects being asked to directly predict and compare their abilities/performance with that of the average person.

Chapter Three

Interhemispheric Interaction and Strength of Handedness

Before further detailing the research findings based on strength of handedness, a brief description of this variable is needed. Modern research in the field of psychology has largely ignored strength of handedness as an individual difference variable. The research in the past has analyzed findings based on direction (e.g., right or left handed). It has been argued by researchers that strength may be more important than direction (Christman, Propper, & Brown, 2006; Christman, Propper, & Dion, 2004; Propper & Christman, 2004; Propper, Christman, & Phaneuf, 2005). Strength of handedness is determined by subjects' self reported hand preference on various tasks (e.g. writing, throwing, and using a spoon). A strong hander refers to an individual that consistently prefers the use of one hand across all tasks, while mixed handers refer to individuals who use their non-dominant hand for at least one activity.

The corpus callosum is the large bundle of nerve fibers that connects the left and right cerebral hemispheres. The corpus callosum enables interhemispheric interaction to occur, combining left and right hemisphere processes. There have been studies showing a relationship between strength of handedness and corpus callosum size. Wittelson and Goldsmith (1991) examined corpus callosum size as a function of strength of handedness in a sample of males who were all right-handed for writing. They found a significant negative correlation (r =-.67) between strength of handedness and callosal size, indicating stronger degrees of right-handedness were associated with smaller corpus callosa. Supporting this finding, Clarke and Zaidel (1994) and Habib et al. (1991) reported larger callosal sizes in non-consistent right-handers than in consistent right handers. Consistent

with Wittelson and Goldsmith (1991), Cowell, Kertesz, and Denenberg (1993) reported that strongly right handed males had smaller corpus callosal sizes than weakly right-handed males. They also found that strong left-handedness was associated with larger callosal sizes than mixed left-handedness. Denenberg, Kertesz, and Cowell (1991) reported larger corpus callosa in mixed handed males, relative to strong-handed males and all females. Thus, it has been hypothesized that mixed-handers have increased, callosally mediated interhemispheric interaction and access to right hemisphere (RH) processes.

Strength of handedness has been shown to be a significant individual difference variable in many processes believed to be dependent on access to RH processes. For example, mixed handers have a superior episodic memory compared to strong handers (Christman, Propper, & Brown, 2006; Christman, Propper, & Dion, 2004; Lyle, Logan, & Roediger, 2008; Lyle, McCabe, Roediger, 2008; Propper & Christman, 2004; Propper, Christman, & Phaneuf, 2005). Since episodic retrieval is lateralized to the RH (Tulving et al., 1994), the greater interhemispheric interaction in mixed handers gives them increased access to RH retrieval mechanisms.

There have also been significant findings establishing a relationship between strength of handedness and belief updating and persuasion. The RH has been implicated in belief updating and attitude change (Caccioppo, Petty, & Quintanar, 1982; Coltheart, 2005; Drake, 1991; Drake & Bignham, 1985; Ramachandran, 1995; Rausch, 1977). Mixed handers have been shown to be better at representations of body image (Christman, Bentle, & Niebauer, 2007), which is a function of maintaining and updating beliefs about one's body. Mixed handers have also been shown to be more persuadable

than strong handers (Christman, Henning, Geers, Propper, & Niebauer, 2008), which reflects a better ability to update beliefs to account for new contradictory information.

Chapter Four

Strength of Handedness: A Link between Understanding Self and Others

It has been proposed that counterfactual production is a key component in making attribution biases (Lipe, 1991). Counterfactual production is related to being able to put one's self in a different situation and being able to see different results if certain steps were taken instead. Comments like "if only this would have happened" or "if I were in that situation" are examples of counterfactuals. Jasper, Barry, and Christman (2008) showed that mixed handers generate more counterfactuals than strong handers. If counterfactuals play an important role in making attributions of other's behavior, as Lipe (1991) states, then mixed handers should be more accurate in their attributions of behavior of others due, in part, to their increased counterfactual production.

Handedness researchers have also investigated the effects of strength of handedness in other experiments related to evaluations of the self and others. Sontam, Christman, and Jasper (2005) showed that strong right handers are worse at taking other people's perspectives into account, which is a critical aspect of exhibiting the fundamental attribution error. They reported that strong handers showed the endowment effect to a greater degree than mixed handers. Subjects were asked to imagine hearing about a wine salesman that bought a good case of wine back in the 1950's for 5 dollars a bottle. Subjects were asked how much would they pay for a bottle today. The other version placed the subject in the wine salesman's position and then asked them how much they would sell it for today. The mixed handers said they would purchase the wine for $41.80 whereas they would sell the bottle for $71.80. The strong handers said they would purchase the bottle of wine for $13.90 whereas they would sell it for $180.00.

This significant difference between the self and others, based on strength of handedness, suggests that other areas of self versus others judgments may also be influenced by strength of handedness. If the fundamental attribution error is dependent on self-other perception, then strength of handedness with significantly moderate the fundamental attribution error. To the extent that the fundamental attribution error is dependent on self-other processes exhibit the fundamental attribution error due to the ability of taking "others" perspectives into account which is integral to making an accurate attribution of behavior.

Research conducted on theory of mind using autistic patients (Mason, et al., 2008) and RH brain damaged patients (Weed, et al., 2010) support the hypothesis that, having better access to RH processes, would better enable a person to make more accurate comparisons between the self and others as well as being better able to see another person's perspective. Mason et al. (2008) found that, when comparing autistic patients to age and gender matched controls on theory of mind tasks the size of the corpus callosum was significantly smaller in the autistic patient group. The diminished interconnectivity in autistic patients diminishes their ability to complete theory of mind tasks correctly. Weed, et al., (2010) found that patients with RH brain damage had a diminished ability in theory of mind tasks compared to controls. The research above suggests that having better access to RH theory of mind processes allows a person to more accurately see the perspective of others.

From the research reviewed, it has been shown that strength of handedness is a significant factor across many paradigms. In addition to examining handedness differences in the fundamental attribution error, the current study will also look at a

related phenomenon involving another form of self versus other evaluations, comparative judgments.

Self vs. Others Inaccuracy and Handedness Predictions

It appears that people are biased when comparing the self to others on comparative judgments and judging the influence of dispositional and situational factors on behavior of others. Researchers of these differences in judgments of the self and others have neglected to include an important individual differences variable known to be a significant moderator across many paradigms. This study proposes that strength of handedness is an important moderator in judgments of self and others, specifically in the attitude-attribution and comparative judgments paradigms.

Two experiments will be conducted hypothesizing that strength of handedness is a significant moderator of the inaccuracy in judgments of the self and others (e.g. FAE & comparative judgments). The first experiment will use the attitude-attribution paradigm of Jones and Harris (1967) to investigate the fundamental attribution error. The hypothesis for Experiment 1 is that strong handers will show the fundamental attribution error to a greater degree than mixed handers. The second experiment will use a procedure modeled after Kruger (1999), Rose, Jasper, and Corser (2010), and Burson, Larrick, and Klayman (2006) using normalized trivia questions taken from Nelson and Narens (1980).

