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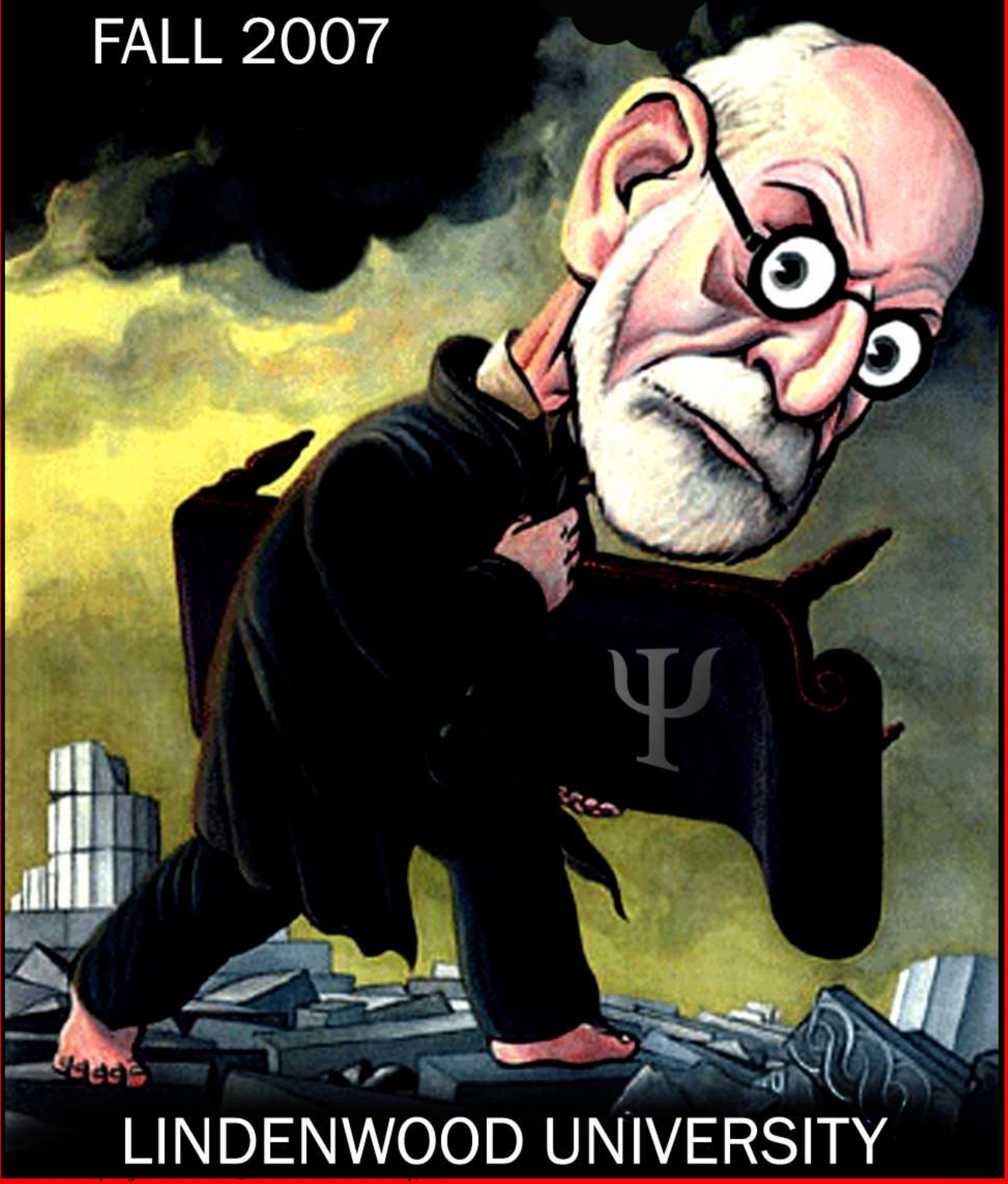

LINDENWOOD UNIVERSITY

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The PSY404 Class of Fall 2007

This modest class of 14 students resulted in only seven different projects. However, the range of research topics that were tackled by these students was perhaps the most diverse in recent semesters. This class also holds the record for the most number of students who expressed an interest to present the results of their projects at a regional conference in a future semester.

Many of the students competed in our end-of-the-semester journal cover design competition for bonus points. The creative cover that was chosen for this journal was designed by Dana Castrellon. This journal was edited by our very capable course tutor, Rachel Rogers.

The students have put forth a lot of effort in completing their original research projects for this course. However, their projects were made possible not only through their dedication but also the support of the LU Institutional Review Board members, the Human Subject Pool office and the many professors and students at LU who have taken the time to take part in the studies. I would like to take the opportunity here to thank everybody who helped to make this journal a possibility and to congratulate my students for a fine job they did on their respective projects.

Michiko Nohara-LeClair
Course Professor

Gender Bias in Peer Grading Among Undergraduate Students

Elizabeth Dalton

Using the observation that people refer to their own genders when talking about an unknown author, one might infer that people might relate to authors of their same sex. If this is true, this could be a gender bias as people could attribute good qualities of an unknown author to their gender. This led to an investigation of gender bias in peer grading where students were thought to attribute better grades on a paper if the author is their same sex. Participants were separated into three groups separated by the knowledge of the author's gender then asked to grade a paper. The results showed higher scores in the same sex group raising the issue of importance of anonymous peer grading.

While observing in various undergraduate classes I began to notice that when a male student was referring to a document that had no identifying characteristics, he began to refer to the document as one that was written by a man. During the same class period, and referring to the same document, a female student began to discuss the document referring to the author as a woman. Astonished by the complete ignorance that the two students had toward their references of what they perceived was the author's gender, I began to wonder whether men and women could perhaps identify better with authors that they think are men and women. This thought process led me to ponder whether sex was a defining influence on how people grade. Perhaps, men and women attribute better grades to those of the same sex as opposed to the opposite sex.

If men and women attribute better grades to those of the same sex, this could be affecting the academic careers of students. For example, if a woman was grading a paper written by a man, she might attribute a grade lower than the one she would have given to another woman. The woman might have placed a grade on a paper that would have been better or more adequate if the gender of the author were unknown. Perhaps people unknowingly engage in gender bias in order to ensure the superiority of their particular gender and to stifle this problem, steps should be taken to ensure complete anonymity of students when they are peer grading. Gender bias is considered to be "the prejudice in action or treatment against a person on the basis of their sex," ("Legal," n.d.).

There have been various studies conducted that have asked the question of gender bias in grading. In one such study, Welsh (2004) predicted that females would give better grades to authors that were men. She conducted a one-way ANOVA to find that there was no statistical significance showing that men received a better grade than women. Because there was no significance found, it gave way to the idea that perhaps Welsh should have looked at same-sex bias as opposed to opposite-sex bias. Her study led me to believe that women might have attributed better grades to other women as opposed to men.

In another study Greatorex and Ball (2004) state that, "sex and gender bias in marking should be monitored…but is unlikely to be found to an extent that affects grades (32)." Although this study did not specifically study the effects of gender bias and grading it does give way that it is present in education. They acknowledge its existence then refute its effects. In regards to a possible sex bias by professors, Manley (1933) shows that a sex bias is evident in various professors over a longitudinal study. He stated

that some professors were shown to have a bias towards college students of the same gender whereas others did not. His study was understood to identify that there is a risk of bias in grading.

Cho, Schunn, and Wilson (2006) found in their study of the validity of peer assessment that only minimal assessments were viewed by students as a valid form of grading. They found that students do not feel as though peer grading is an adequate form of academic assessment. This study suggests that students should not be prompted to participate in peer assessment as they are not in the same academic level as the teacher. Perhaps students who grade papers will be make more uneducated mistakes such as unknowingly grading with a gender bias and letting that biases affect the grade of the paper.

The current study randomly assigned participants into three groups to test the hypothesis that participants will attribute better grades to authors of the same sex. The first group was the "same sex" group where participants were told that the author of a paper is of the same sex. The second group was the "opposite sex" group where the participants were told that the author of the same paper will be of the opposite sex, and the third group will be the control group where the participants will have no knowledge of the sex of the author. Participants will grade the same paper in the same room with the same rubric in attempt to control for extraneous variables. The only variable that will differ, or will be considered the independent variable, will be the participant's knowledge of the gender of the author. The grade the participant attributes to the paper will be the dependent variable.

Method

Participants

There were a total of 74 participants tested by use of the Human Subject Pool at Lindenwood University. Participants were recruited from various social science survey classes including psychology, sociology, and anthropology at Lindenwood University. Of those 74 participants only 46 participants' data were used. The 28 other participants' data was discarded on the account that the experimenter could not test those who spoke English as their second language. Of the 46 participants, 32 were women and 14 were men. There were 19 freshmen, 12 sophomores, eight juniors, and seven seniors that participated in this study and their grade point averages ranged from 2.0 to 4.2 with the mode at 3.3. Participants were recruited from various social science survey classes including psychology, sociology, and anthropology at Lindenwood University. They were given extra credit towards those classes of which they were involved as compensation for their time and energy spent on the experiment. Although no participants dropped out of the study, there would have been no pressure if any participant decided to leave the experiment. The experimenter understood that all of the participants were to be treated equally in accordance to the ethical guidelines that were established by the American Psychological Association

Materials

The materials used consisted of a paper, a survey, and a rubric as well as the informed consent form, the list of participants, the feedback sheet, and the extra credit slips. Pens used to grade the papers were provided by the experimenter. The paper was taken from the 2007 Advanced Placement Exam with the permission of Dr. Schnellmann,

an English professor at Lindenwood University. The paper was rather mediocre in its presentation and it was slightly modified, to ensure that the grade was not easily attributed as extremely poor or well. The paper was also completely anonymous, completely leaving out any identifying characteristics to ensure that the gender, as well as the specific identity of the author could not have been known (see Appendix A for copy of paper used).

The rubric, the item the participants used to grade the paper, was provided by Dr. Nohara-LeClair, a professor of psychology at Lindenwood University. The rubric allowed participants to circle what they believed was appropriate under the areas of format, spelling and grammar, organization, clarity, and their presentation of agreements (See Appendix B for copy of rubric used). The survey was composed by the experimenter. It asked participants to state their sex, class standing at Lindenwood University, their grade point average, their first language, whether they felt as though their grading was influenced by the gender of the author, and whether they felt as though teachers' grading could be influenced by the knowledge of the author's sex (See Appendix C for copy of survey used).

Additionally, the informed consent form as well as the feedback letter was composed by the author. The list of participants and the extra credit slips were provided by the Lindenwood University Human Subject Pool. The room that was used to conduct the experiment was a part of the Psychology lab at Lindenwood University. The room used consisted of a table, three chairs, and a desk with a computer. The participants were seated at a chair on the left side of the table while The experimenter was seated at the desk with the computer.

Procedure

The experiment was constructed using a between groups design where there were three different conditions used. Each participant was randomly assigned into one of three different conditions. The first condition was referred to as the "same sex." condition. Participants were told that the sex of the author was the same as their own. The next condition was referred to as "opposite sex," where the participants were told the sex of the author was the opposite of their own. The third condition was the control where the participants were told nothing of the gender of the author.

When the participant was ushered into the room, they were first asked to read over and sign the informed consent after the experimenter explained the form. They were then asked to complete the list of participants. After this was completed, the participants were given the paper and told specific information pertaining to the condition they were randomly assigned. They were also told to use the rubric to grade the paper and they were permitted to mark on the paper as needed. After the participants had finished grading, they were then given the survey to complete. After finishing, they were then debriefed using the feedback letter as a reference. After fully discussing the feedback letter and thanking them for their participation, the participants were given the extra credit slip which was fully explained.

Results

Upon collecting the data the researcher used SPSS to analyze the research. A one-way analysis of variance was used to analyze the results. The results revealed a statistically significant effect of group assignment on grade assigned to the paper, $F_{(2, 43)} = 7.32$, $p = .002$, showing that the experimenter could reject the null hypothesis. The

results of a series of Tukey post-hoc tests revealed that the grade assigned by the same sex group (M=25.81) was significantly higher than the grade assigned by the opposite sex group (M=17.9) and the control group (M=20.93). In order to determine whether there were differences in responses between participants in the same sex group as opposed to those in the opposite sex groups in regards to their answers to the question of how much the knowledge of gender of the author of the paper effected their scoring, a Mann-Whitney U test was conducted on the ordinal data collected. The test showed no difference between the two groups.

Discussion

The experiment was designed to examine whether peers would give a better grade to those of the same sex as opposed to the opposite sex. Upon analysis, the results do support the hypothesis suggesting that there is a gender bias in peer grading. Perhaps there could have been more details placed in to action to ensure that these results were from no other confounding variables. The researcher could have had separate rubrics to be given to each participant in the conditions. For instance, if a woman was in the "same sex" group, she should have been given a rubric that stated the same information yet also stated the gender of the author, as a woman instead of only being told once by the experimenter. This would ensure that the participant would not forget the gender of the author while grading as the participants might have forgotten or not even listened to the experimenter during the process.

Another idea that might have been an influencing factor is the realization by the experimenter that the paper was truly very mediocre. This paper was not an average paper; it was actually rather poor in terms of writing quality. Various participants in all

of the conditions remarked about how the paper should not have been written for an Advanced Placement exam. This could have generated much of the lower scores although the results do show clearly that sex could have been a defining factor in the author's grading.

Despite the idea that this paper did deserve the poor grades it received, the feedback the experimenter received was uncanny. Many participants, when told of the nature and purpose of the study were very adamant in saying that they believed that they had felt as though their grades were influenced by their gender. Some participants specified that they felt as though they had benefited from taking classes with a teacher of the same gender as they felt the teacher could identify better with their work and personal problems and they received no penalties for absences or rushed work. Others actually felt as though teachers, as well as students held a bias of superiority to the opposite sex. One woman, who was in the "same sex" group actually said that if she thought the paper were written by a man, she absolutely knew that she would have been harsher when grading.

Another realization was that everyone who participated in the study did not think that their knowledge of the author's sex influenced their grading. In fact, the highest number that was circled was "3" which meant that the participant thought the knowledge of the author's gender only influenced them "somewhat" while they were grading. Yet results can be inferred that the information given to the participant was taken into account while grading. Even though the participants did not think that the information they were told about the gender of the author affected their grading, they did think that teachers' grading could be affected by the knowledge of the author's gender. Answers ranging to

"5" indicated that even though the participants did not think that they could be influenced by the author's gender, they did think that teachers' grading could. From inferring the results, one might ask the question of whether the same results could be seen when testing teachers as well.

