Journal of
Psychological Inquiry

Volume 21 Number 2 2016

Journal Contents

Articles

Special Features – Conducting Psychological Analysis: Dramatic

Call For Papers

From the Editor's Desk

Another fall, another school year, and another edition of JPI! We've had a busy summer reviewing manuscripts and working with our editors. To highlight our busy summer, we want to address some of the changes that have occurred:

1. Our graduate assistant, LaNaya Anderson, has moved on this summer to complete her Ph.D. at Bowling Green State University in clinical psychology. Many of you have worked with LaNaya over the past couple of years and you know that she will be sorely missed. Jenn and I want to thank LaNaya for all she has done for JPI and us!
2. With change comes opportunity and we would like to welcome LaNaya's replacement and newest member of our team, Faith Burdine. Faith will be working as our graduate assistant while she completes her Master's degree in clinical psychology. We know you will give her a warm welcome when you see her out on the road at conferences this fall and spring.
3. Several of our Associate Editors have also moved on this summer. We formally say goodbye to Elizabeth Nelson, Fred Sanborn, Joshua Tanguay, and Janett Naylor-Tincknell. While they each will stay on as the occasional reviewer, we want to formally thank and acknowledge their contributions to JPI over the last several years.
4. Despite the loss of the aforementioned outstanding Associate Editors, we have the pleasure in this edition of introducing several new ones. Please join us in welcoming the following individuals to the role of Associate Editor:
    - Chelsea Arndt, Fort Hays State University
    - Mark Chu, Western New Mexico University
    - Drew Curtis, Angelo State University
    - Thomas Faulkenberry, Tarleton State University
    - Tay Hack, Angelo State University
    - Holly Thomas, Bethany College

As you can see, there is a lot going on at JPI!

Finally, as we do in every issue, we want to draw your attention to one of the unique features of JPI, The Elizabeth A. Dahl, Ph.D., Award for Excellence in Undergraduate Research. This award recognizes one article which is deemed to distinguish itself in undergraduate research in each issue. The award was created to celebrate the distinguished contributions of Dr. Dahl, who for 25 years as faculty member and chair of the Psychology Department at Creighton University, challenged, guided, and supported numerous undergraduate students in the design and execution of research, and the scholarly communication of results.

Good luck to all on a productive and enjoyable academic year . We can't wait to see everyone at conferences this year and to see what you've been producing!

Best regards,

Jenn Bonds-Raacke and John Raacke

Managing Editors

Acknowledgement: Reviewers and Special Associate Editors

The following individuals reviewed manuscripts for this volume of the *Journal of Psychological Inquiry*. We gratefully acknowledge their valuable contributions to the journal.

Patrick Ament, Ph.D. (University of Central Missouri)

Christopher Barlett, Ph.D. (Gettysburg College)

Jennifer Bonds-Raacke, Ph.D. (Fort Hays State University)

Alicia Briganti, Ph.D. (Dalton State College)

Frank Ferraro, Ph.D. (Nebraska Wesleyan University)

Wind Goodfriend, Ph.D. (Buena Vista University)

William Trey Hill, Ph.D. (Fort Hays State University)

Jisook April Park, Ph.D. (Fort Hays State University)

Fred Sanborn, Ph.D. (North Carolina Wesleyan College)

Chelsea Schnabelrauch Arndt, Ph.D. (Kansas State University)

Tammy Sonnentag, Ph.D. (Kansas State University)

Josh Tanguay, M.S. (Fort Hays State University)

Susan Tucker, Ph.D. (Missouri Southern State University)

Taylor Wadian, M.A. (Kansas State University)

Theresa Wadkins, Ph.D. (University of Nebraska at Kearney)

Acknowledgement: Institutions & Organizations

The following institutions and organizations contributed financially to pay for the operating expenses of the *Journal of Psychological Inquiry*. We gratefully acknowledge their valuable support of the journal.

Benedictine College
Buena Vista University
Creighton University
Evangel University
Fort Hays State University
Kansas Wesleyan University
Missouri State University
Missouri Western State University
Nebraska Wesleyan University
Rockhurst University
University of Nebraska, Kearney

Association for Psychological and Educational Research in Kansas

Nebraska Psychological Society

Cover:

Logo: The creation of the graphic for the logo came about by thinking of how ideas are formed and what the process would look like if we could see into our brains. The sphere represents the brain, and the grey matter inside consists of all the thoughts in various stages of development. And finally, the white spotlight is one idea that formed into a reality to voice. The entire logo is an example of creation in the earliest stages.

Cathy Solarana, Graphic Designer

Cover Design: The overall design was influenced by many aspects of psychology. Much of the inspiration was developed through the use of the iconic symbol for psychology as well as the beauty of psychology in its own right.

Brittney Funk, Graphic Designer

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 6—14

Elizabeth A. Dahl, Ph.D., Award for Excellence in Undergraduate Research

Does the Mere Expectation of a Cellphone Call Occupy Working Memory?

Amy E. Hufstedler and Kenith V. Sobel *
University of Central Arkansas

Abstract—There is extensive evidence that cognitive deficits will occur when one is actively using a cellphone while trying to divide their attention, particularly for individuals considered to be dependent on their cellphones. We wondered if the mere anticipation of an incoming phone call would cause similar impairment. To assess this, we implemented a visual search task (known to test and measure working memory) to determine if deficits in cognition can be seen even if a participant is not actively using their phone. Students from the University of Central Arkansas performed a number search task twice; once with no cellphone and a second time with a cellphone present, anticipating a phone call. We predicted the anticipation would cause reaction times, as well as error rates, on the task to increase in cellphone dependent participants. Although there were no effects on reaction times and no indication cellphone dependency affected performance, the results revealed anticipating a call significantly affects participants' accuracy.

Keywords: cellphone dependency, attention, memory, accuracy, number search task

Most people today, particularly young adults, use cellphones; as of December, 2014 there were more wireless connections (355 million) than people (just over 320 million) in the United States (Bergmann, 2015). People are not only using cellphones to stay in touch with family and friends, but also to play games, check the time and weather, send emails, and hundreds of other functions for everyday use. With all of these uses, people have come to depend on their cellphones to the extent that they often interfere with life in the "real" world, causing distraction in occupational, social, and educational settings (Lepp, Barkley, & Karpinski, 2014). Carrying on a conversation on a cellphone can distract from other activities requiring mental processing such as driving a car (Boiteau, Malone, Peters, & Almor, 2014; Strayer & Johnston, 2001). Among the 1,506 hospitalizations attributed to cellphone distraction in 2010 was a 14 year old boy treated for a chest contusion after he walked off a bridge while focused on his cellphone (Nasar & Troyer, 2013). Because people commonly carry their phones with them at all times, we wondered if the mere *expectation* of an incoming call or text message could distract from other mental processing, and whether the effect of expectation is more acute for people more dependent on their cellphones. If the expectation of a call is sufficient to cause distraction, then many of the people around us who appear to be engaged in a mentally taxing activity may in fact have part of their minds focused elsewhere, specifically on the anticipation of an incoming phone call or text message.

Given the prevalence of cellphones and their apparent importance in daily life worldwide, the question of the effects of cellphone dependency has gained global interest. In this spirit, many scales and surveys have been developed to assess cellphone dependency, overuse, and addiction (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Kawasaki et al., 2006; Merlo, Stone & Bibbey, 2013; Toda, Monden, Kubo, & Morimoto, 2004; Walsh, White, & Young, 2010). Cellphones

*Kenith V. Sobel served as Faculty Sponsors.

are far more distracting to individuals who are dependent on them (Merlo et al., 2013), and distraction is detrimental to many cognitive functions, including working memory (Yoon, Curtis, & D'Esposito, 2006). Many daily situations require the use of working memory, which is essential to the ability to maintain and process information.

People use working memory in many mental tasks throughout the day, such as following steps in a recipe or mentally solving a math problem (Cowan, 2008). The ability to maintain information in working memory can be affected by many things, including emotional states (Krause-Utz et al., 2012) and auditory stimuli (Hughes, Hurlstone, Marsh, Vachon, & Jones, 2013). The power working memory has over distraction and multitasking can vary with the level of task demand and strength of the distractor (Berti, Roeber, & Schröger, 2004; Berti & Schröger, 2003). Cellphones would be a strong distractor, given the levels of dependence reported. Many studies have explored the effects cellphone dependency and use can have on driving ability (Strayer & Johnston, 2001), situational awareness (Nasar & Troyer, 2013), relationships (Przybylski & Weinstein, 2012), anxiety, school performance, and even overall life satisfaction (Lepp et al., 2014). Though the effects of actually using a cellphone are well documented, no studies have investigated whether the mere expectation of an incoming call can occupy working memory, thereby interfering with performance on other tasks requiring mental processing. This could have serious implications for how the mere presence of a cellphone in one's pocket can undermine the operation of working memory and other higher cognitive functions when they are needed most, such as in educational and occupational settings. This study sought to expose the effect of cellphone anticipation on working memory functioning, by determining whether participants would perform more slowly and make more errors while they were anticipating a phone call.

We asked college-aged students to perform two intervals of a task requiring working memory and then to complete a survey designed to measure dependency on cellphones. To test the effect of cellphone anticipation on working memory, the participant's cellphone was located in the experiment room during one interval of the working memory task and removed from the room during the other interval. Furthermore, during the cellphone-present interval, the experimenter told the participant she would call the participant's cellphone at a randomly determined time, and the participant should answer the call as quickly as possible. Because this design entails two different intervals in time, we needed to consider order effects.

The first interval could promote either practice or fatigue (Mackworth, 1948), so even without our manipulation participants might be significantly more or less proficient at the working memory task during the second interval than the first. To neutralize order effects, ideally we would counterbalance the order so half of the participants would do the cellphone-present interval first and cellphone-absent interval second, and vice versa for the other half of participants. We also wanted to expose each participant to the same number of trials in both intervals, so in the cellphone-present condition we wanted to interrupt participants with a phone call only after they had executed as many trials as there were in the cellphone-absent condition. However, because we expected different participants to carry out the experiment at different rates, we couldn't know when to interrupt participants in the cellphone-present condition until *after* they provided a baseline time by carrying out the cellphone-absent condition. This constrained us to expose all participants to the cellphone-absent condition first and the cellphone-present condition second. We expected the participant's cellphones to distract them in the cellphone-present interval so they should have longer response times and make more errors than in the cellphone-absent condition. As mentioned above, any detriment in performance in the cellphone-present interval could be attributed to either the presence of a cellphone or to fatigue. Fortunately, order effects in visual search tasks such as the one we used typically reflect practice rather than fatigue (Menneer, Cave, & Donnelly, 2009; Menneer et al., 2012), so without our manipulation participants should be more

proficient (faster responses and fewer errors) during the second (cellphone-present) interval than during the first (cellphone-absent) interval. If instead participants proved to be less proficient during the second interval, this would support our hypothesis that the mere anticipation of a cellphone call is distracting. Our hypotheses were as follows:

a. Response times will be longer and error rates will be higher in the cellphone-present interval compared to the cellphone-absent interval.
b. Differences between conditions will increase with cellphone dependency scores.

Method

Participants

The study was approved by the University of Central Arkansas Institutional Review Board prior to recruitment, and all participants were treated in accordance with the guidelines described by the APA. A total of 36 undergraduate students (29 female) between the ages of 18 and 25 (mean = 20.1) volunteered for the experiment in exchange for course credit. All participants reported having normal or corrected-to-normal vision.

Materials

The primary method of data collection was a computer-based visual search task, previously shown to rely on working memory (Sobel, Puri, & Hogan, 2015). In each trial, participants searched for a single target digit from among several non-target (i.e., distractor) digits. Each search display contained one of two target digits (3 or 8) and four sets of two distractor digits (5 and 6) for a total of nine items (one target and eight distractors) arranged on an imaginary circle. Figure 1 depicts a search display containing one target digit 3 and four sets of the distractor digits 5 and 6. At the beginning of each trial, the search display appeared on the computer monitor and remained visible until the participant made a response by pressing one of two keys on the keyboard. Participants were asked to press the '/' key to report the target appeared on the right side of the display and the 'z' key to report it appeared on the left side of the display. The fixation mark is situated in the center of the circular array; so in Figure 1, the target (the digit 3) is on the left side of the display. The computer measured and recorded the time between the onset of the search display and the keypress for each trial. Response times from error trials (e.g., the target appeared on the left side of the display but the participant pressed the key associated with the right side of the display) were excluded from analysis, but the number of errors during each interval was

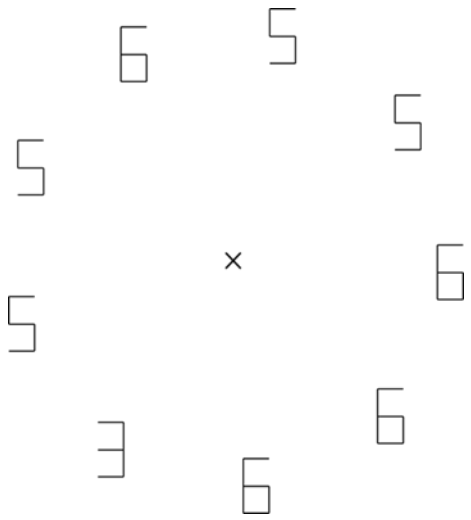

Figure 1. A sample display from the visual search task.

recorded. In each of the two cellphone anticipation conditions (absent and present), participants completed 25 replications with each target digit (3 or 8) and target location (left side or right side) for a total of 100 trials (= 25 x 2 x 2), lasting approximately 10 minutes in each condition.

After completing both intervals of the visual search task, participants completed the Mobile Phone Dependency Questionnaire developed by Toda et al. (2004) and revised by Kawasaki et al. (2006). We further revised the questionnaire to better adapt its items to a modern American audience. For example, we replaced the word "train" with the word "car" and "email" with "text." As can be seen from the set of questions contained in the Appendix, participants provided responses on a Likert Scale with values ranging from 1 to 5. The sum of all answers to the survey's 20 questions represented the level of cellphone dependence.

Procedure

When participants signed up for the experiment, they were asked to bring their cellphones with them to the appointment. After arriving at the lab, they were asked to give their cellphone to the experimenter, who held it for them in a sealed envelope while seated just outside the experiment room. They were additionally asked for their cellphone number and were assured it would not be saved or shared outside of the context of the experiment.

Participants then completed two intervals of the visual search task. In the first interval, there was no cellphone in the testing area. After completing 100 trials, the computer program paused and instructed the participants to alert the experimenter. The experimenter then informed participants they would be performing the same task again, only this time they would be receiving a phone call from the experimenter to the number provided. Participants were given their cellphones from the envelope and were directed to answer the phone call as quickly as possible. As mentioned previously, we wanted to expose participants to the same number of trials in the cellphone-present condition as the cellphone-absent condition. One way to guarantee both conditions had the same number of trials would be to deceive participants by telling them the experimenter would call during the cellphone-present condition when in fact the program would just quit after the necessary number of trials. Because participants were undergraduate students primarily within the Psychology and Counseling department, we believed some participants might discuss the experiment with friends even though the debriefing urged them not to do so, thereby eliminating the sense of anticipation for participants who had been warned of the deception. To avoid deception the experimenter measured the time required to complete the first interval, then waited that duration before dialing the telephone during the second interval. All participants carried out more trials in the cellphone-present condition than the cellphone-absent condition, indicating the experimenter never called any participants prematurely. For the cellphone-absent condition, the results from only the first 100 trials were analyzed. Participants were asked if they happened to receive any phone calls prior to the experimenter's call, and all participants indicated they had not. After the second interval, participants completed the Mobile Phone Dependency Questionnaire, then were provided with a debriefing form and invited to ask any questions.

Results

We conducted two analyses of variance with interval as a within-subjects factor and dependency as a covariate. The analysis of response times did not support either of our hypotheses because response times were not significantly different in the cellphone-present interval (M = 936, SD = 175) than the cellphone-absent interval (M = 1023, SD = 194), p = .526, and the interval x dependency interaction was not significant, p = .908. The analysis of error rates provided some support for our first hypothesis because error rates were significantly higher during the cellphone-present interval (M = 7.83, SD = 6.21) than during the cellphone-absent interval (M = 5.89, SD = 4.79), F = 5.12, MSE = 25.49, p = .02 9, but not the second hypothesis because the interaction between interval and dependency was not significant, p = .09.

Discussion

Anticipation of a cellphone call did not slow responses, but it did induce more errors compared to the absence of anticipation. Cellphone dependency did not seem to have an effect on either response times or error rates. This is the first empirical evidence of cognitive deficits being caused by the mere anticipation of a phone call, without actually requiring the participant to use the phone while performing a task. Although the results of the experiment revealed cellphone anticipation did not appear to affect the *speed* of participants' working memory, it did affect accuracy. This implies that even when people are not actively using their cellphones, the mere anticipation of a call can impair the accuracy of cognitive tasks. Also, the fact that accuracy was impaired, while speed was not, has serious implications on its own. Even if anticipating a phone call does not slow mental functioning, anticipation does cause more mistakes, which might mask the effect of anticipation. That is, when anticipating a phone call, people perform mental activities just as quickly as when not anticipating a phone call so they may fail to notice any effect of anticipation; while in fact, the anticipation may be causing more errors. This could explain why students bring their phones to class without expecting they may interfere with their concentration.

It is also worth noting the accuracy deficits were occurring with no significant relationship to how dependent a participant was on his or her cellphone. This could imply that regardless of whether or not one considers themselves dependent on a cellphone, having it present while anticipating its use will cause deficits to occur. This generalizes the results beyond individuals who are considered technology-obsessed, to anyone with a cellphone.

There were limitations to this study, which did not allow for optimal methodology. This study was conducted on a college campus with participants who were exclusively undergraduate students. This somewhat narrow age range may not provide an accurate representation of cellphone use among the total population of cellphone users. Older adults, or younger adolescents, might not be accustomed to the multitasking cellular phones demand, and therefore might have had different results. A broader age range and background for participants would also provide more generalizable data. An additional concern was the aforementioned lack of counterbalancing and how both practice and fatigue effects may have influenced the scores during the second set of trials. Subsequent studies could assess whether counterbalancing the conditions might yield different results.

Future research on the subject of cellphone anticipation could investigate cognitive functions other than working memory. For example, other tests not involving visual search could be used like reading comprehension, mathematical problems, verbal skills, or even games such as Tetris. It is very possible this effect can cause deficits regardless of what one may be trying to do. Also, subsequent studies could see if the same effect exists when participants are in a more natural setting, such as a classroom or work environment, to better simulate these real life situations we all face.

Given the dependency modern society has developed on cellphones, the growing body of research on the effects they have on our functioning is becoming increasingly important. As cellphones are used for more and more daily functions to make life easier, we must gather more empirical evidence regarding how they might be impairing other areas. This paper has addressed one such area, however, there are many more yet to be explored.

References

Bergmann, S. (2015). *Mobile wireless competition: The proof is in the numbers.* Retrieved from http://www.ctialatest.org/2015/07/14/mobile-wireless-competition-the-proof-is-in-the-numbers/

Berti, S., Roeber, U., & Schröger, E. (2004). Bottom-up influences on working memory: Behavioral and electrophysiological distraction varies with distractor strength. *Experimental Psychology, 51*(4), 249–257. doi:

10.1027/1618-3169.51.4.249

Berti, S., & Schröger, E. (2003). Working memory controls involuntary attention switching: Evidence from an auditory distraction paradigm. *European Journal of Neuroscience, 17*(5), 1119–1122. doi: 10.1046/j.1460-9568.2003.02527.x

Boiteau, T. W., Malone, P. S., Peters, S. A., & Almor, A. (2014). Interference between conversation and a concurrent visuomotor task. *Journal of Experimental Psychology: General, 143*, 295–311. doi: 10.1037/a0031858

Cowan, N. (2008). What are the differences between long-term, short-term, and working memory? *Progress in Brain Research, 169*, 323-338. doi:10.1016/S0079-6123(07)00020-9

Hughes, R. W., Hurlstone, M. J., Marsh, J. E., Vachon, F., & Jones, D. M. (2013). Cognitive control of auditory distraction: Impact of task difficulty, foreknowledge, and working memory capacity supports duplex-mechanism account. *Journal of Experimental Psychology: Human Perception and Performance, 39*(2), 539–553. doi: 10.1037/a0029064

Jenaro, C., Flores, N., Gómez-Vela, M., González-Gil, F., & Caballo, C. (2007). Problematic internet and cell-phone use: Psychological behavioral, and health correlates. *Addiction Research & Theory, 15*, 309–320. doi:10.1080/16066350701350247

Kawasaki, N., Tanei, S., Ogata, F., Burapadaja, S., Loetkham, C., Nakamura, T., & Tanada, S. (2006). Survey on cellular phone usage on students in Thailand. *Journal of Physiological Anthropology, 25*, 377–382. doi:10.2114/jpa2.25.377

Krause-Utz, A., Oei, N. Y. L., Niedtfeld, I., Bohus, M., Spinhoven, P., Schmahl, C., & Elzinga, B. M. (2012). Influence of emotional distraction on working memory performance in borderline personality disorder. *Psychological Medicine, 42*(10), 2181-2192. doi: /10.1017/S0033291712000153

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014). The relationship between cellphone use, academic performance, anxiety, and satisfaction with life in college students. *Computers in Human Behavior, 31*, 343–350. doi: 10.1016/j.chb.2013.10.049

Mackworth, N. H. (1948). The breakdown of vigilance during prolonged visual search. *Quarterly Journal of Experimental Psychology, 1*(1), 6-21. doi: 10.1080/17470214808416738

Menneer, T., Cave, K. R., & Donnelly, N. (2009). The cost of search for multiple targets: Effects of practice and target similarity. *Journal of Experimental Psychology: Applied, 15*(2), 125–138. doi: 10.1037/a0015331

Menneer, T., Stroud, M. J., Cave, K. R., Li, X., Godwin, H. J., Liversedge, S. P., & Donnelly, N. (2012). Search for two categories of target produces fewer fixations to target-color items. *Journal of Experimental Psychology: Applied, 18*(4), 404–418. doi: 10.1037/a0031032

Merlo, L. J., Stone, A. M., & Bibbey, A. (2013). Measuring problematic mobile phone use: Development and preliminary psychometric properties of the PUMP scale. *Journal of Addiction, 2013*, 1–7. doi:10.1155/2013/912807

Nasar, J. L., & Troyer, D. (2013). Pedestrian injuries due to mobile phone use in public places. *Accident Analysis and Prevention, 57*, 91–95. doi:10.1037/a0027292

Przybylski, A. K., & Weinstein, N. (2012). Can you connect with me now? How the presence of mobile communication technology influences face-to-face conversation quality. *Journal of Social and Personal Relationships, 1*, 237–246. doi:10.1177/0265407512453827

Sobel, K. V., Puri, A. M, & Hogan, J. (2015). Target grouping in visual search for multiple digits. *Attention, Perception, & Psychophysics, 77*, 67–77. doi:10.3758/s13414-014-0761-9

Strayer, D., & Johnston, W. (2001). Driven to distraction: Dual-task studies of simulated driving and conversing on a cellular telephone. *Psychological Science, 12*(6), 462–466. doi: 10.1111/1467-9280.00386

Toda, M., Monden, K., Kubo, K., & Morimoto, K. (2004). Cellular phone dependence tendency of female university students. *Japanese Journal of Hygiene, 59*, 383–386. doi:10.1265/jjh.59.383

Walsh, S. P., White, K. M., & Young, R. M. (2010). Needing to connect: The effect of self and others on young people's involvement with

their mobile phones. *Australian Journal of Psychology, 62*, 194–203. doi:10.1080/00049530903567229

Yoon, J. H., Curtis, C. E., & D'Esposito, M. (2006). Differential effects of distraction during working memory on delay-period activity in the prefrontal cortex and the visual association cortex. *Neuroimage, 29*(4), 1117–1126. doi: 10.1016/j.neuroimage.2005.08.024

Author Note

Correspondence may be addressed to: Kenith V. Sobel, Ph.D., Department of Psychology and Counseling, University of Central Arkansas, Conway, Arkansas, 72035. Email: k.sobel@mac.com.

Appendix

Mobile Phone Dependency Questionnaire

I spend more on my cellular phone bill than I spend on clothing or food each month.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

I do not feel good all day if I forget my cellular phone.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

I would feel worse if I lost my cellular phone than if I lost my wallet.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

I do not like to go to places with poor signal strength.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

I recharge my cellular phone every day.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

When I ride on a plane or bus, or in a car, I touch my cellular phone as a matter of course.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I make or receive calls even when riding on public transportation.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I talk on my cellular phone even when with others.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I make calls on my cellular phone even late at night.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I talk at least one hour per day on my cellular phone.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I find it difficult to socialize with people who don't have cellular phones.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

I unconsciously use my cellular phone to check if I have any calls or messages.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I send text messages even during work or class.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I send at least 10 messages per day.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I feel happy when I receive a message.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

I sometimes send blank messages even though I have no reason to do so.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I frequently use emoticons when I type text messages.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I always reply to messages I receive.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I frequently write long messages.

1	2	3	4	5
Almost Never	Rarely	Sometimes	Often	Almost Always

I can say what I feel more easily through text than on the phone or when speaking face to face.

1	2	3	4	5
Strongly Disagree	Disagree Slightly	Neutral	Agree Slightly	Strongly Agree

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 15—22

Mock Jurors' Perception of Blind vs. Non-blind Interviewing: The Role of Recantation

Ian Lawrence Campbell[1], Jillian Rivard[2], & Nadja Schreiber Compo[3]*
University of Oregon[1], Barry University[2], & Florida International University[3]

Abstract—Decades of cognitive psychology research suggest interviewer expectations may influence a witness's statement. In cases of suspected child sexual abuse, a witness's statement is oftentimes the only piece of evidence. As such, how the child witness was interviewed becomes of central importance during court proceedings. The present study examined whether mock jurors evaluate differently the evidentiary value of a child witness statement as a function of the interviewer's preconceived notion about the case. The study also investigated the role of recantation in jurors' perception of the evidence, resulting in a 2 (pre-informed interviewer vs. not) X 2 (child recanted vs. not) design. Undergraduate students (N= 442) were presented with 2-page trial summary varying interviewer pre-interview information and child recantation. They then read Florida jury instructions before being asked to render a verdict in the case, followed by additional questions and a demographic questionnaire. It was predicted mock jurors would be sensitive to pre-informed interviewing, if the witness recanted resulting in fewer guilty verdicts and attribute a lower credibility rating to the witness's statement in the recantation condition only. Results indicated mock jurors were sensitive to blind interviewing and recantation in their assessment of the case, which supports the notion of expectancy effects.

Keywords: pre-informed interviewing, blind, non-blind, recantation, no recantation, child witness, expectancy effects, juror decision making

Eliciting accurate information from a witness can be difficult even in the best of circumstances. Memory is malleable and therefore susceptible to false information, a term Loftus and Pickrell (1995) coined the misinformation effect. In their study, Loftus and Pickrell took 24 average participants ranging from 18 to 53 years and demonstrated a false memory of an event could be implanted via suggestive questions despite the fact no event had actually occurred. Children are even more likely than adults to be influenced by outside and possibly false information. Schreiber et al. (2006) illustrated the types of suggestive and leading information found in child witness interviews via an in-depth analysis of the Kelly Michaels and McMartin daycare abuse cases, which resulted in the wrongful convictions of innocent people. The study revealed jurors are still willing to convict based on erroneous information elicited through biased questioning strategies (Nathan & Snedecker, 1995).

However, under certain conditions mock jurors might be able to differentiate between witness statements of different quality. Tubb, Wood, and Hosch (1999) found a child's report of sexual abuse to be less credible when it was elicited by suggestive questions than when it was elicited by focused or open-narrative questions. Interestingly, conviction rates by mock jurors were the same whether the child's report was presented

*Nadja Schreiber Compo served as Faculty Sponsor.

directly in an interview transcript or indirectly through secondhand testimony of a police interviewer.

Further research suggests many adult and child witness interviewers have pre-interview information about both the case and the witness (Poole & Lamb, 1998; Schreiber et al., 2006). That is, before interviewing a child, forensic interviewers are often encouraged to read the case file to find out as much information as possible. This is at odds with decades of research on the impact of expectancy effects on experiment and test outcomes. Rosenthal and Jacobson (1963) conducted research on expectancy effects in a groundbreaking study. Teachers of first and second graders were led to believe the "Harvard Test of Inflected Acquisition" administered to their students was a marker of academic blooming. Teachers were informed students who did well on the test would have greater academic gains compared to students who did not perform well. Unbeknownst to the teachers, students were randomly placed on one of two lists identifying the bloomers from the others, regardless of test performance. The actual test provided no predictive validity. When retested at the end of the year, students who had previously been labeled as "bloomers" showed greater academic gains compared to students who had been labeled the opposite.

A multitude of evidence in experimental psychology suggests researchers' attitudes play a pivotal role in potentially biasing the outcome and directionality of their experiments through the expectancy effect (Rosenthal & Jacobson, 1963). In order to safeguard against these subtle influences, research is typically designed with double blind or single blind preventative measures. Single blind experiments are akin to typical police interviewing, in which the investigator has prior information about the case from the file. The ideal situation is a double blind procedure where neither party has prior information about the case protecting against expectancy effects, which may unduly influence recall.

The expectancy effect is very damaging to the legal system as a forensic interview's objective is to elicit accurate and reliable information from a witness. Pre-interview information has the potential of biasing the witness's statement. In combination with lack of knowledge about ground truth, pre-informed interviewers may therefore be more likely to elicit inaccurate information and/or information aligned with preconceived notions (Rivard, 2014). The present study thus examined to which extent jurors are sensitive to the potential difference between pre-informed and blind interviewers and their possible effects on child witness accuracy. In addition, the present study examined whether the effect of non-blind interviewing on juror decision-making depends on other more prominent features of the child witness's statement, such as whether or not the child witness recanted his or her testimony.

Malloy, Lyon, and Quas (2007) suggest a child's recantation may ultimately affect the credibility, progression, and outcome of a case. At trial, juries scrutinize factors such as witness demeanor, expert testimony, and consistency in testimony (i.e., recantation) when making decisions about verdict (Narensky, 2008). The likelihood of recantation often correlates with the amount of familial support after an allegation is disclosed (Malloy et al., 2007). Explicit pressure on a child to recant a previous allegation compounded by accusations of victim culpability for the given situation, create a sense of self-blame for the offender's arrest (Marx, 1996). When the offender is a relative, such as a parent or grandparent, and another family member denies the allegation's veracity, the likelihood of recantation occurring is increased (Bulkley, 1988; Rieser, 1991; Summit, 1983). However, it is unclear whether and to what extent jurors might scrutinize an interviewer's behavior when a child has recanted.

Based on the previously discussed research, the purpose of the current study was to examine whether mock jurors' perceptions of a defendant's guilt and a child witness's credibility would differ as a function of the interacting effects of interviewer expectations (i.e., pre-informed vs. not) and child witness consistency (i.e., recanted

vs. not). The current study predicted mock jurors may fail to differentiate between pre-informed and blind interviewers, but would be more responsive to the effects of pre-informed interviewing if there was a reason to question the credibility of the child's statement (i.e., the witness recanted).

Method

Participants

Participants were recruited from the psychology department's research participation system (i.e., Sona) at a metropolitan university in Southeastern Florida and participated in exchange for research credit. The sample consisted of 442 participants, 20.4% (n = 90) were men, 76.7% (n = 339) women, and 2.9% (*n* = 13) chose not to report. Participants (*N*=427) reported ethnicity. The greatest number reported Hispanic (*n* = 296) followed by Caucasian (*n* = 60), African American (*n* = 40), multiple ethnicities (*n* = 21), and a small number of participants chose not to report. Participants ranged in age from 18 to 58 years (*M* = 24, *SD* = 6.36). After participants were assessed for jury eligibility (i.e., male or female, at least 18 years of age, and citizens of the United States), the final sample consisted of 349 participants.

Materials and Procedure

Prior to the study, the survey was pilot tested using a pool of 15 participants independent from the current study to assess whether the trial summaries generated both guilty and not guilty verdicts to a comparable degree. Pilot data confirmed final verdict decisions were rendered in both directions.

The present online study used a 2 (pre-informed interviewer vs. not) x 2 (child recantation vs. not) between participants design to test the effects of pre-informed interviewing and child witness recantation on jurors' verdicts. The crime scenario described a mother accused of lewd and lascivious molestation of her younger daughter who was 2 ½ at the time of the alleged abuse. In the non-blind condition, Dr. Montgomery, the child's pediatrician, testified to having prior information about the abuse of another daughter (i.e., "Dr. Elias Montgomery, who was under the impression that Margaret Schuler had been accused of sexually abusing her other daughter, Jennifer Schuler, 6 years old…"). The pediatrician's testimony was challenged by opposing defense witness testimony from Dr. Lillian Michaels, a cognitive psychologist, (i.e., "After reviewing the case file, including notes from Dr. Montgomery's hospital interview, Dr. Michaels expressed serious concerns regarding the level of bias the doctor may have had given he had prior knowledge of abuse allegations by Abigail's older sister, and his interview was not videotaped for more detailed analysis").

In the recantation condition, participants read testimony addressing the witness recanting her allegation of abuse to Detective Torrez (i.e., "After asking Abigail several questions regarding the time and location of the alleged abuse, Detective Torrez admitted she kept looking to her grandmother for reassurance. When plainly asked if her mother had touched her on her "private parts," Abigail mumbled a barely audible "no" while staring down at the floor"). The recantation testimony was counterbalanced by the prosecution in closing arguments (i.e., "Sure, she may have recanted but that was only because she was scared"). Aside from the aforementioned manipulations, the trial summaries remained the same.

Participants were presented with a consent form and acquiesced by clicking on a button at the bottom of the screen. On the next page, participants completed demographic information. On the third page, participants were presented a 2-page trial summary modeled after Idaho v. Wright (1990). Participants were randomly assigned to one of four conditions (i.e., blind/ recant, blind/ non-recant, non-blind/ recant, or non-blind/ non-recant) and read a case summary matching the condition. After reading the trial summary, participants were presented with judge's instructions for reaching a verdict (see Appendix). Participants were then asked to respond to the following prompts in no particular order: credibility rating (i.e., 1 = *not credible*, 2 =

Table 1. *Blind/Recantation Interactions*

Dependent Variable	Blind condition (blind vs. non blind)	Recantation (recantation vs. no recantation)	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
How confident are you in your verdict?	Blind	Recantation	3.685*	.111	3.466	3.904
		No recantation	3.605	.109	3.391	3.820
	Non blind	Recantation	3.541	.110	3.323	3.758
		No recantation	3.521	.113	3.299	3.743
How convincing do you find Dr. Montgomery's statement?	Blind	Recantation	3.260	.131	3.002	3.519
		No recantation	2.895	.129	2.641	3.148
	Non blind	Recantation	3.473	.131	3.216	3.730
		No recantation	3.000	.133	2.738	3.262
How convincing do you find Detective Torrez's statement?	Blind	Recantation	3.466	.108	3.253	3.678
		No recantation	3.079	.106	2.871	3.287
	Non blind	Recantation	3.514	.107	3.302	3.725
		No recantation	3.042	.110	2.827	3.258
How convincing do you find Dr. Lillian Michaels's statement?	Blind	Recantation	3.616	.104	3.412	3.821
		No recantation	3.618	.102	3.418	3.819
	Non blind	Recantation	3.811*	.103	3.607	4.014
		No recantation	3.394	.106	3.187	3.602
How convincing do you find Sherry Sullivan's statement?	Blind	Recantation	3.466	.107	3.255	3.677
		No recantation	3.342	.105	3.135	3.549
	Non blind	Recantation	3.514	.107	3.304	3.723
		No recantation	3.169	.109	2.955	3.383
How strong was the defense's case?	Blind	Recantation	3.384	.119	3.149	3.619
		No recantation	3.632*	.117	3.401	3.862
	Non blind	Recantation	3.527	.119	3.294	3.760
		No recantation	3.225	.121	2.987	3.464

Note: * Denotes significance in difference of means between blind and recantation conditions

somewhat not credible, 3 = *neutral*, 4 = *somewhat credible*, 5 = *extremely credible*), verdict, confidence in verdict, reason for verdict, strength of the prosecution/defense's case, and a series of manipulation check questions. Participants were then thanked for their time.

Results

Logistic regression analysis was used to test the effects of blind interviewing and recantation on verdict. The results of the regression (see Table 1) indicated an interaction between blind interviewing and recantation (B = -1.08, Wald = 5.11, $p = .020$). A MANOVA then tested the effects of blind interviewing and recantation. There was a main effect of recantation on "How convincing do you find Dr. Montgomery's statement?" ($M = 3.26$, $SE = .13$); "How convincing do you find Det. Torrez's statement?" ($M = 3.47$, $SE = .11$); "How convincing do you find Dr. Lillian Michaels statement?" ($M = 3.62$, $SE = .10$) and "How convincing do you find Sherry Sullivan's statement ($M = 3.47$, $SE = .11$), all $p < .05$. One of the main effects, "How convincing do you find Dr. Lillian Michaels statement?" was qualified by a recantation by blind interviewing interaction, $F(1, 290) = 4.06$, $p < .05$. There was one additional interaction between blind interviewing and recantation for "How strong was the defense's case?", $F(1, 290) = 5.33$, $p < .02$. Follow-up comparisons revealed mock jurors found cognitive psychologist Dr. Lillian Michaels more convincing in the non-blind/recantation ($M = 3.81$, $SE = .10$) condition compared to the blind/recantation condition ($M = 3.62$, $SE = .10$).

Discussion

Suggestive questioning in interviews has shown to implant false memory (Loftus & Pickrell, 1995), lead to sexual and satanic abuse allegations (Schreiber et al., 2006), and provide less accurate information (Rivard, 2014). In the current study, the defense's case was rated strongest when the interviewer had no prior information, and the child did not recant her statement, arguably the most ideal situation in terms of an interview. Given the circumstantial nature (i.e., lack of scientific evidence) of the case, this result is not all surprising. Interestingly, the current study had a higher frequency of not guilty verdicts (see Table 2) in non-blind/recantation compared to blind/ recantation, supporting the second hypothesis that participants would recognize the effects of suggestive questioning in pre-informed interviews if the witness recanted her statement. A potential reason for the moderately higher numbers of not guilty verdicts in the non-blind/recantation condition compared to blind/recantation is that in

Table 2. *Conviction Rates*

		Blind	Non Blind	N
Not Guilty	**Recantation**	41	50	91
	No Recantation	57	47	104
	Total	98	97	195
Guilty	**Recantation**	38	23	61
	No Recantation	24	29	53
	Total	62	52	114
Total	**Recantation**	79	73	152
	No Recantation	81	76	157
	Total	160	149	309

the former participants were presented with stimulus material highlighting the damaging effects of non-blind interviewing with expert testimony. In the latter, no such comparison was drawn, as participants only read expert testimony without a salient example of a non-blind interview.

The current study's prediction that mock jurors would fail to differentiate between pre-informed and blind-interviewing conditions was partially supported. Jurors were only sensitive to blind interviewing (i.e., rendering more guilty verdicts) when the child witness recanted her testimony; jurors enumerated confidence in their decision (see Table 1 & Table 2). This suggests mock jurors who viewed the case facts without the elements of pre-informed interviewing focused solely on recantation as a marker of guilt for the defendant. Plenty of studies (Bulkley, 1988; Marx, 1996; Rieser, 1991; Summit, 1983) address factors contributing to recantation. Rieser (1991) posits when children make an allegation against a family member feelings of guilt or pressure from other family members weigh heavily on the child, making recantation more likely, which does not necessarily mean the allegation is false. This is further supported by the fact that the third hypothesis was not supported, which theorized jurors would attribute a lower credibility rating in the recantation condition. Although results were not significant, mean differences were slightly higher in the blind/recantation condition (see Table 1), suggesting slightly more confidence in verdict.

Another possible reason for the failure to discern significant difference between the two interviewing protocols may be that mock jurors were not sensitive to pre-informed interviewing, given the tendency of interviewers to conduct interviews with prior information (Rivard, Schreiber Compo, Diego, & Espinosa, 2015). Laypersons may logically infer a pre-informed interviewer is a good thing (Rivard, 2014). In addition, Shelton, Kim, and Barak (2006) posit the CSI effect may be part of the problem as well. Juror expectations seem to demand more scientific confirmation. Their findings suggest a significant number of respondents (26.5%) in cases involving rape, physical assault, or sexual misconduct admit to leaning toward acquittal in the absence of scientific evidence, even if the victim testifies to the alleged assault. In a follow-up question, 21% further stated an increased probability of voting to acquit if the scientific evidence was not DNA.

There were several limitations to this study. To begin, the study was conducted entirely online and relied on self-report measures. This greatly impacted ecological validity as respondents read a 2-page trial summary and answered non-force response questions, which may have led some to rush through the stimulus material. Additionally, the subject pool was comprised of students enrolled in psychology classes with a demographic makeup not representative of Floridian juror pools due to the disproportionality of women (77%) and Hispanics (67%) in the sample.

Future research would ideally seek a more representative sample of the population. A random sampling of various regions within the United States would be optimal. Manipulating interviewer affect in blind and non-blind conditions could provide insight into whether or not level of arousal impacts suggestibility in questioning. Another possible line of research may include the efficacy of dual interviewers working in tandem (e.g., good cop vs. bad cop or blind vs. non blind interviewers). Future research design may also provide salient cues in face-to-face interviews consisting of actual jurors waiting in the jury anteroom. Additional factors such as type of crime (e.g., assault, theft, murder, etc.), status of the witness (e.g., convicted felon, unemployed, professional, student), ethnicity (e.g., own race bias), gender, and crime vignette (e.g., live crime scenario vs. prerecorded video) may all provide deeper understanding of jury decision-making and further implications of blind vs. non-blind interviewing.

References

Bulkley, J. (1988). Legal proceedings, reforms, and emerging issues in child sexual abuse cases. *Behavioral Sciences & The Law, 6*(2) 153-180. doi:10.1002/bsl.2370060203

Idaho v. Wright, 497 U.S. 805 (1990).

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals, 25*(12), 720-725. doi: 10.3928/0048-5713-19951201-07

Malloy, L. C., Lyon, T. D., & Quas, J. A. (2007). Filial dependency and recantation of child sexual abuse allegations. *Journal of the American Academy of Child & Adolescent Psychiatry, 46* (2), 162-170. doi:10.1097/01.chi.0000246067.77953.f7

Marx, S. (1996). Victim recantation in child sexual abuse cases: The prosecutor's role in prevention. *Child Welfare, 75*(3), 219-233.

Narensky, C. (2008). *The influence of recantation, witness demeanor, and expert testimony on child witness credibility in sexual abuse prosecutions.* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Order No. 3326843)

Nathan, D., & Snedeker, M. (1995). *Satan's silence: Ritual abuse and the making of a modern American witch hunt.* New York, NY: Basic Books.

Poole, D. A., & Lamb, M. E. (1998). *Investigative interview with children: A guide for helping professionals.* Washington, DC: American Psychological Association.

Rieser, M. (1991). Recantation in child sexual abuse cases. *Child Welfare, 70*, 611-621.

Rivard, J. R. (2014). *Confirmation bias in witness interviewing: Can interviewers ignore their preconceptions?* (Doctoral dissertation), Retrieved from http://digitalcommons.fiu.edu/dissertations/AAI3644801/

Rivard, J. R., Schreiber Compo, N., Diego, M., & Espinosa, S. (2015, March). *'Blind' interviewing in the field: Forensic interviewers' practices, attitudes, and perceptions.* Survey presented at the meeting of the American Psychology-Law Society, San Diego, CA.

Rosenthal, R., &. Jacobson, L. (1963). Teachers' expectancies: Determinants of pupils' IQ gains. *Psychological Reports, 19*, 115-118. doi:10.2466/pr0.1966.19.1.115

Schreiber, N., Bellah, L. D., Martinez, Y., McLaurin, K. A., Strok, R., Garven, S., & Wood, J. M. (2006). Suggestive interviewing in the McMartin Preschool and Kelly Michaels daycare abuse cases: A case study. *Social Influence, 1*(1), 16-47. doi:10.1080/15534510500361739

Shelton, D. E., Kim, Y. S., & Barak, G. (2006). A study of juror expectations and demands concerning scientific evidence: Does the 'CSI effect' exist? *Vanderbilt Journal of Entertainment & Technology Law, 9*(2), 331-368. Retrieved from http://ssrn.com/abstract=958224.

Summit, R. C. (1983). The child sexual abuse accommodation syndrome. *Child Abuse & Neglect, 7*,177-193. doi:10.4135/9781483326573.n185

Tubb, A. V., Wood, J. M., & Hosch, H. M. (1999). Effects of suggestive interviewing and indirect evidence on child credibility in a sexual abuse case. *Journal of Applied Social Psychology, 29* (6), 1111-1127. doi:10.1111/j.1559-1816.1999.tb02031.x

Author Note

Correspondence may be addressed to: Nadja Schreiber Compo, Ph.D., Legal Psychology Department, Florida International University, 11200 S.W. 8th Street, Miami, Florida 33199. Email: schreibe@fiu.edu.

Appendix

Judge's Instructions

Members of the jury, I thank you for your attention during this trial. Please pay attention to the instructions I am about to give you. The defendant in this case Margret Schuler has been accused of the crime of Lewd and Lascivious Molestation.

The defendant has entered a plea of not guilty. This means you must presume or believe the defendant is innocent. The presumption stays with the defendant as to each allegation in the charge unless it has been overcome by the evidence to the exclusion of and beyond a reasonable doubt.

To overcome the defendant's presumption of innocence, the State has the burden of proving the crime with which the defendant is charged was committed and the defendant is the person who committed that crime. To prove the crime of Lewd and Lascivious Molestation, the State must prove the following elements beyond a reasonable doubt:

a. Abigail Schuler was less than 12 years of age.
b. Margret Schuler in a lewd or lascivious manner intentionally touched the buttocks of Abigail Schuler.

