**Bias in the Evaluation of Psychology Studies:
A Comparison of Parapsychology Versus Neuroscience**

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Abstract

Research suggests that scientists display confirmation biases with regard to the evaluation of research studies, in that they evaluate results as being stronger when a study confirms their prior expectations. These biases may influence the peer review process, particularly for studies that present controversial findings. The purpose of the current study was to compare the evaluation of a parapsychology study versus a neuroscience study. One hundred participants with a background in psychology were randomly assigned to read and evaluate one of two virtually identical study abstracts (50 participants per group). One of the abstracts described the findings as if they were from a parapsychology study, whereas the other abstract described the findings as if they were from a neuroscience study. The results revealed that participants rated the neuroscience abstract as having stronger findings and as being more valid and reliable than the parapsychology abstract, despite the fact that the two abstracts were identical. Participants also displayed confirmation bias in their ratings of the parapsychology abstract, in that their ratings were correlated with their scores on transcendentalism (a measure of beliefs and experiences related to parapsychology, consciousness and reality). Specifically, higher transcendentalism was associated with more favorable ratings of the parapsychology abstract, whereas lower transcendentalism was associated with less favorable ratings. The findings suggest that individuals with a background in psychology need to be vigilant about potential biases that could impact their evaluations of parapsychology research during the peer review process.

Keywords: Bias; research; psychology; confirmation bias; parapsychology; psi; neuroscience

Bias in the Evaluation of Psychology Studies:

A Comparison of Parapsychology Versus Neuroscience

One of the hallmarks of the scientific method involves conducting research in ways that are as neutral and unbiased as possible (Keppel, 1991; Maxwell & Delaney, 2004). This neutrality and lack of bias are expected to generate research findings that are objective, accurate and replicable, and that contribute to our understanding of the world. Indeed, the basic principles of the scientific method are widely accepted by scientists within the field of psychology as the most appropriate and rigorous way to conduct research and share results (Ramos-Álvarez, Moreno-Fernández, Valdés-Conroy, & Catena, 2008).

The field of psychology has a rich history of studying how our biases can influence our thoughts and behaviors not only in our daily lives, but also within our pursuit of the scientific method. The topic of bias has been studied in a variety of ways within psychology, from research on the hindsight bias (Guilbault, Bryant, Brockway, & Posavac, 2004) and the spotlight effect (Gilovich, Medvec, & Savitsky, 2000), to perspectives that highlight bias in the field of psychology as a whole (MacCoun, 1998), including feminist (Sherif, 1998) and evolutionary (Buss & von Hippel, 2018) critiques. Academic psychologists have also studied bias within the scientific method itself. For example, research on experimenter bias suggests that experimenters often elicit the very results that they are expecting (Rosenthal & Fode, 1963), and even design experiments in ways that are more likely to produce their expected results (Strickland & Suben, 2012). Indeed, it is often assumed that scientists are more neutral, unbiased, logical and rational than the average person, however research suggests that this is not always the case (Mahoney & DeMonbreun, 1977).

Bias in The Evaluation of Research Studies

One type of bias that has received relatively little research attention is the potential biases that might exist when individuals with a background in psychology evaluate research studies. Psychology instructors, researchers and clinicians are often required to evaluate research for a variety of reasons, such as for peer review, teaching courses, conducting research studies and/or providing therapy. Preliminary research on these potential biases suggests that scientists evaluate the results of studies as being stronger when the study confirms their prior expectations (Epstein, 2004; Goodstein & Brazis, 1970; Greenwald et al., 1986; Hergovich, Schott & Burger, 2010; Koehler, 1993; Mahoney, 1977; Roe, 1999). In other words, scientists display confirmation bias, which is the tendency to seek out, pay attention to and remember information that supports one's beliefs (Oswald & Grosjean, 2004).