The hypothesis for Experiment 2 is that strong handers will show the above and below average effect on easy and difficult questions, respectively, to a greater degree than mixed handers. A major difference between Rose, Jasper, and Corser (2010) and the

current study is that this experiment was designed to collect actual performance measures. Rose, Jasper, and Corser, (2010) asked subjects to predict their performance and the performance of the average students on categories of trivia without having the subjects answer the questions. Without having the subjects answer the trivia questions an integral question cannot be answered; does strength of handedness only moderate the above and below average effects when subjects have to make subjective predictions about self performance and the average student's performance? As it now stands, the results of Rose, Jasper, and Corser (2010) may simply reflect the possibility of strong handers being better at easy categories of trivia and worse at difficult categories of trivia. Having the subjects complete the trivia questions and make predictions of self versus others performance will try to rule out on test that strength of handedness predicts actual performance on trivia questions.

Chapter Five

Design and Procedure of Experiment 1

Participants. 200 students from Introduction to Psychology at the University of Toledo volunteered to participate for course credit. There were 112 females and 88 males.

Design. The design of this experiment was a 2 (choice/no choice) x 2 (pro or con essay) x 2 (mixed/strong handedness) between subjects design.

Materials. Handedness was assessed using the Edinburgh Handedness Inventory which is a 10-item questionnaire (EHI, Oldfield, 1971). The EHI asks for information about hand preferences for 10 activities. See Appendix. Response choices are "always left", "sometimes left", "no preference", "sometimes right", and "always right" and are scored as -10, -5, 0, +5, +10, respectively. The range of scores on the EHI is from -100 to +100.

The median split of the absolute values of the EHI resulted in a median handedness score of 80, with strong handers scoring 80 and above. As determined by the median split, 117 participants were strong-handed and 83 were mixed-handed. The median split method has been used by previous strength of handedness studies (Christman, Bentle, & Niebauer, 2007; Christman, Henning, Geers, Propper, & Niebauer, 2008; Jasper, Barry, and Christman, 2008) to dichotomize the range of EHI scores into mixed and strong handers.

The fundamental attribution error (FAE) was investigated using a modified version of the Jones and Harris (1967) attitude-attribution paradigm. The topic of the essay was updated. The topic of the original study was Fidel Castro. At that time,

Americans were strongly polarized against Castro. Today, Castro would likely not have the same effect, but one topic that has caused a high degree of polarization is Iran's nuclear arms program. Following the conclusion of Jones and Harris (1967), a low probability behavior is best suited for showing the fundamental attribution error. The causes behind a low probability behavior would likely require more thought than a high probability behavior, because the high probability behavior is exhibited much more frequently, therefore the reasons behind a high probability behavior are more salient than a low probability behavior. A pro-nuclear Iran stance served as the low probability behavior versus the high probability behavior of an anti-nuclear Iran stance. The pro-nuclear Iran essay described reasons why they should be allowed to possess nuclear weapons based on their past history with neighboring countries, rights given to other sovereign nations, and about Israel having nuclear weapons and stating they would take action against Iran if they produce or possess nuclear weapons. The con-nuclear Iran essay described a past conflict with Iraq, suspicion of funding terrorism, and recent aggression against peaceful citizens protesting the government elections.

The key dependent variable was the subject's attribution of the essayist's behavior. To assess the perceived attitude of the essayist, subjects used a 7 point Likert scale. The question was "to what extent do you think the essayist's essay is reflective of their true beliefs". Other questions assessed the subject's attitude on the topic of the essay, clarity and strength of the argument, and questions were designed to check experimental manipulations. The clarity question asked the subject "how clearly does this person express his argument," on a 7 point scale with responses ranging from 1 meaning very unclear to 7 meaning very clear. The Questions about constraint asked

subjects to estimate how much choice the essayist had in writing a pro or con essay. All preceding questions were on a 7 point Likert scale with each question following the same structure as the clarity question, see appendix for a copy of all questions.

Procedure. Subjects were either ran singularly or in small groups of no more than 3. Upon being brought into the room, subjects were given the informed consent form. After giving informed consent, subjects read a cover story about the condition under which the essayist wrote the essay. Subjects were told the essayist either had a choice to write a pro or con essay about the nuclear arms program in Iran or that they had no choice over essay stance. After reading the essay, subjects answered questions assessing judgments of essay characteristics (e.g. clarity, strength, and persuasiveness), personal beliefs on the essay topic, and a question asking about the causal attribution of the essayist's behavior. After completion of this task subjects proceeded on to the next experiment in the booklet and after completion of the experiment booklet subjects completed the EHI, were thanked, and dismissed.

Chapter Six

Results of Experiment 1.

This experiment investigated the influence of strength of handedness on the fundamental attribution error. The design of this experiment was a 2 (choice/no choice) X 2 (positive/negative stance) X 2 (strong/mixed handers). All factors were between subjects unless otherwise stated. There were no effects of gender; therefore gender was collapse across all conditions.

Primary Analysis. The hypothesis was that mixed handers relative to strong handers would exhibit the fundamental attribution error to a lesser degree. The hypothesis would be supported if there was a three way interaction between choice, stance, and handedness. Specifically, strong-handers after reading a positive stance essay under the no choice condition would estimate that the essayist would be in stronger agreement than mixed-handers would. Doing this strong handers will show the FAE to a greater degree and therefore provide evidence that having less access to RH processes will yield a lesser ability to determine the actual causes of behavior of others. All other conditions were not subject to the FAE because there was free choice in two conditions and the other no choice condition was a more popular stance on a nuclear armed Iran, therefore the behavior would be a high probability.

The main dependent variable was the subject's estimation of the extent to which the essay was reflective of the essayist's beliefs on a 1 (not at all) to 7 (completely) Likert scale. A 2 (choice/no choice) X 2 (positive/negative stance) X 2 (strong/mixed handers) between subjects ANOVA was conducted on the extent of the essayist's belief in the essay. There was a significant main effect of choice on estimation of the essayist's true beliefs, F (1, 192) = 7.04, p=.009. This result indicates that when the essayist had a

choice to write in either a positive or negative stance, subjects estimated that the essay reflected more of the writer's true beliefs (M= 5.03, SD= 1.31) than when the writer had no choice of stance (M= 4.5, SD=1.44). Subjects in the choice conditions had a mean of 5.03, whereas subjects in the no choice conditions had a mean of 4.50 on the 1 to 7 scale. There were no other main effects or interactions, all Fs< 2.2, p>.05. The predicted effects of handedness were not significant.

Secondary Analyses. To ensure that the experimental manipulation was effective numerous manipulation check questions were analyzed. The first question is "to what extent do the opinions reflect the requirements of the exam", on a 1 (not at all) to 7 (completely). A 2 (choice/no choice) X 2 (positive/negative stance) X 2 (strong/mixed handers) ANOVA was conducted and there were no main effects of stance, choice, handedness, or interactions to report. Although choice was not a main effect, other manipulation check questions indeed show that the manipulation was effective. A 2 (choice/no choice) X 2 (positive/negative stance) X 2 (strong/mixed handers) ANOVA was conducted on the question of how much choice did the essayist have in writing a pro versus con essay on a 1 (no choice at all) to 7 (complete choice). There was a significant main effect of choice, F (1, 192) = 256.833, p<.001, indicating that the manipulation of choice was clearly detected by subjects. Specifically, the mean estimation of choice in the no choice conditions was 4.67 and in the choice conditions the mean was 2.25, indicating the manipulation of choice was successful.