The defendant is not required to present evidence or prove anything, and thus it is her right not to testify in this trial. You must not view this as an admission of guilt or be influenced by in any way by her decision. Whenever the words "reasonable doubt" is used, you must consider the following:

> A reasonable doubt is not a mere possible doubt, a speculative, imaginary or forced doubt. Such a doubt must not influence you to return a verdict of not guilty if you have an abiding conviction of guilt. On the other hand, if, after carefully considering, comparing and weighing all the evidence, there is not an abiding conviction of guilt, or, if, having a conviction, it is one which is not stable but one which wavers and vacillates, then the charge is not proven beyond every reasonable doubt and you must find the defendant not guilty because the doubt is reasonable.

It is the evidence introduced in this trial and to it alone, that you are to look for that proof. A reasonable doubt as to the guilt of the defendant may arise from the evidence, conflict in the evidence, or lack of evidence. If you have a reasonable doubt, you should find the defendant not guilty. If you have no reasonable doubt, you should find the defendant guilty.

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 23—33

The Relationship between Video Game Type and Eyewitness Memory

Callieann R. Jackson and Susan Tucker*
Missouri Southern State University

Abstract—Cognitive enhancement through video game play has become a focus of cognitive research in recent years. Previous studies have demonstrated experimentally that video game play can improve such skills as resource allocation, spatial attention, and mental rotation among many others. There exists a gap in the literature regarding whether playing video games has an effect on eyewitness memory. Previous research utilizing classic cognitive tests to study memory suggests video game play might affect cognitive skills necessary for more accurate recall. The current study addressed this gap, in part, by exploring the relationships between video gaming experience, game type, and memory recognition for an event. Participants' memory for an event was assessed following play of either an action video game or puzzle video game. Participants, aged 18-41, played a video game for 20 minutes. Afterward, they watched a video simulating an eyewitness event and took a multiple-choice quiz on the video. Results suggest differences in recognition between experienced and casual players and between game types for experienced players.

Keywords: video games, eyewitness memory, visual search, perception, puzzle games, action games

Much of the early research on video games focused on violence and whether or not players learned aggression through game play (e.g., Anderson & Bushman, 2001). Recent research has also focused on learning, but in a different capacity. Interest in the ways cognitive skills can be enhanced through game play has increasingly become a focus of some cognitive researchers (e.g., Achtman, Green, & Bavelier, 2008; Blacker & Curby, 2013; Dye, Green, & Bavelier, 2009a).

As cited by the Electronic Software Association (2015), an Ipsos MediaCT survey shows that approximately 155 million Americans play video games. In 2014, $22.41 billion were spent on video games. With gaming so prevalent in western culture, cognitive researchers have sought to utilize video game play as a tool to promote training-induced learning (Achtman et al., 2008). Enhancement of different skills has been documented since the early 1980s when Griffith, Voloschin, Gibb, and Bailey (1983) showed improvement in hand-eye coordination for video game players. More recently, researchers have begun to investigate the role video games may play in enhancing cognitive skills such as visual attention (Green & Bavelier, 2003), visual sensitivity (Applebaum, Cain, Darling, & Mitroff, 2013), resource allocation (Maclin et al., 2011), and memory (Blacker, Curby, Klobusicky, & Chien, 2014).

Visual short-term memory (VSTM) is one area where video game players (gamers) show improved performance over non-video game players (non-gamers, Blacker & Curby, 2013). When action gamers are tested against non-gamers on an encoding and change detection task, gamers show clear advantages in recall no matter how long the encoding duration lasts (Blacker & Curby,

*Susan Tucker served as Faculty Sponsor.

2013). For example, gamers show a smaller attentional blink, the tiny gap in attention when focus is shifted from one object to another, than non-gamers (Achtman et al., 2008). In the same study, gamers, when compared to non-gamers, were able to process a rapid stream of visual information with greater efficiency. Gamers also recovered faster from the blink than non-gamers and were able to track approximately two more items. Gamer accuracy remained near ceiling performance for a larger number of items. Although gamers show a clear advantage in VSTM, research has not yet shown a greater VSTM capacity. Gamers do not appear to hold more information in VSTM than non-gamers; rather, Green and Bavelier (2006) showed enhanced accuracy may be partly due to a more efficient visual short-term memory system. Since most games force players to process multiple objects simultaneously and disregard irrelevant information quickly, gamers learn to both process and respond quickly to presented stimuli. Failure to make quick and accurate responses can have dire consequences within the context of the game. Gamers were still affected by distractor items but at a much higher perceptual load than non-gamers, and they showed superior target localization abilities under all conditions tested.

Dye, Green, and Bavelier (2009b) further showed video game players were able to better allocate attentional resources over a visual scene by extending previous research to include children. Speed and accuracy were examined using an Attentional Network Test to measure components of visual attention. Gamers responded more quickly than non-gamers, but they were not more likely to make a speed versus accuracy tradeoff. They responded more quickly but did not make more mistakes. Dye and colleagues have proposed an increase in speed of processing can account for the advantages gamers show over non-gamers. Although gamers exhibited greater benefits from orienting cues and greater interference from flankers, this was interpreted as evidence for the increased attentional resources exhibited by gamers who devote more processing resources across the visual scene.

Maclin et al. (2011) demonstrated through the use of electrophysiological measures, specifically EEG and ERP, brain changes can occur due to playing video games. As a participant improved at a primary task, they presumably were able to devote more resources to a secondary task. This finding lends further support to Dye et al. (2009b) by suggesting brain changes are an important component of the differences in cognitive processes between gamers and non-gamers.

Researchers have also examined perception using different game genres, although this line of inquiry still supports a limited body of work. Nelson and Strachan (2009) tested participants using an action game and a puzzle game, predicting different types of games would cause shifts in cognitive strategy reflective of the types of skills utilized while playing the game. The results showed that while reaction times and accuracy did not differ for players in the pretest, there were significant differences for both in the posttest. Thus, different genres of video games prime different reactions from players. Specifically, participants who played the action game showed faster reaction times but less accuracy, consistent with the skills employed during play of the fast paced game. Inversely, participants who played the puzzle game had slower reaction times, consistent with the analytical nature of puzzle games, but showed an increase in accuracy over their action game counterparts. Action video games are utilized most often by researchers, as the majority of gaming studies measure reaction times. When studying memory accuracy, however, it may be more advantageous to employ games requiring more deliberate strategy.

Even if an element of self-selection may exist, video game playing modifies visuospatial attention and cannot be fully explained by either test-retest advantages or by people with better memory self-selecting into the gaming community (Green & Bavelier, 2006). Training studies have previously demonstrated cognitive skills can be improved, and those improvements can last for a

long time. When non-gamers were trained on an action video game, they performed better on a useful-field-of-view task and an attentional blink task, but their performance level was still below that of an experienced gamer (Achtman et al., 2008). Boys normally play different kinds of games than do girls, and this early play is often a major consideration for the differences in adult cognitive differences (Feng, Spence, & Pratt, 2007). Due to the types of games males play from a young age, they tend to perform better than females at certain spatial cognition tasks, especially mental rotation. When females were trained on an action video game, they performed just as well as males did on a useful-field-of-view task, and gender differences were reduced on a mental rotation task. In this study, females benefitted more than males from training, and after five months, females maintained the level of performance they had shown earlier even when they had not continued to play.

A longitudinal study (Adachi & Willoughby, 2013) addressed learning over time by gathering self-report data on high school students over a period of four years. Results indicated higher reported play of strategic games predicted higher self-reported problem solving skills. Adachi and Willoughby also showed an indirect relationship between strategic game play and higher academic grades, where more strategic play was associated with higher problem solving skills, and those reported problem solving skills predicted higher academic grades.

Given the generalized cognitive improvements gamers show in areas such as visual attention, visual sensitivity, and memory, it is likely these improvements demonstrated in the lab can be expanded to real world aspects regarding memory. Eyewitness testimony is easily susceptible to misinformation and misattribution (Schacter & Loftus, 2013), but it is still heavily relied upon in the courtroom. Extreme stress can also reduce the accuracy of eyewitness testimony. Considering the court's reliance on eyewitness testimony, it is necessary to investigate the issue from new perspectives.

Wagstaff et al. (2003) proposed certain laboratory results concerning eyewitness testimony (e.g., identified hair color and style of a perpetrator) could be generalized to real world conditions. They found recall was highly correlated with type of crime. In this study, more violent crime strongly correlated with greater recall of hair color and hair style, while witnesses were not as accurate when tested on build and height of the perpetrator. This study was limited to physical characteristics of the perpetrator, but researchers noted recall of central details, such as hair color, might support the proposal that violence may improve recall for central information.

Research on eyewitness testimony demonstrates eyewitness attention is often drawn toward the central action of an event, such as a person being robbed at gunpoint, while periphery details are recalled less often (Migueles & Garcia-Bajos, 1999). This phenomenon is also known as weapon focus. Migueles and Garcia-Bajos (1999) further showed recall for central actions was more likely than central details, demonstrating focus of attention on what could be deemed the most threatening part of a scene. It is likely gamers would react differently than those with less gaming experience since gamers encounter weapon focus more often. Many popular action games require players to assess threats very quickly, and in support of prior research (e.g., Dye et al., 2009b; Green, Li, & Bavelier, 2010), these practiced reflexes allow them to free up resources to assess more of the situation. Action games still rely heavily on weapon focus, and it is furthermore likely that a different genre, such as puzzle, would allow players to assess even more of the visual scene, as it primes a different response from an action game as Nelson and Strachan (2009) demonstrated.

The current study sought to address a gap in the literature by investigating a possible link between video game play and eyewitness memory for an event. Considering the types of cognitive processes video games have previously been shown to affect, it is likely there are also strong links to the processes underlying eyewitness memory. Based on prior research, two hypotheses

were formulated to explore these links between video games and eyewitness memory. The first hypothesis stated participants who played video games more often would show better memory recognition on a memory test than participants who played only casually or not at all. The second hypothesis stated while experienced gamers would show an advantage over casual gamers, participants who were assigned to play a puzzle game would show greater recognition accuracy than those assigned to play an action game.

Method

Participants

Data was collected from 60 undergraduates (24 female and 36 male) attending Missouri Southern State University. Of these, 25 were classified as casual gamers (14 female and 11 male) and 35 (10 female and 25 male) as experienced gamers. Ages ranged between 18 and 41 ($M_{age} = 22.92$, $SD = 5.46$). Participants were recruited from general psychology classes, the hallways of an academic building, and from flyers posted on bulletin boards in several campus buildings. Individuals were excluded from the study if they had a history of seizures. This exclusion criterion was clearly indicated on the sign-up sheets and when participants entered the lab for the study. Some participants received course credit from their professors in exchange for participation.

Design

The experiment used a 2 (gaming experience: experienced video game player or casual video game player) x 2 (game type: action video game or puzzle video game) between-subjects factorial design. The dependent variable was participants' performance on a memory test.

Materials

A demographic survey (see Appendix A) was created that included video game play preference and game platform preference to determine which group, experienced video game player or casual video game player, participants qualified for. Participants were sorted into the two groups based on a combination of factors including: types of gaming platforms used, types of games played, and to a lesser extent, how often participants played games. Certain platform types (e.g., phone and tablet) are more associated with casual gaming while experienced gamers gravitate toward the Xbox and Playstation, as well as classic consoles (e.g., Nintendo 64, Sega Genesis, and Super Nintendo Entertainment System). Likewise, certain types of games (e.g., arcade, racing, and simulation) are more often played by casual gamers. Experienced gamers play these types of games but also include more immersive ones (adventure, role play, and first person shooter). For example, participants reporting game play on the phone and Wii coupled with simulation and arcade games were categorized as casual gamers. Participants reporting game play on one or more classic consoles and the Xbox coupled with an immersive role play or an adventure game were categorized as experienced gamers. These are two examples of participant categorization. There were many other combinations lending a subjective element to group categorization. Few players are exactly alike given the number of different game genres and platforms available for use. Many games cross genre boundaries falling under multiple categories as well (e.g., Elder Scrolls is both an adventure and role play game). This makes strict category lines a more difficult option. Although categorization was somewhat subjective, it is important to note participants were placed into groups prior to receiving a score on the memory test.

An Xbox 360 slim (model number 1439) was used to administer the manipulation. The Xbox 360 was connected to a 120v 60Hz 110w Emerson 32-inch LCD television (model number LC320EM2) using an HDMI cable. Standard Microsoft Xbox 360 controllers (model number 1460) with Nyko NiMH rechargeable battery packs were used. Participants sat approximately 6 feet away from the television during play time.

Two video games were used; one for each level of the manipulation. *Portal 2* was used for the puzzle game. Players take on the role of a character being experimented on by a rogue computer. They must find a way out of various testing rooms by using a device that creates wormhole-like portals to change the layout of each room and unlock an exit door. The puzzles become more difficult as each subsequent level expands upon information gathered from the previous one. *Portal 2* had an Electronic Software Ratings Board (ESRB) rating of "E" for everyone. *Halo: Combat Evolved Anniversary Edition* was used for the action game. The premise of the game is to investigate the mystery surrounding a newly discovered ring-like planet. Players must also attempt to stop an alien invasion from reaching earth. *Halo: Combat Evolved* had an ESRB rating of "M" for mature content. The mature content included violence, blood, and gore. The blood was not realistic, and participants had the option to further decrease blood content by switching the game to "classic" mode. This option was not exercised by any of the participants. Both games were released during the same year and shared visual similarities: high resolution graphics and a first-person shooter perspective. Although both games share superficial similarities, they were each chosen because they encourage players to use different strategies: quick decision making versus thoughtful deliberation.

To administer the memory task, a Dell OptiPlex computer running Windows 7 Enterprise was used. An 80 s video clip (Preston, 2014) showing a deer breaking into a store, crashing into displays, and police officers chasing it out of the door was shown to participants using Windows Media Player. This video came from a YouTube search for "animals breaking into stores" and was edited to remove unnecessary footage of a second deer in the establishment. This video was chosen, rather than a more traditional crime video, in part to avoid causing psychological trauma from seeing individuals being victimized and in part due to the higher quality resolution. The framing of this video had the added benefit of placing participants in the context of "witnessing" the event from within the room. A multiple choice questionnaire (see Appendix B) was created about the video, consisting of eight questions, with a score of 15 points possible. Participants were instructed that each question could have more than one possible answer and earned one point for each correct selection.

Procedure

Participants entered the lab and were greeted by the researcher. They received two copies of an informed consent form: one to sign and one to keep. Participants were asked if they had a history of seizures and were told the ESRB rating content of the game they would be playing. Participants were randomly assigned to play one of the games when they entered the lab. After participants gave their consent, they filled in the demographic survey. Participants turned in the survey and were familiarized with the game's controls. They played the game for 20 minutes. Once 20 minutes had passed, they were directed to the computer, where they watched the video clip and then were given the video questionnaire to complete. Once finished, participants were debriefed and encouraged to ask questions regarding the experiment. They were thanked for their participation, referred to campus counseling services should they experience any negative side-effects, although none were anticipated, and dismissed from the study.

Results

There were 15 points possible on the questionnaire. All participants scored between 5 and 14, with 78% of participants scoring in the 8-11 point range. To test the hypotheses, participants' total scores from the video questionnaire were subjected to a 2 x 2 factorial analysis of variance (ANOVA) with the two factors being gaming experience (experienced gamer or casual gamer) and game type (action or puzzle). An alpha level of .05 was used for all analyses reported. There was a significant main effect of gaming experience, $F(1, 59) = 8.16$, $p = .006$, $\eta_p^2 = .13$, where experienced gamers ($M = 9.20$, $SD =$

Table 1. *Means and Standard Deviations for all Groups on the Video Questionnaire*

Condition	*M*	*SD*
Experienced/ Puzzle Game	9.82	1.82
Experienced/ Action Game	8.61	1.50
Casual/ Puzzle Game	7.85	1.35
Casual/ Action Game	8.33	1.16

Note. Means and standard deviations represent total scores for each condition tested following play of either the puzzle game (*Portal 2*) or the action game (*Halo*).

1.75) scored higher on the memory test than casual gamers (M = 8.08, SD = 1.26). The main effect of game type was not significant, $F(1, 59) = .85$, $p = .362$, $\eta_p^2 = .02$. Participants assigned to play the action game did not differ significantly from participants assigned to play the puzzle game. The interaction effect was significant, $F(1, 59) = 4.63$, $p = .036$, $\eta_p^2 = .08$. To investigate the interaction, independent samples t-tests were computed to determine if there was a difference of game type on memory performance for each gaming experience group (see Table 1 for group means). Experienced gamers playing the puzzle game recognized more information on the memory test than experienced gamers playing the action game, $t(33) = -2.16$, $p = .038$. For casual gamers, there was no significant difference between participants playing the puzzle game and the action game, $t(23) = 0.97$, $p = .340$. There was a significant difference between experienced gamers and casual gamers such that experienced gamers recognized more information overall, $t(58) = 2.74$, $p = .008$.

The results illustrate experienced gamers playing the puzzle game recognized significantly more information on the memory task than experienced gamers playing the action game. Casual gamers did not exhibit this same effect, as there were no significant differences in scores for this group. More gaming experience also related to better memory performance, such that experienced gamers out-performed casual gamers on the memory task.

Discussion

Experienced gamers recognized more information on the memory test than did casual gamers. This finding supports the first hypothesis and is consistent with findings from the previous literature. Video game players have shown generalized improvement in cognitive skills demonstrated through many studies (e.g., Bavelier, Green, Pouget, & Schrater, 2012; Clark, Fleck, & Mitroff, 2011; Green et al., 2010) and consistently outperform casual and non-video game players. This is possibly due to the continual training of cognitive skills experienced gamers undergo as they play games more often. Feng et al. (2007) utilized training to demonstrate changes for non-gamers lasting for at least five months. The majority of experienced gamers in the current study played many different genres of video games, which may have provided broader generalized improvement in cognition through increased speed of processing as Dye et al. (2009b) suggests.

The second hypothesis, participants playing a puzzle game would recognize more information than those playing an action game, was partially supported for experienced gamers. It would seem that the puzzle game primed experienced participants to analyze and assess more of the

visual scene than the action game did. These results are consistent with findings by Nelson and Strachan (2009), demonstrating perceptual changes in visual attention following game play. This is also consistent with the strategies participants needed to exercise while playing Portal 2. To solve the puzzles present in *Portal 2*, players were encouraged to gather information about the entire scene, while *Halo* encouraged players to narrow their focus to clusters of enemies. Like *Halo* the video contained a focal point, the deer. By focusing on the central event, as Migeles and Garcia-Bajos (1999) demonstrated in their eyewitness study, experienced participants in the action game group scored lower on the test lending further, tentative support to Nelson and Strachan (2009). Prior experience playing *Portal 2* does not account for the higher scores on the memory test, as only 10 participants indicated they had played a *Portal* game previously, while 41 participants indicated they had previously played *Halo*.

This hypothesis was not supported for casual gamers, however. Although not significant, casual gamers playing *Halo* performed slightly better on the memory test than those playing *Portal 2*. It is possible the rules of *Portal 2* were too difficult for the casual gamers to grasp in such a limited amount of time, leading casual gamers to become overloaded with information and unable to adapt quickly enough. In contrast, *Halo* presented casual gamers with fewer objects to attend to, and progression through the game was less dependent on precision and problem solving.

This study was limited by the absence of a control group. A control group was considered but not included due to time constraints. Research into the differences for contrasting game types was chosen instead as very little research still exists in this area. Moving forward, multiple game types in conjunction with a control group would be utilized. Training studies have previously demonstrated improvement for casual gamers (Achtman et al., 2008; Nelson & Strachan, 2009). Casual gamers may have shown improvement over baseline performance, but without a control group this remains speculation. Future studies should address this issue. Training participants to play each game before completing the memory task may lead to casual gamers improving their performance following the puzzle game and would be consistent with past research.

Another possible issue is the somewhat subjective grouping of participants into either the experienced gamer or casual gamer group. Utmost care was taken to place each individual into the correct group, but a few participants (fewer than five) were difficult to classify, as they did not fit neatly into one group or the other. Most participants offered information before leaving the lab aiding in classification. Such statements include, "I love *Portal* but I haven't had time to play recently," and "I never play games like this." The demographic survey should be expanded to make classification even more accurate by allowing participants to indicate their favorite games and to also qualify answers about how often they play. Even though this addition would aid in classification, results supported the hypothesized differences between experienced gamers' and casual gamers' memory performance. The use of the multiple-choice questionnaire also represents an issue. When investigating eyewitness memory, interviewers often use a cognitive interview approach (Geiselman, Fisher, MacKinnon, & Holland, 1985) to minimize misinformation and the creation of false memories. The multiple-choice questionnaire represented the best option for the current study and was chosen out of practicality. Recruitment proved challenging at approximately 30 minutes per participant with no recompense other than extra credit offered by some professors. Many participants chose to forgo this more time consuming study. Future studies with participant compensation should explore the option of using a cognitive interview style or free recall. These types of tests would provide much better indications of recall when studying eyewitness memory. A multiple-choice approach should not be completely discounted as previous research into eyewitness testimony has used multiple-choice, and a suspect line-up could be considered an application of a

multiple-choice quiz; sometimes with the correct answer missing.

Several factors were beyond the scope of the current study but should be considered for future research. Researchers should consider using a delay between the encoding task and the memory task. Participants tend to recall more information when the tasks are presented without delay, and the addition would more closely resemble real world events, where eyewitness testimony often undergoes a delay before a report is given to first responders. The recognition test was administered directly following the video out of practicality. Video games might also be tested against games played in real life. This would examine whether video games specifically account for the observed differences rather than the analytical nature of puzzle games in general. Senior adults should be examined to see if they show similar results as the participants in the current study. Cognitive improvement has been demonstrated in children (Subrahmanyam & Greenfield, 1994) and adults (Green & Bavelier, 2006). Studies with older adults have shown training programs can offer improvement in memory (Fairchild & Scogin, 2010) and processing speed (Peng, Wen, Wang, & Gao, 2012). As the gaming population ages, this research possibility becomes more feasible, as a reported 27% of gamers currently are over the age of 50 (Electronic Software Association, 2015).

As previous research indicates, cognitive skills can clearly become enhanced even when such enhancements are not the primary goal. Gamers are practicing skills in a virtual environment that can have an effect on how they interact with the real world. To what extent these learned skills can be generalized and exactly how much gamers benefit remains to be seen, but the body of research continues to grow. Video games may soon become a tool to train a wide variety of skills as video game developers embed training content and entwine it with the immersive game play and story that video gamers have come to expect and require from their virtual content.

References

Achtman, R. L., Green, C. S., & Bavelier, D. (2008). Video games as a tool to train visual skills. *Restorative Neurology and Neuroscience, 26* (4-5), 435-446.

Adachi, P. J. C., & Willoughby, T. (2013). More than just fun and games: The longitudinal relationships between strategic video games, self-reported problem solving strategies, and academic grades. *Journal of Youth and Adolescence, 42*(7), 1041-1052. doi: 10.1007/s10964-013-9913-9

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, 12*(5), 353-359. doi: 10.1111/1467-9280.00366

Applebaum, L. G., Cain, M. S., Darling, E. F., & Mitroff, S. R. (2013). Action video game playing is associated with improved visual sensitivity, but not alterations in visual sensory memory. *Attention Perception and Psychophysics, 75*(6), 1161-1167. doi: 10.3758/s13414-013-0472-7

Bavelier, D., Green, C. S., Pouget, A., & Schrater, P. (2012). Brain plasticity through the lifespan: Learning to learn through video games. *The Annual Review of Neuroscience, 35*, 391-416. doi: 10.1146/annurev-neuro-060909-152832

Blacker, K. J., & Curby, K. M. (2013). Enhanced visual short-term memory in action video game players. *Attention Perception and Psychophysics, 75*(6), 1128-1136. doi: 10.3758/s13414-013-0487-0

Blacker, K. J., Curby, K. M., Klobusicky, E., & Chien, J. M. (2014). Effects of action video game training on visual working memory. *Journal of Experimental Psychology: Human Perception and Performance, 40*(5), 1992-2004. doi: 10.1037/a0037556

Clark, K., Fleck, M. S., & Mitroff, S. R. (2011). Enhanced change detection performance reveals improved strategy use in avid action video game players. *Acta Psychologica, 136* (1), 67-72. doi: 10.1016/j.actpsy.2010.10.003

Dye, M. W. G., Green, C. S., & Bavelier, D. (2009a). Increasing speed of processing with action video games. *Current Directions in Psychological Science, 18*(6), 321-326. doi: 10.1111/j.1467-8721.2009.01660.x

Dye, M. W. G., Green, C. S., & Bavelier, D. (2009b). The development of attention skills in action video game players. *Neuropsychologia, 47*(8-9), 1780-1789. doi: 10.1016/j.neuropsychologia.2009.02.002

Electronic Software Association. (2015). *2015 sales, demographic and usage data: Essential facts about the computer and video game industry.* Retrieved from http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf

Fairchild, J. K., & Scogin, F. R. (2010). Training to enhance adult memory (TEAM): An investigation of the effectiveness of a memory training program with older adults. *Aging & Mental Health, 14*(3), 364-373. doi: 10.1080/13607860903311733

Feng, J., Spence, I., & Pratt, J. (2007). Playing an action video game reduces gender differences in spatial cognition. *Psychological Science, 18*(10), 850-855. doi: 10.1111/j.1467-9280.2007.01990.x

Geiselman, R. E., Fisher, R. P., MacKinnon, D. P., & Holland, H. L. (1985). Eyewitness memory enhancement in the police interview: Cognitive retrieval mnemonics versus hypnosis. *Journal of Applied Psychology, 70*(2), 401-412. doi: 10.1037/0021-9010.70.2.401

Green, C. S., & Bavelier, D. (2003). Action video game modifies visual selective attention. *Nature, 423*(6939), 534-537. doi: 10.1038/nature01647

Green, C. S., & Bavelier, D. (2006). Effects of action video games on the spatial distribution of visuospatial attention. *Journal of Experimental Psychology: Human Perception and Performance, 32*(6), 1465-1478. doi: 10.1037/0096-1523.32.6.1465

Green, C. S., Li, R., & Bavelier, D. (2010). Perceptual learning during action video game playing. *Topics in Cognitive Science, 2*(2), 202-216. doi: 10.1111/j.1756-8765.2009.01054.x

Griffith, J. L., Voloschin, P., Gibb, G. D., & Bailey, J. R. (1983). Differences in eye-hand motor coordination of video-game users and non-users. *Perceptual and Motor Skills, 57*(1), 155-158. doi: 10.2466/pms.1983.57.1.155

Maclin, E. L., Mathewson, K. E., Low, K. A., Boot, W. R., Kramer, A. F., Fabiani, M., & Gratton, G. (2011). Learning to multitask: Effects of video game practice on electrophysiological indices of attention and resource allocation. *Psychophysiology, 48*(9), 1173-1183. doi: 10.1111/j.1469-8986.2011.01189.x

Migueles, M., & Garcia-Bajos, E. (1999). Recall, recognition, and confidence patterns in eyewitness testimony. *Applied Cognitive Psychology, 13*(3), 257-268. doi: 10.1002/(sici)1099-0720(199906)13:3%3C257::aid-acp566%3E3.0.co;2-7

Nelson, R. A., & Strachan, I. (2009). Action and puzzle video games prime different speed/accuracy tradeoffs. *Perception, 38*(11), 1678-1687. doi: 10.1068/p6324

Peng, H., Wen, J., Wang, D., & Gao, Y. (2012). The impact of processing speed training on working memory in old adults. *Journal of Adult Development, 19*(3), 150-157. doi: 10.1007/s10804-012-9142-6

Preston, W. (2014, May 29). *2 young deer crash into business establishment in Livingston, Texas [*Video file]. Retrieved from https://www.youtube.com/watch?v=fgoNulCx6uk

Schacter, D. L., & Loftus, E. F. (2013). Memory and law: What can cognitive neuroscience contribute? *Nature Neuroscience, 16*(2), 119-123. doi: 10.1038/nn.3294

Subrahmanyam, K., & Greenfield, P. M. (1994). Effects of game practice on spatial skills in boys and girls. *Journal of Applied Developmental Psychology, 15*(1), 13-32. doi: 10.1016/0193-3973(94)90004-3

Wagstaff, G. F., MacVeigh, J., Boston, R., Scott, L., Brunas-Wagstaff, J., & Cole, J. (2003). Can laboratory findings on eyewitness testimony be generalized to the real world? An archival analysis of the influence of violence, weapon presence, and age on eyewitness accuracy. *The Journal of Psychology, 137*(1), 17-28. doi: 10.1080/00223980309600596

Author Note

Correspondence may be addressed to: Correspondence may be addressed to: Susan Tucker, Ph.D., Psychology Department, Missouri Southern State University, 3950 Newman Rd., Joplin, MO 64801. Email: Tucker-S@mssu.edu.

Appendix A

Age _____
Sex (circle one) Male Female
Major_____

Please check all that apply.

In the past 6 months what platforms have you played games on?

_____Phone (Android, Iphone, Windows)
_____Tablet
_____Nintendo 3ds
_____Wii/WiiU
_____Xbox 360
_____PS3
_____Xbox One
_____PS4
_____PC
_____None
Other_____

What types of games do you play? (Examples may fit more than one category)

_____Action (Call of Duty, Assassin's Creed)
_____Adventure (Elder Scrolls, Diablo)
_____Arcade (Fruit Ninja, Angry Birds, Pac-Man)
_____Fighting (Street Fighter)
_____Puzzle (Legend of Zelda)
_____Racing (Forza, Need for Speed)
_____Roleplay (Fallout 3)
_____Shooter (Halo)
_____Simulation (Sims, Farmville)
_____Sports (Madden)
_____Strategy (Dishonored)

How often do you play?

__Daily ___Several times per week ___Several times per month ____Almost never ___Never

Have you ever played a game from the Portal Series? Yes No

Have you ever played a game from the Halo Series? Yes No

Appendix B

Each question may have more than one correct answer.

What type of clothing did the people wear?

a. Officer uniforms
b. T-shirts
c. Store uniforms
d. Suits

What state did the event take place in?

a. Texas
b. Tennessee
c. Kentucky
d. Iowa

What kind of business did the event occur in?

a. Department store
b. Tourist shop
c. Antique store
d. Gas station

What did the person use to shoo the deer?

a. Golf club
b. Baseball bat
c. Paddle
d. Cane

What county did this take place in?

a. Jasper
b. Dade
c. Lawrence
d. Polk

What items were in the shop? (May be more than one correct answer)

a. Purses
b. Plates
c. Cups
d. Sunflowers
e. Teddy bears
f. Potato chips
g. State flag
h. Tractors
i. Wooden bear statue

How many times did the deer run toward the exit?

a. 1
b. 4
c. 3
d. 5

What does the person shooing the deer hide behind?

a. Chair
b. Bookshelf
c. The counter
d. Recliner

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 34—43

The Relationship between Physical Punishment and Norm-Breaking Behavior in Undergraduate College Students

Arianne Fisher, Monica Jo Anderson, and Carol L. Patrick *
Fort Hays State University

Abstract—Much research has been done on physical punishment in childhood and its possible long-term effects. Physical punishment has been shown to be related to several types of unwanted behaviors, including law breaking, which can be classified as a norm-breaking behavior. The present study attempted to see if physical punishment in childhood was related to norm-breaking behaviors that were not against the law, or were fairly minor and common forms of law breaking, by studying 75 undergraduate college students. Participants were assessed using *The Relationship between Parenting Patterns and Behavioral Tendencies in College Students* survey. Results showed participants who were physically punished in childhood were significantly more likely to break norms than participants who were not physically punished. Participants disciplined by the loss of privileges and participants disciplined by non-punishment techniques were not significantly more likely to break norms than participants who were not. Implications of these findings and others like these are discussed.

Keywords: physical punishment, norm-breaking, loss of privileges, parenting

Scientists from many disciplines, including criminal justice, psychology, sociology, and others, study the causes of norm-breaking behavior in an attempt to find solutions to the problem (Pfohl, 1994). The problem of norm-breaking is a complicated one; it is doubtful that only one factor influences this behavior. Understanding the factors that may affect norm-breaking behavior will help society understand how to reduce the number of individuals who participate in these unwanted activities.

The purpose of the present study was to examine one possible influence on norm-breaking behavior in adults: the style of discipline in childhood. Specifically, the present study examined the relationship between physical punishment in childhood and norm-breaking behavior in adulthood by studying undergraduate college students. To examine the links between punishment and norm-breaking, the concepts of punishment and norm-breaking must first be understood.

Norm-Breaking Behavior

A social norm is defined as "a rule of conduct derived from a social behavioral expectation" (Elsenbroich & Gilbert, 2014, p. 4). This can include culturally-determined laws, rules, and unwritten societal expectations for behavior that develop and change over time. Norm-breaking, then, is the act of violating a social norm of some kind. These laws, rules, and expectations are widely accepted by society. Individuals who break social norms are violating an important societal contract governing acceptable behavior and maintaining order. In addition to being socially undesirable, norm-breaking behavior can lead to a number of unwanted consequences. Most norms

*Carol L. Patrick served as Faculty Sponsor.

are enforced because they help society function smoothly, and violations of these expectations generally involve damage to individuals or society as a whole (Elsenbroich & Gilbert, 2014; Pfohl, 1994). Therefore, norm-breaking behaviors are not actions contributing to the good of society, especially when they involve a lack of compliance with laws. Norm-breaking behavior may also have negative impacts on the individual (besides direct impacts such as being physically harmed or forced to pay a fine of some sort). In favor of following social expectations for behavior, one study found complying with norms is related to good health and low levels of stress (Nygren, Janlert, & Nygren, 2011).

Norm-breaking behavior has had many hypothesized causes throughout history. At various points in the past, society believed that deviant behavior was caused by hedonism, physical illness, demonic possession, and social chaos (Pfohl, 1994). Now, some believe discipline in childhood may contribute to norm-breaking behavior. Types of discipline that may contribute to this are discussed below.

Discipline

Researchers have defined skilled discipline in general as involving several factors. These factors include correctly identifying problem behaviors and intervening before the behavior is severe, directing the child toward positive behavior, using mild punishment when necessary (defined as time outs or privilege loss), and following up with the child to encourage positive behavior (Capaldi, Chamberlain, & Patterson, 1997). Discipline can take many forms and may be difficult to classify into categories. Several different classification schemes have been proposed. One popular classification groups disciplinary actions into three categories: induction techniques, love withdrawal techniques, and power-assertion techniques (Hoffman & Saltzstein, 1967). Induction techniques include explaining the consequences of a particular negative behavior on other people to a child. Love withdrawal includes ignoring a child, refusing to speak to a child, or saying one dislikes a child. Power assertion techniques include physical punishment (whether threatened or carried out) and the removal of privileges. Power assertion techniques may also be split into two categories: aggressive (physical punishment) and non-aggressive (time out and removal of privileges, Lopez, Schneider, & Dula, 2002).

The uses of different types of discipline have been debated. Loss of privileges (such as time out) has been shown to be successful when used consistently (Kremer, Smith, & Lawerence, 2010). Some research has argued that strictly positive approaches (i.e., non-punishment techniques like discussion with children and rewarding good behavior) to discipline are not effective because at least mild punishment techniques are necessary to deter inappropriate behavior (Baumrind, 1997; Wells, 1997). Other studies, however, indicate punishments and rewards undermine the real justification for the expected behavior, and parents should help children be intrinsically motivated, instead of the children being given an external reason for good behavior (McCord, 1997). A better understanding of the effects of various types of childhood discipline is necessary to help settle this debate.

Physical punishment has been researched extensively (Kremer et al., 2010; Lansford, Wager, Bates, Pettit, & Dodge, 2012; Leary, Kelley, Morrow, & Mikulka, 2008; McKinney, Milone, & Renk, 2011; Muller, Hunter, & Stollak, 1995; Simons, Johnson, & Conger, 1994; Taylor, Manganello, Lee, & Rice, 2010). This type of behavior can potentially be transmitted through generations. Research has found support for an approach to this phenomenon that is consistent with social learning theories, meaning that children learn this behavior from their parents and then use the same actions on their own children as well (Muller et al., 1995). Physical punishment has been linked to many negative behaviors, including aggression and externalizing behaviors (Lansford et al., 2012; Taylor et al., 2010). Most of these very specific factors could potentially fall under the large concept of norm-breaking behavior. It is necessary to see if physical punishment has an effect on norm

-breaking behavior overall, or if it is just these few specific areas.

Physical Punishment and Unwanted Behaviors

Most of the research findings on physical punishment and unwanted behaviors are consistent in reporting physical punishment as related to higher levels of unwanted behavior (Lansford et al., 2012; Leary et al., 2008; McKinney et al., 2011; Parent et al., 2011; Taylor et al., 2010). For example, more frequent spanking is associated with higher levels of aggression in 3-year-old or 5-year-old children (Taylor et al., 2010).

In another study, mothers and teachers reported data when children were 6, 7, and 8-years-old, and this data suggested spanking overall was related to more externalizing behavior in children (Lansford et al., 2012). However, this study reported no significant difference between the levels of externalizing behavior in children who experienced no spanking and children who experienced mild spanking. Simons et al. (1994) suggested inconsistent physical discipline was associated with increased problem behaviors in children. These two studies could support hypotheses stating that physical punishment itself is not associated with norm-breaking behavior, but rather it is the associated factors, such as the frequency and consistency of the use of physical punishment, related to these unwanted behaviors.

Other studies have found similar results regarding physical punishment. Parent et al. (2011) found harsh discipline is related to disruptive behavior in both boys and girls. Harsh discipline and an authoritarian parenting style (characterized by strict rules and harsh punishments, little warmth, and little reasoning with children) have been linked with poor adjustment in young adults as well (McKinney et al., 2011).

Most of the previously-discussed research focuses on the conduct of young children in relation to the ways they are disciplined. One study on college students did find physical punishment in childhood was related to higher levels of depression, problems with identity, and poor social relationships (Leary et al., 2008). However, to our knowledge, besides this study by Leary and colleagues and one by McKinney and colleagues (2011), research does not exist to examine the lasting effects of physical discipline in childhood on adults. The purpose of the current study was to help address this gap in the research literature and expand the understanding of the effects of physical discipline in childhood on norm-breaking behavior overall. We hypothesized the following:

a. Participants exposed to physical punishment in childhood will report engaging in more norm-breaking behaviors than participants not exposed to physical punishment.
b. Participants exposed to physical punishment in childhood will report engaging in more frequent norm-breaking behaviors than participants not exposed to physical punishment.
c. No difference in reported total norm-breaking behaviors will be found between participants disciplined by loss of privileges and participants not disciplined by loss of privileges.
d. No difference in the reported frequency of norm-breaking behaviors will be found between participants disciplined by loss of privileges and participants not disciplined by loss of privileges.
e. No difference in reported total norm-breaking behaviors will be found between participants disciplined by non -punishment techniques and participants not disciplined by non-punishment techniques.
f. No difference in the reported frequency of norm-breaking behaviors will be found between participants disciplined by non-punishment techniques and participants not disciplined by non-punishment techniques.

Method

Participants

Participants were 75 undergraduate students from Fort Hays State University classes with instructor permission. There were 30 male participants and 45 female participants. The participants ranged in age from 18 to 34 (M = 20.53, SD = 3.02). A total of 58 participants (77.3%) reported being Caucasian, 8 participants (10.7%) reported being Hispanic, 5 participants (6.7%) reported being African American, 1 participant (1.3%) reported being Asian, 1 participant (1.3%) reported being Native American., 1 participant (1.3%) reported they preferred not to respond, and 1 participant (1.3%) did not mark a response to this question. There were 30 participants (40%) who reported growing up in a frontier area, 24 (32%) who reported growing up in a rural area, and 21 (28%) who reported growing up in an urban area.

Materials

To measure participants' norm-breaking and style of discipline in childhood, an instrument was constructed called *The Relationship between Parenting Patterns and Behavioral Tendencies in College Students Survey* (see Appendix A). The survey consisted of 25 questions about various norm-breaking behaviors. Participants marked "yes" or "no" about participating in the behavior. If they marked "yes," participants were asked to report how frequently they participated in the behavior. The frequency options were "less than once a year," "once a year," "once every few months," "once a month," "once a week," and "daily." The total "yes" answers were summed to create a variable indicating the number of total items endorsed, called norm-breaking total. The frequency options were numbered 0-6 and were also summed, to create a variable called norm-breaking frequency total. A zero was counted if the participant had answered that they had not done a particular norm-breaking act. Internal consistency reliability figures for the yes/no scale (α = .88) and frequencies scale (α = .85) were reasonably high.

To measure participants' childhood discipline experiences, three questions were asked. Participants marked "yes" or "no" to report whether they experienced a particular style of discipline. Then, if participants selected "yes," they marked a frequency and intensity for the style of discipline. The frequency options were "a few times ever," "less than once a week," "once a week," "a few times a week," "once a day," and "more than once a day." Intensity was measured on a 1-10 Likert scale with 10 being the most intense. The "yes" answers were once again summed. The frequency options were marked 0-6 and summed, and the intensity options were summed also to calculate totals for all of the different questions. Participants also answered demographic questions about gender, age, ethnicity, and where they grew up (i.e., frontier, 2,500 people or less; rural, 2,501 to 49,999 people; or urban, 50,000 or more people).

Procedure

Students were read a recruiting script to inform them about the study (see Appendix B). If they thought they wanted to participate, they were given an informed consent form to read. There was an opportunity for participants to ask any questions they had about the study. If students decided to participate, they signed the consent forms, which were collected and kept in a separate envelope in a secure location. Participants who signed the consent form were then given the survey to complete. Once the survey was filled out, it was also collected and kept in an envelope separate from the consent forms in a secure location. Participants were given a debriefing form that contained contact information for the researchers, the university counseling center, and the course instructor. They were then thanked and allowed to ask any final questions before they left.

Results

Multiple t-tests were run to examine the effects of physical punishment on norm-breaking behavior. Of the 75 participants, 64 reported being physically punished as a child and 11 did not

Table 1. *Frequency Distribution of Norm-Breaking Behavior*

	Frequencies						
Norm-Breaking Behavior	0 Did not participate in behavior	1 Less than once a year	2 Once a year	3 Once every few months	4 Once a month	5 Once a week	6 Daily
Speeding	5	2	2	10	8	16	32
Parking Illegally	40	7	6	8	4	7	3
Disobeying Traffic Signs	52	3	3	6	3	5	3
Stealing from a Store	62	8	0	5	0	0	0
Cheating	50	9	6	6	3	1	0
Skipping Obligation	10	5	3	23	15	18	1
Lying	27	5	6	22	7	7	1
Line Jumping	53	5	3	7	4	3	0
Stealing from a Person	61	4	5	4	1	0	0
Cell Phone in Theatre	43	4	4	12	8	2	2
Not Paying Admission	60	3	5	5	2	0	0
Lying Online	69	4	1	1	0	0	0
Fake ID	69	2	1	2	0	1	0
Texting and Driving	7	5	6	6	12	15	24
No Seatbelt	36	0	1	7	6	15	10
Violating Dress Code	66	3	2	0	1	2	1
Littering	43	3	5	11	8	4	1
Taking Last Item	51	2	6	11	3	2	0
Express Checkout	51	4	3	9	3	3	2
Bright Headlights	54	5	4	9	1	2	0
Group Project	55	3	4	12	0	1	0
Not Tipping	50	7	3	8	6	1	0
Late Assignment	38	7	6	11	10	3	0
Smoking	67	1	0	3	1	2	1
Illegally Downloading	37	1	6	12	10	7	2

report being physically punished as a child. A one -tailed independent samples *t*-test revealed participants that experienced physical punishment ($M = 10.11$, $SD = 6.82$) broke norms significantly more than participants who did not experience physical punishment ($M = 6.82$, $SD = 2.64$), $t(29.13) = -3.09$, $p < .01$. Effect sizes were reasonably high (Cohen's $d = -.64$; effect size r

= .22). The results of another one-tailed independent samples t-test revealed participants who were physically punished (M = 34.59, SD = 18.63) broke norms significantly more frequently than those participants who were not physically punished (M = 22.45, SD = 10.35), $t(73)$= -2.10, p < .05. Effect sizes were sizeable (Cohen's d = - .81; effect size r = .24). The frequencies of answers to the norm-breaking items and punishment items are included in Tables 1 and 2. The distribution of participants across childhood discipline styles is included in Table 3.

Independent *t*-tests were run to examine the effects of discipline by loss of privileges on norm-breaking behavior. Of the 75 participants, 65 reported being disciplined by loss of privileges and 10 did not report being disciplined this way. A two-tailed independent samples t-test revealed participants who were disciplined by the loss of privileges (M = 9.95, SD = 5.54) did not break norms significantly more than participants who were not disciplined by the loss of privileges (M = 7.50, SD = 4.27), $t(73)$ = -1.34, p > .05. A second two-tailed independent samples *t*-test revealed participants who were disciplined by loss of privileges (M = 34.14, SD = 18.43) did not break norms significantly more frequently than participants who were not disciplined by loss of privileges (M = 24.20, SD = 13.79), $t(73)$= -1.63, p > .05.

Independent *t*-tests were also run to examine the effects of non-punishment techniques on norm-breaking behavior. Of the 75 participants, 56 reported being disciplined by non-punishment techniques and 19 did not report being disciplined by non-punishment techniques. A two-tailed independent samples t-test revealed that participants who were disciplined using non-punishment techniques (M = 10.11, SD = 5.67) did not break norms significantly more than participants who were not disciplined using non-punishment techniques (M = 8.21, SD = 4.50), $t(73)$= -1.32, p > .05. Another two-tailed independent samples t-test revealed participants who were disciplined using non-punishment techniques (M = 34.77, SD = 18.96) did not break norms significantly more frequently than those who were not disciplined using non-punishment techniques (M = 27.05, SD = 14.32), $t(73)$= -1.62, p > .05.

Discussion

These results show participants who were physically punished in childhood were significantly more likely to participate in norm-breaking behavior than participants who were not physically punished. This supported our first hypothesis. Participants who were physically punished also broke norms significantly more frequently than participants who were not physically punished, supporting our second hypothesis. Participants who were disciplined by loss of privileges or non-punishment techniques did not engage in significantly more norm-breaking behavior or significantly more frequent norm-breaking behavior than participants who were not disciplined by these techniques, supporting our third, fourth, fifth, and sixth hypotheses.

Table 2. *Frequency Distribution of Childhood Discipline Styles*

	Frequencies						
Style of Discipline	0 Did not receive discipline style	1 A few times ever	2 Less than once a week	3 Once a week	4 A few times a week	5 Once a day	6 More than once a day
Physical	11	31	13	7	9	3	1
Loss of Privileges	10	26	20	7	10	1	1
Non-punishment	19	10	12	10	15	6	3

Table 3. *Distribution of Participants Across Childhood Discipline Styles*

	Style of Discipline							
	Physical Only	Loss Only	Non Only	Physical + Loss	Physical + Non	Loss + Non	Physical + Loss + Non	No Discipline Reported
Number of Participants	2	4	0	9	5	4	48	3

The results of this study lend support to many of the previous research findings on this topic. Most studies have supported the hypothesis that spanking and physical punishment are related to more unwanted behaviors (Lansford et al., 2012; Leary et al., 2008; McKinney et al., 2011; Parent et al., 2011; Taylor et al., 2010). This study addressed norm-breaking behavior as a whole instead of specific types such as aggression, externalizing behaviors, or disruptive actions. This study also examined the relationship in young adults rather than children, as most other studies have done. The relationship between physical punishment and norm-breaking behavior was demonstrated, which has implications for real-world scenarios.

Spanking has been shown to relate to norm-breaking behavior in many studies (Lansford et al., 2012; Leary et al., 2008; McKinney et al., 2011; Parent et al., 2011; Taylor et al., 2010). The body of research on this topic may influence parents to consider their disciplinary choices. If physical punishment has been shown to be related to norm-breaking behavior, choosing different and more effective types of discipline may help reduce the problem of norm-breaking behavior in society. Parents should consider this area of research when making decisions about discipline with their own children. Physical punishment does not seem to be the best choice for parents to make. The current study does seem to support the conclusions made by many other researchers in this area, but it does have limitations that must be taken into consideration.

First of all, the sample included college students selected from a small Midwestern university, and the results may not generalize well to other populations. The percentage of participants who reported being Caucasian (77.3%) was much higher than any other ethnicity reported. There was a difference in sample size between participants who reported experiencing each type of punishment and participants who reported not experiencing each type of punishment that could influence the results. Many of the participants also reported experiencing multiple styles of discipline, which could make it difficult to attribute an effect to one particular type of discipline with certainty. A final limitation was the self-selection of participants. A participant who experienced severe physical punishment as a child may not feel comfortable participating in the study. Therefore, the sample may not be entirely representative of the population.

Future research should attempt to replicate this study on a larger and more diverse sample. The results need to be repeated several more times with different samples before the reported effect can be confirmed. Future studies could also examine the effects of different types of physical punishment to determine if all physical punishment is positively related to norm-breaking behavior or if the relationship only holds true for one specific act of physical punishment. Future research should also attempt to study participants who experienced only one of the types of discipline to better isolate and understand the effects of each style of discipline on future norm-breaking behavior. Future research should also study this specific type of norm-breaking behavior to better understand the full relationship between physical punishment and norm-breaking behavior. More research is needed in this area to support the idea

that physical punishment is related to norm-breaking behavior before society may be willing to change its expectations for disciplining children. If the link continues to be supported, however, the implications of these findings of this area of research as a whole cannot be ignored.

References

Baumrind, D. (1997). The discipline encounter: Contemporary issues. *Aggression and Violent Behavior, 2*(4), 321-335. doi:10.1016/S1359-1789(97)00018-9

Capaldi, D. M., Chamberlain, P., & Patterson, G. R. (1997). Ineffective discipline and conduct problems in males: Association, late adolescent outcomes, and prevention. *Aggression and Violent Behavior, 2*(4), 343-353. doi:10.1016/S1359-1789(97)00020-7

Elsenbroich, C., & Gilbert, N. (2014). *Modeling norms*. London, England: Springer.

Hoffman, M. L., & Saltzstein, H. D. (1967). Parent discipline and the child's moral development. *Journal of Personality and Social Psychology, 5* (1), 45-57. doi:10.1037/h0024189

Kremer, M., Smith, A. B., & Lawrence, J. A. (2010). Family discipline incidents: An analysis of parental diaries. *Journal of Family Studies, 16* (3), 251-263. doi:10.5172/jfs.16.3.251

Lansford, J. E., Wager, L. B., Bates, J. E., Pettit, G. S., & Dodge, K. A. (2012). Forms of spanking and children's externalizing behaviors. *Family Relations: An Interdisciplinary Journal of Applied Family Studies, 61*(2), 224-236. doi:10.1111/j.1741-3729.2011.00700.x

Leary, C. E., Kelley, M. L., Morrow, J., & Mikulka, P. J. (2008). Parental use of physical punishment as related to family environment, psychological well-being, and personality in undergraduates. *Journal of Family Violence, 23*(1), 1-7. doi:10.1007/s10896-007-9124-9

Lopez, N. L., Schneider, H. G., & Dula, C. S. (2002). Parent discipline scale: Discipline choice as a function of transgression type. *North American Journal of Psychology, 4*(3), 381-393.

McCord, J. (1997). Discipline and the use of sanctions. *Aggression and Violent Behavior, 2* (4), 313-319. doi:10.1016/S1359-1789(97) 00017-7

McKinney, C., Milone, M., & Renk, K. (2011). Parenting and late adolescent emotional adjustment: Mediating effects of discipline and gender. *Child Psychiatry and Human Development, 42*(4), 463-481. doi:10.1007/ s10578-011-0229-2

Muller, R. T., Hunter, J. E., & Stollak, G. (1995). The intergenerational transmission of corporal punishment: A comparison of social learning and temperament models. *Child Abuse & Neglect, 19*(11), 1323-1335. doi:10.1016/0145-2134(95)00103-F

Nygren, K., Janlert, U., & Nygren, L. (2011). Norm compliance and self-reported health among Swedish adolescents. *Scandinavian Journal of Public Health, 39*(1), 44-50. doi:10.1177/1403494810389846

Parent, J., Forehand, R., Merchant, M., Edwards, M. C., Conners-Burrow, N. A., & Jones, D. J. (2011). The relation of harsh and permissive discipline with child disruptive behaviors: Does child gender make a difference in an at-risk sample. *Journal of Family Violence, 26*(7), 527-533. doi:10.1007/s10896-011-9388-y

Pfohl, S. (1994). *Images of deviance & social control: A sociological history* (2nd ed.). Long Grove, IL: Waveland Press, Inc.

Simons, R. L., Johnson, C., & Conger, R. D. (1994). Harsh corporal punishment versus quality of parental involvement as an explanation of adolescent maladjustment. *Journal of Marriage and Family, 56*(3), 591-607. doi:10.2307/352870

Taylor, C. A., Manganello, J. A., Lee, S. J., & Rice, J. C. (2010). Mothers' spanking of 3-year-old children and subsequent risk of children's aggressive behavior. *Pediatrics, 125*(5), 1057-1065. doi:10.1542/peds.2009-2678

Wells, K. C. (1997). The death of discipline: Is the requiem premature? Aggression *and Violent Behavior, 2*(4), 337-341. doi:10.1016/S1359-1789(97)00019-0

Author Note

Correspondence may be addressed to: Correspondence may be addressed to: Carol L. Patrick, Ph.D., Department of Psychology, Martin Allen Room 213, 600 Park St., Fort Hays State University, Hays, KS, 67601. Email: cpatrick@fhsu.edu. We would like to acknowledge Kayle Holsman and Taylor Tomsic for their contribution to this data collection and analysis..

Appendix A

The Relationship Between Parenting Patterns and Behavioral Tendencies in College Students Survey

The Relationship Between Parenting Patterns and Behavioral Tendencies in College Students Survey

Please respond to the following questions about your behaviors. Please mark "yes" to any of the questions about behaviors you have participated in in the LAST 5 YEARS. If you have not participated in a behavior, please circle "no". If yes, please also report how frequently you have participated in the behavior in the LAST 5 YEARS.

	Yes/No	Less Than Once a Year	Once a Year	Once Every Few Months	Once a Month	Once a Week	Daily
Breaking the speed limit while driving	Yes/No						
Parking a car in a spot designated for someone else (handicapped, staff, etc.)	Yes/No						
Not obeying traffic signals (i.e. stop signs, stoplights, yield signs, etc.) when driving	Yes/No						
Taking items from a store without paying	Yes/No						
Cheating on a test, assignment, or document	Yes/No						
Skipping class, a meeting, or another obligation	Yes/No						
Lying to a friend, family member, employer, or a person having some relationship to you	Yes/No						
Jumping ahead of another person in a line	Yes/No						
Taking an item from another person without their permission	Yes/No						
Talking on or using your cell phone or other device at a movie theatre or other performance	Yes/No						
Entering a movie or other place that charges admission without paying	Yes/No						
Presenting false ideas about yourself as true online	Yes/No						
Using false identification (i.e. a fake id) for any purpose	Yes/No						
Texting or using your cell phone for another purpose while driving	Yes/No						
Not wearing a seatbelt while driving or riding in a car	Yes/No						
Wearing clothes that violate a set dress code	Yes/No						
Littering	Yes/No						
Take the last of something in a place shared by roommates, coworkers, etc. without replacing it	Yes/No						
Using the express checkout lane at a grocery store with more than the allowed number of items	Yes/No						
Driving with your bright headlights on in town or when passing someone	Yes/No						
Not doing equal work as others on an assigned group project at work or school	Yes/No						
Not tipping a server at a restaurant for good service	Yes/No						
Turning in an assignment for work or class after the deadline	Yes/No						
Smoking cigarettes in an area where smoking is prohibited	Yes/No						
Downloading music or movies from unlicensed sources	Yes/No						

Please respond to the following questions regarding ways you were disciplined as a child. Please circle "yes" or "no" in response to whether or not the listed style of discipline was used for you. If yes, please also report the intensity (1-10, 10 being the most intense) and the frequency of the use of this type of discipline.

	Yes/ No	A Few Times Ever	Less than Once a Week	Once a Week	A Few Times a Week	Once a Day	More Than Once a Day	Intensity
Physical punishment (i.e. spanking, slapping, etc.)	Yes/No							1-2-3-4-5-6-7-8-9-10
Loss of privileges (i.e. time out, being grounded, being grounded from favorite items, sent to room, etc.)	Yes/No							1-2-3-4-5-6-7-8-9-10
Nonpunishment techniques (i.e. rewarding good behavior, discussion of alternate solutions to bad behavior, etc.)	Yes/No							1-2-3-4-5-6-7-8-9-10

Please complete the following short demographics questionnaire (circle or fill in the correct answer):

Gender:
Male
Female
Other

Age: _____

Ethnicity:
Caucasian
African American
Asian
Native American
Hispanic
Other _____
I prefer not to respond

Did you grow up in a rural or urban area?
Frontier (2,500 people or less)
Rural (2,501 to 49,999 people)
Urban (50,000 or more people)

Appendix B

Recruiting Script

Hello. My name is _____. I am a student in a psychology Experimental Lab class, and would like to ask you to participate in our study by filling out our survey. The purpose of the study is to study the relationship between parenting patterns in childhood and behavioral tendencies in adulthood.

Your participation will help us to increase our knowledge and understanding of the effects of parenting patterns on adult behavior. Through participation, you may consider the parenting patterns you were exposed to as a child and the ways they may be affecting you as an adult.

You are not required to participate in research. And, if you decide to participate, you may stop at any time. You may receive extra credit or course credit from your instructor for participating. If you decide not to participate, your academic standing in this class, the Department of Psychology, or Fort Hays State University will not be impacted in any way. This is just one of many opportunities for extra credit that may be provided by your instructor.

I have a consent form that gives you more details on our study, if you would like to participate in our study please read the form thoroughly. Once you have read the form and had your questions answered you will be asked to sign the form and return it to us. The survey will take about 15 minutes to complete.

Thank you!

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 44—50

Automaticity of Numerical Processing

Jonathon Halligan and Kenith V. Sobel *
University of Central Arkansas

Abstract—Some processes can become automatic with practice. A process is considered automatic if it occurs even when not relevant to a given task (Tzelgov & Ganor-Stern, 2005). The Stroop task indicates reading is automatic because participants are slower at naming the ink colors of color words when the color word and the ink color do not match (e.g., the word "red" printed in blue ink) than when they do match (e.g., the word "red" printed in red ink). We were interested in determining whether numerical processing is similarly automatic. Because numbers represent magnitude (i.e., a larger building can be built with 9 steel beams than with 3), we manipulated the physical size of target and distractor digits in a visual search experiment. We created four conditions: numerically and physically smaller targets (congruent condition), numerically and physically larger targets (congruent condition), numerically smaller but physically larger targets (incongruent condition), and numerically larger but physically smaller targets (incongruent condition). We hypothesized slower response times in incongruent conditions than congruent conditions, and the results supported our hypothesis..

Keywords: Stroop task, automatic processes, numerical processing

Most people can walk and chew gum at the same time. Scientists explain this ability to perform multiple tasks at once by invoking the notion of automaticity, such that automatic tasks can be performed without investing much attention or effort into them (Moors & De Houwer, 2006). Activities that had initially required lots of mental processing can become automatic with practice. To carry out an unfamiliar activity requires the recruitment of multiple distinct cortical areas, but with practice the disparate neural areas become linked into a single neural circuit (Ashby, Ennis, & Spiering, 2007). Probably the most familiar example of this is driving a car. Novice drivers have to invest a great deal of attention on their driving. But after several years of experience, they can drive as if on autopilot. Driving and other automatic processes are characterized by what Bargh (1994) has dubbed "the four horsemen" of automaticity: efficiency, awareness, intention, and control. Automatic processes are more efficient than non-automatic processes; they occur without awareness or intention and require little mental control. How can researchers tell if a mental process is automatic? Automatic processes are those that occur even when not relevant to a given task (Tzelgov & Ganor-Stern, 2005). The Stroop effect is a classic example.

Stroop (1935), and other researchers who replicated his paradigm (e.g., Sichel & Chandler, 1969), presented items of various colors to participants and asked them to name each item's color. In some trials, the items intended for color naming were color words, so a participant may have seen the word "red" printed in blue ink (incongruent trials) or the word "red" printed in red ink (congruent trials, Sichel & Chandler, 1969). The meaning of the word is irrelevant to naming the word's ink color, and yet response times (RTs) were longer for incongruent trials than congruent trials. Because the meaning of the color word interferes with color naming despite being

*Kenith V. Sobel served as Faculty Sponsor.

irrelevant to the task, researchers commonly explain the Stroop effect by arguing that reading is an automatic process (Augustinova & Ferrand, 2014). Just as with driving, most people have had years of experience reading so it has become automatic.

Given the automaticity of reading, we wondered if the mental processing of numerical values is similarly automatic. Considering both words and numerical digits are symbols representing semantic information, it is reasonable to expect that people process them in similar ways. Because automaticity is commonly the result of prolonged exposure to a given activity (e.g., word reading in the Stroop task, Tzelgov & Ganor-Stern, 2005; Helie, Roeder, & Ashby, 2010), we expected numerical symbols should automatically evoke their respective numerical value in adults because adults have spent a lifetime comparing numerical quantities. Also, because there is a link between numerical and physical size with numerical comprehension (Risko, Maloney, & Fugelsang, 2013), we expected numerical symbols to automatically evoke a sense of physical size. For example, a person intending to bake an apple pie might automatically realize that a recipe requiring 9 apples would make a larger pie than a recipe requiring 2 apples. As Tzelgov and Ganor-Stern (2005) argue, to diagnose numerical processing as automatic, we need a task for which numerical size is irrelevant: visual search.

Visual search is a widely used experimental paradigm for investigating how people visually process a complex environment to distinguish objects of interest (targets) from irrelevant distractions (distractors). It is well known that targets can be distinguished from distractors on the basis of perceptual features such as color, shape, and size (Wolfe & Horowitz, 2004) so a pineapple among blueberries is easy to find because it has a distinct color, shape, and size. However, it is unclear whether the semantic features of targets contribute to visual search performance. Letters have commonly been used as both target and distractor items in visual search experiments, but as Wolfe (1998) notes, participants in these kinds of experiments may have been using perceptual features of the targets (shape, size) rather than semantic features. Indeed, when Krueger (1984) asked participants to search for target digits among letter distractors, he suggested all effects were attributable to shape as opposed to category (i.e., letter versus number). However, Lupyan (2008) found a link between search efficiency and semantics by showing that participants were faster in locating the Old English thorn character (þ), which looks to modern eyes like a blend of the letters ‘p’ and ‘b’, when it was among semantically similar distractors (b and B) than when the þ target was among semantically different distractors (p and B). Apparently, participants could more easily group distractors when they were semantically similar than when they were semantically distinct.

The Stroop effect arises due to a conflict between perceptual (ink color) and semantic (the meaning of color words) properties. To adapt the Stroop effect to the visual search paradigm, we created a similar conflict between the perceptual (physical size) and semantic (numerical size) properties of digits. As can be seen in the screenshots for four experimental conditions in Figure 1, the target digit was always the single item that was either physically larger (the two screenshots on the left) or smaller (screenshots on the right) than all other items (the circles did not appear during the experiment, but were added to the screenshots to indicate which item was the target). Also, we manipulated numerical size, so in two conditions the physical and numerical size were congruent (i.e., physically and numerically smaller or physically and numerically larger) and in the other two conditions were incongruent (i.e., physically smaller but numerically larger or physically larger but numerically smaller). Because the target always had a unique physical size, the perceptual feature of physical size was sufficient to locate the target, and numerical size was irrelevant to the task. Though numerical size is irrelevant, if numerical size is processed automatically, the conflict between physical and numerical size in the incongruent conditions should interfere with visual

processing relative to the congruent conditions. Accordingly, we hypothesized faster response times (RTs) in the congruent conditions than the incongruent conditions.

Method

Participants

The University of Central Arkansas Institutional Review Board accepted our protocol, and all participants were treated according to the ethical guidelines designated by the APA. A total of 80 undergraduate students participated for course credit and were randomly assigned to one of four conditions, 20 participants in each condition. All participants were 18 years of age or older.

Materials

A MacBook laptop presented visual search arrays and collected RTs using a custom-written visual search program. To control the role of shape, we created digits from line segments as seen on digital clocks and used the same four digits (2, 3, 8, and 9) in all conditions. Half of the participants were instructed to search for a numerically small target (2 or 3) among numerically large distractors (8 and 9), and the other half of participants were instructed to search for a numerically large target (8 or 9) among numerically small distractors (2 and 3). We also manipulated the physical size of the digits so half of the participants searched for a target digit physically larger than the distractor digits, and the other half of participants searched for a target digit physically smaller than the distractor digits. Figure 1 contains one screenshot from each of four conditions: a) physically and numerically small targets (congruent); b) physically and numerically large targets (congruent); c) physically small but

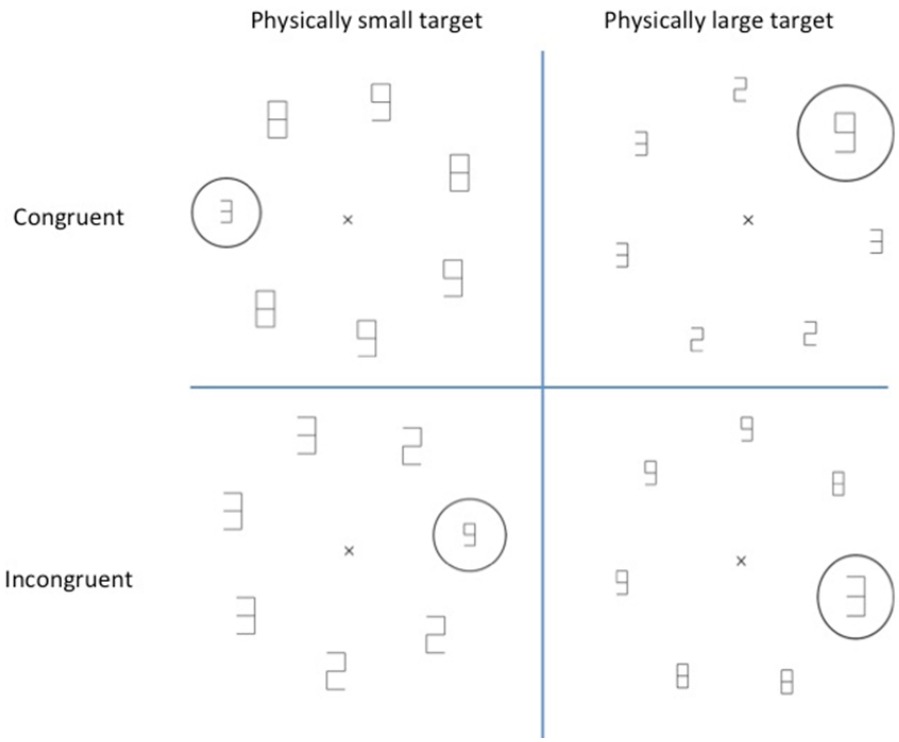

Figure 1. Examples of visual search arrays from congruent trials (upper panels) and incongruent trials (lower panels). The target was physically smaller than distractors (left panels) or physically larger than distractors (right panels). The circles did not appear in the experiment but are presented here to highlight the location of the target digit.

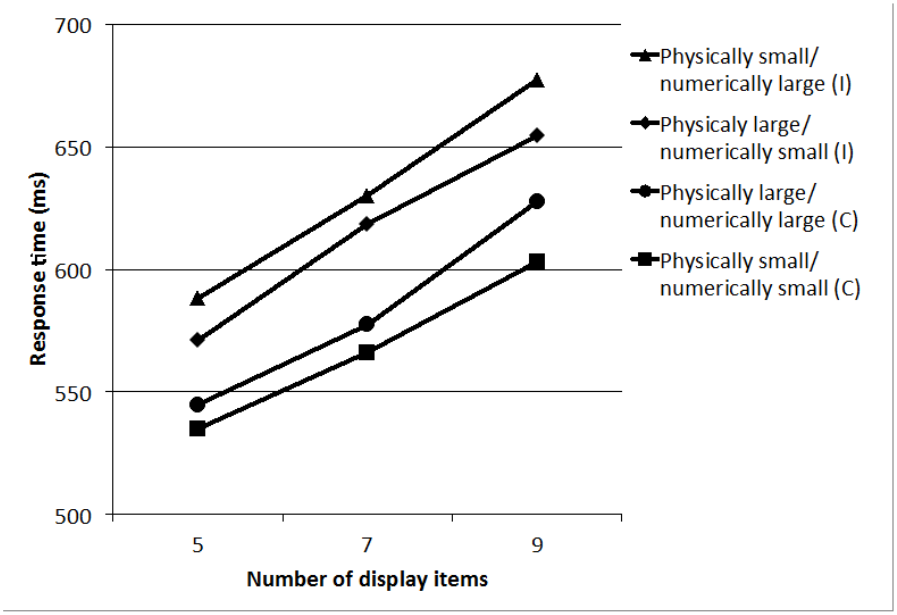

Figure 2. Mean response times for each of the four conditions as a function of display size.

numerically large targets (incongruent); and d) physically large but numerically small targets (incongruent). Each display contained one target digit and either four, six, or eight distractors. The five, seven, or nine items (target plus distractors) were distributed across an imaginary circle centered on a fixation mark.

Procedure

Participants began the experiment by reading instructions presented in a series of screens they could navigate by clicking a button labeled "Next" with the computer mouse. After reading the instructions, the participants searched for a target digit among a series of visual displays. The target was either on the right or left side of each display, and after each array appeared, participants indicated the location of the target digit by pressing the "z" key if the target was on the left side of the display or the "/" key if the target was on the right. The time between the onset of the display and the keypress represented the RT for each trial. The word "Incorrect" appeared onscreen for 1 second if the participant pressed the wrong key (i.e., the participant pressed the "z" key when the target was on the right side of the display or pressed the "/" key when the target was on the left).

The experiment included three levels of display sizes (five, seven, or nine items), two target items (2 and 3 for numerically small targets, 8 and 9 for numerically large targets), and two target locations (left or right) manipulated within participants and replicated 28 times, totaling 336 trials (= 3 display sizes x 2 target items x 2 target locations x 28 replications), presented in random order. The experiment took about 20 minutes to complete. Participants had six practice trials at the beginning of the experiment and another six practice trials after a brief intermission midway through the experiment that were excluded from analysis. Display size was analyzed as a within-participants variable and the numerical and physical sizes of targets were analyzed as between-participants variables.

Results

Mean RTs as a function of display size are depicted in Figure 2. In the first of three analyses, the two congruent conditions were pooled and the two incongruent conditions were pooled to test for the effect of congruence. Mean correct RTs were submitted to a mixed 3 x 2 ANOVA, with display size as a within-participants variable and congruence as a between-participants variable. As is common in visual search experiments, RTs increased as the number of search items increased, $F(2, 156) = 216.87$, $p < .001$, $\eta^2 = 0.73$, because each extra item in the display required a finite amount of processing. Also, as we hypothesized, RTs were longer in the incongruent conditions than the congruent conditions, $F(1, 78) = 4.78$, $p = .030$, $\eta^2 = 0.059$. These results suggest numerical symbols automatically evoke their respective numerical size.

For two follow-up analyses, we pooled data to examine the roles of physical size and numerical size. One analysis pooled the two conditions with physically large targets and the two conditions with physically small targets; another analysis pooled the two conditions with numerically large targets and the two conditions with numerically small targets. Neither physical size, $F(1, 78) = .535$, $p = .467$, $\eta^2 = 0.0068$, nor numerical size, $F(1, 78) = .002$, $p = .954$, $\eta^2 = 2.7 ´ 10\text{-}5$, affected RT.

Discussion

In our visual search experiment, numerical size was irrelevant to the task because targets could be distinguished from distractors solely on the basis of physical size, a perceptual feature of the digits. However, RTs did not differ between conditions with physically larger targets and those with physically smaller targets, nor did RTs differ between conditions with numerically larger targets and those with numerically smaller targets. However, RTs were longer for incongruent trials than congruent trials, indicating that the conflict between physical and numerical size interfered with mental processing. Because the target was always the item with a unique size (either physically larger or smaller than distractors), physical size should have been sufficient information to locate the target without regard to its numerical size, and yet even though numerical size was irrelevant, it interfered with search performance in incongruent conditions. By Tzelgov and Ganor-Stern's (2005) diagnostic criterion for automaticity (i.e., a process is deemed to be automatic if it is executed even when not relevant to the intended task), our results suggest mental processing of numerals is automatic.

Numerical automaticity likely developed from the frequent encounters people have in their daily lives with numerical digits. Perhaps the most common use of numbers in daily life is in comparing numerical magnitudes. Will the number of fat grams in this recipe exceed my daily allowance? Is three hours a sufficient amount of time to reach my destination? Will my bank account balance be enough to cover my expenses? Apparently, people are so often exposed to these kinds of numerical comparisons that mentally processing numerical values becomes automatic.

It may be surprising that numerical processing is automatic considering how common it is for people to struggle with mathematics. Although mathematics is considerably more complex than processing the numerical sizes of single digit numerals, researchers have demonstrated automaticity is essential for mathematical success. Without the ability to automatically make numerical inferences, people are more error-prone as a result of increased cognitive demands (Woodward, 2006). This increase in cognitive load limits the amount of available cognitive resources, which in turn reduces accuracy. Apparently, the difficulty of mathematics lies in the processing of numerical quantities rather than connecting symbols to their numerical quantities.

Numerous fields of human endeavor, such as cockpit design and education, could benefit from applying this research. For instance, flight instruments in the cockpit of an aircraft may

improve the efficiency and accuracy of pilots by displaying numerical values, such as airspeed and altitude, in a way that is congruent with physical size on instruments. We wonder whether the effects of numerical congruence apply to quantities that increase rotationally rather than linearly, such as pitch, roll, and yaw. This is a question which could be addressed by further research. By taking note of the link between numerical and physical size, educators may improve mathematical comprehension in young students. For example, young students learning numerals may better comprehend the number line if the digits increased in physical size along with numerical size.

One limitation of our experiment is that we are unable to specify whether the difference in search times observed between congruent and incongruent conditions is the result of facilitation in the congruent conditions, interference in the incongruent conditions, or some combination of the two. This is a common problem in Stroop-like experiments looking at the effects of congruence (Macleod, 1991), but is a tough problem to solve because researchers have continually struggled to find an adequate control condition in experiments of this nature (Jonides & Mack, 1984). In the future, we look forward to trying to solve this problem by developing an appropriate control condition.

References

Ashby, F. G., Ennis, J. M., & Spiering, B. J. (2007). A neurobiological theory of automaticity in perceptual categorization. *Psychological Review, 114*(3), 632-656. doi: 10.1037/0033-295X.114.3.632

Augustinova, M., & Ferrand, L. (2014). Automaticity of word reading: Evidence from the semantic Stroop paradigm. *Current Directions in Psychological Science, 23*(5), 343-348. doi:10.1177/0963721414540169

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 1-40). . Hillsdale, NJ: Lawrence Erlbaum Associates. Retrieved from: http://www.yale.edu/acmelab/articles/Bargh_1994.pdf

Helie, S., Roeder, J. L., & Ashby, F. G. (2010). Evidence for cortical automaticity in rule-based categorization. *The Journal of Neuroscience, 30*(42), 14225-14234. doi:10.1523/JNEUROSCI.2393-10.2010

Jonides, J., & Mack, R. (1984). On the cost and benefit of cost and benefit. *Psychological Bulletin, 96*(1), 29-44. doi: /10.1037/0033-2909.96.1.29

Krueger, L. E. (1984). The category effect in visual search depends on physical rather than conceptual differences. *Perception & Psychophysics, 35*, 558-564. doi:10.3758/BF03205953

Lupyan, G. (2008). The conceptual grouping effect: Categories matter (and named categories matter more). *Cognition, 108*, 566-577. doi: 10.1016/j.cognition.2008.03.009

MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin, 109*(2), 163-203. doi: 10.1037/0033-2909.109.2.163

Moors, A., & De Houwer, J. (2006). Automaticity: A theoretical and conceptual analysis. *Psychological Bulletin, 132*(2), 297-326. doi:10.1037/0033-2909.132.2.297

Risko, E. F., Maloney, E. A., & Fugelsang, J. A. (2013). Paying attention to attention: Evidence for an attentional contribution to the size congruity effect. *Attention, Perception, & Psychophysics, 75*(6), 1137-1147. doi:10.3758/s13414-013-0477-2

Sichel, J. L., & Chandler, K. A. (1969). The color-word interference test: The effects of varied color-word combinations upon verbal response latency. *Journal of Psychology, 72*, 219-231. doi: 10.1080/00223980.1969.10543502

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology: General, 18*(6), 643

-662. doi:10.1037/0096-3445.121.1.15

Tzelgov, J., & Ganor-Stern, D. (2005). Automaticity in processing ordinal information. In J. I.D. Campbell (Ed.), *Handbook of mathematical cognition* (pp.55-67). New York, NY: Psychology Press.

Wolfe, J. M. (1998). Visual search. In H. Pashler (Ed.), *Attention*. East Sussex, England: Psychology Press.

Wolfe, J. M., & Horowitz, T. S. (2004). What attributes guide the deployment of visual attention and how do they do it? *Nature Reviews, 5*, 1-7. doi:10.1038/nrn1411

Woodward, J. (2006). Developing automaticity in multiplication facts: Integrating strategy instruction with timed practice drills. *Learning Disability Quarterly, 29*(4), 269-289. doi:10.2307/30035554

Author Note

Correspondence may be addressed to: Kenith V. Sobel, Ph.D., Department of Psychology and Counseling, University of Central Arkansas, Conway, Arkansas, 72035. Email: k.sobel@mac.com.

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 51—54

Special Features

Conducting Psychological Analysis: Dramatic

Disturbed Personality: Analysis of the Personality of Charlie Harper on Two and a Half Men

Patrice Crall & Wind Goodfriend *
Buena Vista University

Abstract—Charlie Harper was the main character on the show *Two and a Half Men* for 8 seasons. The show depicts Charlie as a fun-loving but corrupt man with a knack for drinking, smoking, and having a lot of sex. By using the evolutionary theory of mate selection, jealousy, and promiscuity; Alfred Alder's theory of birth order; and Sigmund Freud's psychosexual stages of development, this analysis provides insight into the personality and lifestyle of Charlie Harper .

Keywords: personality, media, pop culture, *Two and a Half Men*

Imagine living in a beach house in Malibu, California. What is even better is that there is a constant flow of available partners coming in and out of this house for causal sexual encounters. Now, imagine living in that same Malibu beach house with the same flow of sexual partners, but now your younger brother and his young, impressionable son are also living in this house with you. This is the general opening plot line for the television show, *Two and a Half Men* (Arhonsohn & Widdoes, 2003). In the show, Charlie Harper, played by Charlie Sheen, must learn to adapt his life and personality to his new houseguests who never leave. This analysis will use the evolutionary theory of mate selection, jealousy, and promiscuity; Alfred Alder's theory of birth order; and Freud's psychosexual stages of development to better understand Charlie Harper's personality.

Evolutionary Theory

Although evolutionary theory works best when thinking back approximately 500 years, its basic ideas still exist (Buss, 2009). In a general sense, evolutionary perspective states that some characteristics will lead to better human survival (e.g., strength or intelligence), while other characteristics work against human survival (e.g., vision impairments or food allergies). Those favorable traits are then passed on to the next generation via natural selection (Darwin, 1859). Technology has nullified the necessity of traits that were once imperative for survival, but those traits continue to be passed on as long as they do not

*Wind Goodfriend served as Faculty Sponsor.

hinder the survival of the human race.

When looking at mate selection, evolutionary personality theory (Buss, 2008; 2009) states that men and women have different personalities based on their differing reproductive needs and parental investments. Therefore, men try to find mates that are physically attractive, young, and fit because these characteristics are signs of health and fertility (Buss, 1991). Women, moreover, will try to find a man that is financially stable and able to support them and potential children. Older, rich men typical signify financial resources (Buss & Barnes, 1986).

Charlie Harper's mating style is quite indicative of evolutionary theory. Charlie is generally attracted to younger, fit, women who are in their prime years of fertility. To name a few, Kandi, Mia, and Chelsea are all women who are younger than Charlie, fit, and fertile; not to mention, each one of these women is beautiful by today's standards. Charlie is the type of man that women search for as a mate because of his ability to provide resources. He appears to be financially stable with his jingle writing business. This money is reflected in his lavish Malibu beach house and in how frivolously he spends his money in bars and on dates.

Since men and women have different parental investments, they experience different types of jealousy related to infidelity (Buss, 2008; 2009). Men are threatened when their female counterpart has sex with another man because it creates a sense of paternity uncertainty if the woman becomes pregnant. In this instance, a man could be frivolously wasting his resources on a child that might not be his. Women, on the contrary, are threatened when their male counterpart falls in love with another woman because this creates a sense of emotional infidelity. As stated earlier, women want men to provide resources when they get pregnant; therefore, when a man falls in love with another woman, the original woman fears that he will utilize his resources on the new woman.

Although Charlie does not outright fear that his women will get pregnant with someone else's baby, he does get jealous when he thinks his women are sleeping with other men; prostitutes being the only exception. If Charlie is sleeping with a married woman, he does his best to make sure that she is only sleeping with him by monopolizing her time and physically wearing her out. Another example is Charlie buying expensive gifts to ensure a woman will continue sleeping with him. Women that Charlie dates get jealous of Charlie's past relationships because these women don't want Charlie falling back in love with these past women. For example, Charlie's fiancé, Chelsea, fears that Charlie is still in love with his past steady girlfriend, Mia, and Chelsea worries Charlie will give his resources to Mia instead of her (Arhonsohn & Widdoes, 2003).

As mentioned previously, men and women have different abilities in producing children (Darwin, 1859). Men reproduce easier than women; all men have to do is have a lot of sex with a lot of women. Women, on the other hand, are pregnant for 9 months per child, and they have a limited amount of time, eggs, and resources necessary to carry each child; therefore, women must be selective with whom they choose to reproduce. With that in mind, evolutionary theory promotes men being more promiscuous than women.

Charlie Harper is essentially the poster child of promiscuity. Charlie sees no shame or problem in sleeping with a different woman every day of the week; in fact, this is a normal week for Charlie (Arhonsohn & Widdoes, 2003). Remember, policies of evolutionary theory are not necessarily applicable to today's society, but those policies continue to persist in society as long as they do not harm the progression of the human race (Darwin, 1859). This helps explain Charlie's promiscuous behavior; although he is not having sex to produce children, Charlie continues to have excessive amounts of casual sex because that is what evolution and society have taught him to do.

Theory of Birth Order

Alfred Adler, a prominent figure in Neo-Freudian psychology, believed that the order in

which an individual was born into his or her family impacts that person's personality. For example, Adler believed that first born and only children receive excessive attention and pampering and are the most likely of children to become a drunkard, pervert, criminal, neurotic, and/or problem child. Alder also stated that middle children are the highest achievers and are most likely to make an extra effort to prove one's self. Finally, Alder believed that youngest children are pampered throughout their lives by everyone in the family, are given more freedom by their parents, and lack initiative (Adler, 1930).

Charlie is the older of two children born to his mother, Evelyn. As mentioned in the introduction, Charlie's younger brother, Alan, played by Jon Cryer, lives with Charlie. Charlie is quite stereotypical of the oldest child in Alder's birth order in almost all aspects. Charlie obviously had problems with his drinking because he is frequently spotted throughout the various seasons drinking at the bar, drinking in excess, and being so drunk that he does not remember what he did the night before (Arhonsohn & Widdoes, 2003). With this evidence, it is without hesitation that Charlie Harper can be considered a drunkard.

Charlie is a pervert in that he deliberately engages in unacceptable sexual behavior. Many of the women Charlie sleeps with are much younger than he is and/or are prostitutes. Charlie is a criminal because does not have a problem breaking the law; he does this by buying sex from prostitutes outside of brothels, driving after consuming too much alcohol, betting illegally on sports, and buying prescription medications illegally. Similarly, Charlie is neurotic because he is very anxious and obsessive with his lifestyle; he becomes upset and anxious when he thinks something will come between him and his drinking (e.g., a medical condition) or having a lot of sex (e.g., being tied down to only one woman; Arhonsohn & Widdoes, 2003).

Psychosexual Stages of Development

Freud (1920) postulated that every human being goes through five psychosexual stages of development; humans go through these stages for biological reasons based on what they are experiencing in their lives (e.g., breast feeding and potty training). Each stage has one erogenous zone, or pleasure region, that is the source of pleasure at that time (e.g., while breast feeding, the mouth is the erogenous zone). Freud also suggested that one may become fixated, or stuck, in one or more stages, and it is those fixations that lead to personality problems later in life.

It appears as though Charlie has become fixated in the oral stage of psychosexual development. The oral stage takes place from birth to 1.5-years-old (Freud, 1920). As termed by the name, the mouth is the erogenous zone at this stage because of an infant's need for breast milk and breastfeeding. There are two different types of fixations that can occur in the oral stage of development. The first fixation is titled oral-passive personality; these individuals are overly dependent, helpless, and infantile. The second fixation is titled oral-sadistic personality; these individuals are cynical and sarcastic in their lives. In both fixations, individuals feel the need to constantly have something in their mouths, such as cigarettes, alcohol, food, fingers, etc.

With strong convictions, it can be said that Charlie Harper is fixated in the oral stage of psychosexual development. This is evidenced by Charlie's addiction to drinking alcohol and smoking cigars; in fact, episodes of *Two and a Half Men* that do not depict Charlie drinking or smoking are rare (Arhonsohn & Widdoes, 2003). Charlie also has an attraction to female breasts that many of his female partners note as a little obsessive. This attitude furthers the evidence in favor of Charlie's oral stage fixation.

Specifically, Charlie has an oral-sadistic personality (Freud, 1920). Charlie is constantly sarcastic and cynical with the people in his life, especially with his younger brother, Alan, and nephew, Jake (played by Angus T. Jones). Examples include: telling Alan they can live together forever; referring to Alan as Forest Gump, bone head, and worthless; frequently making fun of Alan's sex life (or lack thereof); and calling Alan "spine-less" and

a "blood-sucking leech" (Arhonsohn & Widdoes, 2003). Charlie is also sarcastic and cynical with women. Examples include: referring to Evelyn as a heart-less person and telling women what they want to hear, without a willingness to follow through, in order to have sex with them.

Between living in a beautiful Malibu beach house and sleeping with almost any woman he wants, Charlie Harper has a complicated life and an even more complicated personality. He is constantly attending to his drives in accordance with evolutionary theory's mate selection, jealousy, and promiscuity. When he is not doing that, Charlie is trying to overcome the personality he has because he is the oldest child in his family. Finally, Charlie is constantly compensating and living with his oral-sadistic personality that came from being fixated in the oral stage of Freud's psychosexual development. Although his life appears to be perfect on the outside, Charlie Harper's life and time on *Two and a Half Men* ended because his personality became too lucrative and corrupt.

References

Adler, A. (1930). The boy who wants to lead. In W. B. Wolfe (Ed.), *The pattern of life* (pp. 108-132). New York, NY: Cosmopolitan Book Corporation. doi: 10.1037/13354-004

Aronsohn, L. (Writer), & Widdoes, J. (Director). (2003). *Two and a half men* [Television series]. K. Tannebaum (Producer). Burbank, CA: Warner Brothers Burbank Studios.

Buss, D. M. (1991). Evolutionary personality psychology. *Annual Review of Psychology, 42*, doi: 10.1146/annurev.ps.42.020191.002331

Buss, D. M. (2008). Human nature and individual differences: Evolution of human personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 29-60). New York, NY: Guilford Press. Retrieved from http://search.proquest.com/docview/622134714?accountid=26505

Buss, D. M. (2009). The great struggles of life: Darwin and the emergence of evolutionary psychology. *American Psychologist, 64*, 140-148. doi: 10.1037/a001 3207

Buss, D. M., & Barnes, M. (1986). Preferences in human mate selection. *Journal of Personality and Social Psychology, 50*, 559-570. doi: 10.1037/0022-3514.50.3.559

Darwin, C. (1859). *On the origin of species by means of natural selection*. London, England: John Murray. doi:10.1037/13681-000

Freud, S. (1920). Development of the libido and sexual organizations. In G. S. Hall (Trans.), *A general introduction to psychoanalysis* (pp. 277-293). New York, NY: Horace Liveright. doi: 10.1037/10667-020

Author Note

Correspondence may be addressed to: Wind Goodfriend, Ph.D., Psychology Department, 610 W. 4th Street, Buena Vista University, Storm Lake, IA 50588. Email: goodfriend@bvu.edu.

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 55—59

Special Features

Conducting Psychological Analysis: Dramatic

Stigmatization of Mental Illnesses, Step-parenting, and Brief Psychotic Disorder as Portrayed in the Movie The Uninvited

Faith Burdine and Dr. Jenn Bonds-Raacke *
Fort Hays State University

Abstract— *The Uninvited* (2009) is a psychological horror film that depicts an adolescent girl, Anna, who must overcome her mental illness while fighting against her perceived evil step-mother. With the use of previous research, this paper will analyze and relate psychological concepts to the main characters, Anna and her step-mother, Rachel. For example, the portrayal and stigmatization of mental illness in the media will be explored in this movie, as well as negative portrayals of step-parents. Finally, the paper aims to explain how the protagonist's symptoms are consistent with brief psychotic disorder.

Keywords: media portrayals of mental illness, evil step-parents, stigma

The movie, *The Uninvited* (Davison, Guard, & Guard, 2009), is a psychological horror movie that depicts an adolescent girl, Anna, and how she copes with the death of her sick mother and struggles to accept her father's new fiancée. Following her mother's death due to a traumatic house fire as seen through flashbacks, Anna is admitted into a psychiatric hospital for 10 months. The specific reason for Anna's hospitalization is unclear, although there is some reference to cutting behavior. Once Anna returns home from the hospital, she meets her father's fiancée, Rachel. Rachel is beautiful, young, and is depicted as the wicked step-mother. In a twist of fate, Rachel is also the nurse who cared for Anna's mother when she was sick.

Throughout the movie, the viewer watches as Anna and her older sister, Alex, put pieces together about the night their mother died. Anna has a vision of her mother calling someone a murderer and seemingly points at Rachel. This causes both girls to suspect Rachel was involved with their mother's death. When Matt, Anna's boyfriend, is found dead one morning, the girls fear that Rachel is systematically eliminating anyone who stands in her way of marrying Anna and Alex's father, Steven. Since Matt's death is suspicious and violent, Anna and Alex's fear is solidified by the dreams Anna has of a little girl and two little boys who are drugged and stabbed by their nanny,

*Jenn Bonds-Raacke served as Faculty Sponsor.

Mildred Kemp.

When Steven goes on a work trip, the conflict between Rachel and the two girls comes to a head. Rachel tries to sedate Anna, but Anna escapes to the police station. After Anna explains what is happening at her house, the sheriff leaves Anna to supposedly do research on Rachel. The sheriff actually calls Rachel to tell her Anna is at the station, and Rachel arrives to sedate Anna with a syringe of medicine to calm her down enough to bring her back to the house. When the medicine wears off, Anna wakes to a quiet house and a pool of blood outside of her bedroom. Anna follows the trail of blood that leads her to the dumpster outside. Inside the dumpster is Rachel's dead body. Alex walks out of the shadows and tells Anna she had to kill Rachel to save them.

At this point, Steven arrives home and is confronted by Anna who is covered in blood. When questioned, Anna explains that Alex had to kill Rachel. Scared and angered, Steven explains that Alex actually died in the fire that killed their mother and so she could not have killed Rachel. The audience then realizes that Anna was the person who killed Rachel. The fire was accidentally started by Anna. When Anna found out her father was having an affair with Rachel, it is inferred that Anna's intent was to set the main home on fire. Anna goes to get the gas to light the main home on fire. To acquire the gas tank, she must go to the beach home, which is also where her sickly mother resides. As Anna leaves the room with the leaking gas tank, a lit candle is knocked over. Alex then goes in to check on their mother, and as she walks in, the beach home catches on fire, killing both Alex and their mother.

The movie ends with Anna being admitted into the psychiatric hospital again but this time for killing Rachel. It is there the viewer learns the nanny that killed the three children, Mildred Kemp, lives across from Anna's room. It seems that Kemp had the tendency to tell Anna stories when she was first admitted. These stories would range from how Kemp murdered the three children to a prized pearl necklace that was missing. Anna listened and internalized these stories, which may have skewed her idea of reality.

The purpose of this paper is to discuss how mental illness is portrayed in the media and how the stigma of mental disorders can form. Also, the concept of the evil step-mother will be explored and applied to step-parent self-esteem. Finally, this paper aims to explain how the protagonist's symptoms are consistent with brief psychotic disorder.

Mental Illness Stigma

There are six different, but common stereotypes of patients with a mental illness including: rebellious free spirit, homicidal maniac, the female patient as seductress, enlightened members of society, narcissistic parasite, and zoo specimen (Hyler, Gabbard, & Schneider, 1991). In this case, Anna was portrayed as the homicidal maniac. The young protagonist, Anna, is meant to seem normal and in a troubling situation (i.e., her mother passing away and her father potentially marrying a new, younger woman, Rachel). The problem lies in the fact that Anna is constantly saying she is not crazy, meaning she does not have a mental illness. This connection to mental illness and craziness is a popular theme throughout the movie. It is important to note that adolescence can be a time when individuals are constructing their sense of identity and figuring out how they fit into society, all while learning what their opinions and morals are through the growth of their own reality (Arnett, 1995). Thus, the movie, *The Uninvited*, likely has many teenage viewers who are at an important stage in development that can be particularly influenced by media. If those with mental illness are portrayed in a negative light and referred to as "crazy," it can cause the young audience to develop a misunderstanding of mental illness. This impression can follow the teenager throughout his or her life, especially if the media continues to portray mental illness in such a way.

Step-parent Portrayal

The portrayal of mental illness is not the only theme that is misrepresented in The *Uninvited*. The role of a step-parent, specifically the

step-mother, is a main theme throughout the movie as well. Claxton-Oldfield and Butler (1998) explain that the origins of the evil step-mother comes from multiple sources, but more so from famous fairy tales, for example: *Snow White* (Disney & Hand, 1937), *Cinderella* (Disney, Geronimi, Jackson, & Luske, 1950), and *Hansel and Gretel* (Globus, Golan, & Talan, 1987). Other research supports that this stigma can be traced all the way back to the ninth century (Ceglian & Gardner, 2000). It is important to note that, especially in horror movies, the step-mothers are trying to either kill or ridicule their step-children. Even though these stories are centuries-old, they can have an everlasting theme that transcends into modern movie plots. Recent movies do not help diminish this myth, but rather strengthen the negative portrayal of step-mothers, which could impact a child's perceptions and interactions with his or her own step-mother (Claxton-Oldfield, 2000). This perception of step-mothers only being evil, greedy, or selfish continues to have extreme ramifications in today's society and even impacts step-mothers' self-esteem in their familial relationships (Christian, 2005).

The relationship depicted between Rachel and Anna, in the movie *The Uninvited*, is an example of the evil step-mother myth in a modern movie. Rachel is introduced as Anna's future step-mother, and in most scenes Rachel uses a harsh tone of voice when talking to Anna or she is in the shadows of scenes. At one point, Rachel uses the mental institution as a threat to get Anna to comply with her wishes. The movie feeds the stigma when Anna and Alex come to the conclusion that their step-mother killed their mother and is killing people around them so Rachel can have wealth. The movie uses the idea that Rachel was the nurse of Anna's mother when she was sick and was having an affair with Anna's father to further the evil step-mother concept.

Brief Psychotic Disorder

The movie was centered on an adolescent girl who is crippled by a mental illness. Since it is never addressed in the movie what mental illness Anna may have, this paper would like to explain the consistencies with Anna's symptoms and brief psychotic disorder. Anna exhibits three of the four symptoms listed in the Desk Reference to the Diagnostic Criteria from the DSM-5. These include: delusions, hallucinations, and grossly disorganized behavior. Each of these are displayed throughout the movie in vastly different ways.

Delusions. Delusions are false ideas or constructs that are based on incorrect inferences about the individual's reality (American Psychiatric Association, APA, 2013). Throughout the movie, Anna is convinced of Rachel's guilt, but it is a just a delusion. Anna thinks Rachel is a murderer; therefore, Rachel is after her and Alex with the goal to marry their father. Alex feeds into Anna's delusion by supporting the idea that Rachel set the beach house on fire and killed the girls' mother.

Hallucinations. Hallucinations are the false perceptions of reality, and they can be visual, auditory, tactile, or olfactory (APA, 2013). The main hallucination that Anna has is her visual hallucination of her dead sister, Alex. As it is revealed at the end of the movie, Alex was killed in the fire that also killed their mother. However, Anna thinks that Alex is still alive and even interacts constantly with Alex. Alex is seen as Anna's confidant and is always there when Anna seems to be having a hard time adjusting to her surroundings after she is released from the hospital. Alex is with Anna throughout the movie and is giving Anna tips and advice.

Grossly disorganized behavior. Grossly disorganized behavior is unusual behavior that can range from childlike silliness to intense aggression from the individual (APA, 2013). Anna's behavior towards Rachel becomes very chaotic and vicious. Anna shuts the door on Rachel's arm, nearly breaking it. Also, Anna strikes Rachel's head with a bottle, causing Rachel to lose consciousness for a few moments. When Rachel attempts to give Anna a mild sedative, Anna begins kicking and screaming. Finally, it is implied that when Rachel is

putting Anna to bed, Anna takes a knife and stabs Rachel to death.

Conclusion

The Uninvited portrays Anna as young adolescent that appears to be, in the beginning, coming to terms with the death of her mother with the help of her sister. The purpose of this paper was to discuss: a) the stigma of mental illness in a popular movie, b) step-parent stigma and self-esteem due to media portrayal, and c) a cautious diagnosis for the protagonist, Anna.

Something that is very apparent is the stigmatization of mental illness in the movie. Specifically, one of the six common stereotypes of mental illness patients, the homicidal maniac, was depicted in the movie. By using one of these stereotypes of an individual with mental illness, the movie exploits mental illness as something that is evil or that should be locked away. When Anna is being arrested at the end of the movie, she has this lifeless gleam in her eyes. This torpid state indicates that she was never really present. This alludes to the viewer that Anna was evil the whole movie, therefore feeding into the homicidal maniac stereotype explained earlier. Society should be exhibiting care and empathy rather than fear when it comes to mental illness.

The evil step-parent myth was also a main theme in the movie. Though the movie tried to brighten the viewers' outlook of Rachel when it is revealed she was just trying to help, the damage was already done. Giving Rachel dark angles in scenes and condescending lines helped feed off the fear of step-parents and fuel the myth. The most important component to this myth was the casting for the step-mother role. In fairy tales, the step-mother was explained to be beautiful but dangerous (Claxton-Oldfield & Butler, 1998), and the actress who plays this role in the movie is both of those things. Rachel is aloof and scary while being beautiful. Throughout the movie, it is intended for the viewer be scared of Rachel or that Rachel wants to harm Anna and Alex. The movie aims to make the viewer feel that Rachel is murderous and evil, just like step-mothers in fairy tales and this feeds the fear of step-parents.

The main purpose for this movie was entertainment but because of that the line between fiction and nonfiction is blurred. The mental illness Anna portrays was not explained in the movie, so this paper attempted to explain what mental illness Anna may have due to the behaviors she exhibited. Based on what the movie showed, it can be assumed that Anna suffers from brief psychotic disorder. Her interactions with her dead sister, mother, boyfriend, and the three children were sufficient enough to be considered hallucinations. Since Anna was fixated on the thoughts of her step-mother being a murderer, this delusion led to Anna murdering Rachel. From the limited scenes available, Anna's behavior appears to be disorganized.

While analyzing this movie, it is important to remember that it is a horror movie made for entertainment value and not informational purposes. The main theme of this movie was horror, and it definitely lived up to the genre. Even though the movie may not diminish the myth about evil step-mothers or mental illness stigma, it does have some factual basis for Anna's disorder. The point this paper was trying to make was the stigma with mental illnesses is often exploited in horror movies, and it is essential to remind viewers whether the movie is factually based, allowing viewers to form opinions accordingly.

References

American Psychiatric Association (2013). *Desk reference to the diagnostic criteria from DSM-5*. Arlington, VA: Author. doi:10.5860/choice.51-1822

Arnett, J. J. (1995). Adolescents' uses of media for self-socialization. *Journal of Youth and Adolescence, 24*(5), 519-533. doi:10.1007/BF01537054

Ceglian, C. P., & Gardner, S. (2000). Attachment style and the 'wicked stepmother' spiral. *Journal of Divorce and Remarriage, 34*, 111-129. doi:10.1300/J087v34n01_07

Christian, A. (2005). Contesting the myth of the "wicked stepmother": Narrative analysis of an

online stepfamily support group. *Western Journal of Communication, 69*(1), 27-47. doi:10.1080/10570310500034030

Claxton-Oldfield, S., & Butler, B. (1998). Portrayal of stepparents in movie plot summaries. *Psychological Reports, 82*(3), 879-882. doi:10.2466/PR0.82.3.879-882

Davison, D. (Producer), Guard, C. (Director), Guard, T. (Director). (2009). *The Uninvited* [Motion Picture]. United States of America: Paramount.

Disney, W. (Producer), Geronimi, C. (Director), Jackson, W. (Director), & Luske, H. (Director). (1950). *Cinderella*. [Motion Picture]. United States of America: Walt Disney Pictures.

Disney, W. (Producer), & Hand, D. (Director). (1937). *Snow white and the seven dwarfs*. [Motion Picture]. United States of America: Walt Disney Pictures.

Globus, Y. (Producer), Golan, M. (Producer), & Talan, L. (Director). (1987). *Hansel and Gretel* [Motion Picture]. United States of America: MGM.

Hyler, S. E., Gabbard, G. O., & Schneider, I. (1991). Homicidal maniacs and narcissistic parasites: Stigmatization of mentally ill persons in the movies. *Hospital & Community Psychiatry, 42* (10), 1044-1048. doi:10.1176/ps.42.10.1044

Author Note

Correspondence may be addressed to: Jenn Bonds-Raacke, Ph.D., Psychology Department, Fort Hays State University, 600 Park Street, Hays, KS. Email: jmbondsraacke@fhsu.edu.

Journal of Psychological Inquiry
2016, Vol. 21, No. 2, pp.# 60—63

Special Features

Conducting Psychological Analysis: Dramatic

Review of Schizophrenia in Harry Potter

Morgan Baker and Krista Fritson *
University of Nebraska at Kearney

Abstract—The following article interprets the presence of schizophrenia in the character Harry Potter in the movie *Harry Potter and the Sorcerer's/Philosopher's Stone*. Harry's schizophrenic symptoms are tethered throughout the movie in the form of hallucinations, delusions, and paranoia. Harry had a traumatic past, which likely triggered or exacerbated his psychosis. Harry also fits the DSM-5 criteria for the diagnosis of schizophrenia, and his behavior can be associated with psychological concepts from the sociocultural, biological, and integrated model. Although the movie represents a magical and adventurous world, another interpretation could be that Harry is suffering from a severe mental illness that is affecting his life, relationships, and creates a loss of reality, suggesting this magical world is all in his mind .

Keywords: Harry Potter, schizophrenia, psychosis, hallucinations, delusions, analysis, abnormal

In the movie, *Harry Potter and the Sorcerer's/Philosopher's Stone* (Heyman & Columbus, 2001), Harry is a young boy who is introduced to a magical world full of witches and wizards. This popular film series is based off of a fantasy storyline, but what some people might not realize is that Harry Potter could possibly be schizophrenic. His view of the world is far from reality, and his past trauma could also influence his behavior and thinking. Harry and many of his symptoms fit the DSM-5 criteria for schizophrenia and may be associated with other psychological concepts as well.

The movie's storyline introduces young Harry to both the school of Hogwarts and to Lord Voldemort. Harry's parents, who were also wizards, were killed by Lord Voldemort, the most powerful and dark wizard in the world. When Voldemort tries to kill Harry, his spell backfires onto himself and leaves only a scar on Harry's forehead. Harry then lives with his aunt and uncle who treat him like a servant and hardly a human being. Harry first finds out about magic when he is accepted into Hogwarts School of Witchcraft and Wizardry, which his aunt and uncle try to hide from him. Harry can also speak to and hear the voices of snakes. Harry goes to Hogwarts and meets new friends, Ron and Hermione, learns magical spells, and goes on new adventures. He then learns not all of his new friends can be trusted

*Krista Fritson served as Faculty Sponsor.

and is faced with his enemy, Lord Voldemort. Later in the movie series, a prophecy is revealed stating Harry is the chosen one to kill Lord Voldemort and save the world.

When Harry lives with his aunt and uncle, it seems to be set in reality. While living in this house, Harry has a small room under the stairs and is forced to serve the family on command. Harry is also subjected to verbal and physical abuse within a dysfunctional family dynamic. The favoritism in the family is centered on the son, Dudley, and Harry is continually mocked. Harry is deprived of a stable childhood, and the trauma he encounters from his aunt and uncle could be a trigger for Harry's psychosis.

It can be theorized that the magical world filled with wizards is all created in Harry's mind, which can be associated with hallucinations. According to Gomez, Kaehler, and Freyd (2014), a hallucinatory experience can include a false perception in auditory and visual senses interrupting cognitive processes. In the movie, Harry and the family go out for Dudley's birthday to a zoo. While Harry is looking at a boa constrictor, he notices he can communicate with the snake and hears the snake's voice. This scene can be interpreted as an auditory hallucination of hearing voices, such as the snake. Not only can Harry hear the snake's voice, but later in the series he can hear Voldemort's voice. Voldemort is Harry's enemy and could also be a reflection of his aunt and uncle and the trauma they have inflicted on him. Trauma can also induce hallucinations, which may relate to Harry's schizophrenic symptoms. For example, Perona-Garcelán et al. (2014) found higher rates of traumatic experiences for individuals prone to hallucinations compared to those not prone to hallucinations. Since there are eight movies of Harry's story (or possible hallucinations), he would most likely have a high proneness to hallucinations.

Another symptom associated with schizophrenia that Harry experiences is delusions. Delusions are characterized by false beliefs or misinterpretation of reality recognition (Seeman, 2015). Harry's delusions first commence when he believes his parents were killed by Voldemort, although his aunt and uncle tell him that they died in a car crash. Harry's wizarding world then starts to emerge in his thoughts. Harry does not have the most enjoyable family or home, and by having this alternative universe, his delusions can possibly be superior to reality.

A key part of his delusions is the emphasis on his importance to the world. Everyone in this world perceives him as the one who killed Voldemort or "the boy who lived." A scene within the movie that magnifies Harry's importance is when Hagrid (a Hogwarts professor/employee) comes to rescue Harry from his aunt and uncle and repetitively tells them of how powerful Harry is. Although this scene is potentially just a hallucination in Harry's mind, it represents his sense of superiority over everyone. Harry does not get this form of affection from his family, and it becomes established within his delusions and hallucinations. Harry's delusions can also be associated with the sociocultural theory. Developed by Lev Vygotsky, the sociocultural model is "a theory of mind" that recognizes the central role social relationships and culturally constructed artifacts play in organizing uniquely human forms of thinking" (Lantolf, 2004, p. 30-31). Specifically, Harry's thinking could possibly revolve around his environment and his social surroundings being neglectful, such as poor family relationships, negative labels from family, and stressful life events possibly leading to his behavior. Harry also has minimal interaction with others his age, and he has no friends, possibly delaying much of his social development and creating the delusions and hallucinations who are his friends, Ron and Hermione.

The diagnostic criteria according to the DSM -5 for schizophrenia must fall into two or more of the following criteria: delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, and negative symptoms (American Psychiatric Association, 2013). Harry, as stated above, fits the criteria for delusions and hallucinations. Harry also exhibits disturbances in interpersonal relationships by possibly isolating

himself from his family, friends, and the real world and focusing on his world of wizards. Harry demonstrates this behavior for several years and has no association with any other psychotic disorders or substance abuse. Many of the symptoms mentioned may be attempts to consciously or unconsciously relieve the stress and anxiety he has experienced with his aunt and uncle coupled with his parents' deaths. It is uncommon that schizophrenia can occur in children, but Harry could be the exception with his severe symptoms.

Another model that can be used in Harry's case is the biological model. The biological model is when behavior and psychological symptoms are related to biological causes like genetics, stress, neurotransmitters, and many other biological processes (Comer & Whitford, 1996). Evidence suggests schizophrenia is associated with the excessive stimulation of dopamine receptors used for thinking, reasoning, movement, and balance depending on the receptors (Barlow & Durand, 2013). Harry's schizophrenic symptoms could be an excess in dopamine but also could be genetic and passed on from one of his parents. It is unknown if Harry's parent or family experienced mental illness. Since it is not possible to test through genetic testing or to perform an fMRI on Harry, the biological model could be possible but less likely. An integrated model would have the most relevance in Harry's situation because of the wide array of contributing factors in his life including behaviors, cognition, social, and environmental influences.

Harry Potter shows many of the symptoms in the DSM-5 related to schizophrenia. He has lost touch with reality and created a beautiful world in order to cope with his traumatic childhood. The most prominent symptoms in the film are hallucinations and delusions, but the film could be interpreted to be based around his hallucinations of the wizard world. *Harry Potter and the Sorcerer's/Philosopher's Stone* is an enjoyable adventure movie to watch, but watching from a clinician's perspective, one could perceive the story to be a young boy suffering from trauma and schizophrenia and a creative world possibly portrayed in Harry's mind.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.

Barlow, D. H., & Durand, V. M. (2013). *Abnormal psychology: An integrative approach* (7th ed). Stamford, CT: Cengage Learning.

Comer, R. J., & Whitford, F. W. (1996). Fundamentals of abnormal psychology. WH Freeman and Company.

Gómez, J. M., Kaehler, L. A., & Freyd, J. J. (2014). Are hallucinations related to betrayal trauma exposure? A three-study exploration. *Psychological Trauma: Theory, Research, Practice, and Policy, 6*, 675-682. doi:10.1037/a0037084

Heyman, D. (Producer), & Columbas, C. (Director). (2001). *Harry Potter and the Sorcerer's Stone* [Motion picture]. United States: Warner Brothers.

Lantolf, J. (2004). Sociocultural theory and second and foreign language learning: An overview of sociocultural theory. *New Insights into Foreign Language Learning and Teaching*, 9, 13-34.

Perona-Garcelán, S., García-Montes, J. M., Rodríguez-Testal, J. F., López-Jiménez, A., Ruiz-Veguilla, M., Ductor-Recuerda, M. J., & ... Pérez-Álvarez, M. (2014). Relationship between childhood trauma, mindfulness, and dissociation in subjects with and without hallucination proneness. *Journal of Trauma & Dissociation, 15*, 35-51. doi:10.1080/15299732.2013.821433

Seeman, M. V. (2015). On delusion formation. *The Canadian Journal of Psychiatry, 60*, 87-90.

Author Note

Correspondence may be addressed to: Krista Fritson, Psy. D., Department of Psychology, University of Nebraska at Kearney, 2507 11th Ave,

Kearney, Nebraska, 68849-5140. Email: fritsonkk@unk.edu jmbondsraacke@fhsu.edu.

Journal of Psychological Inquiry
2016, Vol.21, No. 2, pp.# 64—70

Special Features

Conducting Psychological Analysis: Dramatic

A Memento to Remember You By

Nikki S. Phillips and Kenith V. Sobel *
University of Central Arkansas

Abstract—For most people, memory is the ability to retain facts and events for later recall, but memory is much more than that. Memory makes people who they are, as becomes apparent from studying case studies of memory loss. Clive Wearing and Henry Molaison are best known for their amnesia, or inability to store new facts and events in memory. Their stories seem to have inspired *Memento*, a movie that follows the misadventures of Leonard Shelby, an amnesic who is trying to find and punish the assailant who injured Leonard's brain and murdered his wife. The movie is at once a thriller and a two-hour crash course in the science of memory. *Memento* employs a unique structure as a way of making the audience feel as disoriented as Leonard must feel. Although people who suffer from anterograde amnesia such as Henry Molaison and the fictional Leonard have lost the ability to store the kinds of memories that can be described in words, they retain the ability to store other memories such as conditioned associations described in the early twentieth century by the neurologist Edouard Claparède. Although Leonard's biggest problem is his memory disability, he is nevertheless harassed by unsettling memories that he wishes he could forget. Like Solomon Shereshevsky, another well-known case of abnormal memory, Leonard tries to eradicate memories that haunt him by burning items associated with those memories. His attempt is unsuccessful, so he resorts to a more conventional method of reducing cognitive dissonance: self-deception. *Memento* is unique among movies that depict abnormal psychological themes for its faithfulness to the available scientific evidence, and can be enjoyed by memory experts and novices alike.

Keywords: memory, anterograde amnesia, *Memento,* Clive Wearing, Henry Molaison, Solomon Shereshevsky psychology

"Time and memory are true artists; they remold reality nearer to the heart's desire"
(Dewey, 1920)

As time moves forward and memories accumulate, humans slowly but steadily add details to the Michelangelo statues of themselves. From the moment of birth, the carving begins. It begins with the helping hands of parents, who rough out the statue and leave the rest. Those first few years

*Kenith V. Sobel served as Faculty Sponsor.

equip each person with the tools and knowledge they will need to continue carving themselves. The memories they make, the skills they develop, and knowledge they store, add to their personal work of art. In essence, each person is both the sculptor and the statue. Each person starts as the artist but by the end becomes the art, a perfect statue built by experience and retained in memory.

Memory can be something as simple as recalling a person's name, a birthday, or the name of the capital of France. Memory can be something more intricate such as events of the past like college days long ago, an unforgettable wedding, or a ridiculous time at band camp. Memory is much more than the ability to recall because it defines who people are (Dalla Barba, 1995), as becomes clear when considering unique cases of memory loss.