Something that could be taken into account is the number of women who participated in the study compared to that of men. There were 32 women used as opposed to 14 men. Perhaps these results were dramatically influenced by the women's participation. Further studies should be done in effort to determine whether this bias is seen mostly in women or if this is true in both sexes. Perhaps the experimenter should have divided the groups between men and women and tested between the two genders. Obviously, it could not have been feasibly done as one could not account for the number of men and women who signed up through the Lindenwood University Human Subject Pool.

Another drawback that the experimenter experienced was the numerous participants who are described as ESL students, or students who spoke English as their second language. As mentioned earlier, 74 participants were run and 28 pieces of data were discarded. As difficult as it was to continuously test, I began to wonder if the same bias occurred in ESL students even though they are grading a paper that was not in their native language. Further studies might be done to determine whether the same bias could be evident in ESL students.

Finally, during feedback, while the researcher was telling the participants about not knowing who actually wrote the paper and they were told a specific gender for experimental purposes, many people immediately claimed that the author was most likely

a man. Even those who were told that the sex of the author was a woman admitted that now that they understood that the author was not a woman, could see the author as being male. Perhaps the researcher could have tried to find a more neutral paper but there was no possible way for me to identify the paper as written by a man or woman which was thought to ensure that there would be no experimenter bias towards the gender of the author of the paper.

Perhaps, in order to stifle this proposed problem, teachers should engage in various tasks to ensure the sex of the author's confidentiality. This might better enhance grading and produce a more accurate grade. Students should be graded on their abilities. No other characteristics should interfere with students and their academic progress. If teachers can ensure complete confidentiality of their students, they are engaging in their part to ensure an adequate grade.

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Appendix A

Most members of society are bombarded with advertisements everyday. This will tell them many things about what they should buy or do and the smart consumer will keep in mind their own values and interests. However many will make decisions that are bad for themselves and others. Because of their powerfully persuasive nature, advertisements can present people with extra decisions and cause them to make these decisions and cause them to make these decisions without necessarily considering their own values.

Advertising is an extremely powerful method of persuasion. It has come to be so after years of research and money. That consumer research is done suggests that companies are decisive in their campaigns to sell product. Also, because the research is described as sophisticated, it is likely affective and thorough, using state-of-the-art technology and powerful thinkers. This emphasizes the decisiveness of company advertisement strategy. At the end of the first paragraph, Shaw continues to describe the size and precision of advertising campaigns. Nobody is to be left without seeing the advertisements. Advertising companies reach far and work hard to persuade consumers.

Advertising is a very powerful means of persuasion, but its main purpose is to make people aware of something. Advertising is designed to inform people. Because everyone is exposed to advertising, some use it to present good ideas or products that people really need. If people must buy something, it is best that they know who to buy it from. Advertising allows people to see what is available to purchase and decide what is best for them.

While advertising is used to inform people of important things, it is also used to make people decide on things that are bad for them and others. Sesana, (2004) provides

an account of powdered milk advertised in areas without a healthy water supply, making many children sick. Advertising has too often been used to make people buy things that will hurt them or spend money on things that they don't need.

Advertising has its good and bad aspects. It is good because it informs people of things they need to know. Unfortunately, people have used this powerful persuasive device to convince people to ignore what it best.

Appendix B

Rubric

The paper you are grading was an essay that was written for the 2007, Advanced Placement Exam. The writer was asked to write an essay developing their opinion on whether or not advertising is an adequate way to inform people or if it is used poorly. The writer was asked to defend his argument thoroughly and persuasively. Pease read the paper and grade according to the provided rubric. Please feel free to take your time and mark on the paper itself if you need to. If you have any questions let me know.

Please circle the appropriate number that you feel best reflects the paper you are grading.

Fulfillment of Assignment Format Requirements (8 points)

(e.g., length, double-spaced, typed, margins, font, font size)

0--------1---------2---------3--------4---------5--------6---------7--------8

Very Poor	Major Problems	You Can Do Better	Minor Problems	Virtually No Problems

Spelling and Grammar (8 points)

0--------1---------2---------3--------4---------5--------6---------7--------8

Very Poor	Major Problems	You Can Do Better	Minor Problems	Virtually No Problems

Organization (8 points)

0--------1---------2---------3--------4---------5--------6---------7--------8

No Organization	Scattered Thoughts	You Are Almost There	Well Organized	Very Well Organized

Clarity of Writing (8 points)

0--------1---------2---------3--------4---------5--------6---------7--------8

Unclear	Fuzzy	Cloudy	Pretty Clear	Clear As Day

Relevance and Ability to Present Convincing Arguments (8 points)

0--------1---------2---------3--------4---------5--------6---------7--------8

Not Enough Effort	Very Poor	You Can Do Better	Very Good Job	Excellent Work

Appendix C

Survey

Group letter and number _____

Please circle: Male Female

How much do you think that the information that you were told about the author's sex influenced your grading?

1 2 3 4 5

"1" being the least, "5" being the greatest

How much do you think a teacher's grading could be influenced by the knowledge of the author's sex?

1 2 3 4 5

"1" being the least, "5" being the greatest

Please circle: Freshman Sophomore Junior Senior

What is your GPA? _____

Is English your first language? _____

Author Note

Elizabeth Dalton affiliated with the Psychology Department at Lindenwood University.

All laboratory access and financial aid was afforded by the Human Subject Pool through Lindenwood University. The paper was provided by Dr. Ana Schnellmann of the English Department of Lindenwood University and the rubric and massive support was provided by Dr. Michiko Nohara-LeClair of the Psychology Department of Lindenwood University. To both of these people I hold much gratitude. Approval for this project was given by the International Review Board of Lindenwood University.

For further information concerning this study, please contact Elizabeth Dalton at edk9sm@gmail.com or Dr. Nohara-LeClair at mnohara-leclair@lindenwood.edu.

Math Magician: A Study on Distraction and Testing Ability

Brad Fincher, Kate Nelson, Carter Bray

The problem with distraction in schools today could be affecting student's learning. Our hypothesis is that students who are confronted with a distraction do not do as well as students who are not confronted with distractions while doing homework. There was a total of thirty five participants. The procedure was for participants in the experimental group would begin doing a math worksheet and a distraction (cell phone ring tone) would be introduced. For participants in the control group they would do the math worksheet in silence with out distraction. The results showed that the distraction did not affect the participant's scores on the math worksheet in comparison to the control group.

Mathematics is based on perfection. Distraction while doing math can decrease accuracy and sometimes add to math anxiety. Math anxiety can also occur when doing math on a timed scale. Decreasing distractions or awareness of possible distractions can be critical to accurately doing math in a public atmosphere. Determining what or how distraction affects the accuracy of completing task such as a math worksheet and other effects that could contribute to ineffectiveness of completing it accurately. Where you are comfortable studying can determine how effective you are while completing a task in a public atmosphere. The purpose of our study was to determine whether distraction had a negative effect on participants performance on a math worksheet in regards to number of correct problems and how long it took them to complete.

This study was important in that it could help reduce distraction in areas where students need silence to focus on task such as math. This can help the university also in

ways such as determining when grounds should be completed or any other activities should be handled based on lowering the distraction rate.

There is a wide variety of information regarding ideas that are used in our study. The main three are distraction, the student's place of residence, and math and its effects. Distraction can be correlated to "irrelevant sound effects might reflect attentional distraction"(Bell & Buchner, 2007,p 353) which "prospective memory is disrupted by increasing attentional demands of ongoing activities"(Guynn & McDaniel, 2007, p 484) such as homework. Distraction can affect everyone. In a study done by Nelson, Sabur, and Shaw they found that age effects how distracting background noise is. They found that children are more negatively affected than adults are (Nelson, Kohnert, Sabur, & Shaw, 2005, p. 219- 229). When people are in an academic setting distraction can be devastating to learning. Also in this study, they found that ventilation and heating and cooling systems were the most common form of background noise in schools, and that nearby highways were the second most common "distractor" (Nelson, Kohnert, Sabur, & Shaw, 2005, p. 219- 229). The distractions come from many different areas both in and around school. Distraction can come from many different areas such as auditory, sensory, and visual. "Sustained listening in natural settings (concerts or at home) may not necessarily require speed or accuracy, presumably for the purpose of pleasure or possibly distraction from other stimuli" (Flowers & O' Neill, 2005, p. 309). This idea is that at some moments a person might not even know if they are being distracted due to the normality of it. When you're comfortable you may be less likely to overlook things you a used to such as house noise. Other forms of distraction can be disorders that the person can not help. One of these problems is Chronic fatigue syndrome (CFS), and it effects

approximately one in every one thousand people. Some of the symptoms, as identified by Morris, Robson and Deakin, were fatigue, poor memory and concentration (Morris, Robson, & Deakin, 2001, p. 168). There was no part on our study asking for any health problems so as far as we know a participant could have had CFS and not reported it. This could have affected their data which affects the results of the study.

On the area of where a student lives while attending class has an effect on a students critical thinking which is needed while doing homework. "There is strong evidence that student interaction with faculty and peers had a positive impact on critical thinking" (Gellin, 2003, p. 747). This is important because students who live on campus are more apt to receive interaction and attention, sometimes unwanted, from both faculty and other peers which can sometimes distract the particular student. There is a relatively low rate of students going away to college and living at school. In a study done by Sessa, we learn that approximately one third of college students reside at their college (2005). More and more students are choosing to stay at home and commute to school for various reasons. That might not always be the best idea. "Housing arrangements, placement in sets of classes with the same students, and special academic, athletic, and interest groups can aid in developing social attachment to the school" (Bean; Jackson & Moore, 2006, p. 361). When a person becomes attached to something, in particular a school they become comfortable and the learning environment becomes much friendlier. This can play a role in how focused a student may be. When talking about differences in sex and how it affects their relationship with their school women have the bigger attachment. Two studies have found that sex may have something to do with how people adjust to college life. Both of them found that women depend more upon relationships and social support

than do men (Kenny & Rice, 1995; Enochs & Roland, 2006). Women may have a harder time adjusting to a new environment if they had gone away to college and are having a tough time making new friends. This could affect how they act and or think in particular events and situations.

A newer more updated problem is also affecting college students. In a study recently done by Seligman and Wuyek they have discovered that separation anxiety disorder could be diagnosed in college students. This disorder may also skew the results of a study done exclusively on the college population (Seligman & Wuyek, 2007). This disorder is becoming increasingly viewed on college campuses where students are used to being really close to their family and close friends. Lindenwood University is known as a smaller school on the rise and has a lot of students that come from small towns with close knit families as well as students who are local and are trying to stay close to home. This disorder could have affected some of our participants in various ways. Our participants were very diverse in t that they were from other countries then the United States. The distance between home and school can sometimes be too much for a student who may be alone while at school.

An important part of the experiment is based on math and different affects it has on people. In our study it will be taking place in a lab. The idea that "labs testing at the simpler levels or arithmetic need not worry about a confounding relationship between achievement and math anxiety" (Ashcraft & Krause, 2007, p 245-246) may have an effect on the participants. The experiment we are doing is based on math achievement while a distraction occurs. Distraction can increase math anxiety so there could be a correlation there. Also, in a study done by Tsui and Mazzocco, there is evidence that

timed math scores are worse than when a math test is not timed(Tsui & Mazzocco, 2007, 132), but since all participants were timed it shouldn't have affected one group more than another. Math has an effect on many different things. In some schools a math placement test is done to determine what class a particular student should be in. In a study done by Uysal it was shown that students that were accepted into schools without taking an introductory exam had lower scores than students who were tested (Uysal, 2007). The students who had been tested on math were more apt to success after school. At Lindenwood University there was no math entrance exam so the students that attend there may not be very well versed in mathematics. That could effect how they did on our math worksheet and more in general if they were in the distraction group. Sex differences in how people go about doing math can make a difference also. Several studies have shown evidence that there is a difference in the way men and women think. These studies have also shown that on average men solve problems using "abstract principles" and women do not (Lynn, 1969; Entwisle, Alexander, Olson, & Steffel, 1994). Math involves deep problem solving and the varying mental process used to do math can be complex. How a participant goes about getting there answer can affect the answer they may get at the end. On top of all these different variables, a growing problem called math anxiety has an affect on students. Math anxiety was described by Perry as being a condition where an perfectly normal person was incapable of going through the mental processes required to solve math problems (Perry, 2004). This problem could have a huge effect on participants who could have been involved with our study. There was a signup sheet that has a brief description saying the study had math involved but an individual may have not seen that and just signed up for an open slot. Math anxiety would have the great influence on our

study. There are varying degrees of math anxiety and they could all have an effect on the study.

Student involvement in extracurricular activities can differ from Greek life to athletics, and how that can resemble distraction is unclear but in some cases there is a link. Our study is an extension to prior research in that it wants to determine how influential distraction can be in certain settings such as school.

Our study has the purpose to help both student and schools determine how influential distraction can be in academic life. Students who live on campus are more able to work around distractions then students who live off campus and are not used to the everyday background noise of schools. Universities will benefit in that they will have a better understanding on how distraction can reduce the academic atmosphere witch can lead to unsuccessful students. The experimenter's predictions are that distraction will negatively affect performance on a math task. The study will be done by using a ringing cell phone as a distraction to a group and a different controlled group will be able to do the worksheet without the distracting ringing. Although, both groups will be given a five minute time limit this could increase some anxiety. Our research design relates to the theoretical issue that distraction is more influential then most people think. Students who are not used to a lot of background noise might experience increased anxiety and will not be able to concentrate on the task at hand.

Method

Participants

The participants were able to sign up for the experiment on a sign up sheet on the bulletin board across the hall from room 407 in Young Hall. There were 34 total

participants, nineteen male and fifteen female. The average age of the participants was 19 years old. The ages did range from 17 to 22. There was a diverse group of participants that were involved with the study. There were 17 people in each of the groups. Extra credit was awarded to the participants who participated in the study. All students were recruited through the Lindenwood Human Subject Pool and their extra credit went towards entry level Psychology, Sociology, and Anthropology classes. Seven of our participants were biology majors and five of them were undecided. These were the most common majors. 16 participants were in the control group (non-distraction) and 18 were in the experimental group. We had 20 men and 15 female participants. 7 of these participants were commuters and 28 were residents.

Materials

The materials used were a stopwatch, a ring tone off of a cellular phone, ink pen, three chairs (two for the experimenters and one for the participant), desk, and a table for the participant to work on. The cell phone was used to receive the calls made by an experimenter in hopes of producing a distraction to the participant. The stopwatch was used to time the individual on how look it too them to complete the math worksheet. The maximum amount of time allotted for the worksheet was five minutes. We also had all of the required forms from the HSP and instruction that were read to all participants.