For example, in a seminal study, Goodstein and Brazis (1970) randomly assigned a group of 1,000 psychologists to read one of two virtually identical abstracts that described a fictitious research study on astrology. One abstract reported significant effects of astrological predictors and concluded that additional research would be beneficial, whereas the other abstract reported no significant relationships and concluded that additional research would not be productive. The results showed that participants rated the non-significant abstract as being better designed, more valid, and as containing more adequate conclusions than the significant abstract. Similarly, Koehler (1993) found that scientists judged studies that disconfirmed parapsychological theories (i.e., studies that were in line with their prior beliefs) to be more relevant, methodologically sound and clearly presented than otherwise identical studies that were out of line with their prior beliefs. Roe (1999) found a similar effect, namely that psychology undergraduate students rated

a hypothetical study as being of poorer quality when the study challenged their a priori beliefs about paranormal phenomena.

In a more recent study, Hergovich et al. (2010) conducted an experiment in which 711 psychologists were asked to rate an abstract that described a hypothetical study that had tried to predict 40 different behaviors. The authors manipulated three aspects of the abstract, which varied between participants: 1) The predictors of the behaviors (either Big 5 personality factors or astrology factors); 2) The methodological quality of the study (low, medium, high) and 3) The results and conclusions of the study (confirmation or rejection of hypotheses). The participants also completed a questionnaire about their belief in astrology prior to reading the abstract. The results showed that participants rated the abstract as being of higher quality and more appropriate when the results confirmed their expectations (which in this study, involved cases in which astrological hypotheses were rejected).

The ways in which research is evaluated is important for a variety of reasons, particularly during the peer review process. One of the purposes of peer review is to uphold the rigors of the scientific method by ensuring that scientific manuscripts are “quality controlled” by neutral, unbiased, and typically anonymous reviewers prior to publication (Ramos-Álvarez et al., 2008). However, research suggests that the peer review process can be biased, particularly for studies that present controversial results (Armstrong, 1996; Horrobin, 1990). While several researchers have provided tips for making the peer review process as unbiased as possible (e.g., Hadjistavropoulos & Bieling, 2000; Harcum & Rosen, 1993; Holt & Spence, 2012; Palermo, 2010; Parsi & Elster, 2018; Ramos-Álvarez et al., 2008), the aforementioned research suggests that confirmation bias continues to exist even among scientists who tend to pride themselves on their neutrality.

Potential Bias Against Parapsychology Research

One area of psychology that tends to publish controversial results, and thus might be subject to bias during peer review, is the field of parapsychology. Parapsychology involves the study of phenomena that fall within two major categories: 1) Extrasensory perception (ESP)/anomalous cognition (i.e., obtaining information or knowledge unmediated by the senses or logical inference), and 2) Psychokinesis (i.e., an effect of mental events on physical objects, unmediated by muscular or mechanical sources) (Cardeña, 2018). A recent comprehensive review of 18 meta-analyses on parapsychological phenomena (hereafter referred to as psi phenomena) revealed that 15 of the meta-analyses yielded statistically significant effect sizes that were supportive of psi (Cardeña, 2018). The statistically significant effect sizes were typically small (ranging from .007 to .50), however the findings suggest that the results of psi studies replicate across a variety of experimental procedures and research labs. In addition, the majority of the meta-analyses maintained statistically significant effect sizes after accounting for variables that might have impacted the data, such as design quality, homogeneity of studies, and potential publication biases (i.e., file drawer effects).

It is interesting to note that the size and strength of many of the effect sizes found in Cardeña (2018) are similar to the results found for meta-analyses in other areas of psychology, such as a meta-analysis of more than 25,000 social psychology experiments which also found small, statistically significant effect sizes (Richard, Bond, & Stokes-Zoota, 2003). In other words, while the evidence for psi phenomena is not overwhelmingly strong, it is on par with the magnitude of effects found within other areas of psychology, yet parapsychology research tends to be critiqued more harshly (discussed in more detail below). In addition, while there are several limitations to meta-analytic procedures (Bierman, Spottiswoode, & Bijl, 2016; LeBel, McCarthy,

Earp, Elson, & Vanpaemel, 2018), these limitations apply within all topics of psychology, not just parapsychology (yet parapsychology meta-analyses are often used in these papers as prototypical examples of the limitations of meta-analyses).

Despite the fact that the results of psi meta-analyses tend to be commensurate with meta-analyses in other areas of psychology, skepticism about parapsychology continues to be prevalent, and the topic of parapsychology has remained on the fringes of psychology as a whole (Shanks, 1986). Many academic psychologists perceive parapsychology as being a pseudo-science, even though research suggests that this is not the case. Indeed, published research on parapsychology tends to meet the majority of the overarching scientific standards that are met by research in other areas of psychology (Mousseau, 2003). Yet parapsychology is not often taught in mainstream universities, and many academic psychologists confidently conclude that there is no evidence for psi phenomena. For example, in a popular introductory research methods textbook, Stangor (2015) cautions readers against relying on their intuition by stating that, “People also become convinced of the existence of extrasensory perception, or the predictive value of astrology, when there is no evidence for either” (p. 6). Similarly, Hacking (1993) declared that, “every claim to persistent, subtle, but statistically detectable psychic phenomena has been refuted” (p. 591). These types of statements are common when psychology researchers evaluate parapsychological findings, yet these statements are false (and are rarely challenged). Indeed, some have suggested that academic psychologists lack informed knowledge about parapsychology findings, and are largely “uninformed skeptics” who sometimes dismiss findings without taking the time to properly inform themselves about psi research (Cardeña, 2018; French, 2001).

Evidence for potential bias in the evaluation of parapsychology research can be seen when one considers scholarly reactions to parapsychology studies that are published in mainstream journals. These studies are often met with intense criticism that goes far beyond the critiques offered for studies on more mainstream topics. For example, Bem (2011) reported nine experiments on precognition (i.e., the retroactive influence of a future event on an individual's current responses), in which all but one of the experiments reported statistically significant effects. Bem's (2011) paper was published in a prestigious journal (the *Journal of Personality and Social Psychology*), and it was subjected to intense criticism. This criticism ranged from a heated debate by academics from a variety of disciplines in *The New York Times* opinion page (Room for Debate, 2011), to suggestions in subsequent scientific papers that psychology researchers need to change the ways that they collect data and do research (LeBel & Peters, 2011; Wagenmakers, Wetzels, Borsboom, & Van Der Maas, 2011). Some academic critics went so far as to call parapsychology researchers "crackpots", and to suggest that Bem's findings "...would necessarily send all of science as we know it crashing to the ground...[and] spell the end of science as we know it" (Hofstadter, 2011). One critic stated that publishing research on psi phenomena "should be seen for what it is: an assault on science and rationality" (Helfand, 2011). Bem and his colleagues have since published a meta-analysis on precognition that reports the results of 90 experiments from 33 laboratories in 14 countries (Bem, Tressoldi, Rabeyron, & Duggan, 2015). This meta-analysis yielded a small, but statistically significant effect size (greater than six sigma) in support of precognition, suggesting that the effects found in the 2011 paper are replicable. Despite this type of evidence, academics continue to fiercely debate the findings from psi research.

It is important to note that not all critiques of psi research are unjustified. Like any area of psychology, parapsychology has limitations, and it is important that these limitations are pointed out during the peer review process so that scientists can improve their research in the future. For example, LeBel and Peters (2011) and Wagenmakers et al. (2011) used Bem's (2011) study to highlight several valid criticisms of the ways in which academic psychologists do research. LeBel and colleagues (LeBel et al., 2013; LeBel, Campbell, & Loving, 2017; LeBel et al., 2018) as well as other scientists (Munafò et al., 2017) have gone on to advocate for much needed open science perspectives that encourage replicability and transparency in the research process. Similarly, Battista, Gauvrit and LeBel (2015) highlight several useful methodological adjustments that could be made in order to enhance the rigor of research on mediumship, and several researchers have described alternative (and potentially more rigorous) approaches to meta-analyzing data (LeBel et al., 2018) as well as interpreting the results of meta-analyses (Bierman et al., 2016). That being said, parapsychology studies tend to elicit intense and sometimes emotional criticism that is not often found for studies of other psychological topics. In addition, parapsychology studies are often used as the prototypical examples of "what is wrong" with psychology research as a whole. Indeed, the limitations of Bem's (2011) study are limitations that are common in many psychology studies, but these other types of studies are often published without receiving rebuttals from researchers and/or the popular press. One might imagine, for example, that Bem (2011) had been a paper about nine experiments supporting a new theory within social or educational psychology. In this case it is unlikely that the paper would have received such intense criticism or sparked debate about the overarching ways that psychologists do research.

Research suggests that parapsychologists find it difficult to work within an often hostile academic zeitgeist, with common issues including a lack of funding, lack of feasible career path, and lack of access to mainstream journals (Irwin, 2014). Numerous examples exist of unnecessarily critical and potentially biased peer review of parapsychology studies, some of which border on censorship (e.g., Murray & Fox, 2007; Cardeña, 2015). One example is a recent case in which a parapsychology study was published and then retracted with very little explanation. Delorme, Pierce, Michel and Radin (2016) published a study that examined whether 12 mediums could accurately state whether an individual was dead or alive based only on viewing the individual's photograph. They found that participants' accuracy on the task was 53.8% (with 50% expected by chance), which was a statistically significant result. However, soon after publication, the journal (*Frontiers in Human Neuroscience*) retracted the article without providing the authors with an explanation for the retraction. At first the retraction notice (Frontiers Editorial Office, 2016) did not give a reason for the retraction, and the authors were not given a reason despite repeated queries to the journal editors. Eventually the retraction notice was amended to include an explanation for the retraction, however the explanation is extremely vague, simply stating that, "Following publication, concerns were raised regarding the scientific validity of the article. The Chief Editors subsequently concluded that aspects of the paper's findings and assertions were not sufficiently matched by the level of verifiable evidence presented" (p. 515). The authors were not given an opportunity to respond to the retraction or revise their article. They did eventually re-publish the study in a different journal (Delorme, Pierce, Michel & Radin, 2018), however this scenario provides an example of some of the ways in which parapsychology research is potentially censored or suppressed (see Cardeña, 2015 for additional examples of censorship and suppression in psi research). Despite repeated attempts to

satisfy critics, parapsychology research continues to be marginalized and even ridiculed by mainstream scientists (Irwin, 2007).

Materialism as a Motivator for Bias?

One potential reason why parapsychology studies are met with such intense criticism is that these studies challenge the materialist/physicalist stance that underlies the beliefs and practices of most mainstream scientists. Materialism and physicalism are models which hold that everything in the universe is ultimately physical, and that matter represents the ultimate nature of reality (Beauregard, Trent & Schwartz, 2018; Taylor, 2018) (for the sake of brevity, the word materialism will be used for the remainder of this article). Examples of materialist ideas are that atoms/sub-atomic particles and fields are the only components of our physical reality, and that phenomena such as consciousness are the direct result of brain activity. Under the materialist paradigm, psi phenomena are impossible, because there is as of yet no physical explanation for them.

Despite the fact that most scientists claim that they are not operating from any belief system, materialism is a belief system of sorts, and it often operates at subtle levels, perhaps even outside of most scientists' awareness. Indeed, in their exploration of potential biases against theism in psychology, Slife and Reber (2009) suggest that these types of biases occur without explicit intention and outside of the awareness of most researchers. Slife and Reber (2009) hypothesize that these biases occur in the "social imaginary" or background understanding of psychologists (Taylor, 2007, p. 171), and that these biases are a type of implicit prejudice (Dovidio, Kawakami & Gaertner, 2002). Along these lines, empirical research suggests that academic psychologists hold a variety of "value systems" that contribute to their scientific attitudes and behaviors, and some of these value systems are related to materialist ideas (Coan,

1968; