Ideomotor Action and Absorption: Relating the Tellegen Absorption Scale to Ideomotor Tasks

by

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A Thesis Submitted to the
Faculty of the College of Graduate Studies
in Partial Fulfillment
of the Requirements for the Degree of
Master of Arts
in Psychology

Middle Tennessee State University
May 2013

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I dedicate this research to my husband.
I love you.

AKNOWLEDGEMENTS

I would like to thank my advisor and mentor, Dr. Will Langston, for his guidance, support, and eternal patience. His insight and expertise have been invaluable throughout this entire experience. I would also like to thank the members of my thesis committee, Dr. John Pennington and Dr. Stephen Schmidt, for their time and insight during this process. Additionally, I would like to thank Jeannie, Emily, and Nikki for their assistance in the development of this project and with data collection.

A special thank you to my parents, especially my mom, for her love and support and for encouraging me to finish what I started. She believed in me always, and made sure I never truly gave up, even when it looked like I had. Many thanks to my mother-in-law Sara. There is a very real sense in which this last year would not have been possible without her. Finally, I would like to thank my husband Paul for his unconditional love and unwavering confidence in me. He never lost sight of my goals, and for that I am eternally grateful.

ABSTRACT

This study examined the relationship between two ideomotor tasks: a pendulum task and a rubbing task, and the Tellegen Absorption Scale (TAS). Seventy-four undergraduate students at Middle Tennessee State University participated in exchange for course credit. Each participant completed all three tasks, and completed a funnel questionnaire. The cover story for the pendulum task was found to be effective, while the cover story for the rubbing task was not effective. No relationships between the pendulum task, the rubbing task, and the TAS were found. Analysis of the data based on whether participants were suspicious of each cover story is included, as well as an analysis of any order effects. Implications for future research in this area are considered in light of the existing research on the ideomotor effect.

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CHAPTER I - INTRODUCTION

The defining principal of ideomotor action is that "an action is initiated by the anticipation of its effects" (Stock & Stock, 2004). In layman's terms, just the idea or anticipation of a specific action can cause the body to produce the action unconsciously. The classic example of the effect of ideomotor action is the Ouija Board. The user places his or her fingers on the pointer and asks a question, and as if by magic, the pointer starts to move and spell out words to answer the question. The effect is so subtle that the user is often convinced that he or she is communicating with spirits and that the action came from outside his or her body, and will indeed passionately insist that they had nothing to do with the action (see Hyman, 1999 for other demonstrations and examples). The purpose of this research is to explore ideomotor action in several ways. I will be using two ideomotor tasks as well as the Tellegen Absorption Scale (TAS) to attempt to cross-validate two ideomotor tasks and to find out whether the TAS is correlated with ideomotor susceptibility. In this section, I will present the history of the ideomotor effect, outline prominent ideomotor tasks, discuss the TAS, and finally, I will introduce the present study and hypotheses.

History of Ideomotor Action

The ideomotor effect is a phenomenon which has interested scientists for over 150 years, and it was discovered by scientists in England and Germany at roughly the same time. The English origin begins with the work of William Carpenter and Thomas Laycock in the 1840's and 50's, while the German origin predates the English one and

dates to Johann Herbart's work in the 1810's and 20's (Stock & Stock, 2004). Herbart was the first to outline the elements of ideomotor action, although his goal was medical and philosophical rather than psychological. He was motivated by the desire to find a solution to the mind-body dichotomy, and he did not want "to disentangle the psychophysiology" of the issue (Stock & Stock, 2004). He felt that any attempt to do so would fail because "the mind has no idea about the anatomy and physiology of the body" (Stock & Stock, 2004). Herbart defines the elements of ideomotor action control as a two-step process:

> In the first phase, the soul observes from the body which movements are accompanied by which sensory effects. In the second phase, the soul is able to use this knowledge about action and their effects in a purposeful manner in order to initiate actions by means of the anticipation of the action's sensory consequences (Stock & Stock, 2004).

Although researchers today have discarded the involvement of the soul, the overall principal that bodily actions can be initiated by expectation remains intact.

Thomas Laycock was a British medical doctor in the 1840's whose work involved treating hydrophobia (rabies) patients. Through the course of treating these patients, he noticed that just the presence or mention of water was enough to induce spasms, convulsions, and distress in his patients. Unable to find a physical or medical explanation for the behavior, he proposed the existence of what he called the "ideagenic" and "kinetic substrates" in the brain (as cited in Stock & Stock, 2004). He postulated that the ideagenic substrate is activated when the patient imagines water, which in turn activates the kinetic substrate and causes the patient to exhibit the actual symptoms of hydrophobia

(Stock & Stock, 2004). Essentially, the mind has the ability to control the body, at least in rabies patients.

While Laycock is credited as the discoverer of the ideomotor effect, at least for the English half of its history, it was William Carpenter who coined the term "ideo-motor." He was also the first person to apply the theory to psychology. In his presentation to the Royal Institution of Great Britain in 1852, he said that ideomotor action occurs when ideas suggested to the mind exert power over the body. Specifically,

> …the operator asserts that the 'subject' cannot rise from his chair, or open his eyes, or continue to hold a stick; and the 'subject' thereby becomes so completely possessed with the fixed belief of the impossibility of the act, that he is incapacitated from executing it, *not* because his will is controlled by that of another, but because his will is in abeyance, and his muscles are entirely under the guidance of his ideas. (Carpenter, 1852)

Carpenter proposed this theory of ideomotor action as a scientific explanation for paranormal phenomena such as table-turning and divining rods that were common in England in the 1800's. He argued that table-turning and the like could be explained not by ghosts or paranormal forces, but with psychology.

In the past, some of the greatest minds in science have been drawn in by the effects of ideomotor action. Michael Faraday conducted an empirical study of table-turning in 1853. During a table-turning session, the "sitters" would sit around the table, and everyone would rest his or her hands on the surface of it. The session was essentially a séance, in which the sitters claimed that they communicated with ghosts or spirits. For a short time, the sitters would silently wait, until suddenly there was a noise and the table started to move. During some of these sessions, the sitters even claimed that the table went up on one leg or levitated off the ground (Hyman, 1999). Faraday was suspicious of

table-turning, and decided to conduct an experiment. He found that by putting sheets of cardboard that were attached to each other with a malleable substance on top of the table and marking their original positions with a pencil, he could prove that the "table-turners" were, in fact, subconsciously pushing the table in the intended direction (Hyman, 1999). Unfortunately, some scientists were not convinced.

The earlier, German, root of ideomotor theory was focused on human behavior and reflexes, particularly in relation to medicine. On the other hand, the British root emphasized explaining ideomotor *phenomena*, particularly occult phenomena. These two origins were finally merged in William James' 1890 book, *Principals of Psychology*. In his book, he discussed the theory of ideomotor action, and his major accomplishment regarding the theory was to publicize it. *Principals of Psychology* was a widely used textbook at the time, and by including the ideomotor principal in it, James ensured that many psychology students would read about it (Stock & Stock, 2004).

With the rise of behaviorism in the early twentieth century and with the help of Edward Thorndike, psychological study of the ideomotor principal and its effects went out of style. Thorndike was the president of the American Psychological Association, and in 1913 he published a speech he had given at an APA conference in which he likened the ideomotor principal to believing in magic (as cited in Stock & Stock, 2004). Fortunately, scientists in recent years have continued to study the ideomotor principal in contexts other than the occult phenomena that originally gave it popularity (Burgess et al, 1998; Wegner, Ansfield, and Piloff, 1998; Wegner, Sparrow, and Fuller, 2003).

The Ideomotor Effect Today

As recently as 1992, Ray Hyman, a psychology professor at the University of Oregon, was hired to be an expert witness to the effects of ideomotor action. The state of Oregon had put four chiropractors on trial for using what was called a "Toftness-like device" in their practices (Hyman, 1999). The Toftness device was designed by a chiropractor of the same name as a way to diagnose spine ailments. In short, it worked like this:

> It consisted of a metal cylinder shaped somewhat like a thick soup can. At one end was a lens; at the other was a smooth plastic "rubbing plate". A handle was attached perpendicular to the middle of the cylinder. In practice, the operator would grasp the handle with one hand and place the lens against the patient's spine. While moving the device along the spine, the chiropractor would rub the fingers of his other hand back and forth on the plastic rubbing plate. (Hyman, 1999)

Essentially the idea was that if the lens was positioned over a healthy part of the spine, the chiropractor's fingers would slide across the plate, but if there was a problem with the spine, his fingers would stick on the plate. Toftness believed that the device was sensitive to radiation from the spine in areas where there was need of chiropractic attention (Hyman, 1999).

In a decision upheld by the U.S. Supreme Court in 1984, the District Court in Wisconsin had banned the Toftness device as well as any similar devices in 1982. Hyman (1999) was hired by the state of Oregon because the chiropractors in question were accused of using a similar device, though they maintained it was completely different. In his expert testimony, Hyman showed a video of a demonstration involving his students in which he used a divining rod, a pendulum, and finally a rubbing plate, to great effect. He

was able to show the court that our muscles will unconsciously produce effects in accordance with implanted suggestion.

In addition to the use of the Toftness device and others like it in the 1980's and 90's, ideomotor action is continuing to influence other areas as well. Facilitated communication (used with autistic children), applied kinesiology (used by chiropractors), and Traditional Chinese Medicine can all trace some if not all of their effects to ideomotor action (Hyman, 1999).

Perhaps the most frightening result of the failure to acknowledge the impact of ideomotor action can be seen in the controversy surrounding facilitated communication. Facilitated communication can take many forms, but the basic premise is that a trained "facilitator" can "assist" an otherwise incapable person with writing or typing messages. The facilitator holds the person's hand steady so that it is easier for them to write or type. Since its inception, facilitated communication has been used with autistic patients, people with cerebral palsy, as well as other individuals with varying disabilities. As Herman Spitz (1997) discusses in his book *Nonconscious Movements*, the use of facilitated communication with developmentally disabled individuals has resulted in false allegations of violence and sexual abuse (pp. 10-18). Despite the psychological research showing that facilitated communication is an ideomotor response where the facilitator is actually the one answering the questions or typing the messages rather than the patient (Burgess et al., 1998), the procedure still has proponents, even in the medical community (Radtke et al., 2011).

Ideomotor Tasks

A common test of ideomotor susceptibility is the pendulum task, originally studied by a French chemist named Michael Eugène Chevreul in the 1850s (as cited in Easton & Shor, 1976). The task is simple: instruct participants to hold a pendulum steady and concentrate on keeping it completely still. Much of the time, the pendulum will start to sway seemingly of its own accord, even though the participant is holding it steady (Easton & Shor, 1976). The pendulum interested Chevreul, who studied it systematically and found that the pendulum's movement could be attributed to involuntary muscle movements resulting from expectation – what we know today as the ideomotor effect (Easton & Shor, 1976).

Eysenck and Furneaux (1945) performed a factor analysis on twelve tests of suggestibility, including hypnosis and Chevreul's pendulum test. They found a two factor solution indicating a *primary suggestibility* factor and a *secondary suggestibility* factor. The authors conclude that primary suggestibility is "of the ideo-motor kind," and it is correlated with hypnotizability (Eysenck & Furneaux, 1945). The pendulum task is a primary suggestibility test. Secondary suggestibility, on the other hand, is a more indirect form of suggestion, and is not correlated with hypnotizability (Eysenck & Furneaux, 1945).

The Tellegen Absorption Scale (TAS)

The Tellegen Absorption Scale, or TAS, is a 34-item questionnaire developed by Tellegen and Atkinson (1974) that measures a person's "openness to absorption." In this case, *absorption* describes how involved or "absorbed" a person becomes in everyday

experiences such as books, music, another person's voice, etc. Tellegen and Atkinson found that the trait they named absorption correlates with hypnotic susceptibility. In their study on primary and secondary suggestibility, Eysenck and Furneaux (1945) found that the amount of swing during a pendulum task is correlated with hypnotizability. Both tasks are tests of primary suggestibility, which is influenced by the ideomotor effect. Since the pendulum task (which is ideomotor) is correlated with hypnotizability and hypnotizability is correlated with absorption, it is reasonable to wonder whether there is a direct relationship between absorption and ideomotor susceptibility.

The Current Study

In this study, I seek to understand the relationship between ideomotor susceptibility and absorption. This research contributes to the literature on the ideomotor effect and the literature on absorption by examining a relationship between them. The results of this research will provide information about individual differences in personality that may help explain why some people are more susceptible to ideomotor effects than others. In addition, if there is a relationship between ideomotor susceptibility and absorption, it would indicate there is a pencil-and-paper test that can be used to determine ideomotor susceptibility. This is helpful because, until this point, the only way to measure ideomotor susceptibility was to use a physical ideomotor task such as the pendulum task or hypnosis, which must be administered either individually or in very small groups. The TAS, on the other hand, can be administered to large groups at once.

CHAPTER II - METHODS

Sample and Participant Selection

Seventy-five Middle Tennessee State University undergraduates enrolled in introductory psychology courses were recruited for this study through the Psychology Department's online experiment sign-up system. Seventy-three participants completed all three tasks in the experiment. The participants had a mean age of 21.30 years. Each participant was given one research credit toward their course requirements for their participation. One participant was excluded from the analyses because of incomplete data.

Procedure

Each participant was given an informed consent form to read and sign (see Appendix B), and completed three experimental tasks: a pendulum task, a rubbing task, and the Tellegen Absorption Scale (TAS). The order in which participants performed the tasks was counterbalanced to rule out order effects in the data. There were a total of 24 counterbalances. Participants were run in groups of 1 to 4 at a time in 30-minute sessions to ensure that the experimenter was able to observe each participant closely.

Pendulum Task. Each participant completed a pendulum task. This task is based primarily on Chevreul's original pendulum task. In order to provide the expectation that the pendulum should swing under certain circumstances, participants were told that the pendulum is magnetic (it is not) and that it should start to sway or swing when it is held over iron, but not when it is held over cotton. Participants were instructed to hold the

pendulum steady over a white board with a small cup in the middle. A sample of either iron or cotton was placed in the cup. Different colored rings one-half inch apart on the board which were used as a ruler to determine as precisely as possible how much the pendulum moved in each trial. Each participant completed one "magnetic" trial and one control trial. The order of the trials (iron first or cotton first) was counterbalanced. Participants recorded on their rating sheet (see Appendix C) the color of the outermost circle to which they saw their pendulum move. In addition to this self-report measure, the task was videotaped using wall-mounted cameras that were already present in the lab. The lab contained a total of four cameras. Each participant was placed at his or her own table which was positioned under one of the four cameras. The pendulum apparatus was placed on the table and the camera was pointed down toward the table. When possible, participants were placed in the lab so that their backs were to each other. Also, a plain presentation display board was placed on each participant's table in order to block his or her view of the other participants in the room. These precautions were taken to avoid any confounds caused by participants' observation of other participants' results on the pendulum task.

The experimenter and one other person viewed the DVD and recorded the amount of pendulum swing in the same manner as the participants. The participant and experimenter ratings were used in data analysis to determine whether participants were accurately able to judge how much their pendulum moved during the task.

Rubbing Task. Each participant completed a rubbing task. The purpose of including this task in the experiment was to establish it as an ideomotor task by

correlating the results with those of the pendulum task. The rubbing task is a replication of Langston and Leigh (2008), in which the researchers found that participants rated a plastic surface as “sticker” when holding their hands over white paper after viewing a presentation explaining that white is more arousing than black.

First, the participants were asked to rub their fingers over a plastic surface (a plastic binder) and to determine how “sticky” the surface felt to them. This established a baseline for stickiness. After that, the experimenter presented a PowerPoint presentation (see Appendix D) about the research on color and arousal. The presentation explained that some research exists which indicates that the color black is associated with good and the color white is associated with evil (e.g., the KKK, ghosts, etc.) and that according to this research, the color white should be more arousing than the color black, which means that staring at it will make a person more aroused. This arousal will cause perspiration, which will make the plastic surface feel stickier. The participants were then asked to look at and concentrate on a piece of paper while rubbing their fingers across the plastic surface. There was one trial for white paper and one for black paper. Participants rated how sticky the surface felt to them while concentrating on each color compared to the baseline using a Likert-type scale, with 1 being “same as the baseline” and 5 being “much stickier than the baseline”. The order of the trials in this task (black or white paper first) was also counterbalanced. See Appendix E for the rating sheet for this task.

Tellegen Absorption Scale (TAS). Each participant also completed the TAS, which measures “absorption”, or how absorbed a person becomes in everyday experiences. It contains 34 true/false questions such as, “I think I really know what some

people mean when they talk about mystical experiences" and "My thoughts often do not occur as words but as visual experiences." The score for the TAS is the number of questions marked "True," and the maximum score is 34. A higher score indicates higher absorption. The TAS was administered on paper, and the participants were asked to mark each question "true" if it applied to them, and "false" if not. See Appendix F for a list of the questions in the TAS.

Funnel Survey and Debriefing. At the end of the research session, each participant was given a six-question funnel survey containing questions about the experiment, such as "did the presentation convince you that white is more arousing than black?" (see Appendix G). The purpose of the funnel survey was to determine what participants guessed or inferred about the experiment's true purpose and the ideomotor effect. After all of the tasks and the funnel survey were completed, the researcher explained the study to the participants and answered any questions about the experiment.

Hypotheses

In this study, I expected to find positive correlations between the three variables: TAS scores, stickiness ratings, and pendulum swing. Positive correlations would indicate that people who scored higher on the TAS would also rate the plastic surface as stickier and report more pendulum swing during the pendulum task. The opposite should be true for people who scored lower on the TAS. These results would support the conclusion that the two tasks are measuring the same thing (ideomotor susceptibility) and that people who are higher on absorption are more susceptible to ideomotor effects.