To test if the manipulation of stance was effective, subjects were asked to what extent is this essay for or against Iran possessing nuclear missiles on a 1 (completely against it) to 7 (completely for it). A 2 (choice/no choice) X 2 (positive/negative stance)

X 2 (strong/mixed handers) ANOVA was conducted on the extent to which the essay is for or against Iran possessing nuclear missiles. There was a significant effect of stance, $F(1, 192) = 229.48$, $p<.001$, with subjects that saw a positive stance essay rating it as being for Iran with a mean of 6.08 and with subjects that saw a negative stance essay rating it as being against Iran with a mean of 2.4. This finding shows that the manipulation of stance was successful.

Three questions assessing experimental manipulation were asked of subjects; how clear was the argument, how persuasive was the essay, and how clearly does this person express his argument, all questions were on a 1 to 7 scale. A reliability analysis was conducted to determine if these three questions could be combined into an overall essay attitude score. For these three questions to be combined, a Cronbach's alpha above a .6 is recommended to combine these questions into a new variable. The reliability analysis revealed a Chronbach's alpha of .801. The new essay attitude dependent variable was subjected to a 2 (choice/no choice) X 2 (positive/negative stance) X 2 (strong/mixed handers) between subjects ANOVA. There were no significant effects of choice, stance, handedness, or any interactions to report, all $Fs< 2.3$, $ps>.05$. This analysis indicates that subjects on both versions (pro & con) of the essay did not have significantly different attitudes towards the essay regardless of stance or choice and therefore did not cause any unforeseen effects on the primary analysis.

As pointed out by Jones and Harris (1967), a polarized topic and/or a low probability behavior are what are needed for the fundamental attribution error to be observed. With this in mind, a 2 (choice/no choice) X 2 (positive/negative stance) X 2 (strong/mixed handers) ANOVA was conducted to assess the level opposition or support

that subjects felt about Iran's nuclear missile program on a 1 (completely against it) to 7 (completely for it) scale. There was a significant main effect of stance, $F(1, 191) = 21.31$, $p<.001$, indicating that subjects were influenced by the stance of the essay they read. In both the positive and negative stance conditions subjects were against Iran possessing nuclear weapons with a mean of 3.06 and 2.09, respectively. This main effect of stance shows that, on average, subjects were against Iran but the degree of opposition was increased when they read a negative essay versus a positive essay. This shows that Iran possessing nuclear missiles is indeed a polarized topic and therefore being pro-Iran would be a low probability behavior.

To further investigate the possible difference between these two means, both means were compared to each other and to the mid-point. The analysis revealed that the means were significantly different $t(197) = -4.864$, $p<.01$, which shows that the mean of 2.09 in the negative stance is significantly lower that the positive stance mean of 3.06. The comparison to the mid-point revealed that both means were also significantly different from the mid-point. The positive stance mean of 3.06 was significantly different than the mid-point of 4 $t(112) = -6.95$, $p<.01$. The negative stance mean of 2.09 was also found to be significantly different from the mid-point $t(85) = -13.26$, $p<.01$. Although a direct assessment of persuasion could not be obtained due to not including a pre-test question regarding the subject's attitude towards a nuclear armed Iran, it is apparent from the data that being for a nuclear armed Iran is not a popular stance to take.

Discussion

The hypothesis for Experiment 1 was that strong handers relative to mixed handers would be more likely to commit the FAE. The results of Experiment 1 do not support the hypothesis. Jones and Harris (1967) found that in all conditions, subjects attributed the behavior of the essayist, regardless of stance or choice, to the disposition of the writer. Their finding was not replicated in this study. Specifically, subjects rated that the essay was a function of the essayist disposition in the free choice conditions whereas in the no choice conditions subjects rated the essay to be a function of the situational constraints. As concluded by Jones and Harris (1967), for the FAE to be committed there has to be a topic that is highly polarized and a behavior that is unpopular, as being pro-Castro was in the 1960's. This requirement was met as the overall opinion of Iran possessing nuclear missiles by subjects was negative on average, 3.06 in the pro-Iran conditions and 2.09 in the anti-Iran conditions out of a possible 7. The results also show that the fundamental attribution error was not committed by subjects in this experiment, which is contrary to the robustness of the FAE to experimental manipulations as Gawronski (2004) would suggest. Because the FAE was not committed, strength of handedness could not moderate this attribution error and possible reasons for this will be detailed in the General Discussion section.

Chapter Seven

Design and Procedure of Experiment 2

Participants. Participants in this experiment were the same participants from Experiment 1. However, there were 3 subjects removed from the data because they did not complete the second experiment. As a result of excluding 3 subjects, the total number of participants was 197. As determined by the median split, 115 participants were strong-handed and 82 were mixed-handed.

Design. The design was a 2 (mixed/strong handedness) X 2 (easy/hard questions) between subjects design. Subjects were asked the answers to 20 easy or hard difficulty general knowledge trivia questions. Questions following the 20 trivia questions assessed subjects' estimation of absolute performance out of 20, subjects' estimations of the average student's performance, and estimations of their relative percentile rank compared to the average student.

Materials. The Edinburgh Handedness Inventory (EHI) and Experiment 2 materials were included in the same booklet; therefore strength of handedness was assessed using the same EHI as in Experiment 1.

Easy and hard trivia questions were taken from a set of 300 normalized trivia questions ranging from very easy to very difficult (Nelson & Narens, 1980). 20 easy and 20 difficult questions were used as the test material. The 20 easy and hard questions were determined based on the normative data from Nelson and Narens (1980). Easy and difficult questions were determined according to the number of people that answered them correctly. Easy questions were questions that people answered correctly 70 to 80%

of the time, whereas difficult questions were questions people answered correctly 30 to 40% of the time. For example an easy question was "what is the comic strip character that eats spinach to increase his strength" and an example of a hard question was "what is the name of the unit of measure that refers to a six-foot depth of water". See appendix for all questions asked.

Subjects answered questions comparing their performance on the trivia questions with that of the average student after test completion. Questions included asking subjects to state how many questions they got correct out of 20, to estimate the average number of correct responses given by the average student out of 20, and to predict how well they did compared to the average person based on a percentile rank. A copy of all experimental materials is included in the appendix.

Procedure. Subjects, upon completion of experiment 1, continued on to answer the easy or hard trivia questions. After answering the easy or hard trivia questions, subjects responded to questions assessing judgments of their performance compared to the performance of the average University of Toledo student. Subjects then completed the EHI and were debriefed, thanked, and dismissed.

Chapter Eight

Results of Experiment 2

The experimental manipulation used easy and hard trivia questions taken from Nelson and Narens (1980) and strength of handedness as independent variables. Dependent variables included the number of questions the subject thought they got correct, their estimations of how many the average student got correct, the actual number correct, and their estimation of their relative percentile rank. The design of this experiment was 2 (easy/hard questions) X 2 (mixed/strong handers). There were no effects of gender to report; therefore gender was collapsed across all conditions.

Primary Analyses. There were several dependent variables of interest as listed above. The first analysis was on the number of questions that subjects think they answered correctly out of 20 possible. A 2 (easy/hard) X 2 (mixed/strong handers) ANOVA yielded two significant main effects with no interactions. There was a significant effect of difficulty, F (1, 197) = 322.5, p<.001, indicating that subjects estimated that they correctly answered significantly more in the easy condition versus the hard condition. The mean number subjects thought they got correct in the easy condition was 14.77 and for the hard condition the mean was 4.49. There was also a main effect of handedness, F(1, 197) = 4.571, p = .034, indicating that mixed, relative to strong handers, estimated that they answered more questions correctly out of 20, regardless of difficulty. Strong handers estimated on average that they answered 14.29 questions correctly, whereas mixed handers estimated that they answered 15.68 correctly out of 20 questions in the easy condition. In the hard condition, mixed handers estimated they would answer 5.07, whereas the strong handers estimated they would answer 3.98. The significant main

effect of difficulty was expected and there was no interaction between handedness and difficulty to report.

As part of this experiment not only were participants subjective estimations of number of correct were obtained but also the actual number of correct responses to the 20 easy or hard trivia questions. As stated above, mixed-handers estimated that they answered more questions correctly than strong-handers did regardless of difficulty. To test if mixed-handers indeed answered more questions correctly, a 2(easy/hard) X 2(mixed/strong handers) ANOVA was conducted. There were two significant main effects and no interactions revealed in the analysis. There was a main effect of difficulty, F (1, 196) = 342.8, $p < .001$, with participants in the easy condition answering 14.09 correctly whereas in the hard condition participants only answered 3.34 correct out of 20. There was also a main effect of handedness, F (1, 196) = 5.76, $p < .017$, where mixed handers answered more questions correctly in both easy and hard conditions; refer to Table 1 on the following page for means.

The correlation between subjects estimated self score and their actual score was also obtained. For mixed handers the correlation was r =.934 and for strong handers it was r =.921. Using a Fisher r to z transformation allowed for the two correlation coefficients to be compared. The result showed that there was not a significant difference between the accuracy of mixed and strong handers on self performance, z = .63, p =.53.

Table 1

Subjects' Actual Number Correct Out of 20: Separated by Difficulty and Handedness

Difficulty	Handedness	Mean	SD
Easy	Mixed	15.44	4.08
	Strong	13.39	4.67
Hard	Mixed	3.77	4.02
	Strong	2.98	3.36

The third analysis was conducted on subject's estimation of the number of questions they thought the average student got correct out of 20. A 2 (easy/hard) X 2 (mixed/strong handers) ANOVA revealed a significant main effect of difficulty, F (1, 197) = 84.1, p<.001, indicating that subjects' estimations of how many other students got correct out of 20 was significantly influenced by the difficulty of the questions. The mean number that subjects estimated the average student got correct out of 20 for the easy condition was 14.2 and in the hard condition it was 7.8 out of 20 correct. This significant effect was expected due to the large difference in the difficulty of the questions as part of the experimental manipulation.

More importantly, subjects estimated their percentile rank based on their performance on the 20 questions compared to the other students completing the trivia questions. Subjects' estimations of their percentile rank were submitted to a 2 (easy/hard) X 2 (mixed/strong handers) ANOVA. There was an expected significant main effect of difficulty, F (1, 197) = 45.3, p<.001, indicating that subjects' estimates of their percentile rank were significantly influenced by the difficulty of the questions. Subjects in the easy condition estimated their percentile rank, on average, as 67.3 and subjects in the hard condition estimated their percentile rank, on average, as 43.8 (refer to Table 2 for means). The analysis also revealed a hypothesized significant two way interaction between difficulty and handedness, F (1, 195) = 7.065, p=.009. The simple effects analysis revealed that, on easy trivia questions strong-handers rated their overall percentile rank at 70.1, whereas the mixed-handers rated their overall percentile rank as 64.6, t (84) = 1.12, p= .268, d = .252. Strong-handers rated their overall percentile rank on hard trivia questions as 37.4, whereas mixed-handers rated their overall percentile

rank as 50.3, t (110) = -2.78, $p < 01$, $d = .53$. This shows the hypothesized interaction showing that strong handers exhibit the "above average" and "below average" effects to a greater degree than the mixed-handers, refer to Figure 1 for interaction graph.

Table 2

Subjects' Estimation of Percentile Rank: Handedness by Difficulty

Difficulty	Handedness	Mean	SD
Easy	Mixed	64.62	23.34
	Strong	70.15	20.49
Difficult	Mixed	50.35	23.24
	Strong	37.24	26.20

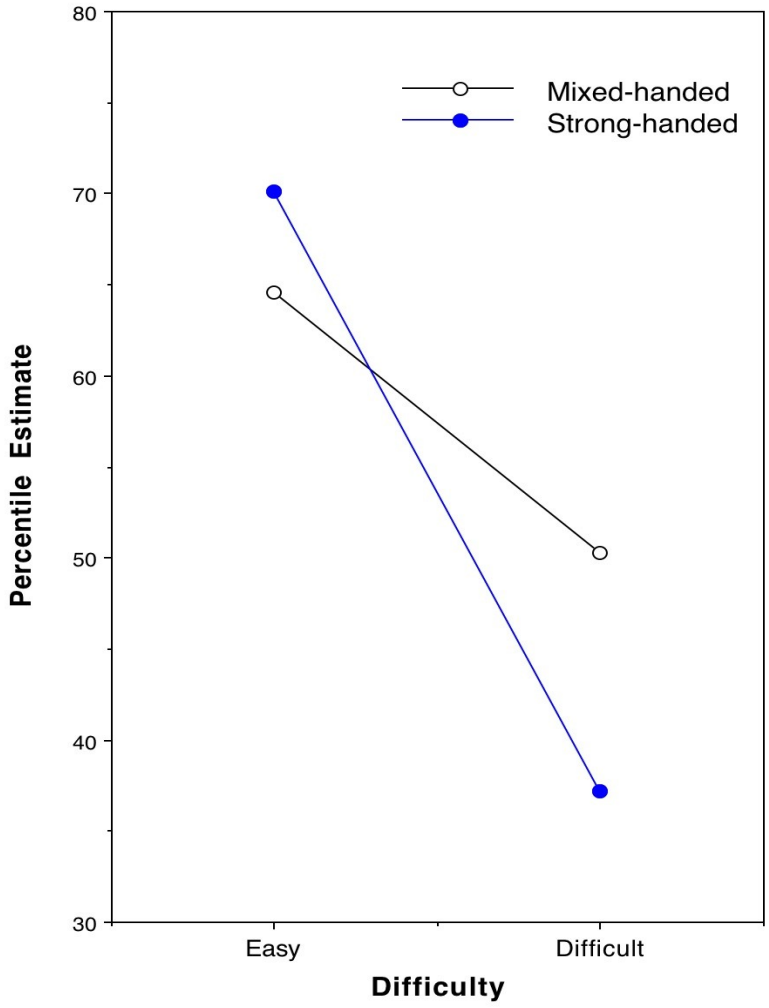

Figure 1. Subjects' Estimation of Percentile Rank: Handedness by Difficulty

As shown in the previous analyses, there was not a significant difference between mixed and strong handers in the amount they showed the "above average" effect. A significant difference, however, was seen between these two groups and the amount they showed the "below average" effect with strong handers showing it to a greater degree, whereas mixed handers do not show this effect. Regardless if strong handers do show the "below average" effect to a greater degree than mixed handers, it does not directly answer the question of whether strong and mixed handers use their own performance or the performance of others when they estimate their percentile rank.

With this question in mind, a regression analysis was conducted using subjects' percentile rank estimations as the dependent variable and the subjects' estimated number of correct and the subjects' estimation of the number other students got correct out of 20 as the predictor variables. Refer to Table 3 on the following page for regression coefficients. Strong handers estimation of their own performance as a predictor was significant, $\beta = .839$, $p < .01$ and their estimation of others' performance was not a significant predictor, $\beta = -.110$, $p = .126$ of their estimation of percentile rank. Mixed handers estimation of their own performance as a predictor was significant, $\beta = .707$, $p < .01$ and their estimation of others' performance was also a significant predictor, $\beta = -.32$, $p = .028$. The results of the regression analysis support the hypothesis that mixed-handers will be less likely to show the above and below average effects which is reflected by both the self and others' estimations of performance being significant predictors for mixed handers, whereas the self estimation of performance is the only significant predictor for strong handers. If a person does not consider "others" when comparing oneself to the average person then the comparison is inaccurate which leads to an improper placement

of one's skill compared to the average person. Although the only significant difference was seen in the below average effect, the addition of the regression analysis further shows that mixed and strong handers significantly differ in ability to accurately compare the self to others.

Table 3

Regression Coefficients

EHI Model	Predictors	B	Std. Error	Beta	t	Sig.
Strong Handers	Constant	24.642	3.486		7.069	.000
	Self estimate	3.747	.319	.839	11.735	.000
	Average student estimate	-.480	.311	-.110	-1.541	.126
Mixed Handers	Constant	49.731	5.946		8.364	.000
	Self estimate	2.635	.533	.707	4.941	.000
	Average student estimate	-1.825	.816	-.320	-2.235	.028

Discussion

This experiment was designed to investigate above and below average effects and to evaluate the relative weight that mixed and strong handers put on the performance of the self versus the performance of others when estimating overall percentile rank. The hypotheses for Experiment 2 were that strong handers, relative to mixed handers, would show the "above" and "below" average effects to a greater degree as well as weighting the performance of the self more than others when estimating percentile rank.

The results revealed that strong handers showed the below average effect to a greater degree than mixed handers but no differences were found in the above average effect. This lack of a significant difference in the above average effect [although the means were in the hypothesized direction] is consistent with the findings of Rose, Jasper, and Corser (2010). In the hard difficulty condition strong handers estimated their percentile rank to be significantly below average, whereas mixed handers estimated their rank as average. When a person is estimating their rank compared to others without an objective scale, a 50 percent rank would be the average and mixed handers estimated their rank at almost exactly 50 percent. This suggests that mixed handers are considering that other students would have similar difficulty in answering the same questions and therefore predict that they will perform as well as the average person. Because they did not predict their performance to be below 50 percent, mixed handers did not show the below average effect which is consistent with the theory that mixed handers, due to better access to RH processes, would be more accurate in their comparative judgments of the self and others. A possible limitation as proposed by Rose, Jasper, and Corser (2010), is that the difference seen in the below average effect could be partly due to mixed handers

being more loss averse. The subjects in this study did not have anything to lose per se (i.e. money, grades, or possessions), but evaluating oneself as below average may cause a feeling of loss partly due to the loss of relative rank among peers on trivia knowledge. This would increase the estimates of percentile rank by mixed handers in the hard condition but not in the easy condition because the potential for loss is significantly less due to the ease of the task, but still increases accuracy of comparisons in the hard condition, despite the possibility that some of the accuracy could be due to compensating for possible loss.

In addition to mixed handers having more accurate estimations of percentile rank, mixed handers considered both the performance of the self and others when they estimated percentile rank whereas strong handers did not. The regression analysis revealed that strong handers use only the performance of the self while mixed handers used both the performance of the self and the performance of others when they estimated percentile rank. This suggests that the increased access to right hemisphere processes allows the mixed handers to consider the perspective of others more accurately then strong handers. Implications of these findings and future directions will be detailed in the General Discussion section.

Chapter Nine

General Discussion

Are there individual differences in the ability to make accurate comparisons between the self and others? The main objective of this thesis was to answer this question using two areas of comparisons, both indirect and direct, between the self and others with handedness being a significant moderator of these comparison processes. The first phenomenon that was investigated was the fundamental attribution error (FAE) using an updated version of the attitude-attribution paradigm (Jones & Harris, 1967), which is an indirect comparison between the target of the behavior and the subject. To accurately determine causal attribution one must be able to put oneself in the target's position to determine what caused the behavior. The second phenomenon investigated was the comparison of ability to correctly answer general knowledge trivia questions between the self and others. Specifically, subjects were asked to estimate their performance compared with the average student on 20 easy or hard general trivia questions (Nelson & Narens, 1980). Strength of handedness was shown to be a significant moderator of social comparisons (below average effect), whereas these moderating effects were not extended to the fundamental attribution error.

The More "Fundamental Error": The Above and Below Average Effects

Why are some people unable to make an accurate comparison between the self and others? On some dimensions being accurate may be possible, but from past research and the findings of this thesis, it has been shown that people are unable to make accurate comparisons with others on measures of skills and abilities (Burson, Larrick, & Klayman, 2006; Ehrlinger, Johnson, Banner, Dunning, & Kruger, 2008; Krueger, & Mueller, 2002;

Kruger, 1999; Kruger, & Dunning, 1999; Rose, Jasper, & Corser, 2010). As Burson et al (2006) point out; there is an inherent noise and bias when people try to make accurate estimates of their relative ability compared to others in the form of percentile ranks. The "noise" refers to the inherent difficulty in estimating one's performance as well as estimating the performance of others. The "bias" refers to subjects being biased towards estimating self performance based on difficulty of the task; for example, hard tasks will bias people towards estimating performance negatively (below average) or positively (above average) for easy tasks. Contrary to Burson et al. (2006), Rose, Jasper, and Corser, (2010) as well as the results of this thesis showed that the ability to accurately judge one's percentile rank among others is significantly affected by individual differences, specifically subjects' strength of handedness.

This thesis was designed to show that a very important area of a human's life, social comparison, is significantly affected by one's strength of handedness which has been significantly correlated with the size of the corpus callosum (Wittelson & Goldsmith, 1991; Clarke & Zaidel, 1994; Habib et al., 1991; Denenberg, Kertesz, & Cowell, 1991; Cowell, Kertesz, & Denenberg, 1993). The stated hypothesis was that strength of handedness would significantly affect subject's estimations of their relative performance compared to the average student. Specifically, mixed handers would show both the "above" average and "below" average effects to a lesser degree. The findings support the hypothesis that strength of handedness would significantly influence subjects' estimation of performance compared to others, based on percentile rank. Specific findings and implications will be discussed below.

Because of the methods of this experiment, it was possible to investigate the above and below average effects using actual performance measures instead of relying on subjects' self-reported hypothetical estimates of performance. Although, the estimation of performance by subjects was self report, each subject completed the trivia questions and then rated themselves on their actual performance compared to the average instead of rating oneself and others on a hypothetical performance (Rose, Jasper, Corser, 2010). The results showed that both the above and below average effects were observed and these effects differed for strong and mixed handers. In the easy condition, both mixed (M=64.6%) and strong handers (M=70.1%) showed the above average effect to the same degree. In the hard condition, strong handers showed the "below" average effect to a greater degree, $t(110) = -2.78$, $p < .01$, $d = .53$, with 37% being the average, whereas mixed handers did not show the effect at all with an average of 50.3%. An interesting thing to note is that mixed handers answered more questions in both the easy and hard conditions than strong handers did as well as predicting higher estimations of self performance with no differences between groups on accuracy of the self prediction. This suggests that although mixed handers performed better, they still gave estimations of percentile rank closer to the average of 50 percent which further suggests that they consider the performance of others when estimating their own rank. The significant difference in the hard condition suggests that mixed handers are more accurate in their comparisons of performance to that of the average student. The primary analysis lends some support for the hypothesis that strength of handedness significantly affects comparisons between the self and others.

Having both estimates for the self and for others allowed for a regression analysis to be conducted on the relative weight subjects' placed on the performance of the self and the performance of others when making an estimation of their own percentile rank. The analysis compared mixed and strong handers using the estimation of self performance and the performance of others to determine what estimate(s) predicted subjects' estimation of percentile rank. The results strongly supported the hypothesis that strength of handedness significantly influences accurate comparisons of the self compared to others. Strong handers use their own performance while not including estimations of others' performance when predicting their relative percentile rank, whereas mixed handers use both self performance and the performance of others. The regression analysis further supports the primary analyses in that mixed handers are better able to make more accurate comparisons of ability than strong handers presumably due to increased access to right hemisphere processes.

Accuracy of Social Comparison: Implications of Handedness

Following the previous work by Kruger (1999), Rose, Jasper, and Corser, (2010) showed that when making estimates of performance, without actual performing the task, mixed handers show both the "above" and "below" effects to a greater degree. The difference between this thesis and the previous study is that actual performance data was collected and subsequent estimations of performance and percentile rank were obtained. The main reason this is important is that in this study subjects answered the questions then gave estimations of their actual performance compared to the actual performance of the average student. In addition to the actual performance measure, accuracy of performance estimate could be obtained and it showed that both handedness groups were

equally accurate in their own performance. By both groups being equally accurate in their estimation of self performance, the only difference should be how heavily they weight the estimated performance of others. The regression analysis supported this idea in that strong handers only used their own performance to determine percentile rank, whereas mixed handers used both the self and others estimated performance to determine percentile rank. In both studies, handedness was assessed and nearly identical results were observed.

As described previously, research by Burson et al. (2006) stated that noise and bias explained why these two errors in comparison of ability exist. The results support the "noise and bias" explanation but shows that being mixed handed reduces the amount of "bias" in comparing performance between the self and other. When comparing oneself to the average person on a specific task, many processes occur concurrently; for example when comparing one's ability with the use of a computer mouse or juggling to others ability on the same task, episodic memories of oneself and others using a mouse or juggling must be brought to mind to compare the relative performances accurately. Mixed handers have a better episodic memory than do strong handers (Christman, Propper, & Dion, 2004; Christman, Propper, & Brown, 2006; Propper & Christman, 2004; Propper, Christman, & Phaneuf, 2005; Lyle, Logan, & Roediger III, 2008; Lyle, McCabe, Roediger III, 2008), which has been interpreted in terms of their better access to RH episodic memory retrieval mechanisms (Tulving et al., 1994). Because mixed handers have better ability to recall episodic memories they may be able to picture more examples of another's performance to accurately rate oneself against. The "bias" towards

estimating performance based on difficulty can be moderated by having better access to RH processes as mixed handers showed in this experiment.

The influence of strength of handedness has been shown throughout many experiments in psychology to be a significant individual difference variable. As described in the introduction, handedness effects have been found in memory (Christman, Propper, & Dion, 2004; Christman, Propper, & Brown, 2006; Propper & Christman, 2004; Propper, Christman, & Phaneuf, 2005; Lyle, Logan, & Roediger, 2008), belief updating (Christman, Bentle, & Niebauer, 2007), counterfactual thinking (Jasper, Barry, & Christman, 2008) and when taking other people's perspectives into account (Sontam, Christman, & Jasper, 2005). The last finding has been further explored with direct social comparisons of personal skill compared to the average other (Rose, Jasper, & Corser, 2010). The methodological addition of actual performance measures allowed for the much needed accuracy data to compare with the subjective estimates of performance of the self and others and the subsequent percentile rank estimate. This thesis provided further support that strength of handedness plays an influential role in social comparison processes in that the more access that one has to right hemisphere processes, the more accurate they will be in comparing oneself to the average other.

Limitations to the study of the "above" and "below" average effect

The results of this study showed that strength of handedness is a significant moderator of the below average effect and has been shown to affect who's performance is used when comparing oneself to the average. Mixed handers did not show the below average effect and used both others' performance and self performance on the trivia questions to predict overall percentile rank. Mixed handers and their better access to RH

processes allowed them to have a more accurate perception of their overall percentile rank compared to the average and gave them a better ability to consider others as well as the self when estimating their overall percentile rank. There are some limitations that can be seen when making this conclusion.

In psychology, researchers ask numerous questions that require subjects to make predictions or estimations of oneself and the average person. It seems that comparing oneself to the "average" would be a difficult task considering the average may not be known and in this study the subject had to create an image of the average person's skill because the average score was not given to subjects. A person will be better creating the "average" when they can consider the wide range of possible performances by people instead of just evaluating self performance relative to a perfect score. Although it is argued in this paper that mixed handers, because of better access to RH processes, are more accurate in their comparison, it cannot be concluded with absolute certainty without the brain being imaged during the comparison process. The previous studies presented as well as the data reported on in this paper supports the theory strength of handedness is a significant predictor of the amount of access to RH processes, with mixed handers having more access than strong handers. Until a study is conducted using brain imaging to study the amount of activation during these comparison processes it can be definitively disproven that having more access to RH processes allows mixed handers to be more accurate than strong handers.

The "Not So" Fundamental Attribution Error

As described in the introduction, there have been many variations of the scenario that have been given to subjects for attribution of behavior. The scenario that the original

research (Jones & Harris, 1967) concluded is most likely to elicit this error is one that involves a person performing a behavior that is highly unpopular. To elicit this error, a procedure similar to Jones and Harris (1967) was used, but replacing Fidel Castro as the subject of the essay was Iran possessing nuclear arms. Being for Iran and their possession of nuclear arms was indeed a highly unpopular topic, shown by subjects across all conditions being against Iran having nuclear arms. One major addition to the original work, as well as other research reviewed in the introduction, was the inclusion of strength of handedness as a moderator of the FAE.

As described in the introduction, interhemispheric interaction, as correlated with strength of handedness, may play a role in the attribution of behavior by others. The hypothesis was that mixed handers would show the fundamental attribution error to a lesser degree than strong handers. The results were not in support of the hypothesis. Based on the data, it can be concluded that strength of handedness does not moderate behavior attribution of others, at least when using the methods of this study. In fact, the fundamental attribution error was not even observed among the entire sample. This is not necessarily a surprise and reasons for this will be discussed as one of the limitations to the study. Handedness as a moderator of the FAE cannot be definitively ruled out because there was one aspect of the methodology which could significantly affect the occurrence of this attribution error.

Limitations to the study of the Fundamental Attribution Error

Contrary to what Gawronski (2004) concluded, the FAE is not robust to nearly any manipulation, especially to that of constraint information. Given the results of this experiment, one may wonder if the FAE is as robust as Gawronski suggests. A study by

Alicke et al., (1996) found that, under extreme reward or extreme punishment, the FAE disappears. This could possibly explain why the FAE was not detected; therefore strength of handedness could not moderate the FAE because it was not observed.

Specifically, in the no choice conditions, the instructions had the words no choice underlined. By underlining the words "no choice" it does not allow for individual interpretation because it clearly states the student had "no choice", whereas Jones and Harris (1967) used the words "asked to write", leaving room for individual interpretation. A practical analog would be if a person in a middle management job was told by a superior they had no choice but to fire a fellow employee. In this case, if the person does not fire the employee his/her job or relationship with upper management may be in jeopardy. Losing a job would be an example of extreme punishment as would not answering the exam question in the specified manner which typically results in a failing grade on the question or even the entire exam. By foreseeing a bad grade on the student's exam if they do not answer the way they are told, subjects will simply attribute the behavior with situational constraints as the results suggest. This type of stipulation on the occurrence of the FAE was found by Alicke et al. (1996). They found that, under extreme punishment/reward, the FAE does not occur as it was also not seen in Experiment 1.

Having "no choice" but to answer a question means that the student had to answer it and it really should not reflect the internal disposition. There is no ambiguity in the words "no choice", and some level of ambiguity is needed to elicit this error in behavior attribution. If words like "asked" or "told" were used, this may possibly set up a scenario that allows for subjects to discern for themselves the amount of constraint and its

effects on attributing the behavior of others to a particular cause. An effect cannot be moderated if the effect is not seen; as a result, future research conducted on the fundamental attribution error (FAE) needs to increase the amount of ambiguity on consequences of the behavior. Increasing the level of ambiguity will allow subjects to interpret the information in a way that is natural to the individual instead of being told explicitly how to interpret it.

Future Directions

Research on the strength of handedness and its relation to access of right hemisphere processes via interhemispheric interaction has only just begun. As this thesis and other strength of handedness research has shown, individual difference variables are a significant moderator of many processes studied in psychology and as such should be included as an individual differences variable in further research regardless of construct. Moreover strength of handedness measures (e.g. EHI) should be included, especially, in research that investigates psychological constructs that are believed to be dependent on the interaction between the two hemispheres. This thesis at the very least suggests that strength of handedness appears to be a significant moderator in social comparison processes, specifically when making comparisons between the self and others.

To further investigate the influence of strength of handedness on the two phenomena, variations of the two experiments reported here will need to be conducted. As described in the limitations to the study of the FAE, a study will need to be conducted that increases the level of ambiguity by using the words ask instead of underlining no choice in the instructions. Although the manipulation checks showed that the topic met the criteria for the FAE to be committed, a survey of possible topics could be conducted

to see if there are other equally unpopular topics and attitudes that might be more salient to students than a nuclear armed Iran. To investigate the above and below average effect experiments must be designed to test other abilities after performance and to other areas, such as health risk or chances of getting the job a person wants after college compared to the average person.

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Appendix A

Handedness Inventory

Please indicate your preference in the use of hands for each of the following activities or objects by placing a check in the appropriate column.

	Always Left	Usually Left	No Preference	Usually Right	Always Right
Writing					
Drawing					
Spoon					
Open Jars					
Toothbrush					
Throwing					
Comb Hair					
Scissors					
Knife					
Striking a match					

1. Gender: Male _____
   Female _____
2. Country of Origin _____
3. Ethnicity: Caucasian_____
   African American _____
   Asian _____
   Pacific Islander_____
   Arabic _____
   Other _____

Appendix B

Experiment 1 Materials

Instructions for Choice Conditions

The purpose of the experiment today is to determine how well people are able to judge the strength of an argument advocating one side of a particular issue. The following essay was written by an undergraduate student in a sophomore level political science course, as the last question on a recent exam. The writer of the essay was told that they would be given a choice to either write an essay in support of or against Iran possessing nuclear weapons, as a final question on a recent exam.

Instructions for the No Choice/Pro Condition

The purpose of the experiment today is to determine how well people are able to judge the strength of an argument advocating one side of a particular issue. The following essay was written by an undergraduate student in a sophomore level political science course, as the last question on a recent exam. The writer of the essay was told they had no choice but to write an essay in support of Iran possessing nuclear weapons, as the final question on a recent exam.

Instructions for the No Choice/Con Condition

The purpose of the experiment today is to determine how well people are able to judge the strength of an argument advocating one side of a particular issue. The following essay was written by an undergraduate student in a sophomore level political science course, as the last question on a recent exam. The writer of the essay was told they had no choice but to write an essay against Iran possessing nuclear weapons, as the final question on a recent exam.

Iran Pro-Essay

Iran should be allowed to produce and sustain a nuclear arms program. There are many reasons for this position. Iran has not invaded any country in the last two centuries although they have been invaded, Iraq specifically during the 1980's. Iran should be in control of its own destiny as any other country is able to like the United States or Russia. Iran is a sovereign nation and as such is not allowed to be interfered with by any other nation like the United States or Russia, which both have large amounts of nuclear missiles capable of causing great devastation if they would see fit to do so. Another point is that Israel, which is a sworn enemy of Iran, has nuclear missiles and has stated its intentions on stopping Iran from obtaining nuclear status. Iran should not be singled out and not allowed to have nuclear weapons simply for the fact that they are a peaceful nation not infringing on other countries and that most of the developed nations have

nuclear weapons. They have shown that they do not want to go to war but they merely want nuclear weapons for deterrent purposes only. Is it not fair for a country that is hated by many, especially from countries that have nuclear weapons and are within striking distance, to produce and sustain a nuclear arms program aimed at deterring any from attacking them?

Iran Con-Essay

Iran should not be allowed to produce and sustain a nuclear arms program. There are many reasons for this position. When Iraq invaded Iran in the 1980's Iran won the conflict and was determined to invade the border regions of Iraq but the U.N. negotiated a treaty with Iraq and Iran, which deterred Iran from invading. Iran has been suspected of funding and allowing terrorists to train within their country. The president of Iran has openly stated his hate for Israel and much of the western world, including the United States. He has openly said that he would like to see Israel wiped off the map. Iran is not a democracy and the few top leaders control the entire governmental structure including what is the fate of any nuclear device that is developed. In the past few months the government of Iran had an election in which the challenger to the current president lost but a significant uprising in his favor and also in favor of human rights in which the United States has had an influence. The result of the uprising was that many hundreds or thousands of people were killed by the government to prevent a loss of power by the top leaders. So if they are willing to use conventional weapons to silence the opposition what would be stopping them from using nuclear arms to stop opposition outside of their borders?

Judgments of the essay writer

1. To what extent do the opinions represent the writer's true beliefs?

(1=not at all; 7=completely)

1	2	3	4	5	6	7
Not at all			Neither Incomplete nor Complete			Completely

On a scale from 0-100%, how confident are you in the judgment you provided for the previous question. A response of 0% would mean you are not at all confident and a response of 100% would mean you are completely confident.

_____

2. To what extent do the opinions reflect the requirements of the exam?

(1=not at all; 7=completely)

1	2	3	4	5	6	7
Not at all			Neither Incomplete nor Complete			Completely

On a scale from 0-100%, how confident are you in the judgment you provided for the previous question. A response of 0% would mean you are not at all confident and a response of 100% would mean you are completely confident.

_____

3. To what extent were the writer's beliefs based on the demands of the test versus their true beliefs? Total of 100%

Demands of exam _____

True Beliefs _____

Judgments of the essay

1. How strong was the argument in this essay?

1	2	3	4	5	6	7
Very weak			Neither Strong nor Weak			Very Strong

2. How persuasive was this essay? 1-7 scale

1	2	3	4	5	6	7
Very Unpersuasive			Neither Persuasive nor Unpersuasive			Very Persuasive

3. How clearly-does this person express his argument? 1-7 scale

1	2	3	4	5	6	7
Very Unclear			Neither Clear nor Unclear			Very Clear

Manipulation check questions

1: To what extent was this essay that was for or against the issue of Iran possessing nuclear weapons? (1=completely against it; 4=neutral; 7=completely for it)

1	2	3	4	5	6	7
Completely Against it			Neither For or Against			Completely For it

2. How much choice did the essayist have in writing a pro or con essay? (1=no choice at all; 7=complete choice)

1	2	3	4	5	6	7
No Choice At All			Neither A Choice nor No Choice			Complete Choice

3. How much choice did the essayist have in choosing a essay in favor of or against Iran having nuclear missiles?

A. Free Choice
B. No Choice
C. Some Choice

Self judgments

1. To what extent is the essay reflective of your own beliefs? (1=not at all; 7 completely)

1	2	3	4	5	6	7
Not at All			Not Completely Nor Incompletely			Completely

2. Would you classify yourself as for or against Iran having nuclear weapons? (1=completely against it; 7=completely for it)

1	2	3	4	5	6	7
Completely Against it			Not For it Nor Against it			Completely For it

Consensus questions

Out of 100%, please indicate the overall percentage of your peers at UT that would be in favor of versus against Iran having nuclear weapons. Your percentages should add to 100%.

a. _____% of my peers are <u>for</u> Iran having nuclear weapons

b. _____% of my peers are <u>against</u> Iran having nuclear weapons

c. _____% of my peers having no opinion on Iran having nuclear weapons

NOTE: Make sure your percentages for a, b, and c add up to 100%

Appendix C

Experiment 2 Materials

Easy Questions (correct answer; % subjects answering correctly)

Criteria= 80-100% correct

1. What is the name of the comic strip character who eats spinach to increase his strength? (Popeye; 97.4)

2. What is the name of the long sleep some animals go through during the entire winter? (Hibernation; 97.0)

3. What is the last name of the brothers who flew the first airplane at Kitty Hawk? (Wright; 91.9)

4. What is the capital of France? (Paris; 91.5)

5. What is the name of a dried grape? (Raisin; 89.6)

6. Which sport is associated with Wimbeldon? (Tennis; 89.6)

7. What is the name of the crime in which a building or property is purposely set on fire? (Arson; 88.1)

8. What is the name of the Lone Ranger's sidekick? (Tonto; 87.0)

9. Which precious gem is red? (Ruby; 87.0)

10. What is the name of an airplane without an engine? (Glider; 85.6)

11. What is the names of the remains of plants and animals that are found in stone? (Fossils; 85.2)

12. What is the rubber object that is hit back and forth by hockey players? (Puck; 85.2)

13. What is the name for a medical doctor who specializes in cutting the body? (Surgeon; 84.4)

14. What is the name for the inability to sleep? (Insomnia; 83.7)

15. What's the name of Dorothy's dog in "The Wizard of Oz"? (Toto; 83.7)

16. What is the last name of the man who showed that lightning is electricity? (Franklin; 83.7)

17. What is the name of the spearlike object that is thrown during a track meet? (Javelin; 83.3)

18. What is the last name of the man who rode horseback in 1775 to warn that the British were coming? (Revere; 81.9)

19. What is the term for hitting a volleyball down hard into the opponent's court? (Spike; 81.9)

20. What is the name of the severe headache that returns periodically and often is accompanied by nausea? (Migraine; 80.7)

Difficult Questions (correct answer; % subjects answering correctly) Criteria= 30-50% correct

1. What is the name of the unit of measure that refers to a six-foot depth of water? (Fathom; 51.9)

2. What is the last name of the author who wrote "The Old Man and the Sea"? (Hemmingway; 49.6)

3. What is the name of Socrates' most famous student? (Plato; 47.0)

4. What is the last name of the woman who began the profession of nursing? (Nightingale; 46.7)

5. What is the last name of the man who wrote the "Star Spangled Banner"? (Key; 44.8)

6. What is the last name of the scientist who discovered radium? (Curie; 43.3)

7. What is the name of the first artificial satellite put in orbit by Russia in 1957? (Sputnik; 43.3)

8. Of which country is Buenos Aires the capital? (Argentina; 43.0)

9. What is the name of the furry animal that attacks cobra snakes? (Mongoose; 41.1)

10. In which city is the U.S. Naval Academy located? (Annapolis; 40.7)

11. What country was the first to use gunpowder? (China; 38.1)

12. What is the last name of the man who invented the phonograph? (Edison; 37.0)

13. What is the capital of New York? (Albany; .370)

14. In which game are the standard pieces of Staunton design? (Chess; 36.7)

15. What brand of cigarette was the first to have the flip-top box? (Marlboro; 34.8)

16. What is the last name of the author of the book "1984"? (Orwell; 33.0)

17. What is the name of the hillbilly family that had a famous feud with the McCoy family? (Hatfield; 32.6)

18. What is the last name of the author who wrote under the pseudonym of Mark Twain? (Clemens; 32.2)

19. What is the name of the Roman Emperor who fiddled while Rome burned? (Nero; 31.1)

20. What is the last name of the astronomer who published in 1543 his theory that the Earth revolves around the Sun? (Copernicus; 30.4)

Comparative Judgment Questions

1. How many questions do you think you answered correctly?

_____ (out of 20)

2. What percentage of questions did you answer correctly? (Out of 100%)

_____

3. How well do you think you did compared to other students? (out of 100%; 0%=better than no one; 50%= average; 100%=better than everyone)

_____

4. How confident are you in your answer to the above question? (Note: Between 0%-100%)

_____

5. How many questions do you think, on average, other students answered correctly? (out of 20)

_____

6. What is the average percentage of questions answered correctly by other students?

_____ (out of 100%)