Procedure

The study would start when the participant walked into the lab room. The participant was first asked to fill out informed consent forms and the extra credit sheet. Once the participant finished that the main experimenter read the participant the instructions regarding the study. After the directions were read to the participant the main

experimenter ask the participant if they were ready to start the math worksheet. Following that the participant started the worksheet. Immediately when the participant started the secondary experimenter started the stopwatch. In intervals of every 45 seconds the ring tone was then activated for experimenter group. The switch between the control group and experimenter group was every other participant. This was the best way to keep all of the subject variables even with regard to the number of participants involved each day and as a total per group. If the participant was in the control group the room remained quiet for up to a minimum time of five minutes. If the participant finished the worksheet early the time on the stop watch was immediately stopped and recorded. Once the participant finished he/she were asked to fill out a follow up questionnaire and debriefed in that, he/she were told what the study was about and notified the reasoning of the ring tone if he/she were in the experimenter group. As a conclusion the participants were asked if they had any questions; if they did they were answered and were free to leave at their leisure.

Results

Our hypothesis was that the experimental group (which was the group who experienced the distraction) would take longer to finish the test, on average. Our results, however, show that both groups had the same mean which was 200 seconds (3 minutes and 20 seconds). Additionally, we hypothesized that the control group would get more questions correct on the math worksheet. Again, we were wrong as the experimental (distraction) group got an average of 27.83 questions correct and the control group got 27.25 questions correct. These two averages where obtained by using an independent t-test at a p level of .05 and the degrees of freedom being 32 for each of the two tests. The

t-value for the time variable was only t(35)=.004, p=.05 which is very bad and the t-value for the number of questions answered correctly was a phenomenal t(35)=-.626, p=.05. This means that there was no to our data, which would reinforce the fact that the independent variable of distraction had little to no effect on the study.

Discussion

The original hypothesis stated that we expected to see the distraction group do worse in reference to time it took them to finish and the number of questions they got right. Unfortunately the means of the distraction group were better than the means of the control group on both the time and number correct categories. There are several factors that could have influenced these results. For one, the distraction provided might not have been loud enough or aversive enough. In a study conducted by Walters (2006), he reported that the "volume of the distraction had more of an effect than anything else", which means that if the distraction was not loud enough it would not have had an effect on the differences between groups (which is what we found).

Though this effect was not measured, it was observed that some of the subjects seemed to experience signs of what may be described as urgency whenever the distraction was introduced. They appeared to work more quickly and focus a bit more which may have affected their times. This would also lead you to believe that their number of correctly answered questions would be lower, but this was not the case. Subject variables might have also had something to do with the results. This study could have been done with a within subjects design or at least a matched subject design. We suspect that the independent variable was not potent enough to affect the outcome of the results for the experimental group did not do significantly better than the control group.

In addition, the control group often experienced distractions of their own including the extraneous variable of noisy water works and a flickering ceiling light. A completely silent lab would have been good and a larger subject sample would have helped as well, but we had a strict deadline for when we had to start data analysis for the end of the project.

Another problem that we had with the study is that we encountered a ceiling effect. The test may have been too easy, because all but two of the participants finished the test completely and we didn't want them to complete it at all. This affected our dependent variable of number of correctly answered questions by a lot. If we were to redo this study we would make a harder math test with at least 50 questions on it. Since the average time for both groups was 200 seconds I think that 50 or 60 questions would make at least half of the participants not be able to finish, but if we added 100 questions none of them would finish with all questions correct. With none of the tests being finished we could just measure how many questions were correctly answered.

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Figure 1

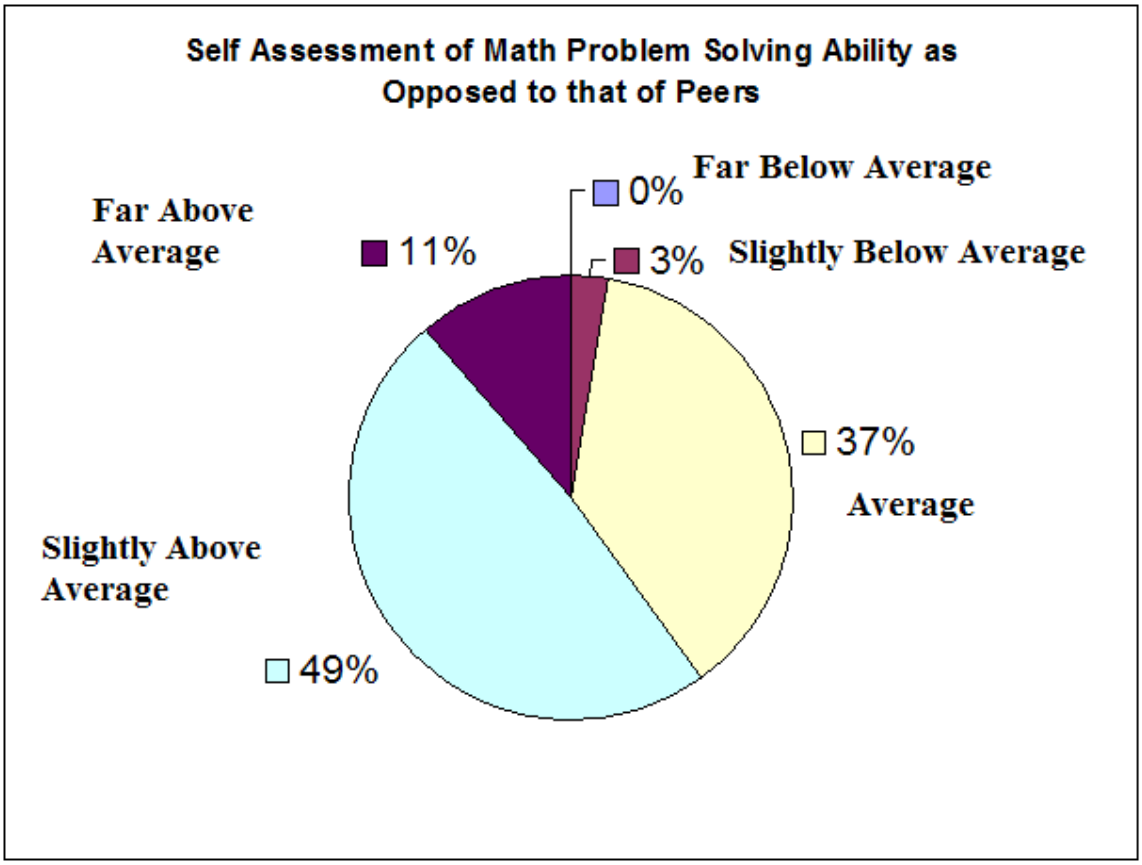
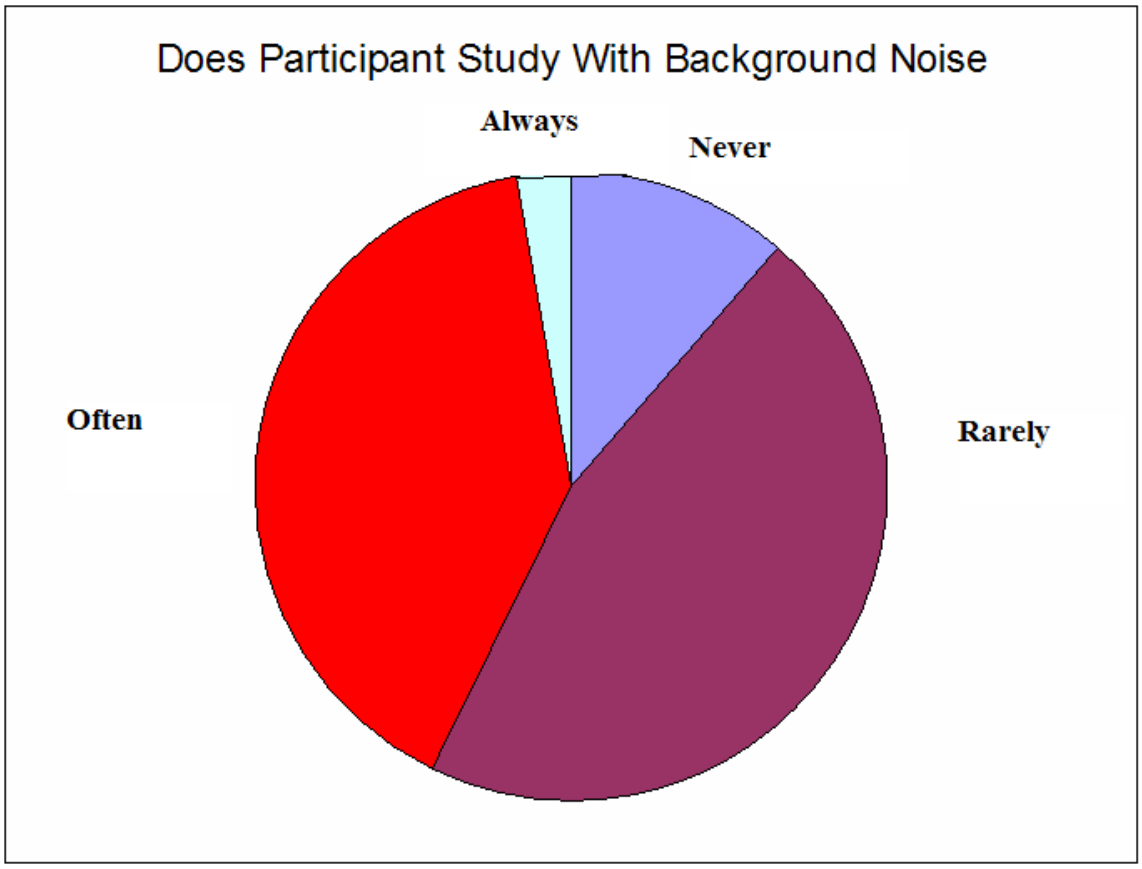

Self Assessment of Math Problem Solving Ability as Opposed to that of Peers
Far Below Average
0%
Far Above Average
11%
3%
Slightly Below Average
37%
Average
Slightly Above Average
49%

Figure 2


Does Participant Study With Background Noise
Always
Never
Often
Rarely

Appendix A

Answer the following questions to the best of your ability.

1.) 17 +55	2.) 77 - 9	3.) 7 x 9	4.) 44 - 16	5.) 33 + 17
6.) 71 -28	7.) 17 x 6	8.) 96 -30	9.) 100 - 25	10.) 8 x 7
11.) 62 -14	12.) 96 + 2	13.) 17 x 4	14.) 82 x 3	15.) 69 - 55
16.) 39 -11	17.) 71 +35	18.) 95 x 3	19.) 57 - 19	20.) 24 +84
21.) 89 +18	22.) 34 - 13	23.) 7 x 5	24.) 78 - 42	25.3 x 34
26.) 67 x 5	27.) 42 +56	28.) 130 x 5	29.) 24 - 9	30.) 57 - 5

Appendix B

Informed Consent Form

I, _____ (print name), understand that I will be taking part in a research project that requires me to complete a short questionnaire asking about simple questions regarding history, math and science. I am aware that my participation in this study is strictly voluntary and that I may choose to withdraw from the study at any time without any penalty or prejudice. Furthermore I was able to hear everything the instructor said to me and can communicate without the use of sign language or any hearing device. If I need a hearing device I assert that I have it in at this time and it is functioning as normal. I should not incur any penalty or prejudice because I cannot complete the study. I understand that the information obtained from my responses will be analyzed only as part of results as a whole and that all identifying information will be absent from the data in order to ensure anonymity. I am also aware that my responses will be kept confidential and that data obtained from this study will only be available for research and educational purposes. I understand that any questions I may have regarding this study shall be answered by the researcher(s) involved to my satisfaction. Finally, I verify that I am at least 18 years of age and am legally able to give consent or that I am under the age of 18 but have on file with the HSP office, a completed parental consent form that allows me to give consent as a minor.

_____ Date: _____

(Signature of participant)

_____ Date: _____

(Signature of researcher obtaining consent)

Principal Investigators:

Student 1	Carter Bray	314-578-1178	cab190@lionmail.lindenwood.edu
Student 2	Kathleen Nelson	314 799 6210	kjn553@lionmail.lindenwood.edu
Student 3	Brad Fincher	314 313 5031	bef767@lionmail.lindenwood.edu

Appendix C

Demographic Questionnaire

1. Age:
2. Sex:
3. Do you commute or are you a resident at Lindenwood University:
4. What is your major?:
5. How would you rate your math skills on a scale of 1 to 10? 1 being the worst and 10 being the best.

   (**1)** I-----I-----I-----I-----I-----I-----I-----I-----I-----I (**10)**

6. Do you study in silence or with background noise? Circle one best response.

   Never ----- Sometimes ----- Always

7. If circled "sometimes" or "always" what is the background noise?

Appendix D

Instructions

1. Fill out informed consent form, participant receipt, and demographic survey.
2. After those are completed you will be given the math worksheet.
3. You will have 5 minutes to complete the worksheet.
4. After you are either finished with the worksheet or the 5 minutes are up, give the worksheet back to the experimenters.
5. You will then be given a feedback letter and you may ask any questions you have regarding this study.

Appendix E

Feedback Letter

Thank you for participating in our study. The questionnaire was used in order to determine whether distractions negatively effected people's performance in simple tasks. If you were in the experimental group then you obviously heard two people talking in the room. This two people were a part of the study and were there only to provide you with a mild distraction.

Please note that we are not interested in your individual results; rather, we are only interested in the results of a large group of people, of which you are now a part of. No identifying information about you will be associated with any of the findings.

If you have any questions or concerns regarding any portion of this study, please do not hesitate to bring them up now or in the future. Our contact information is found at the bottom of this letter. If you are interested in obtaining a summary of the findings of this study at a later date, please contact us and we will make it available to you at the completion of this project.

Thank you again for your valuable contribution to this study.

Sincerely,

Principal Investigators:
Carter Bray 314-578-1178 cab190@lionmail.lindenwood.edu
Kathleen Nelson 314 799 6210 kjn553@lionmail.lindenwood.edu
Brad Fincher 314 313 5031 bef767@lionmail.lindenwood.edu

Supervisor:

Dr. Michiko Nohara-LeClair
Course Instructor
(636)-949-4371
mnohara-leclair@lindenwood.edu
Adapted, in part, from LU Ethics Form
8/03

The Effects of Relatedness and Order of Anagrams on the Ability to Recall

Dana Castrellon, Mai Ozaki, and Sarah Staley

This paper discusses the effects of the relatedness and order in which words are presented on a person's ability to solve anagrams. One of the hypotheses was that it would be easier to recall anagrams if they were related and presented in the same order as the study sheet. The other was that a person would more easily recall words if they are related rather than unrelated. Forty-eight participants were recruited and asked to complete two of four anagrams tests. The results of a one-way MANOVA examining the effect of consistency of item order did not reveal statistically significant results. The results of a paired t-test comparing the participants' performance on the related and unrelated lists revealed that there was significance.

The purpose of this project was to determine whether the relatedness of words and the order in which the words were presented affected the ability to complete the word puzzles which required people to unscramble letter strings to form words. This study also showed the effectiveness of the order difference and the relatedness of words concerning the variance of gender, age, grade, primary language, and previous experiences with anagrams. We predicted that participants would be able to correctly complete the anagrams more when they receive the anagram list of related words in the same order as the test. Our study gave better understanding of our participants' memory skills, and this helped them learn how to be able to improve to know how to improve their learning techniques.

In the past, Williams (2003) conducted a study to evaluate the level of importance of verbal and nonverbal intervening task and it's retroactively intervention with learning. Retroactively interference is the problem when learning new information and at the same time recalling previous information. Williams (2003) referred to a study done by Underwood and Wheeler, in which they asked the participants to learn a word list of paired adjectives, and after 30 minutes they were asked to recall these articles. On the other hand, the participants that were in the experimental group were asked to learn a second list of words during the 30-minute delay period while individuals in the control condition did not learned any list of words during this period. The results were that the experimental group recalled half of the paired adjective in the list of words than the control group recalled. This was important to know in order to avoid any distraction in any experiment about memory. The experiment mentioned above demonstrates that interference is a key factor when learning a list of words, and recalling them. So this retroactive interference will affect the memory skills of the participant in a certain situation.

Studies similar to ours have been conducted in the past, but some of those studies manipulated other variables to determine the ability to complete the task. For instance, Cangoz (2005) did an experiment to find out if the solution type had anything to do with the ability to complete anagrams. In this study, there were two anagram lists. The first list contained thirty words with a single solution. The other list contained thirty words which had multiple solutions. The results showed that the participants solved more single solution words than multiple solution words, this results were due to the study phase.

Witte and Freund (2001) performed an experiment to determine if it is easier for participants to solve anagrams if the words started with a consonant or a vowel. Their anagram list contained ten words that began with a consonant and ten words that began with a vowel. They found that people are more likely to choose a consonant to determine an anagram's solution so the words beginning with consonants were solved more frequently. In the second part of their study, they wanted to determine if the frequency of the words had anything to do with the ability to solve anagrams. Of the twenty anagrams on this list, ten were high frequency and ten were low frequency words. The findings were that more people were able to solve more anagrams consisting of high frequency words and in a shorter amount of time rather than low frequency words.

Tan and Ward (2007) studied the effectiveness of order difference and pre-cued or post-cued for immediate serial recall tasks. They used and showed 32 lists with 8 words per each, and the participants are separated into three groups: one group is asked to write down the words with the same order of the lists before the experiment starts (Pre-cued); ones are asked to write down the words with any order before the experiments starts (Pre-cued); one is asked to write down the words but they do not know which kinds of orders they do at the beginning, and after half of the trials, they were told which kinds of order (same or any) they did (Post-cued). The result showed significant difference between the same order and any order and there was also a significant difference found when informing the order to the participant at the beginning of the study or in the middle of the experiment. The proportion of the response with the same order becomes lower than any order, and the proportion of the responses when they were told after half of the trial became higher than when they did not know which order types they should do at the

beginning. The researcher suggested output order plays an important role in the primacy effect in immediate serial recall ISR and that the regency items are most highly accessible at recall.

Another important factor of remembering words depends in how frequent we use these words daily. Usually, specific words are lower-frequency, and general words are higher-frequency and better-recognized stimuli than specific ones. However, when specific words have been used more often, these become easier to recognize than common words. In other terms, when lower-frequency words are studied this make them easier to remember than general words. This is referred as the "mirror effect" (Van Overschelde, 2002).

Hulme et al (2003) conducted a study in which he used lists of high- and low-frequency word, and the participants were asked to recall the words. In the first experiment of the study he alternated low-frequency with high-frequency word lists. In the second experiment he included low- and high-frequency words in the same list. His results showed that low- and high-frequency words were recalled identically when he used the list that included low- and high- frequency words. This finding was contradictory to many results from other experiments that would state that higher-frequency words are recalled more easily than low-frequency words.

According to Kenrick, Neuberg, and Cialdini (2007), knowledge is remembered easier when it has been made accessible; this is referred to as priming. When the list of words are related to school, the specific circumstance has a strong effect for people who have spent time in school because they use the school-related words intensively, which is not used in other places, so they recognize the school words, or specific words, easier

than general words. The subjects are already primed to recall these words easier because they come across them in everyday life. Also, when the participants are given the list of related words, one word might prime another word because the words have the same theme. For example, when someone sees the word "pencil", they could be primed to recall the word "paper" because these words are closely related.

According to Humpreys, Dennis, Maguire, Reynolds, Bolland, and Hughes (2003) people simply recall familiar words and recollect words which they remember into consciousness.

However, on the other hand, Szarkowicz and Rankin (2003) conducted a study on the difference of the levels of accuracy when recalling related words and non-related words. It showed that related words are more confusing when trying to memorize them accurately, and errors when recalling them are most likely to occur. Non-related words are easier to remember when the specific meaning is given. The accuracy of recalling non-related words also increased, because there is only one learned meaning for it.

One problem that could have arisen from our study is what is known as the word length effect. The word length effect states that when it comes to word recognition, it is easier to process a short word rather than a long word. On average, it takes 60 milliseconds longer to recall a six-letter word than a four-letter word (Lee, 1999). In order to prevent this confounding variable in our study, we made sure that each study list contained the same amount of words with the same amount of letters. So the word length effect should not account for the amount of time it takes each participant to complete the anagrams on either lists.

In our experiment, we recruited 48 participants, who all were college students. The materials that we used were: 2 study list, 1 had school-related words and the list number 2 had unrelated words. Then we had 4 lists of anagrams, 2 for each study list. Our 48 participants were randomly assigned in 4 groups. The first group was given the anagrams in which the related words and unrelated words lists were in the same order as the original study list. The second group received the anagrams in the incorrect order, but they had to do first the related word list and then the unrelated list. The third group received the anagrams in which the words were not related but were in the correct order, and the fourth group was given the anagrams in which the words were related but not in the correct order. Our independent variable was the particular list of anagrams given to each group.

Method

Participants

Thirty-three college students who were enrolled in 100-level Sociology, Psychology, and Anthropology classes at Lindenwood University participated in this study through the Human Subject Pool. We also recruited 15 college students from Lindenwood University who were not part of the Human Subject Pool. These 15 participants took the experiment in a number of locations including the library, computer lab, and dorm room. All of these participants were either friends or classmates of the researchers. We based our data off of a total of 48 participants. They gave informed consent in accordance with the guidelines set by the American Psychological Association. The age range was between eighteen and 24 years old. 24 of the participants were female and 24 were male. In regards to the class status of the

participants, 47.9 percent were freshmen, 27.1 percent were sophomores, 6.3 percent were juniors, and 18.8 percent were seniors. The participants in our study spoke seven different languages. See table 1 in order to see a list of the different languages and the percentage of the participants who spoke each.

The largest percentage (20%) of the participants whose primary language was not English had been speaking English for 72 months. Other than that, 10% had been speaking English for 60 months, 10% 144 months, 10% 180 months, and all the rest were only 5% each. Only two of the participants had problems such as dyslexia or visual problems that could have affected their performance on the anagram tests.

The 33 students recruited through the Human Subject Pool received extra credit points for the class mentioned above, and the15 participants recruited outside of the Human Subject Pool received chocolate for their participations in our study. We had a total of fifty-two participants, but we excluded four because we accidentally gave them the anagrams test in the wrong order.

Materials

The materials used in this study included a non-standardized questionnaire (see Appendix A), a stop watch to measure the time, pens, a chair, a desk, and rooms to complete the anagrams in. The room used for the HSP participants was Lab D in first floor of Young Hall that consisted of one desk and two chairs. The rooms used for the fifteen participants not recruited through the HSP were the computer lab in Spellman, a room in the library with a desk and chairs, and a dorm room with a desk and a chair.

Some other materials include 30 words two different lists of the correct answers for the anagrams, and the two separate anagrams lists for each of the two different lists of

words. The 30 words from one of the lists are school related words (see Appendix B), and the other 30 words are common words which are not related (see Appendix C). In order to prevent any confounding variables, the words on each study list of thirty words contained the same amount of words with the same amount of letters. Each study list contained two four-letter words, six five-letter words, ten six-letter words, four seven-letter words, four eight-letter words, three nine-letter words, and one ten-letter word There were four lists of anagrams (see Appendices D-G): one had the anagrams in the same order as the list of related words lists, the second was another list of anagrams in the same order but this was of the unrelated words lists, the third list of anagrams was in a different order of the related words, and the last list of anagrams was in a different order of he unrelated words.

Procedure

In this study, a mixed-subject design was used. Of the 48 subjects, 12 subjects were randomly assigned to four different groups. The independent variable in our study is the particular list of anagrams that was given to each group. The order in which the participants received the anagrams lists was counterbalanced. The first group received the related in-order anagrams then the unrelated in-order anagrams. The second group first received the related out of order anagrams then the unrelated out of order anagrams. The third group first received the unrelated in-order anagrams then the related in-order anagrams second. The fourth group was given the unrelated out of order anagrams and then the related out of order anagrams.

The participants were first asked to sign two informed consent forms and a questionnaire which asked various questions about their anagram experience, any

disabilities they may have, etc. Then the experimenters passed out the list containing the correct answers for the anagrams and the participants were given one minute in order to attempt to remember all of the 30 words on the list.

After one minute, the experimenter picked up the list of correct answers and passed out one of the four different types of anagram papers. The subjects were divided into four different groups consisting of twelve people each based on which anagram list they were given first. One subject group will receive the anagrams in which the related words are in the same order as the study list. The second group will receive the anagrams in which the words are related but are not in the correct order. The third group will receive the anagrams in which the words are not related but are in the correct order, and the fourth group will receive the anagrams in which the words are not related or in the correct order. All four groups were given seven minutes to unscramble the letters to form words on the anagrams test.

After seven minutes, the experimenter stopped the subjects and gave them the second study list of words. After one minute, the experimenter picked up the list of correct answers and passed out one of the four anagrams tests. The first subject group will receive non-related words in correct order, the second will receive non-related words in incorrect order, the third will receive related words in correct order, and the fourth will receive related words in incorrect order.

The dependent variable in our study was the accuracy of the subjects' anagrams tests. We measured this based on the amount of anagrams the subjects were able to unscramble correctly among the four different anagram tests. When grading the anagram tests, the answer was counted as correct if it were spelled correctly in full. In other

words, even if the word was missing one letter or one letter was not in the correct spot, the answer was not counted as correct. All of the grades were taken out of thirty points because there were thirty anagrams on each test sheet. In addition, we related this to some of the answers obtained from the questionnaires such as the subjects' previous experience with anagrams, gender, disabilities, etc.

Results

Our hypothesis was that the participants would be able to correctly solve more anagrams when they receive the anagram list of related words in the same order as the test. In order to find the results of our experiment, we conducted a one-way MANOVA in which the independent variable was the order received (correct vs. incorrect) and the dependent variables were the two means of the number of anagrams solved when related and the number of anagrams solved when unrelated. The analysis did not reveal any significance of the order received on the mean of the number of anagrams solved when related, $F_{(1,46)} = .152$, $p>.05$. There was also no significance found of the order received on the mean of the number of anagrams solved when unrelated, $F_{(1,46)} = .033$, $p>.05$. We failed to reject the null hypothesis.

However, upon further analysis, we did find significance when a paired t-test was conducted for the related versus non-related anagrams, $t_{(47)} = 10.122$, $p<.001$. The mean score for the related words anagram test was 18.54 while the mean score for the unrelated words anagram test was 12.19. Because the mean of the related words anagram test was significantly higher than the mean for the unrelated words anagram test, our hypothesis that it would be easier to solve anagrams that are related rather than anagrams that are not related was supported so we could reject the null hypothesis.

According to our analysis, a little over half (54.2%) of the participants had history with completing anagrams. Of these 26 participants who had history with anagrams, most of them (39.1%) had only done so once a year and 21.7% had only completed anagrams twice a year.

Discussion

The results of this experiment only supported one of the hypotheses. According to the analyses, it does not make any difference if the order in which the words are presented on the anagram test are different from how the words were ordered on the study sheet. Maybe the reason for this is because since there were so many words to memorize on the study list, that it was simply too difficult to recall the order while taking the anagram test. Perhaps if the test had consisted of 15 words rather than 30, then the participants would have remembered the order of the words more and it would have helped them solve more anagrams.

Even though our hypothesis that the order of words affects the ability to recall words was not supported, the analyses proved our other hypothesis that the relatedness of words does make a difference. The analyses showed that on average, people solved more anagrams if they were related. The reason for this could be that it is easier to recall words that have a theme rather than words that have no similarities at all.

Even though we ended up being successful in supporting one of our hypotheses, there were several limitations in the study that could have affected our results. For instance, 41.8 percent of our participants spoke a primary language other than English. This could have negatively affected their test results because all of the anagrams were in English. Perhaps if the anagrams were written in their primary language, then they would

have been able to solve more anagrams because they would be much more familiar with how all of the words are spelled. According to some of our Spanish speaking participants, two or three of the words could actually be unscrambled into a word in Spanish. This could have affected their anagram solving ability because it caused confusion. If this study were to be redone, maybe the confounding variable of language could be eliminated by excluding all of the data of the participants whose primary language was not English.

An extraneous variable that could have affected some of the participants' ability to solve anagrams could be the noise and lack of lighting in the room. 33 of the participants took the experiment in Lab D, which did not have an actual door. Instead, it was located in the middle of a bigger room which consists of another lab without a door right next to it, and three other smaller rooms with doors. During this experiment, other groups were conducting experiments in some of the other labs and all of the noise they made was clearly audible to our participants. Also, there was also a loud sound that occurred every few minutes which was probably a result of the toilets flushing in the above floors. The conversations of the other groups, the sound of doors opening and closing, and the sound from the toilets flushing could have distracted the participants and caused them to solve fewer anagrams than they normally would have in a completely silent room. Also, the lighting in Lab D was very dim. Because of this lack of lighting, the participants might have had a harder time reading the words or perhaps the dim lighting caused them to become sleepy. Either way, their ability to solve anagrams could have been affected.

Fifteen of the participants did not do the experiment in Lab D because they were not a part of the Human Subject Pool. These fifteen participants took the experiment in a number of locations including the library, computer lab, and dorm room. The location of these experiments could have also affected the participants' abilities to solve anagrams due to a number of reasons ranging from noise to having other things distracting them such as computers.