CHAPTER III - RESULTS

To facilitate data analysis for the pendulum task and rubbing task responses, difference scores were calculated. The difference score for the pendulum task was calculated using the formula (Iron Swing-Cotton Swing), since the pendulum was supposed to swing more when it was held over the iron. Two difference scores for this task were obtained in this way: one for the participants' ratings of swing and one for the experimenter's ratings. For the rubbing task, the difference score was calculated using the formula (White-Black) because according to the hypotheses, the participants should have rated the plastic surface as stickier when looking at the white paper. These three difference scores, and participants' scores on the Tellegen Absorption Scale, were correlated in the initial analysis. None of the correlations between the three variables (pendulum, rubbing, TAS) reached significance. See Table 1 for descriptive statistics for all variables. See Table 2 for correlations.

Pendulum Task: Self Report vs. Experimenter Ratings. Each participant was recorded during the pendulum task; however, upon completing data collection and finalizing the DVD so that it could be viewed on the computer, I discovered that only 31 of the participants' pendulum tasks were present on the DVD. The remainder of the data was missing from the DVD. Because of these complications, I was only able to view the pendulum task for the 31 participants whose data were present on the disk. Despite the fact that the sample size is much lower than intended, the correlation between the two difference scores for the pendulum task (self report and experimenter rating) was

Table 1
Descriptive Statistics for all Variables – All Participants

Variable	*N*	*M*	*SD*
Self Report Iron	74	3.12	2.34
Self Report Cotton	74	1.47	.76
Experimenter Iron	31	2.45	2.10
Experimenter Cotton	31	1.10	.30
Self Report Difference Score	74	1.65	2.44
Experimenter Difference Score	31	.57	1.44
Rub White	74	2.35	1.06
Rub Black	74	2.09	1.15
Rub Difference Score	74	.25	1.50
TAS	74	20.95	5.85

Table 2
Correlations for all Participants

		Pendulum - Exp	Rubbing	TAS
Pendulum-Self	*r*	.69*	-.04	.05
	p	<.001	.75	.65
	N	31	74	74
Pendulum-Exp	*r*		.07	.12
	p		.69	.51
	N		31	31
Rubbing	*r*			-.04
	p			.75
	N			74

*Correlation is significant at the .01 level.

significant, $r(31) = .694$, $p < .001$. This indicates that participants accurately judged and reported the amount of swing during the pendulum task, and that there was no need to record their performance. See Table 2.

Post-Hoc Tests and Additional Variables

Several additional analyses were performed on the data in an attempt to identify any problems with the experiment and to further explain the results of the study. These analyses included t-tests for the pendulum and rubbing variables (as a manipulation check), an analysis of any order effects, and analyses of the responses to the funnel questionnaire.

Manipulation Checks. Paired samples t-tests were performed for each of the ratings to determine whether the experimental manipulations (cover stories) were effective. The test for the difference between self-reported ratings of pendulum swing over iron and self-reported ratings of pendulum swing over cotton (iron minus cotton) was significant, $t(73) = 5.824$, $p < .001$, $d = .95$. This indicates that the cover story for the pendulum task was effective and produced a significant and meaningful difference in amount of swing when participants held the pendulum over iron and cotton. The t-test for the difference between "stickiness" ratings of the white and black paper (black minus white) was not significant, $t(73) = -1.432$, $p = .156$. This result indicates that the cover story for the rubbing task (that white is more arousing than black, see Appendix D) may not have been effective because it produced no meaningful difference in the sticky ratings for the two colors. Thinking that there may be an explanation for these results, additional analyses were performed for the rubbing variable.

Funnel Questionnaire. There were three questions of particular interest on the funnel questionnaire (see Appendix G). Question 1 asked participants to state what they thought the purpose of the experiment was. Question 5 was "Did the presentation convince you that white is more arousing than black?" Finally, question 6 asked if participants thought that the pendulum task was about something other than what they were told. Three additional variables were created using the responses to these questions: *Convinced, Suspicious,* and *Figured Out*.

Convinced refers to whether participants were convinced that white was more arousing than black – this was a binary, yes-or-no variable. Participants who wrote "yes" in response to this question (n = 23) were considered convinced and participants who wrote anything other than yes (but did not leave the question blank) (n = 50) were considered not convinced.

Suspicious refers to the final question about the pendulum task. In the same fashion as the *convinced* variable, participants who wrote "yes" were considered to be suspicious of the task's cover story (n = 44), and participants who answered the question but did not write the word "yes" were considered to not be suspicious of the cover story (n = 29).

Finally, *figured out* refers to the experiment's true purpose and to the first and last questions simultaneously. Participants were considered to have figured out the purpose of the experiment if they wrote, anywhere on the survey, a statement similar to the experiment's actual purpose. For example, "to see whether what we are told influences our responses" or something similar to that as a response to either question was

considered an accurate statement of the experiment's true purpose. Eleven participants wrote something on their funnel questionnaire indicating they understood the true purpose of the experiment.

We removed the participants who were not convinced by the cover story for the rubbing task and performed a paired samples t-test for the stickiness of the black and white paper (black minus white) for only those participants who *were* convinced. See Table 3 for descriptive statistics. This test was significant, $t(22) = -2.969$, $p = .007$, $d = -.84$. Given that the overall test for all participants was not significant, this indicates that the only participants who were convinced by the cover story rated the plastic surface as stickier when looking at the white paper than when looking at the black paper. In addition, correlations between the three original variables were performed using only the participants who said they were convinced by the presentation. None of these correlations reached significance, but the correlation between the rubbing task and the pendulum task and the correlation between the pendulum task and the TAS increased. See Table 4 for correlations.

A similar analysis was performed for the pendulum task to determine whether suspicion had any effect on the results, and the difference in pendulum swing over the iron and cotton was significant for participants who were not suspicious of the experiment, $t(28) = 3.785$, $p = .001$, $d = 1.00$. Because the overall paired samples t-test for the pendulum was significant (see previous section), this result indicates that the cover story was effective regardless of suspicion. Participants reported more swing when

Table 3
Descriptive Statistics Based on Suspicion

Task		*N*	*M*	*SD*
*Pendulum-Self	Suspicious	44	1.59	2.44
	Not Suspicious	29	1.76	2.50
*Rubbing	Convinced	23	.94	1.51
	Not Convinced	50	-.08	1.41

*Means reported are mean difference scores.