Case Studies of Memory Loss

Clive Wearing was once a renowned British musician and composer who now suffers from a severe case of amnesia (described in Kean, 2014). At the age of 46, after a prolonged bout with flu-like symptoms, Clive was diagnosed with the Herpes simplex virus. Due to the extended amount of time before his diagnosis, the virus had already caused devastating damage to his limbic system. The limbic system carries out vital functions for the brain, including long-term memory (Postle, 2009). Due to considerable damage, Clive could no longer create new memories, but what made his case nightmarish was he also lost his memories of the past. He was utterly deprived of his episodic (i.e., autobiographical) memories of the previous 46 years. If people were to ask him about the music he composed for the royal wedding, he would look at them with a blank stare and state he never did such a thing.

Clive's misfortune did not stop there, because what makes his case profoundly different from other cases of amnesia is that he also lost his ability to hold short-term memories. Every waking second of Clive's life is spent not knowing who he is, where he is, whom he is with, and what he is doing. Clive lives moment by moment without the resources to recognize something is wrong. He keeps a journal with him at all times, and when he realizes he is awake or aware of his surroundings, he will write "now I am awake." Alas for poor Clive, within seconds he loses his stream of consciousness then regains awareness, which compels him to angrily cross out what he previously wrote and replace it with "Now I am truly awake" (Wilson & Wearing, 1995). Clive is like a drowning man in a sea of his own mind, and there is not a single raft or life jacket to help him.

If Clive Wearing shows how disorienting memory loss can be, Henry Molaison did more than anyone else to reveal the taxonomy of memory. As a cheerful and compliant subject of research for five decades (described in Corkin, 2013), Molaison showed that memory is not a single monolithic structure, but instead consists of an array of separate modules. As a young man, Henry suffered from a crippling seizure disorder, which made him desperate for relief, so at the age of 27 he consented to experimental brain surgery. The post-operative prognosis was optimistic; his seizures were less frequent and intense, allowing him to reduce the dosage of his anti-seizure medication. However, there was something deeply wrong with his memory.

For example, during the weeks he spent in the hospital recovering, he had to be accompanied to the bathroom for every trip because he could never retain the route. The doctors quickly took note of the issue, as Henry seemed to be unable to store any new memories, a condition called anterograde amnesia (Gabrieli, 1998). For years following the surgery, researchers catalogued various ways he was unable to store new memories. A breakthrough occurred when Brenda Milner (1962) tried to find out if there was any kind of memory Henry could store. Milner asked Henry to trace along a narrow and winding path with his pencil, but only allowed him to see the pathway's reflection in a mirror. At first he made many mistakes, but with practice he gradually improved without having any conscious memory of the effort required. This experiment showed that even though Henry could not retain conscious

recollections, he was still able to learn new motor skills. The mirror-drawing task and other assessments such as Henry's acquisition of classically conditioned associations (Corkin, 1984) revealed that while he had lost the ability to store memories that can be described in words (i.e., declarative memory), he retained the ability to store non-declarative memories. The examples of Clive Wearing and Henry Molaison show that memory is an essential component of who people are. As such, fictional depictions of characters with disordered memory and their everyday struggles make compelling subjects of movies.

Depiction of Memory Loss In The Movie *Memento*

Memento (Todd, Todd, & Nolan, 2000) is a film that attempts to show how disorienting memory loss can be, while remaining faithful to the scientific study of memory. The movie portrays Leonard Shelby, aka Lenny, who has the same debilitating anterograde amnesia as Henry Molaison. Unlike Henry, Lenny's amnesia was caused by a home intruder who bashed his skull with a blunt object. The last memory Lenny can recall was when he was lying on the bathroom floor looking into the eyes of his wife, with the blood from his injury spreading across the floor between them. Though Lenny has been severely handicapped, he becomes determined to find his wife's assailant and exact revenge.

Phenomenology of Amnesia

While most films are presented linearly, proceeding from earlier events to later events (as depicted in the upper part of Figure 1), *Memento* (2000) employs a radically different approach (as depicted in the lower part of figure 1). Each scene begins with Lenny (and the audience) not knowing where he is or how he got there, and then proceeds forward in time for several minutes. The movie leapfrogs from the end of one scene back to the beginning of the previous scene, which then proceeds forward until it reaches the moment just before the beginning of the next scene, which had been shown previously. By presenting the movie in this nonlinear order, the director induces the sense

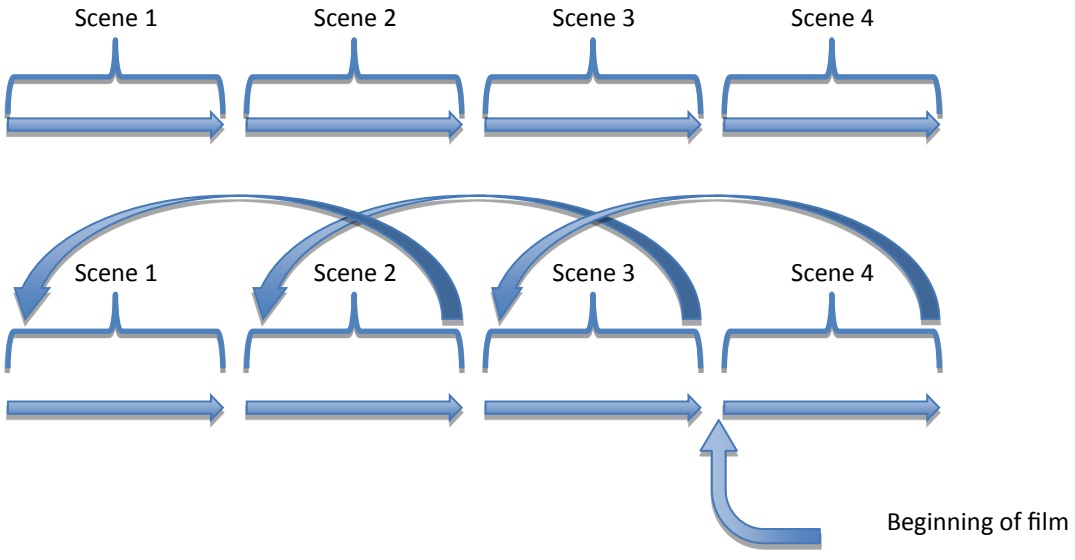

Figure 1. The structure of a conventional movie is in the upper portion of the figure, and the structure of *Memento* in the lower portion of the figure. The opening scene in *Memento* is actually near the end of the film; it then jumps back to the beginning of the temporally previous scene, and so on.

of disorientation in the viewer that Lenny must feel, because at the beginning of each scene Lenny and the audience have no idea what came before.

For someone like Lenny, who has an important mission to complete but is unable to remember any progress he has made, he must rely on an alternative method to retain information in order to stay on track. Lenny finds a way to store memories externally, by using his body as a human notepad. To pursue his wife's assailant he needs to retain the most important facts, for which he needs something more permanent than a Sharpie. Lenny resorts to tattoos, ink so permanent he would need a laser to remove it. These tattoos record important clues such as the assailant's likely name and other identifying information. Among his other tattoos is the admonition to "remember Sammy Jankis."

Fear Conditioning in Amnesia

As the leapfrogging structure of the film develops, another sequence of scenes appears intermittently that tells the story of Sammy Jankis. These black-and-white scenes depict Lenny's experiences before the injury, from a time when he worked as an insurance investigator. Lenny met Sammy when Sammy's wife filed a claim for his debilitating amnesia. Sammy was said to have anterograde amnesia, and Lenny wanted to determine whether this was true or not. While it seemed Sammy had a problem, Lenny had his doubts. In order to determine whether or not Sammy was faking his amnesia, Lenny used a test based on a well-known conditioning experiment described by the Swiss neurologist Edouard Claparède.

In 1907 Dr. Claparède visited his middle-aged amnesic patient each day, and at the beginning of every visit, he would introduce himself and shake his patient's hand (Nicolas, 1996). On one of his visits, Claparède placed a small threading needle between his fingers, and as he extended his hand to greet her, he jabbed her hand with the pin. The next day and the following days after, Claparède would extend his hand to greet his amnesic patient, as usual, but she would not comply. Instead, she would quickly withdraw her hand and gaze at him suspiciously, even though she had no idea why she avoided touching his hand. In Lenny's test, Sammy was asked to pick up several metal shapes from a tabletop, with one object wired to deliver a painful shock when touched. When Sammy was asked to repeat the procedure, he would not avoid the object that had shocked him on previous trials, and he would be shocked again. Sammy gave the same response multiple times, which led Lenny to believe he was defrauding the insurance company. Lenny knew that if Sammy actually had amnesia, like Claparède's patient, Sammy should have acquired a conditioned aversion to the object that shocked him. Lenny denied Sammy's claim, which left Sammy's wife in a pit of despair and yearning for an answer.

After Lenny dismissed Sammy's case, Sammy's wife became desperate and devised her own test to determine if Sammy was faking his amnesia. Sammy's wife was diabetic and every day around the same time, Sammy would give his wife her insulin shot. Although the injection procedure was a complicated series of steps, Sammy always remembered every step perfectly. One day, Sammy's wife told him it was time for her shot as usual. Once the shot was administered, he resumed watching television. A few minutes later, Sammy's wife repeated the request and Sammy administered the shot, seemingly without any recollection of the previous injection just minutes before. She asked Sammy a third time to administer the shot, and once again he complied. This shot gave Sammy's wife her answer, as she descended into an insulin-induced coma, never to wake again.

While the story of Sammy inadvertently killing his wife by administering an insulin overdose is tragic, the facts are not as Lenny would prefer to remember them. Lenny misattributes the insulin story to Sammy; Lenny's wife actually survived the assault and her death was the result of Lenny administering a lethal overdose of insulin. Lenny's quest to find and punish the assailant who he believes murdered his wife gives his current

situation a sense of purpose, so both of these facts (his wife's survival of the assault and her death at Lenny's hands) represent a threat to Lenny's self-identity, motivating him to wipe them from his memory. In the next two sections, we will describe how Lenny struggles with each of these facts, beginning with his wife's survival of the assault.

Cleansing Memory with Fire

At one point in the movie, Lenny finds himself in an empty parking lot, hovering over a fire in the middle of the night. Lenny tosses a small worn out teddy bear, a well-read book, a tiny mantel clock, and a hairbrush into the fire. The audience wonders why Lenny is burning these objects, but they must wait for the next scene (which occurred earlier in time) to find out. The scene transition jumps backwards to find Lenny sitting in his hotel room clutching the four items, unburned. To aid Lenny in his endeavor to forget flashbacks to the night of the home invasion, he engages the services of a prostitute, not for the usual reason, but to relive the fateful night. Lenny asks her to place the objects around the room and to lie in bed with him until he falls asleep, then to go to the bathroom, and slam the door. The noise from the slamming door wakes Lenny, who sees the objects lying around the room and feels the warmth on the bed, just like the night of the home invasion. When he opens the door to the bathroom, Lenny (and the audience) sees a flashback of his wife lying on the bathroom floor, as had occurred previously in the movie, but this flashback is subtly different from prior flashbacks. As in previous flashbacks, Lenny looks into his wife's eyes, but in this flashback his wife blinks her eyes, indicating that she actually survived the attack. If she survived, then a central part of what Lenny tells himself is a lie. By reliving the fateful event, Lenny hopes to imbue the household items with the memory of his wife's eyeblink, which he might then incinerate.

For the observant viewer, Lenny's attempt to rid himself of a painful memory by burning associated items alludes to another famous case study of abnormal memory: Solomon Shereshevsky (as described in Luria, 1975). Shereshevsky was a mnemonist, a title given to individuals who can remember long lists, conversations, etc., verbatim. The Russian neuroscientist, Alexander Luria, spent 30 years trying to find the limits of Shereshevsky's memory, but eventually had to admit defeat. Shereskevsky never forgot a thing Luria had presented him. He could recite Italian poetry without understanding a word of Italian, complex mathematical formulas without any idea what the symbols meant, and strings of digits for years after memorizing them. Remembering everything cluttered Shereskevky's mind, burdening him with memories he wished he could forget. Just as Lenny burnt his wife's belongings to forget, Shereshevsky would write down his memories on pieces of paper then burn them. Shereskevsky hoped this voodoo would do the trick, but it did not. Although it is tempting to consider a memory like Shereshevsky's to be a valuable tool in professional life, he was unemployable in conventional jobs and drifted aimlessly. Shereshevsky retained every fact he encountered, but was utterly unable to comprehend the relationships between facts.

Using Self-Deception to Reduce Cognitive Dissonance

In contrast to Shereshevsky's cluttered memory, Lenny was tormented not by the sheer volume of his pre-injury memories, but by particular memories that threaten the comforting fiction he tells himself about his wife's death and its aftermath. As mentioned, the memory of Lenny's wife blinking shows that she survived the assault. Lenny's discomfort is aggravated by Teddy, a cop who divulges the truth about Sammy, the home intruder, and his wife's death. According to Teddy, Sammy was a con man trying to make a quick buck off the insurance company by faking his disability. Sammy never had a wife, and it was in fact Lenny's wife who was diabetic. Teddy's revelations prompt Lenny through a series of flashbacks that force him to realize that Teddy was telling the truth. What had once been a scene of Lenny pinching his wife on the leg, transforms into one in which he is injecting a shot of insulin. Like

Shereshevsky, Lenny was disappointed to discover that fire would not cleanse his mind of unsettling memories so he was forced to resort to self-deception to relieve the cognitive dissonance he felt when confronted by a threat to his self-concept.

Cognitive dissonance was initially described by Festinger (1957) as a feeling of discomfort that arises when people mentally entertain two conflicting ideas at the same time. Aronson (1968, 2007) extended Festinger's ideas by arguing that a common source of cognitive dissonance is the clash between one's self concept and an inconvenient fact. For Lenny, focusing his depleted resources on finding and punishing his wife's murderer instills his life with meaning and a sense of purpose. The fact that Lenny's wife actually survived the attack and he was the one who killed her leaves him stranded. To reduce the discomfort that accompanies cognitive dissonance, the sufferer can either change his self-concept or deny the offending fact. Lenny tries to deny that he killed his wife, but the guilt from her death repeatedly intrudes on his memory.

Here, the viewer may wonder how Lenny could remember killing his wife, because it must have occurred after his injury and thus at a time when he would have been incapable of forming new memories. The answer is provided by Claparède's patient; like her, Lenny forgets the details, but retains the emotion associated with the event. The intact memories of his wife from before the injury trigger overwhelming feelings of guilt and dread. Apparently, Lenny has learned to use his memories of Sammy Jankis as a way to offload his own guilt onto someone else. When Lenny is confronted by guilt for having killed his wife, Lenny's tattoo reminds him of Sammy Jankis, enabling him to deceive himself into believing Sammy was the one who killed his wife by administering an insulin overdose.

Conclusion

For the viewer familiar with the history of memory research, *Memento* (2000) alludes to a pantheon of famous case studies: Clive Wearing, Henry Molaison, Claparède's patient, and Solomon Shereshevsky. Each case demonstrates the importance memory has within people's lives and how people are capable of manipulating their memories in order to suit their needs. Unlike most films that address a mental illness or disorder, *Memento* (2000) stays true to what it would be like for someone with anterograde amnesia. The accurate film portrayal and the induced disorientation in the audience makes *Memento* a classic among those who study human memory and cognition. Fortunately, viewers need not be memory experts to enjoy or understand the film; even if they know nothing about the science and history of memory, it will still be a compelling thriller.

Memento (2000) is not a simple Friday night thriller; it requires viewers to focus more than is required for a typical film. After viewing the movie the audience is left with unsettling thoughts. Clearly, Lenny has a disabled memory, but does his method of coping with disturbing memories extend to the audience? Does everyone creatively self-deceive in order to retain only reassuring memories? If so, how could they tell? That is, if people rewrite their memories, the rewritten memories become their version of the past. People typically believe their memories accurately represent the past (Nordqvist, 2011). *Memento* suggests people's memories are not an accurate portrayal of the past but instead represent the way they wish the past had been. This is a surprisingly subtle message that will keep the viewer thinking and wondering long after the movie ends.

References

Aronson, E. (1968). Dissonance theory: Progress and problems. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, & P. H. Tannebaum (Eds.), *Theories of cognitive consistency: A source book* (pp. 5-27). Skokie, IL: Rand McNally.

Aronson, E. (2007). The evolution of cognitive dissonance theory: A personal appraisal. In A. R. Pratkanis (Ed.), *The science of social influence: Advances and future progress* (pp. 115-135). New York, NY: Psychology Press.

Corkin, S. (1984). Lasting consequences of bilateral medial temporal lobectomy: Clinical course and experimental findings in HM. *Seminars in Neurology, 4*, 249-259. doi:10.1055/s-2008-1041556

Corkin, S. (2013). *Permanent present tense*. New York, NY: Basic Books.

Dalla Barba, G. (1995). Consciousness and confabulation: Remembering 'another' past. In R. Campbell & M. Conway (Eds.), *Broken memories: Case studies in memory impairment* (pp. 101-123). Oxford, England: Blackwell.

Dewey, J. (1920). *Reconstruction of philosophy*. New York, NY: Henry Holt and Company. doi:10.1037/14162-000

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

Gabrieli, J. D. (1998). Cognitive neuroscience of human memory. *Annual Review of Psychology, 49*(1), 87-115. doi: 10.1146/annurev.psych.49.1.87

Kean, S. (2014). *The tale of the dueling neurosurgeons*. New York, NY: Little, Brown and Company.

Luria, A. R. (1975). *The mind of a mnemonist*. New York, NY: Penguin.

Milner, B. (1962). Memory impairment accompanying bilateral hippocampal lesions. In P. Passouant (Ed.), *Psychology of the hippocampus* (pp. 257-272). Paris, France: National Center of Scientific Research.

Nicolas, S. (1996). Experiments on implicit memory in a Korsakoff patient by Claparède (1907). *Cognitive Neuropsychology, 13*, 1193-1199. doi: 10.1080/026432996381700

Nordqvist, C. (2011, August 4). Our memories are not as objective and reliable as we think they are. *Medical News Today*.

Postle, B. R. (2009). The hippocampus, memory, and consciousness. In S. Laureys (Ed.), *The neurology of consciousness: Cognitive neuroscience and neuropathology* (pp. 326-338). New York, NY: Academic Press. doi:10.1016/b978-0-12-374168-4.00024

Todd, J., (Producer), Todd, S. (Producer), & Nolan, C. (Director). (2000). *Memento* [Motion picture]. United States: Newmarket.

Wilson, B. A., & Wearing, D. (1995). Prisoner of consciousness: A state of just awakening following herpes simplex encephalitis. In R. Campbell & M. Conway (Eds.), *Broken memories: Case studies in memory impairment* (pp. 14-30). Oxford, England: Blackwell.

Author Note

Correspondence may be addressed to: Kenith V. Sobel, Ph.D., Department of Psychology and Counseling, University of Central Arkansas, Conway, Arkansas, 72035. Email: k.sobel@mac.com .

Journal of Psychological Inquiry

Call for Papers

The *Journal of Psychological Inquiry* (JPI) encourages undergraduate students to submit manuscripts for consideration. Manuscripts may include:

- *Empirical studies*
- *Literature reviews*
- *Historical articles*
- *Special Features I:* Evaluating controversial issues. Two students work together on different facets of the same issue.
    - Select a controversial issue relevant to an area of psychology (e.g., Does violence on television have harmful effects on children?—developmental psychology; Is homosexuality incompatible with the military?—human sexuality; Are repressed memories real?—cognitive psychology). Each student addresses the current empirical research and makes a persuasive case for one side of the argument.
- *Special Features II:* Conducting psychological analyses- Dramatic. This manuscript is a psychological analysis of a television program or movie.
    - Television program: select an episode from a popular, 30-60 min television program, describe the salient behaviors, activities, and/or interactions, and interpret that scene using psychological concepts and principles. The presentation should identify the title of the program and the name of the television network. Describe the episode and paraphrase the dialogue. Finally, interpret behavior using appropriate concepts and/or principles that refer to the research literature.
    - Analyze a feature film for psychological content. Discuss the major themes but try to concentrate on applying some of the more obscure psychological terms, theories, or concepts. Briefly describe the plot and then select key scenes that illustrate one or more psychological principles. Describe how the principle is illustrated in the movie and provide a critical analysis of the illustration that refers to the research literature.
- *Special Features III*: Conducting psychological analyses- Current events. By using the perspective of any content area in psychology, this manuscript analyzes a current event.
    - Example 1: Several psychological theories could be used to describe people's reactions to the destruction of the World Trade Center on September 11, 2001. Terror management research has often shown that after reminders of mortality people show greater investment in and support for groups to which they belong and tend to derogate groups that threaten their worldview (Harmon-Hones, Greenberg, Solomon, & Simon, 1996). Several studies have shown the link between mortality salience and nationalistic bias (see Greenberg, Simon, Pyszczynski, & Solomon, 1992). Consistent with these findings, the news reported that prejudice towards African Americans decreased noticeably after 9/11 as citizens began to see all Americans s more similar than different.

- Example 2: A psychological concept that could be applied to the events of September 11 would be that of bounded rationality, which is the tendency to think unclearly about environmental hazards prior to their occurrence (Slovic, Kunreuther, & White, 1974). Work in environmental psychology would help explain why we were so surprised by his terrorist act.

- *Special Features IV:* Teaching techniques- Student and faculty mentor collaborate on this manuscript regarding a teaching technique the faculty member uses that the student found particularly helpful.
    - Some examples of teaching techniques are interteaching, the use of clickers, podcasting, team-based learning, and reflective journaling. The description should contain enough information so that another teacher could use the technique and should provide reasons why you think the technique worked well. The second half of the paper should be written by the faculty member who can explain why he or she chose the technique you found to be effective, and what they hoped to accomplish in terms of learning outcomes by using the technique.

Manuscripts may cover any topical area in the psychological science. Further details for the special features submission can be found at the end of volume 18 (1), available at: http://www.fhsu.edu/psych/jpi/

Submission Details:

1. Manuscripts must have an undergraduate as the primary author. Manuscripts by graduates will be accepted if the work was completed as an undergraduate. Graduate students or faculty may be co-authors, if their role was one of teacher or mentor versus equal collaborator.
2. Manuscripts must come from students who meet the following conditions: (a) from students at institutions who are current on their financial annual support of JPI (see list on JPI website), (b) from students at institutions who are willing to pay an $80 annual processing fee for unlimited submissions, or (c) from students who pay a one-time $30 processing fee to have a single submission processed.
3. Submit original manuscripts only. Do not submit manuscripts that have been accepted for publication or that have been published elsewhere.
4. All manuscripts should be formatted in accordance with the APA manual (latest edition).
5. Submissions are made online at http://www.edmgr.com/jpi.
6. Ordinarily, the review process will be completed in 30 to 60 days.
7. If a manuscript requires revisions, the author(s) is (are) responsible for making the necessary changes and resubmitting the manuscript to the Journal. Sometimes you may have to revise manuscripts more than once.
8. For further submission guidelines, see the JPI website at http://www.fhsu.edu/psych/jpi/ or contact Dr. Jenn Bonds-Raacke (jmbondsraacke@fhsu.edu) or Dr. John Raacke (jdraacke@fhsu.edu).