The scores on some of the participants' tests might not have been the best to their ability because of lack of interest. Many of the participants seemed to get bored quite easily and asked if they had to keep trying to solve the anagrams for the full seven minutes. Other participants seemed rushed as if they wanted to get in and out quickly. Others said they were not good at anagrams and just gave up. Maybe some of the participants just did not care about solving the anagrams because it did not really matter to them what score they received on the tests because they got their extra credit or candy bar either way. If this experiment were to be redone, it would probably be a good idea to decrease the amount of time the participants got to solve the anagrams. In hindsight, seven minutes seems to be too much time. As mentioned before, many of the participants, probably over half, did not want to use the entire seven minutes to try to solve the anagrams.

The findings support the hypothesis that the relatedness of words affect a person's ability to recall the words later on. This finding could help people who have difficulty remembering information they study. Maybe if they categorize the information they need to study into themed groups, then they will be able to remember the information better. To improve this experiment, maybe the number of participants could be increased in

order to be a more representative sample. Also, maybe the experiment would be more accurate if some of the data were to be excluded, such as the data which represents the scores of participants who do not primarily speak English as mentioned before. The range of age could also be minimized to less than twelve years so that the argument could be eliminated that people who are older have more experience with words games and therefore are better at anagrams. If all of these limitations were eliminated as well as finding a well lit and noise-free room, then the experiment could be improved.

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Author Note

Mai Ozaki, undergraduate psychology student; Sarah Staley, undergraduate psychology student; Dana Castrellon, undergraduate psychology student, Lindenwood University

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If further information about the study is required or requested please contact Mai Ozaki at mo674@lionmail.lindenwood.edu, Sarah Staley at scs061@lionmail.lindenwood.edu, Dana Castrellon at djc966@lionmail.lindenwood.edu, or Dr. Nohara-LeClair at mnohara-leclair@lindenwood.edu.

TABLE 1

Primary Language of Participant

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	English	28	58.3	58.3	58.3
	German	2	4.2	4.2	62.5
	Japanese	3	6.3	6.3	68.8
	Nepali	7	14.6	14.6	83.3
	Polish	1	2.1	2.1	85.4
	Shona	1	2.1	2.1	87.5
	Spanish	6	12.5	12.5	100.0
	Total	48	100.0	100.0	

Appendix A

Questionnaire

Subject's ID Number _____

1) Are you MALE FEMALE

2) Age _____years

3) Are you SENIOR JUNIOR SOPHOMORE FRESHMAN

4) Have you ever done anagrams, which requires unscrambling letters to form words?

YES NO

5) If so, how many times in a year do you solve anagrams? _____

6) What is your primary language?

ENGLISH OTHER_____

7) If English is not your first language, how long have you studied English (months)?

_____

8) If you feel that your performance in this experiment was affected negatively by whatever reason (including, although not limited to such things as test anxiety, learning disability, vision problems, dyslexia, problems with writing) please check here: _____

Appendix B

SENIOR
EXAM
BOARD
WATCH
PENCIL
STUDIO
LIBRARY
CHAIR
INTERN
STUDENT
LOFT
NOTEBOOK
BOOKSTORE
COMPUTER
MAILBOX
STAIRS
TEACHER
ERASER
GRADE
FRESHMAN
LOCKER
SOPHOMORE
JUNIOR
CLASSROOM
BINDER
ACTIVITY
STUDY
FRIEND
UNIVERSITY
LIGHT

Appendix C

BEHAVIOR
CHICKEN
RESPONSE
COUNTRY
STATION
FAVORITE
SHIRT
AIRPLANE
RESTAURANT
CONCERT
STORE
WINDOW
SHAKE
PERSON
SEPTEMBER
FRUIT
JACKET
LAKE
CANDY
HAIR
STREET
CRANBERRY
CLOWN
WALLET
ORANGE
CELLPHONE
HORSE
CLOUD
ANIMAL
MOTIVATE

Appendix D

ENSRIO _____
XMAE _____
DAORB _____
CWTHA _____
NIPELC _____
TIUDSO _____
YBARLIR _____
RICAH _____
RETINN _____
TUSTDEN _____
OTLF _____
OOBOTEKN _____
EBSOKOORT _____
MPREUTOC _____
MIXOLAB _____
TSIASR _____
RCATHEE _____
SRAERE _____
DERAG _____
MNESRHFA _____
EKOLCR _____
HOMOPOES _____
OJURNI _____
ASRSOCMLO _____
EIDNBR _____
TVAIYCTI _____
YUDTS _____
IDRNFE _____
YTURSIVINE _____
GTILH _____

Appendix E

MIXOLAB _____

DAORB _____

GTILH _____

EKOLCR _____

SOLSMCARO _____

TUSTDEN _____

IDRNFE _____

OOBOTEKN _____

YUDTS _____

YTURSIVINE _____

MPREUTOC _____

CWTHA _____

TSIASR _____

LNPCIE _____

OJURNI _____

RCATHEE _____

RETINN _____

OTLF _____

DERAG _____

TVAIYCTI _____

TIUDSO _____

MNESRHFA _____

ENSRIO _____

XMAE _____

HOMOPOES _____

SRAERE _____

RICAH _____

EIDNBR _____

EBSOKOORT _____

YBARLIR _____

Appendix F

ORABEVIH _____
KCNIHEC _____
SOSPRENE _____
NOTRCUY _____
NOSATTI _____
TIFRVOEA _____
TRISH _____
PLINEARA _____
STREANURTA _____
OCTENRC _____
ESTRO _____
DIOWNW _____
KHSEA _____
SPNEOR _____
BESRTEPEM _____
UTFIR _____
KJATEC _____
ELKA _____
DYNCA _____
RIHA _____
ESRTET _____
ERRBAYCNR _____
WCOLN _____
LWTLAE _____
GEOANR _____
EPCLNOHLE _____
SORHE _____
UCODL _____
MALANI _____
OTVAMETI _____

Appendix G

ELKA _____
BESRTEPEM _____
UTFIR _____
SPNEOR _____
ORABEVIH _____
OTVAMETI _____
SORHE _____
KHSEA _____
ERRBAYCNR _____
NOTRCUY _____
ESRTET _____
SOSPRENE _____
WCOLN _____
KJATEC _____
GEOANR _____
KCNIHEC _____
LWTLAE _____
STREANURTA _____
EPCLNOHLE _____
TIFRVOEA _____
DYNCA _____
OCTENRC _____
PLINEARA _____
NOSATTI _____
UCODL _____
RIHA _____
DIOWNW _____
MALANI _____
ESTRO _____
TRISH _____

Homophones with Dual Interpretations as Affected by Temperature

Jamie Fritz

This study investigated the effect of temperature on selection of neutral and negative connotations. Homophones, words with two meanings with the same pronunciations, with a neutral and negative connotation were used to detect differences in temperature environments (75° or 85° F). Homophones were selected based on their use in a study by J. B.Halberstadt, P.M. Niedenthal, and J. Kushner (1995) where homophone-meaning selection was affected by "happy" and "sad" music played during the experiment. The current study did not find statistical significance between the two temperatures to reject the null hypothesis, but demonstrated the need for further study in this area.

Temperature fluctuations are a common issue to all life. The extreme heat and cold determines what we wear, where we live, and what we eat. Obviously the physiological effects are noticeable to most people even if it is only verbalized with a comment of the high humidity. The psychological manifestations of this weather awareness are rather less known. The idea that temperature could affect what we think and how we feel is a concept that many researchers have set out to explain. However, cognition as affected by temperature is a lesser studied topic. This point was also noted by Keller et al. (2005), as they were only able to cite two studies that related cognition and weather. Their research also referenced a study by Allen and Fischer (1978), which reported that performance on a paired association memory task peaked at 72°F and declined with warmer or cooler temperatures. The room to explore in this category is massive.

A large portion of research is offered through the study of industrial and military workers who are in extreme heat environments because of their occupation. Faerevik and Reinertsen (2003) studied the deterioration of the cognitive ability of helicopter pilots while exposed to temperatures warm enough to raise their internal body temperature by 1.2°C, which found that mentally demanding tasks suffered the greatest decline under these conditions. The rate of mistakes and the amount of accidents/crashes increased with temperature and length of exposure. This point, task difficulty with respect to deterioration while exposed to heat, is confirmed by the article analysis of Hancock and Vasmatzidis (2003) as they compiled relevant research on the topic of temperature and cognition. However, most research has suffered from the presence of confounding variables reflected in people's personal preference and tolerance of heat.

The current study set out to determine if the physiological discomfort of the participants would manifest itself in the outward selection of the negative connotation of a set of homophones. A homophone is defined as a word that is pronounced in the same way as one or more other words but is different in meaning and sometimes spelling, as are "hair" and "hare." J. B. Halberstadt, P. M. Niedenthal, and J. Kushner (1995) used homophones with neutral and negative meanings to determine how music affected the emotional state or cognitive perception of the participants. In that situation, homophone definitions were demonstrated to fluctuate with the tone (sad or happy) of the music played.

The internal processes required to acquire a definition of a homophone cannot exactly be monitored in this experiment. According to Tanenhaus and Lucas (1987), information such as spelling, pronunciation, and meaning involves the first stage of

processing sensory input with the results then forwarded to the language processing system. Mathew, Richards, and Eysenck (1989) wrote, "Some contemporary positions on this issue suggest that all possible meanings of an ambiguous word are accessed automatically, even when only one of these meanings becomes conscious" (34). The aforementioned study examined how a predisposition toward anxiety would affect homophone-meaning selection and found that high anxiety individuals would select more negative or threatening meanings.

In the current study, homophones were utilized to show the effects of increased temperatures (85°F) on the state of the participant. The focus was to determine if a high heat environment would increase the likelihood that the participants would select the negative interpretation of a homophone more than the participants in the unaltered environment. It is hypothesized that the heat will increase the negative connotation selection. Participants entered the same room in one of two conditions: 75°F or 85°F. After signing a consent form, a list of words was read to them in which they verbally defined. The experimenter recorded their responses. A short questionnaire was given to obtain demographic information. This was followed by the feedback and debriefing. The results of this experiment will offer further knowledge to the growing pool of understanding of the effects of heat on emotion and cognitive ability.

Method

Participants

The group of participants was comprised of 31 undergraduate students, ages 18 to 26, who have participated through the Human Subject Pool to gain extra credit in a 100

level Social Science class in which they are currently enrolled. A single researcher conducted experiments for each session.

Materials

A space heater with an internal thermometer was used to increase the room's temperature to 85°F. A fan was used in two capacities: to cool the small lab room after a heated session and to create the 75°F situations needed for the experiment. A list of 15 words, consisting of 10 homophones and 5 filler words, were read to the participants. The homophones not only had dual meanings, but had specifically both a neutral and a sad/negative connotation. The filler words served as a vocabulary screening to ensure that the participants had an adequate understanding of the English language to complete the experiment. Three or more vocabulary words incorrectly defined resulted in their data being excluded. These vocabulary words were integrated into the homophone list and the two portions were given as one definition exercise. The verbal definitions made by each participant for each word were then recorded by the experimenter on a data sheet (see Appendix A). The final exercise was a questionnaire, which gathered demographic information such as age, gender, ethnicity, and original language whose results will be reported in the Discussion section (see Appendix B). Informed consent forms, participant receipts, and feedback letters were also utilized in each experiment session.

Procedure

Participants were met outside of the research lab room by the experimenter and walked into Lab B, which is located in the Psychology Lab in Young Hall on the campus of Lindenwood University. Group assignment was as random as possible. Being that the temperature had to be changed, alternating temperature between participants was not an

option. Therefore, for each day, the list of scheduled participants was divided in half. One half would be heated and the other not. This order alternated. Depending on which group that they were assigned, the room would either be 85° F (heated environment) or 75° F (the room's normal temperature). Upon entering, if the participant requested to change rooms because of the heat, they were told that all other rooms had been assigned and that the experiment would only take 20 minutes. They were also informed that they had the right to decline participation at any time and would still receive their credit. The participant and observer sat across from each other at a table with two chairs. The participant was then presented with 2 informed consent letters to read and sign. The participant kept one form. The participant receipt was also filled out at this time. The homophone portion was then initiated. They were told that a list of words would be read to them and they would be asked to verbally respond with the meaning of each word (definition). They were not told that some of the words had two meanings at this stage of the experiment. They were asked to give the first and only one definition for each word. Each word was read twice with 3 seconds in between each reading. The experimenter recorded participants' responses on a separate data sheet. All participants were then given a demographic questionnaire. Once the questionnaire was completed, if in the heated environment, the heater was turned off and a fan was turned on. Finally they were presented with a feedback letter. The experimenter also verbally explained the purpose of the study and gave the participant an opportunity to ask questions. The word list was identified as homophones with five filler words. The filler words were disclosed as a vocabulary screening for the experiment and the temperature change was explained as a

manipulated variable. The participants were thanked for their time and walked out of the room.

Results

The hypothesis was that exposure to a high heat environment would increase the selection of the negative meanings for a list of homophones. An independent t-test was conducted to analyze the data. The effect of temperature was not statistically significant, $t_{(29)} = -.024$, $p > .05$. The null hypothesis, that there would be no difference in response results due to temperature changes, could not be rejected in this study. Temperature was not shown to have a statistically detectable effect of the types of responses (i.e. increase in negative connotation selection while in heated environment).

Discussion

This particular study did not yield statistically significant results to support the hypothesis that increased temperature would result in an increase in the rate of selection of negative homophone meanings. However, there is still a lot that can be learned through this process. There are some comments to be made regarding the experimental design and there is much to say about the results.

In terms of design, if this hypothesis were to be pursued further, some changes would be made to the materials and the experimental situation. The list of words would be lengthened and refined. There were only ten words used in this experiment. A larger variety of words might increase the opportunity to find significance without distorting the data results. The refinement would entail the selection of words. There were a few homophones that never yielded neutral responses. This may have had more to do with

our use of these words in everyday language. A few examples of this would be pane/pain and steel/steal. The word pane, as in windowpane, is not used as regularly in daily language as the word pain. Steel, although a real word, is not commonly used either. The commonality of the word use may have large effects on the likelihood of selection. In fact, this is called the frequency effect, which is defined as a phenomenon in memory that we tend to remember information better if it is repeated. If the participant has never used the word in a natural sentence, how likely would he be to select that meaning regardless of the surrounding environment? Many homophones have this issue. Perhaps the second meaning developed because the first fell into disuse? Separate testing on a large list of homophones to determine the average rate of use would be beneficial in creating a proper list of homophones for this study. A lengthened and revised list of homophones may yield different results.

This experiment should be conducted again, but with a larger subject pool, perhaps 50 to 200 participants. In terms of the participants in this study, 10 were male and 21 were female. Of the 31 participants, 6 were Asian, 1 Hispanic, and 24 White. Their first languages are as follows: 25 English, 1 Japanese, 4 Nepali, and 1 Spanish. A larger subject pool is always a good idea, but particularly here. Another interesting angle to pursue would regard comparing results of those with English as a second language with results of English as a first language. In a non-statistical observation, there was a slight increase in ESL students to select the meanings with more literal connotations, such as pane instead of pain. A study could be designed to specifically investigate this superficial observation.

There is a secondary observation related to both the amount of participants and to amendments to the experimental procedure. The mood of the participant before taking the vocabulary portion could be assessed with a self-report questionnaire with a possibility of being repeated after the exercise is finished (integrated into the demographic questionnaire). This could record and measure many latent factors such as the participant's mood or disposition before and after the experiment as well as indicating their own perceptions of how temperature affects them (i.e. I am cold natured, I actually like the heat, etc.). These surveys and changes, compiled with a larger group of participants could help to decrease or at least discover their effects on the data.

The temperature gradient may not have been strong enough to yield any results. The difference between the settings was only 10°F, which may not have been a large enough difference. Furthermore, the neutral or non-heated environment should have been set at 72°F to replicate the previously mentioned ideal temperature environment. The heated environment could be increased to 90°, which is just below the documented maximum temperature for cognitive operations. A third environment could also be added to measure the other extreme reaction to cold temperatures. More research would need to be conducted to formulate the appropriate cold temperature. These additions and adjustments would be valuable if this study were repeated.

Although this study brings more questions than it offers answers, there is still a definite desire to continue research in this matter. Despite the lack of statistical significance, changes to the stimuli, changing the temperatures and subject pool size may be vital adjustments that could be made to a valuable experiment.

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Author Note

Jamie L. Fritz, Department of Psychology of Lindenwood University

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If further information about the study is required or requested please contact Jamie Fritz at jamie-l-fritz@hotmail.com or Dr. Nohara-LeClair at mnohara-leclair@lindenwood.edu.

Appendix A

Data Sheet

	Actual Response	Neutral Answer	X	Negative Answer	X	Other	X
1		Dye		Die			
2	**	Secret		**			
3		Fowl		Foul			
4	**	Extinct		**			
5		Steel		Steal			
6		Brake		Break			
7		Heroine		Heroin			
8		Pane		Pain			
9	**	Calm		**			
10		Slip		Slip			
11		Vein		Vain			
12	**	Overrated		**			
13	**	Wealthy		**			
14		Know		No			
15		Week		Weak			

Heater Environment: _____

Non-Heater Environment: _____

Appendix B

Questionnaire

1. What is your gender? Male ____ Female ____

2. What is your age? _____ years

3. How would you characterize your ethnicity?
   ____ Asian or Pacific Islander
   ____ Black, Non-Hispanic
   ____ Hispanic
   ____ American Indian or Native Alaskan
   ____ White, Non-Hispanic
   ____ Other

4. What is your first language?

Appendix C

Instructions

Now you will be asked to define or explain the meaning of a list of words that will be read to you.

I will read each word twice. After a single word has been read twice you will be asked to verbally explain its meaning. Please say the first explanation that comes to mind. Please only give one response. I will record your response on a data sheet with a pencil. This portion of the experiment will be followed by a short questionnaire. Please know that the quickness of your response is not important, so you may take your time.

Please follow these instructions very carefully. Now we will begin.

1. die, dye
2. secret **
3. foul, fowl
4. extinct **
5. steal, steel
6. brake, break
7. heroin, heroine
8. pain, pane
9. calm **
10. slip, slip
11. vain, vein
12. overrated **
13. wealthy **
14. know, no
15. weak, week

Please fill out this short questionnaire. Thank you.

** Denotes a word that is not a Homophone.

Influences on Spelling Ability: Written vs. Oral Performance

Jake Jadwin and Sara Robards

The purpose of this study was to determine if spelling ability was affected by speaking or writing the spellings of the words. We further tested to see if vocabulary ability had any effect on spelling ability as well. Participants spelled two lists of ten words one list, was orally spelled and one list was written spelling. Upon completion of the spelling tasks, participants were asked to complete a vocabulary task. Participants' results were analyzed and conclusions were drawn based on written and oral performance and vocabulary ability. Our research revealed that participants spelled more accurately when writing the spellings versus speaking the spellings. Vocabulary was also slightly correlated to spelling ability.

The purpose of this experiment was to find out if participants were more successful at spelling words correctly when they were writing the spelling of words instead of orally stating the spelling of words. We chose to have each participant write the spelling of ten words and orally spell another set of ten words. Vocabulary ability was also investigated to see if it were related to spelling ability. Our study was to help determine if differences in individuals' spelling abilities differ when the person is speaking or writing words and if the person has a strong or weak vocabulary.

There has been an extensive amount of research done involving spelling techniques in other experiments. Experimenters have studied a broad variety of areas related to spelling. Rieben, Ntamakiliro, and Gonthier (2005) investigated the effect of inventive spelling on spelling ability. They recruited 148 kindergarten students to

participate in the study and assigned a student to one treatment group out of four. The four treatment groups were the invented spelling (IS) group, copied spelling (CS) group, invented spelling with feedback on correct spelling (ISFB) group, and drawing (D) group. These groups were tested on different measures involving spelling and the ISFB group scored the highest means on all the measures. Rieben et al. reasoned that inventive spelling allows children to make mistakes while learning and they can then learn from their mistakes. In regards to our study, this indicates that visually seeing the word as they write it out may alert the individual that the spelling they are writing is not correct or trigger the actual correct spelling in the process.

Holmes and Castles (2001) conducted an experiment concerning the surprisingly poor spelling ability of students who attended a university. In the study, they compared students who were poor spellers and students who were superior spellers. All of the students completed the following tasks of producing the spellings of words, recognizing authors, defining words and completed a questionnaire about reading and writing tendencies. The results of this study showed that the students with less spelling ability had less ability because they had insufficient knowledge of specific spelling of words. This was due to the lack of focusing on proper sequences of letters (Holmes & Castles). We relate this to our study because writing gives visual exposure to the sequences of letters. People can learn how important reading and writing a variety of words is for spelling ability as well as taking an active role in that kind of exposure. This also coincides with our idea that a broad, extensive vocabulary relates to better spelling.

In another study, Masterson and Apel (2006) investigated the spelling abilities of students in grades 2-6. Every student spelled words by writing them or typing them, but

before these tasks, every student participated in a task measuring words-per-minute to demonstrate their level of competence with a keyboard. The main interest in this study was to see the differences produced in spelling by writing or typing the word. Results showed spelling ability did not differ when these students wrote or typed words. When considering these results, we are not discouraged from our hypothesis because Masterson and Apel did not include an oral task. We want to include this factor in our study which can add on more detail from Masterson and Apel's study and further investigate what's involved in spelling ability.

Kelman and Apel (2004) conducted a case study involving an eleven-year-old girl to see what components of language such as phonemes and morphemes support spelling ability. In this study they found that including different linguistics elements in spelling lessons resulted in better spelling development for the eleven year old girl. Lily's abilities in spelling and reading were assessed before she was taught about phonemes (sounds in words) and morphemes (units in words) in spelling lessons. When Lily's abilities were tested after the lessons and she greatly improved or made fewer errors on spelling tests. By writing the word, the participant can recognize all these elements, therefore spelling more words correctly. Lily was taught about the sounds which also improved spelling but we do not think that this is the same as a participant orally spelling the word and hearing the letters as they spell.

Ward (2003) reviewed other studies that describe the inconsistencies between oral and written spelling capabilities. Drawing from the results of other studies, Ward proposed a model to explain these differences. Ward wanted to summarize research on oral spelling to grasp a better understanding on the interactions between factors of

spelling. It was discussed how oral spelling is an unusual task in the English language. One of the only times that oral spelling is used in English is when the spelling of a word is unclear or when the spelling cannot be assumed from the order of sounds. Writing is a form of communication whereas spelling words orally is not used as communication.

Two case studies were compared by Forde and Humphreys (2005) to examine two patients' ability to identify words that were orally spelled, reading skills, and spelling efficiency when writing or speaking the spelling. However the specific objective of the comparisons was to see if identification of words when orally spelled was contingent on either reading or spelling patterns. The two patients were referred to as FL and FK. Interesting findings arose when the certain previously mentioned skills of the patients were measured. FL and FK both had stronger reading skills than written and oral spelling. However, FK had better spelling skills when writing the words rather than using oral spelling. From these case studies, Forde and Humphreys concluded that recognition of spoken words is related to both spelling and reading which goes a step beyond what we are investigating.

Finally, Deacon and Bryant (2006) organized an experiment that focused on children's knowledge about morphemes. A positive correlation was shown between the level of morphological awareness that the children possessed and their success on standardized spelling tests. The researchers want to use the information they found to encourage children's growth in morphological awareness. Morphemes are the smallest structures in words that people visually recognize and seeing these structures is made possible by writing out the spelling of words. Therefore, when our participants are writing the words, they see the letters creating the morphemes in the words which gives

them an advantage over just hearing individual letters that make up a word when spelling it orally.

In our study, we expected to find that participants would spell words more accurately when writing the words as opposed to speaking the spelling. We also anticipated that participants who scored higher on our vocabulary task would spell more words correctly overall. Our reasoning is that writing gives visual cues that aid spelling ability. As we discovered from earlier research, many conditions affect accurate spelling of words. We propose that there will be a difference in accurate spelling when the conditions are either writing or speaking the spelling of words. Writing the words will result in more accurate spellings.

To investigate our hypothesis we used a within-subjects design and tested each participant in each condition so every participant was tested twice on spelling. An experimenter read all words to the participants from a list. The independent variables were whether participant wrote or orally spelled the words after they were read, and the dependent variable was the participant's performance on both the written and oral spelling tasks. We then used statistically analyses to quantitatively reflect on our data.

Method

Participants

Thirty participants consisted of eighteen female and twelve male college undergraduate students. There were a total of 30 participants. The participants were recruited through the Human Subject Pool at Lindenwood University. All of the participants were offered bonus points for their participation. The bonus points went

toward their introductory level psychology, sociology, and/or anthropology classes at Lindenwood. A demographic questionnaire revealed the following: when asked to compare their spelling ability to that of their peers, the majority, seventeen reported somewhat above average spelling ability. Participants were then asked to rate their ability to spell difficult words as compared to their peers and the majority of sixteen reported average ability. The next question asked participants to rank their desire to learn new words as compared to their peers and most participants (eleven) responded a somewhat above average desire. When asked about personal frequency of participation in word games seventeen being the majority, stated that they occasionally participate. Nineteen participants competed in a spelling bee and eleven participants have never competed in a spelling bee. The participants that did participate in a spelling bee were asked what their highest rank in the bee was and the results showed that most participants either did not remember their rank or received second place in the spelling bee. Information on the level of the spelling bee was then collected. Almost all of the participants participated in the spelling bee during grade school. Finally, the number of participants in the spelling be was inquired. The highest reported number of participants in the spelling bee was seventy-one (see Appendices E, F, & G for participants' answers on questionnaire).

Materials

A questionnaire including demographic information was needed. The questionnaire was created by the researchers and included questions asking the participants to rank their spelling ability, their knowledge about spelling, the level of

interest the participant had in learning new words, if the participant engaged in word games, and if the participant had ever participated in a spelling bee. If the participant had participated in spelling bee, they were told to specify their rank(s) out of how many participants, and the level of the spelling bee. The questions were asked in the context that the participants answer in relation to their peers (see Appendix A for questionnaire). A list of twenty words was needed for this study. The list of words was divided into two groups of ten (see Appendix B). One list of ten words was spelled by participants orally and the other set of ten words participants spelled by writing. The order in which participants received the two halves of the original list of twenty words was counterbalanced among participants. The two list contained pairs of words matched based on work length and starting letter. All words that were chosen were at an eighth grade spelling level found on the internet.

Another part of the study involved a vocabulary task, adapted from http://www.english-test.net/gmat/vocabulary/words/004/gmat-test.php, which listed five vocabulary words with definition options provided to choose from (see Appendix C). Participants were also given a spelling improvement tip sheet upon completion of the study. Ideas for this sheet were borrowed from http://puma.kvcc.edu/success/handouts/spelling/spelling.pdf (see Appendix D). The study also used pens, sheets of lined notebook paper for the experimenters to record the participants' oral spelling of words, chairs, a desk, a table to sit at, and a cell phone. The experimenters handed out participant receipts, consent forms, questionnaires, vocabulary tasks, and feedback letters to the participants. Experimenters used a notebook, pen, and pencil to record data. All participants were run in Lab B in Young 105 for this study.

The lab was relatively quiet and adequately lighted. Inside the lab was a desk with a computer, a large table, and three to four chairs.

Procedure

The experimenters first needed to gather and create all the necessary materials for the study. The day before the experiment, the experimenters called each of the participants to remind them of their sign-up times. When participants arrived, they were asked to fill out participant receipts, the list of participants, two consent forms; one for the experimenters and one for the participant's personal record, and finally were asked to begin participating in the study. The experimenters gave a brief verbal set of instruction on what to expect. Once participants felt that they understood what was being asked of them, the experiment began.

The experimenter had a list of the twenty words divided into two groups of ten words. Depending on the order of the participant, an experimenter would read one group of ten words one at a time, pausing after each one to give the participants time to spell the word out loud to the experimenter. The experimenter recorded how the participant spelled the word on the datasheet. After that first group of ten words, the next ten were read to the participant one at a time. But, instead of verbally spelling the word back to the experimenter, the participant wrote the spelling of the word on a sheet of paper after each word was read. The order in which participants engaged in the two specific spelling tasks: oral and written was counterbalanced. The first participant spoke the spelling of the first group of ten words and then wrote the second group of ten, whereas the next participant wrote the spelling of the words first and then spoke the second group of ten words. After spelling the total of 20 words, the participant was given the questionnaire

and short vocabulary task to complete. Every participant was tested twice, which made this a within-subjects design. Upon completion, the participants were verbally debriefed, and asked if they had any questions. Then, the participants received the spelling tips improvement sheet along with a feedback letter which explained in detail the purpose of the study. The letter also provided the contact information of the experimenters in case the participant was to have future questions or interested in the results of the completed study.

Results

The results of this study revealed statistical significance between spelling words orally and spelling words in a written fashion. Participants spelled more accurately when they were writing the words rather (M=7.27, SD = 2.164) than speaking the spelling of the words (M=6.40, SD = 2.094), $t_{(29)} = 1.867$, $p < .05$. To determine the relationship between spelling and vocabulary ability, we conducted a correlational analysis and found a weak correlation between vocabulary and overall spelling ability, $r = .072$. When the analysis was conducted separately comparing vocabulary and oral spelling, there was virtually no correlation, $r = .021$. But when vocabulary ability was compared to written spelling ability, there was a weak correlation $r = .103$. Our second hypothesis which stated that there will be a relationship between spelling and vocabulary ability was weakly supported (see Appendices F).

Discussion

Based on our results we obtained in our study we have rejected our null hypothesis, and thus accepted our alternate hypothesis concerning our first hypothesis. Statistical significance was found, meaning that there was a significant difference in the

amount of accurate spellings of words when participants wrote or spoke the spellings. Participants spelled the list of ten words more accurately when they wrote the spelling of the words. As for our second hypothesis, we found a weak correlation between spelling and vocabulary ability when spelling ability is defined as either written and oral spelling or just written spelling. There was virtually no correlation between spoken spelling ability and vocabulary ability.

One experimental design deficit that could have affected our findings was using a within-subjects design rather than a between-subjects design. If a between-subjects design, only one list of words would have been needed. Then every participant would be spelling all the words in only one way; either orally or written. In this study the participants had to orally spell and write the spellings which could have led to fatigue or practice effects that may have affected the participants' spelling accuracy for the second list of words they spelled.

Another potential design flaw was the words used in the two lists. The two word lists, while similar, were not entirely equal in word length and structure. One list had a word that appeared in the past tense and therefore had a suffix. The word was "dismissed". Participants did not always have the "ed" suffix and instead spelled "dismiss". They did not misspell any other words on the second list because no word with a suffix was presented. This could mean that they are not necessarily spelling the word wrong, rather they were spelling the word that they thought they heard the experimenter state. Either the lists of words should not have differed in tenses or we should have ensured the participants clearly understood the word being presented to them before they spoke or wrote the spelling of the word. Because the two lists differed, the

participants' spelling performance could have differed not because of the oral or written spelling factor but because the words on the two separate lists differed in sound clarity.

A general change that could have made the collection of data and the analyses of data easier was to make fewer open-ended questions on the demographic questionnaire. The participants could fill in whatever answer they wanted for the question number seven on the questionnaire. This lead to multiple different answers meaning almost every participant answered differently. If the answers would have been set, participants would have had fewer options and the answers would have been more standard. There was also confusion of what to answer if the participant did not remember or know the answer to the question. If there were set answers, an option could have been "I do not know or I do not remember." Participants would have been less confused and entering data would have been simplified. We also learned after we analyzed our results that a content analysis would have eliminated this problem.

When analyzed separately, oral spelling virtually had no correlation to vocabulary ability, but written spelling revealed a weak correlation to vocabulary. We believe that this is because written spelling is more similar to the format of the vocabulary task. The vocabulary task consisted of five questions that were to be read and answered in a written fashion on a piece of paper by the participant. The participant also wrote the spelling of the words for the written spelling on a piece of paper sharing the written component with the vocabulary task.

If a later study conducted a more in depth vocabulary task, it might reveal a greater correlation between spelling and vocabulary ability. Our vocabulary task was very short and did not provide much of an opportunity for the participant to show broad

vocabulary knowledge. Perhaps if participants were tested more thoroughly on vocabulary knowledge, the test would better represent their vocabulary ability. A more accurate correlation between spelling and vocabulary ability could then be studied. A future study could detect more of true correlation and would not allow as much error in analyzing oral and written spelling ability due to some improvements that can be made. Our significant findings in our study may encourage other research that can be applied to areas of education in speech, spelling, and vocabulary. Spelling techniques will be more effective if we know what conditions affect spelling ability.

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Author Note

Jake Jadwin, Psychology Major; Sara Robards, Psychology Major, Lindenwood University.

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Any questions/concerns about our paper should be addressed to Jake Jadwin, undergraduate psychology student, Lindenwood University, St. Charles, MO 63301. E-mail jaj762@lionmail.lindenwood.edu or Sara Robards, undergraduate psychology student, Lindenwood University, St. Charles, MO 63301. E-mail: ser442@lionmail.lindenwood.edu.

Appendix A

Spelling/Vocabulary Questionnaire

SUBJECT ID NUMBER:_____(to be assigned by researcher)

1.) Are you MALE FEMALE?

For questions 2-4: On a scale from 1 to 5:
1 = Well below average
2 = Somewhat below average
3 = Average
4 = Somewhat above average
5 = Well above average

2.) How would you rate your overall spelling ability? 1 2 3 4 5

3.) How would you rate your ability to spell difficult words? 1 2 3 4 5

4.) How would you rate your desire to learn new words? 1 2 3 4 5

5.) How often do you play word games such as scrabble or crossword puzzles? Never Occasionally Often Always

6.) Have you ever participated in a spelling bee? Yes No

7.) If you have participated in a spelling bee:
What was the highest ranking you received? _____

What level was this particular spelling bee? (for example what grade were you and the others in?) _____

How many people were in the spelling bee? _____

Appendix B

List of words to be spelled

1. Because	1. Believe
2. Thoroughly	2. Tremendous
3. Accumulate	3. Appropriate
4. Spacious	4. Sufficient
5. Dismissed	5. Diameter
6. Mannequin	6. Memento
7. Consequence	7. Criticism
8. Instructor	8. Inference
9. Reconstruct	9. Referral
10. Structural	10. Sentimental

Appendix C

Vocabulary Task: Please circle the correct answer for each question

1. v. to cancel; to invalidate; to annul
    a. nullify
    b. chastise
    c. behoove
    d. implement

2. v. to annoy; to irritate; to wear away; to make sore by rubbing
    a. desecrate
    b. chafe
    c. aggrandize
    d. affiliate

3. v. to tempt; to torment
    a. innovate
    b. tantalize
    c. supplant
    d. abandon

4. v. to combine; to join; to confederate; to merge; to unite
    a. conjoin
    b. rout
    c. prate
    d. spurn

5. v. to make a journey; to migrate
    a. ruminate
    b. batten
    c. conjure
    d. trek

Adapted from http://www.english-test.net/gmat/vocabulary/words/004/gmat-test.php

Appendix D

Spelling Tips

1. Make it a rule to use the dictionary.

2. Keep a list of words that you misspell and study the words individually.
-Examine the word, say the word, spell it, write it, make connections to the word, Incorporate it in your vocabulary, and study it repeatedly.

3. Become an expert in the vocabulary of your major subject.

4. Be familiar with the spelling of common words and build upon them.

5. Learn spelling rules of the English language including, ie/ei combinations, prefixes, suffixes, plurals, and consonants etc.

For more information in detail go to http://puma.kvcc.edu/success/handouts/spelling/spelling.pdf

Borrowed Ideas from http://puma.kvcc.edu/success/handouts/spelling/spelling.pdf

Appendix E

Overall Spelling Ability

Participant's Response	Frequency of Response Among Participants
well above average	1
somewhat above average	17
average	9
somewhat below average	1
well below average	2

Ability to Spell Difficult Words

Participant's Response	Frequency of Response Among Participants
well above average	2
somewhat above average	4
average	16
somewhat below average	8
well below average	0

Desire to Learn New Words

Participant's Response	Frequency of Response Among Participants
well above average	1
somewhat above average	1
average	9
somewhat below average	11
well below average	8

Frequency of Playing Word Games

Participant's Response	Frequency of Response Among Participants
Never	11
Occasionally	17
Often	2

Appendix F

Have You Participated In A Spelling Bee

Participant's Response	Frequency of Response Among Participants
Yes	19
No	11

If You Participated, What Was Your Highest Rank

Participants Response	Frequency of Response Among Participants
First	1
Second	4
Third	1
Fourth	1
Fifth	2
Seven out of ten	1
Twenty out of Twenty-Three	1
Knocked after 1st round	1
Almost Last Place	1
Don't Know	3
Don't Remember	4
N/A	2

What Level Was the Spelling Bee

Participant's Response	Frequency of Response Among Participants
First Grade	2
Second Grade	2
Third Grade	2
Fourth Grade	4
Fourth and Fifth Grade	2
Fifth Grade	6
Grades 4-6	1
Grade School	1

N/A	1

Appendix G

How Many People Were in the Bee

Participant's Response	Frequency Of Response Among Participants
Six	1
Ten	2
Twenty	4
Twenty-Three	1
Twenty Through Twenty-Four	1
Twenty-Five	1
More or Less Than Twenty	2
More Than Twenty	1
Thirty	2
More Than Thirty	1
Seventy-One	1
The Whole Class	1
Don't Know	2
N/A	1

I Changed My Mind

Jodi Curtis and Adam Saito

Some might say that college is a time for people to find out what they want to do with the rest of their lives. Students select fields based on their interest, to study and further turn into a career. Some students become unsatisfied with their choice, or even find interest in another field. This leads to students making the decision to change their major and pursue another major. In this paper, it is hypothesized that due to exposure to different, required, general education classes of different fields, students change their majors. Data was collected from students enrolled in capstone classes, through their participation in filling out a questionnaire, and those who were asked to do a follow up interview to obtain further information. Results, though limited, showed that the hypothesis of the experiment was found to be true. Although there has been little investigation as to why students do chose to change their major previously, this paper, through experiment, explores the underlying factors that help influence a change in major after entering into college.

Some might say that college is a time for people to find out what they want to do with the rest of their lives. College students select a field of study to focus on which will in turn become their career. What happens when a college student decides that their choice of study is not what they want to do for a career? Most students would then change their major to something else, but what aids in the decision of making this change. Why do some college students change their major?

There is little research that has been conducted on the influences of students who change their majors. One study that gives some insight about the subject was done by Charles Malgwi, Martha Howe, and Priscilla Burnaby. In their research they were focused on why business majors chose that major, and while doing the research they came up with another question of why students change their majors. Malgwi, Howe and Burnaby (2005) predicted switching of majors to come from two possible reasons. One would be the fact that they were dissatisfied with their current one, the other one being that they have a high expectation for the new one. Also through this experiment it was identified that the three most common factors in being interest in the field, opportunities with a career, and compensation of that career. The main point is that positive factors are more important then negative ones.

The motive for finding the reasons students change their majors is beneficial to institutions everywhere. This will help universities assist students with discovering a passion that they enjoy and would like to have a career in. Not only will this help out the student population but the universities will be better in the sense that they have a dedication to helping students succeed.

The hypothesis of our research is that at Lindenwood University, the reason students change the major is because of the exposure to numerous different general education classes that are required. Influences from these various general education classes help to give students more insight into different fields. From these different fields of studies, students form better ideas about which career pathway they would like to take. There may be other influences as to why students change their major but, we predict that the choice is mainly based upon exposure to introductory (general education) courses.

Method

Participants

Participants were undergraduate students enrolled in two capstone classes from different fields of study here at Lindenwood University. There were 40 undergraduate students involved in the study. Fourteen of these participants were males, whilst twenty-six were females. The ages of the participants ranged from 20 to 43 years old, with a mean of 23 years old. The age that had that highest frequency was 21, with 35% of the participants. Out of the participants, 60% (24) of the participants replied that they were scheduled to graduate in May of 2008. The experiment was conducted by both a male and female researcher. Nineteen of the participants stated that they changed their major since entering college, and 21 answered that they did not change their major while enrolled in college. Out of the males, 8 reported that they had not changed their major, and 6 reported that they had. Out of the females, 13 answered that they had not changed their major and the remaining 13 had made a change to their major.

Materials

A survey was made for the use of obtaining data from the participants. The survey asks questions pertaining to their major and whether or not they have switched majors at any point during the duration of college. It also asks just a few personal questions, such as age and sex. Informed consent forms and feedback letters were also used and dispersed to every participant.

Procedure

We had to go to the classrooms of the capstone classes. We only went to the ones that the teacher had agreed to allow us to conduct our survey in their class. The survey

was handed out to every student in the class. A section of the survey asks if they would be willing to meet for a follow up interview, if they had indeed changed their major. The participants that had agreed were later contacted and scheduled to do an interview. Due to time restraints, we were unable to do face-to-face interviews with the participants. To fix this problem, we sent out our interview questions in an e-mail to those who had agreed to meet in person for the interview. In the interview e-mail, participants were asked questions as to the reasons why they changed their mind and the influences that helped in making their decision to change. Participants were also asked if they enjoyed their new area of study, if they regretted the change in majors, and if their choice was supported by their family or social network. There also was no compensation given from the researchers or teacher for participating in the survey or interview.

Results

Out of the 40 participants, only one replied in response to the further detailed interview. The participant that responded reported that initially they entered into college with an undecided major, but then discovered an interest in psychology, and later emphasized in developmental psychology due to an interest in working with children. The participant was influenced by both their advisor, who was a psychology professor and the introductory course into psychology. As for enjoyment in the area of study, the participant answered that they have always enjoyed it. The participant also noted that their decision to emphasize in developmental psychology was not supported by their mother, due to the mother's opinion that children are very difficult to work with, but the participant did note that they (the participant) had wished their emphasis was not in developmental but in clinical psychology.

Discussion

Although the initial proposal of this study was to find out the reasons and factors as to why most college students changed their major after entering into college, a few changes had to be made due to numerous factors. Participants of this experiment were all from capstone classes of designated fields of study; therefore one would assume that all participants are seniors. This being the seniors last year in college may have presented a problem with their ability to commit to doing a follow up interview, which would have further allowed us to properly conduct our experiment. Out of the 40 participants, only ten participants (who, on the questionnaire, answered that yes they had changed their major) said they were willing to participate in a follow up interview. Out of the ten participants that were willing to further participate, and were then contacted (via email, due to time constraints), only one participant responded. This left a definite dilemma. Because of the time in which the experiment was done (November) more towards the end of the semester, maybe the seniors were too busy to do a follow up interview. Those who answered yes and were willing to participate in a follow up interview, we believe, initially were willing to help out with the experiment, but later lost interest.

Although we could not obtain the data that we had hoped for, we both at one point had wanted to change our major (with one actually succeeding in doing so). For one researcher, Jodi Curtis, she entered as a bio-chemistry major. But after the stress of classes, and taking an introductory class of psychology, she made the change to psychology. Her choice was mainly influenced due to the fact that she was always interested in psychology, and the introductory class further sparked that interest. She did

receive support from her social networks also, and that helped to make the transition and choice much easier.

For researcher Adam Saito, although he remained with his initial major, psychology, after an introductory class in sociology, he wanted to change his major. Because he was already a junior in college, he did not make the decision to change, and still wishes that he had.

If the experiment were or should be conducted again, a few things would need to be implemented in hopes of obtaining better results. For better participation, which was the major problem of the experiment, introducing a reward (compensation) for participation in the study may persuade more participants to actually respond and further participate. Also, a longer time period to conduct the experiment might be better (a few months compared to a few weeks), and would yield more time to acquire more participants to obtain data.

Through the little data obtained, it can be concluded that yes many college students change their majors, and it can be attributed to their enrollment in various introductory classes that further help them to gain interest in certain fields of interest. If time had permitted for further investigation, results may have been different.

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Author Note

Jodi Curtis, Department of Psychology of Lindenwood University

Thanks to all professors who allowed us to conduct our experiments with in their designated classes rooms, during their class time. All research was overseen by Dr. Nohara-LeClair. All initial reviews were done by members of PSY404 (research methods). For additional information on or about the study please contact:

Jodi Curtis at yeahproject2@hotmail.com and or Adam Saito at saito037@hotmail.com, or Dr. Nohara-LeClair at mnoharaleclair@lindenwood.edu.

Appendix A

Questionnaire

SUBEJCT ID NUMBER: _____ (Assigned by Researcher)

1) Are you: Male Female

2) What is your age?
_____

3) When do you plan on graduating? _____

4) Since entering college have you changed your major?

YES (If you select yes, go to 5a)

NO (If you select no, go to 5b)

5a) If you answered **YES** to number 4, please state all the majors you have elected in the order you declared them.

_____
_____

5b) If you answered **NO** to question number 4, state your major.

_____

6) Would you be willing to participate in a 15 minute interview about why you changed or did not change your major? YES_____
NO _____
MAYBE_____

If you checked off YES or MAYBE, please leave your contact information below.
Name: Phone: E-mail:

If you agree to meet for an interview your survey answers will be associated with your interview responses and therefore you will not remain anonymous. Please sign below if you consent to be identifiable only to the researchers for the purpose of matching your survey answers with interview responses.

_____ _____

Participant Signature **Date**

Appendix B

Interview Questions

1.) Why did you decide to (or not to) change your major?

2) What was your choice influenced by? (e.g. After taking a specific class?)

3) Do you enjoy your area of study now more than you did before?

4) Was your choice supported by your family and social network?

5) Do you regret the change (or not making a change)? Why or why not?

Appendix C

Male or Female

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	14	35.0	35.0	35.0
	female	26	65.0	65.0	100.0
	Total	40	100.0	100.0	

Age of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20.00	1	2.5	2.5	2.5
	21.00	14	35.0	35.0	37.5
	22.00	12	30.0	30.0	67.5
	23.00	4	10.0	10.0	77.5
	24.00	2	5.0	5.0	82.5
	25.00	3	7.5	7.5	90.0
	26.00	2	5.0	5.0	95.0
	30.00	1	2.5	2.5	97.5
	43.00	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

Whether there was a change in major or not

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	19	47.5	47.5	47.5
	no	21	52.5	52.5	100.0
	Total	40	100.0	100.0	

Date of graduation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	December 2007	6	15.0	15.0	15.0
	December 2008	3	7.5	7.5	22.5
	December 2009	1	2.5	2.5	25.0
	May 2007	1	2.5	2.5	27.5
	May 2008	24	60.0	60.0	87.5
	May 2009	5	12.5	12.5	100.0
	Total	40	100.0	100.0	

Why Do You Come to LU?

Sara Hawkins and Amanda Schmidt

The purpose of this study was to examine the reasons that people attend and continue to attend Lindenwood University. We examined 129 surveys completed by current Lindenwood University students. The survey asked a variety of questions, including demographic data, resident/commuter status, and what the student likes/dislikes about Lindenwood. There were two hypotheses for this study. Our first hypothesis was that commuter students would attend class more often than resident students. Our second hypothesis was that scholarships/funding was the top reason that students chose to come to Lindenwood. While our second hypothesis did yield statistical significance, our first one did not. Implications of these findings are discussed.

With the job market currently being so competitive, more and more people are realizing that a college degree is necessary to land the job of their dreams. There are many reasons that people choose to pursue a degree, but why do they choose the schools they do? Specifically, why choose Lindenwood University? We were very curious to see why students choose to come here and why they continue to return. We were also interested in finding out if there were a difference between class attendance and student status (resident or commuter). Our first hypothesis is that commuter students will miss fewer classes than resident students because the reasons for attending college differ. Since commuter students often have less funding, they have to pay more of their own tuition than resident students do. For this reason, the motivation is higher for commuter students to attend their classes.

Rogers (2006) discusses a study done to improve enrollment at a university in Ohio. This study could be very relevant to colleges and universities around the country. Seeing what worked for one school can inspire administrators about changes that need to be made at their school, particularly Lindenwood University. The results of our study could prompt administrators to examine the current problems here and change them to raise students' levels of satisfaction.

Graham and Kummer (2006) point out that rising costs of traditional, four-year universities has caused many students to opt for a less expensive community college or technical school. In their article, Graham and Kummer found that the percentage of students planning to attend community college had risen significantly in many areas. For example, in South Jersey, the number of students planning to attend community college rose 8 percentage points. At Edison/Fareira school in Philadelphia, the number of students planning to attend a community college rose from 32 percent in 2001 to 70 percent in 2002. Community college is more acceptable and has less stigma attached than in the past. These schools used to be considered "junior colleges" and somehow less adequate than traditional universities. However, the low price of these institutions makes them very tempting for students who cannot afford an expensive education.

Rowan-Kenyon (2007) discusses the importance of one's socioeconomic status. Often, not having the money is an excellent reason no to attend colleges. However, often students from low socioeconomic backgrounds tend to receive large grants and scholarships due to their inability to pay. This can impact the financial aid that other students receive, which can impact the choice to attend college.

International students also have a large impact on our schools. Roach (2007) talks at length about the importance of international students and the possibility of ensuring that all receive a proper education. Since Lindenwood hosts so many international students, this would affect them. One reason that Lindenwood has so many international students is that they are willing to pay for the student's entire tuition in most cases.

This article supports our second hypothesis. Our hypothesis is that the top reason that students attend Lindenwood is the funding or scholarships that they receive. For many students, Lindenwood grants huge scholarships and it makes it easier on students who would not be able to afford another, more expensive area school, such as St. Louis University. A person who receives a full scholarship to a school will often choose that school simply because they can't afford other schools. We hypothesize that this is the case for many Lindenwood students, especially students who reside on campus. For commuter students, we believe that the top reason for attending Lindenwood is the location of the university. Many people grew up in St. Charles, and Lindenwood is a very short commute for many people in the St. Louis area. With the price of gas soaring to unheard of amounts, a short commute is very important for many people.

However, as much as scholarships help, they do not fix the financial problems that many students have while in college. Schworm (2007) states that free tuition is not the only solution to this problem. This statement was made in response to a Massachusetts proposal to provide free education for all students attending a community college. This is a novel concept, but could it really work? Even if this proposal were passed, Schworm points out that there are other things to consider.

There are other financial factors aside from tuition that many college students struggle with everyday, especially commuter students. Students must not only raise the money for tuition, they also must pay for books, food, and rent. For students struggling on a low budget, this can be very difficult. Although the idea of free tuition for all students is appealing, it will not fix these other problems that need to be addressed. The price of textbooks needs to be lowered, and apartment buildings can offer student discounts for full-time students. These small adjustments can make a huge difference in the life of the student who is struggling to pay the bills and attend school.

We decided to study the questions we had by administering a survey to Lindenwood student. We recruited people through the use of flier and the Human Subject Pool (HSP). We also administered the survey to random classes on campus. The survey focused on two topics: why did you come to Lindenwood, and how is your class attendance? We also collected demographic data including age, sex, status (commuter or resident) and how long they had been attending Lindenwood. We were interested in finding out if our hypothesis could be supported or not.

Method

Participants

One hundred and fifty-four participants took part in our study, and all of our participants were current Lindenwood students. Students that were recruited through the Human Subject Pool were given extra credit, and the non-HSP students were given small bags of candy as compensation. We had to discard data from 31 participants because they did not state whether they were commuters or residents. 23 freshmen, 23 sophomores, 43 juniors, and 33 seniors took part in this study. We had 43 males and 80 females. The age

of the participants ranged from 18 to 34 years, with a mean of 21.11. 83 participants were from the United States and 16 were international students. The top area of origin of the participants was Missouri, with 43 participants reporting origination there. The GPA of our participants ranged from 2.00 to 4.00, with a mean of 3.69. The top two majors reported by participants was biology with 17 participants and psychology with 28 participants. We had 36 commuter students, 87 resident students, 92 full-time students, 4 part-time students, and 75 undergraduate students. The number of semesters the participants attended LU ranged from 0-11, with a mean of 3.38 and a mode of 1. The number of hours worked by our participants ranged from 0-60, with a mean of 16.16 and a mode of 0. The number of credits the participants are currently taking ranged from 6-20, with a mean of 15.01 and a mode of 15.

Materials

For this study, we used a variety of materials. We used all the necessary HSP paperwork, including a list of participants, experiment description, participant receipts, and sign-up sheets. We also used informed consent letters, instructions (see Appendix A), feedback letters, copies of the survey (see Appendix B), pens, pencils, desks, chairs, and bags of candy for non-HSP participants. We used a variety of classrooms. All but one of the classrooms was in Young Hall; the other was in Roemer Hall. All of the classrooms had enough desks for all of the participants, adequate lighting, and a large table on which we organized our materials.

Procedure

For this study, we collected data in two different settings, meaning that we had two different procedures. For the first procedure, we collected data from participants

using the HSP (human subject pool). We first posted a description of our experiment and a sign-up sheet on the HSP board. We used a classroom in Young Hall that had about 30 desks with chairs, a table with two chairs, and adequate lighting. As the participants came in, we had them sign their name on the list of participants and take two copies of the informed consent letter, a copy of the instructions, the survey, and a participant receipt. Once they had completed the survey, we looked over their receipt to be sure it was correctly filled out. We took the survey and one copy of their signed informed consent letter and gave them a feedback letter. Once they had the feedback letter and their receipt, they were thanked for their time and told that they were free to leave.

For the second procedure, we went to different classes and, with the instructor's permission, administered our survey to these classes. All participants were told that this was completely optional and that their participation would in no way affect their grade for the class. All the classrooms used in this procedure had adequate lighting, enough desks and chairs for all participants, and a table for us to organize our things on. Since these participants were not recruited through the HSP, we did not use any HSP paperwork in this procedure. We handed out the surveys, instructions, and two copies of the informed consent form to all participants. The participants were given as much time needed to complete their surveys. As they handed in their surveys and one copy of their informed consent form, they were given a feedback letter and a small bag of candy as compensation for their time. Once all the participants had finished and received their feedback letter and candy, we thanked the class and instructor for their time and exited the class.

Results

The results of the experiment did not turn out the way we had hoped. Our first hypothesis was that resident students would miss a higher amount of classes than commuter students. The results that we found concluded that there was no significant difference between the amounts of classes missed in the two groups. We conducted an independent t-test to determine this. The results of our independent t-test were t (119) =.685, p>.05 ns. We were unable to reject the null hypothesis.

Our second hypothesis was that most often the reason for students attending Lindenwood University would be a scholarship that the student received from the school. For this hypothesis we conducted a chi-square analysis. Through this analysis we were able to conclude that there was a statistical significance for scholarships over other reasons for attending Lindenwood University. The results were chi-square= 20.489, p<.05. We were able to reject the null hypothesis.

The number of classes missed each semester ranged from 0-20, with a mean of 2.89 and a mode of 3. For type of class most likely missed, 68 participants reported missing GE classes, 5 reported missing classes required for their major, and 36 reported missing elective classes. The top two reasons reported for missing class were oversleeping, with a total of 5 participants, and being sick, with a total of 13 participants. Many participants reported being sick or oversleeping as part of the answer, but the top results were only oversleeping or only being sick. The top reason that participants reported coming to LU was scholarships/funding, with a total of 78 participants. 25 participants reported location as their main reason, 5 participants reported outside influences as their reasons, and 14 participants reported some other reason for attending.

To further elaborate this question, we also asked the participants to explain their answer to the question. The top two reasons listed were that they were given a good scholarship and/or that it was close to home. Since there were such a variety of answers, it was difficult to pinpoint exact numbers, but the top two reasons that participants continue to attend LU were that it is close to their homes, and that they're almost done, or about to graduate. The top two things that participants like about LU were its location and its small classes/campus size. The top responses to what the participants dislike about LU were the rules, the food, the parking, and the visitation policy. The top things that the participants would change about LU were the rules, the food, and the visitation policy.

Discussion

While conducting this experiment we came across several issues that could have had an effect on the outcome of the study. One of these issues was the question about the participants' country and area of origin. This question was not on the original survey (see appendix), but it was later added on as a result of having many international students take the original survey. Not knowing where some of the first participants lived may affect the answers that they gave. Being an international student may be a bigger motivator for those that are residents because they have more to lose if they do not do well in school. Since we do not know exactly how many of the residential students were foreign, we cannot tell for sure why there was no statistical significance found between the two groups.

Another issue that could have affected our results was that one of the questions referred back to a previous question and on some of the surveys it asked the participant to refer back to the wrong question. We tried to catch the error before the participants

answered the question, but we were not able to change all of them. This could have affected the results because we were not able to include those answers that referred to the wrong question. This may have skewed the results by not having all of the data from each participant.

If we were to conduct this experiment again we would get permission to view attendance and GPA records of the participants. Since the number of classes that each participant misses each semester and their GPA were both self-reported, there was no way to ensure accuracy of unless we looked up the official records of them. If these numbers were not correct it would greatly affect the results since that was one of the main things that we were looking for. We would also change the other before mentioned problems that we encountered during the experiment in order to improve the accuracy of the results of any future experiments like this one.

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Appendix A

Instructions

You will now be asked to complete a survey about Lindenwood University.

You will complete a survey regarding your attendance and status at Lindenwood University. Please answer all questions as honestly as possibly. Your answers and information will be kept completely confidential. Your answers and time are very valuable to us. Once you complete your survey, you will be compensated for your time.

Thank you for your time.

Appendix B

Why Do You Come to LU?

1. What is your class status?

   Freshman Sophomore Junior Senior

2. Age_____

3. Sex_____

4. What is your country of origin? _____

5. What area of that country are you from? (State, city, province, etc.)

   _____

   _____

6. overall GPA at LU_____

7. Major(s)_____

8. What type of student are you? (please circle all that apply)

Commuter Resident Full-time Part-time

   LCIE Graduate Undergraduate

9. How many semesters have you attended (including this semester) at Lindenwood University?_____

10. How many hours per week do you work (if you do not work, please write 0)?

    _____

11. How many credits are you currently taking?_____

12. On average, how many sessions of each class do you miss per semester?

    _____

13. Which type of class are you more likely to miss?

General ed. Required for major elective

14. What is most often your reason for missing class?

_____

_____

15. What made you choose to come to Lindenwood University? (circle all that apply)

Scholarship convenience/location outside influence educational reasons

Other

16. Please explain your answer to question 15. _____

_____

_____

17. Why do you stay at Lindenwood University?

_____

_____

18. Is your reason for coming here still a factor in your staying here?

19. What do you like/dislike about LU? (please give at least one of each)

20. If given the opportunity, what would you change about LU?