Table 4
Correlations for Convinced Participants

		Rubbing	TAS
Pendulum-Self	*r*	-.27	-.22
	p	.20	.32
	N	23	23
Rubbing	*r*		.05
	p		.82
	N		23

they held the pendulum over iron than cotton, whether they suspected the pendulum task was about something other than magnetism or not.

Order Effects. Analyses were performed based on order: which task participants did first (pendulum, rubbing, or TAS). First, Chi-Square tests were performed to determine whether order had an effect on *convinced*, *suspicious*, and *figured out*. None of these tests were significant. ANOVAs were performed to determine whether order had any effect on the amount of pendulum swing or rubbing task ratings, using order as a between-subjects variable. The ANOVA revealed an effect of order on the pendulum task, $F(2,71) = 3.39$, $p = .039$, $MSE = 2.879$. Participants reported more swing on the pendulum task, and thus had higher difference scores, when the rubbing task was first. See Figure 1. These tests revealed no effect of order on the rubbing task, $F(2,71) = .837$, $p = .437$, $MSE = 1.328$, although Figure 2 shows a trend for white to be rated as stickier when the rubbing task is done first in the experiment.

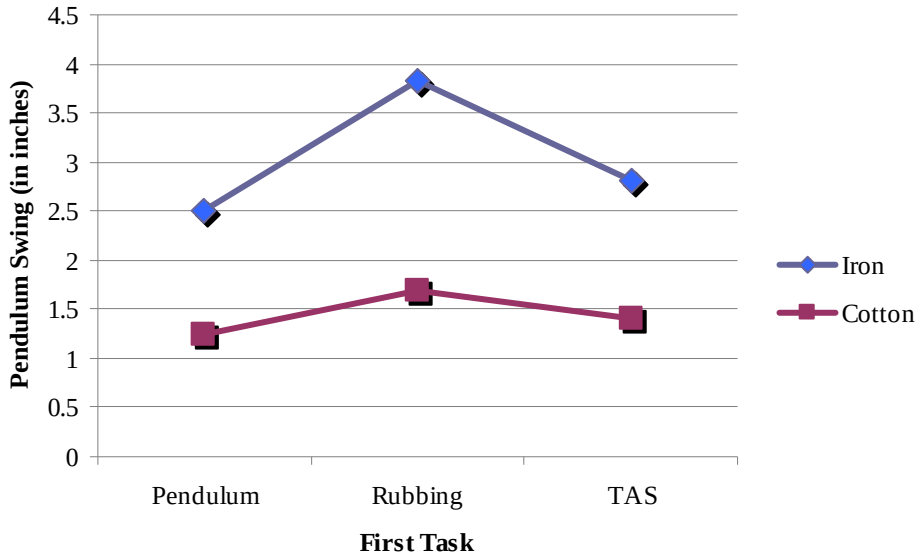

Figure 1.
Amount of Pendulum Swing by Order

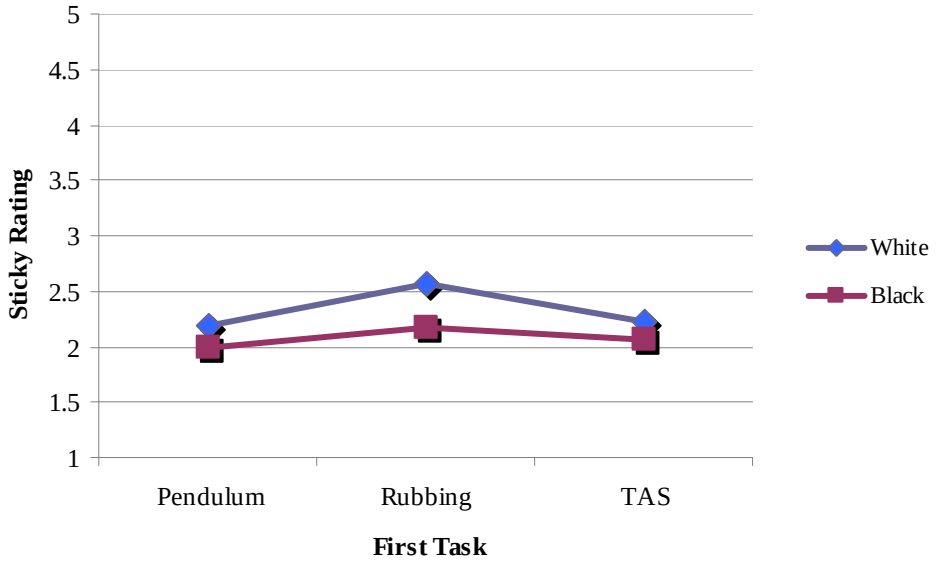

Figure 2.
Sticky Ratings by Order

CHAPTER IV - DISCUSSION

General Discussion

The results of this experiment show that the three predicted correlations between the pendulum task, the rubbing task, and the TAS were not present. No support was found for the hypothesis that absorption is related to ideomotor susceptibility. Despite the lack of evidence for the hypotheses, this research has provided some other interesting results. The pendulum task that was used in this experiment is loosely based on Chevreul's pendulum experiments, but the cover story about magnetism was original. The results of the data analysis confirmed not only that the cover story was an effective manipulation, but that it is effective regardless of whether the participants are suspicious of the task or not. A possible explanation for this effectiveness may be that the effects (the muscle movements that result in pendulum swing) are truly unconscious, meaning that the effect is present regardless of suspicion. In addition, by recording the pendulum portion of the experiment as well as including a self-report measure of pendulum swing, this experiment is able to demonstrate that is it unnecessary to record the pendulum task; participants' self-report responses on this task are reliable.

Correlations between the pendulum and rubbing tasks were expected, even if there was no correlation to TAS scores, because the two tasks are believed to be ideomotor tasks. It follows logically that the two should correlate with one another. The fact that this correlation was not present raises some concerns. It is possible that they are not correlated simply because the rubbing task was not effective or the cover story was not effective. However, it is evident from Table 3 that the correlation between the

pendulum and the rubbing tasks for only those participants who were convinced by the rubbing task cover story is *negative*, although not statistically significant. Perhaps an increased sample size may yield a significant negative correlation between the pendulum and rubbing tasks. This would be contrary to the positive correlation that was expected.

It is possible that the pendulum task and the rubbing task are, in fact, not measuring the same thing. Eysenck and Furneaux (1945) present evidence that there are two different kinds of ideomotor tasks, those of primary suggestibility and those of secondary suggestibility. In a review of suggestibility literature, Evans (1967) points out that although the pendulum is an accepted primary suggestibility task, it differs from other such tasks, like the Body Sway Test (see Eysenck and Furneaux, 1945), in that the suggestion is directed at an object (the pendulum) rather than directly at the participant's body. Primary suggestibility is generally explained using the ideomotor theory, but Evans (1967) suggests that ideomotor action only relates to suggestions of *bodily* movement. This suggests that the pendulum task is not, in fact, an ideomotor task because the suggestion that the pendulum should swing when it is held over iron is directed at the pendulum itself, rather than at a specific bodily movement. However, if this were the case, it would mean that other effects that are commonly accepted as ideomotor, such as a Ouija board, dowsing rod, etc., could not be considered ideomotor tasks either because the action relates to an object rather than a bodily movement. It is more likely that the pendulum task is a true ideomotor task, and the rubbing task that was used is flawed in some way. Another explanation for the results is that the rubbing task and the pendulum task are not measuring the same thing (ideomotor susceptibility). Whether the rubbing

and pendulum tasks measure different things or whether the rubbing task that was used was simply not believable to the participants is a question that can only be answered empirically.

The Rubbing Task

For the rubbing task, this experiment found no difference between the stickiness ratings of the white and black paper. This result is contrary to Langston and Leigh's (2008) finding. This experiment used the exact same PowerPoint presentation as Langston and Leigh, and the task was conducted in an almost identical manner with similar participants (undergraduate introductory psychology students). The results of their experiment showed a strong effect of color and suggestion, meaning that participants who saw the presentation explaining that black is more arousing rated the plastic surface as stickier for the black paper, and participants who saw the presentation explaining that white was more arousing rated the plastic surface as stickier for the white paper. Langston and Leigh found no effect of order in their study; it didn't matter which color of paper the participants rated first. In the current experiment, the effect of which color of paper the participants rated first was not analyzed, but an analysis of the effect of which task in the experiment was first was performed. There was not a significant effect of order on the rubbing task, but there was a trend toward "stickier" ratings for the white paper when the rubbing task came first. Refer to Figure 2.

It was not possible to directly analyze the effect of counterbalance on the rubbing task due to the number of counterbalances and participants (each counterbalance has about 2-5 participants and there were 24 counterbalances). A visual examination of the

means for each counterbalance reveals that there are several counterbalances in which participants rated the black paper as stickier than the white paper. These counterbalances seem to have one thing in common: the rubbing task was not first. This supports the trend shown in Figure 2 for the white paper to be rated as stickier when the rubbing task comes first in the experiment.

Another explanation for the rubbing task's ineffectiveness is that the cover story was not convincing. Perhaps people are simply unwilling to believe that the color white is more arousing than the color black. There is strong research evidence for the idea that the color black is considered to be negative and more arousing than the color white (Adams and Osgood, 1973; Stabler and Johnson, 1972; Stabler, Johnson, and Jordan, 1971). Perhaps this belief is so pervasive that participants are unwilling to reverse their beliefs about the colors white and black. One of the questions on the funnel survey asked participants to explain what they believe to be true about the two colors. Reading those responses, it is clear that the majority of participants believe that white is positive and black is negative. Statements to this effect are present even for participants who were convinced by the presentation and showed the desired effect during the rubbing task. An analysis of the responses to the white/black question could provide insight into the results of the rubbing task. In addition, perhaps the use of different colors that do not have any previous connotations (purple and yellow, for example) would improve the rubbing task.

Strengths and Weaknesses of the Current Study

The strengths of this experiment include the pendulum task and the use of a funnel questionnaire. The pendulum task was well designed and effective, and through

the use of experimenter ratings in addition to participant ratings, this research was able to show that participants report the degree of pendulum swing accurately. This can aid future research by eliminating the need to record participants during the task, therefore making the task easier and faster to administer without concern for whether participants will self-report accurately or not.

The funnel questionnaire used in this experiment provided useful insight into participants' responses on the two ideomotor tasks. By analyzing the responses, it was possible to separate the participants into groups based on whether or not they were suspicious of the two tasks. This revealed that the pendulum task was effective regardless of suspicion, but that the rubbing task was not. The funnel questionnaire also allowed the researcher to identify participants who correctly guessed or inferred the true nature and purpose of the experiment, thereby allowing for an evaluation of the research design. Very few participants stated the true purpose of the experiment, which supports the conclusion that the experimental design used to test the hypotheses was appropriate.

The main weakness of this research is the rubbing task that was used. It was intended to be a replication of the task developed by Langston and Leigh (2008), but the current results were inconsistent with the results of their experiment. Another weakness of this study is the complicated methodology. The three tasks used in this experiment resulted in a total of twenty-four counterbalances, which made analyzing all but the most fundamental order effects impossible. Using a less complex research design in the future may be able to provide insight into the order effects that were present in this research. A

final weakness of this study was its sample size. A larger sample size was needed to clarify the results of the experiment.

Future Research Directions

Future research should attempt to resolve the unanswered questions raised by this experiment. First, an attempt should be made to replicate the rubbing task used in Langston and Leigh (2008) and in this experiment. By replicating the task, it would become clear whether the cover story is effective and help to determine whether the results of this study are due to some artifact of the experiment itself or because the task is simply ineffective.

This experiment should also be replicated with a greater number of participants. More participants would allow for an analysis of the 24 counterbalances and any effect they may have had on the data. This would also make the analysis of the *convinced* and *suspicion* variables, as well as the analysis of task order effects more powerful. In this study, more participants were needed to conclusively analyze the effects of order, since only 16-30 participants did each of the three tasks first.

The data from the funnel questionnaire was useful and interesting, however in future studies including a Likert-type scale for the question about whether the presentation on color and arousal was convincing and for the question about whether the participants were suspicious of the pendulum task may be more informative than the open-ended questions used in this experiment. Also, this type of response method would facilitate more accurate data analysis. It would enable the researcher to determine an objective cut-off score for the two variables (i.e. scores of 3 or higher on a 5-point scale

indicate suspicion), rather than having to make a subjective judgment. Using a Likert scale, it would be possible to make a determination about suspicion and identify only those participants who are *highly* suspicious for data analysis. In this experiment, a subjective assessment for the two variables was necessary. An attempt was made to be as stringent as possible by only considering participants suspicious if they wrote the word "yes" in response to the question. "Possibly," "maybe," "I don't know," and the like were considered "no" responses, in order to only identify highly suspicious participants. A Likert scale would make the funnel questionnaire much more precise.

Conclusions

Although the results of this experiment did not lend support for the hypothesis that absorption is related to ideomotor susceptibility, this research can provide some useful insights. This research has contributed to the existing literature on the ideomotor effect and absorption by establishing a new version of the pendulum task as a valid test of ideomotor susceptibility. Also, the results of this experiment indicated that the Tellegen Absorption Scale is not correlated with ideomotor susceptibility, which suggests that some other personality trait may be responsible for individual differences in ideomotor susceptibility. Future research may investigate what other factors may be related to ideomotor susceptibility, which may further scientific understanding of the phenomenon.

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APPENDICES

APPENDIX A – IRB Approval Letter

March 4, 2013
Kirstin Tretter, Dr. Will Langston
Department of Psychology
ket2d@mtmail.mtsu.edu, William.Langston@mtsu.edu
Protocol Title: "Ideomotor Action and Absorption: Relating the Tellegen Absorption Scale to Ideomotor Tasks"

Protocol Number: 13 - 249

Dear Investigator(s),
The exemption is pursuant to 45 CFR 46.101(b) (2). This is because the research being conducted involves the use of educational tests, survey procedures, interview intakes or observation of public behavior.

You will need to submit an end-of-project report to the Compliance Office upon completion of your research. Complete research means that you have finished collecting data and you are ready to submit your thesis and/or publish your findings. Should you not finish your research within the three (3) year period, you must submit a Progress Report and request a continuation prior to the expiration date. Please allow time for review and requested revisions. Your study expires on **March 4, 2016.**

Any change to the protocol must be submitted to the IRB before implementing this change. According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. **If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance before they begin to work on the project.** Once your research is completed, please send us a copy of the final report questionnaire to the Office of Compliance. This form can be located at www.mtsu.edu/irb on the forms page.

Also, all research materials must be retained by the PI or **faculty advisor (if the PI is a student)** for at least three (3) years after study completion. Should you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,
Andrew W. Jones
Compliance Office
615-494-8918
Compliance@mtsu.edu

APPENDIX B – Informed Consent

MTSU
IRB Approved
Date: 3/4/2013

Principal Investigator: Kirstin Tretter
Study Title: Ideomotor Action and Absorption
Institution: Middle Tennessee State University

Name of participant: _____ Age: _____

The following information is provided to inform you about the research project and your participation in it. Please read this form carefully and feel free to ask any questions you may have about this study and the information given below. You will be given an opportunity to ask questions, and your questions will be answered. Also, you will be given a copy of this consent form. Your participation in this research study is voluntary. You are also free to withdraw from this study at any time. In the event new information becomes available that may affect the risks or benefits associated with this research study or your willingness to participate in it, you will be notified so that you can make an informed decision whether or not to continue your participation in this study.

For additional information about giving consent or your rights as a participant in this study, please feel free to contact the MTSU Office of Compliance at (615) 494-8918.

1. Purpose of the study:

You are being asked to participate in a research study because we are evaluating several psychological tests and/or surveys, and the relationships that may exist between them.

2. Description of procedures to be followed and approximate duration of the study:

This study will last approximately 30-45 minutes and consists of three different tasks. The first task is a computerized survey. The second is a pendulum task in which you will hold a pendulum in your hand and the researcher will observe its movement under different conditions. The third task is a rubbing task, in which you will watch a short presentation and then report how sticky a surface feels to you. There will also be a short exit survey. You may complete these tasks in a different order than they are described here. In addition, the pendulum task will be recorded, but only your hand will be visible on the recording.

3. Expected costs:

None

4. Description of the discomforts, inconveniences, and/or risks that can be reasonably expected as a result of participation in this study:

None

5. Compensation in case of study-related injury:

MTSU will not provide compensation in the case of study related injury.

6. Anticipated benefits from this study:

a) The potential benefit to science and humankind that may result from this study is a greater understanding of the effects being studied.

b) You may benefit from this study by contributing to psychological science. Also, after you have completed the session, you will have an opportunity to learn about this research, which may help you to better understand the field of psychology.

7. Alternative treatments available:

N/A

8. Compensation for participation:

You may be granted research credit for participating in this study.

9. Circumstances under which the Principal Investigator may withdraw you from study participation:

The Principal Investigator may withdraw you from participation in this study if you have any prior knowledge of the study or of the effects being studied.

10. What happens if you choose to withdraw from study participation:
You may withdraw from the study at any point without penalty.

11. Contact Information. If you should have any questions about this research study or possible injury, please feel free to contact **Kirstin Tretter** at **615-649-2188** or my Faculty Advisor**, Dr. Will Langston** at **615-898-5489**.

12. Confidentiality. All efforts, within reason, will be made to keep the personal information in your research record private but total privacy cannot be promised. Your information may be shared with MTSU or the government, such as the Middle Tennessee State University Institutional Review Board, Federal Government Office for Human Research Protections. If you or someone else is in danger or if we are required to do so by law.

13. STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS STUDY
I have read this informed consent document and the material contained in it has been explained to me verbally. I understand each part of the document, all my questions have been answered, and I freely and voluntarily choose to participate in this study.

_____ _____
Date Signature of patient/volunteer

Consent obtained by:

_____ _____
Date Signature

_____
Printed Name and Title

APPENDIX C

Participant #: _____

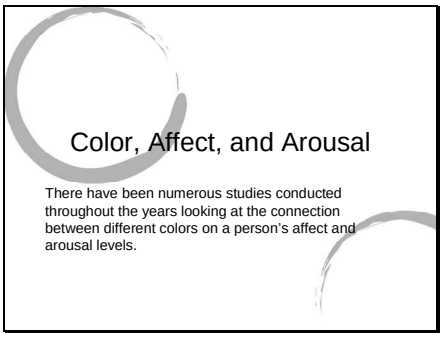
Please write the color of the farthest circle your pendulum moved to during the task:

When my pendulum was over the iron: _____

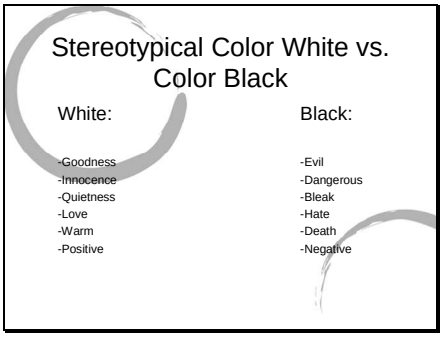
When my pendulum was over the cotton: _____

APPENDIX D

Slide 1



Slide 2



Slide 3

Stereotypical Color White vs. Color Black

In spite of the stereotypes associated with white and black, research evidence has provided some surprising results…

Slide 4

Studies looking at Color and Affect

- Adams, F. M. & Osgood, C. E. (1973). A cross-cultural study of the affective meanings of color.
  - One of the earliest studies done looking at the connection of the colors white and black to emotions and behavior.
  - Participants from 10 countries evaluated a number of colors.
  - In all countries, the color white was evaluated negatively while the color black was evaluated positively.
  - People tended to relate the color white to such negative images as the KKK and ghosts.

Slide 5

Some Other Studies

- Stabler, J. R., Johnson, E. E., & Jordan, S. E. (1971). The measurement of children's self concept as related to racial membership.
  - Used prerecorded positive and negative self statements that were played with equal intensity out of two speakers: one painted white, the other black.
  - Children were told that each statement was only being played over one speaker and their task was to point to the speaker through which each statement was broadcast.
  - Overall, the children indicated they heard the positive statement coming from the black speaker and the negative coming from the white speaker.

Slide 6

Some Other Studies Cont…

- Stabler, J. R., & Johnson, E. E. (1972). The meaning of black and white to children.
  - Preschool children were asked to evaluate desirable (e.g., a lollipop) and undesirable (e.g., plastic vomit) objects. Objects were then placed in either a white or black box out of view of the children. The children were then asked to point to the box likely containing each object.
  - Results showed that children tended to guess that positive objects were in the black box and negative objects in the white box.

Slide 7

A Newer Theory

- White causing "stickiness"
  - There has been recent research suggesting that the color white (due to being associated with more negative affect according to some research) can cause a person to be more aroused while staring at it, therefore causing the person to perspire.
  - This perspiration would make a plastic surface appear sticky to the person rubbing it.
  - More so than when staring at the color black?

APPENDIX E

Participant #: _____

Use the following scale to rate the “stickiness” of the plastic surface during both trials:

1	2	3	4	5
Same as the baseline		Slightly stickier than the baseline		Much stickier than the baseline

1. When my hand was over the black paper: _____

2. When my hand was over the white paper: _____

APPENDIX F

1. Sometimes I feel and experience things as I did when I was a child.
2. I can be greatly moved by eloquent or poetic language.
3. While watching a movie, a TV show, or a play, I may become so involved that I forget about myself and my surroundings, and experience the story as if it were real.
4. If I stare at a picture and then look away from it, I can sometimes "see" an image of the picture, almost as if I were still looking at it.
5. Sometimes I feel as if my mind could envelop the whole world.
6. I like to watch cloud shapes change in the sky.
7. If I wish I can imagine things so vividly that it's like watching a good movie or hearing a good story.
8. I think I really know what some people mean when they talk about mystical experiences.
9. I sometimes "step outside" my usual self and experience a completely different state of being.
10. Textures – such as wool, sand, wood – sometimes remind me of colors or music.
11. Sometimes I experience things as if they were doubly real.
12. When I listen to music I can get so caught up in it that I don't notice anything else.
13. If I wish, I can imagine that my body is so heavy that I cannot move it.
14. I can often somehow sense the presence of another person before I actually see or hear him/her.
15. The crackle and flames of a wood fire stimulate my imagination.
16. Sometimes I am so immersed in nature or in art that I feel as if my whole state of consciousness has somehow been temporarily changed.
17. Different colors have distinctive and special meanings for me.
18. I can wander off into my thoughts so completely while doing a routine task that I actually forget what I am doing and a few minutes later find that I have finished it.
19. I can sometimes recall certain past experiences so clearly and vividly that it is like living them again.
20. Things that might seem meaningless to others often make sense to me.
21. If I acted in a play I think that I would really feel the emotions of the character, and "become" that person for the time being, forgetting both myself and the audience.
22. My thoughts often occur as visual images rather than as words.
23. I am often delighted by small things (like the colors in soap bubbles and the five pointed star shape that appears when you cut an apple across the core).
24. When listening to organ music or other powerful music, I sometimes feel as if I am being lifted into the air.
25. Sometimes I can change noise into music by the way I listen to it.
26. Some of my most vivid memories are called up by scents and smells.
27. Some music reminds me of pictures or changing patterns of color.
28. I often know what someone is going to say before he or she says it.
29. I often have "physical memories"; for example, after I've been swimming I may feel as if I am still in the water.
30. The sound of a voice can be so fascinating to me that I can just go on listening to it.
31. At times I somehow feel the presence of someone who is not physically there.
32. Sometimes thoughts and images come to me without any effort on my part.
33. I find that different smells have different colors.
34. I can be deeply moved by a sunset.

APPENDIX G

1. We have recently changed the instructions to participants. As a check on how accurate they are, could you please describe what you understood to be the purpose of this study?

2. We often find that participants in our studies have good ideas about them. Could you think of any other way we might use the information we obtained from you?

3. The pendulum task you participated in is still being developed. Can you think of anything we could change to make the task better?

4. Please explain what you believe to be true about the colors white and black.

5. Did the presentation convince you that white is more arousing than black?

6. Did you think the pendulum task was about something besides what we told you?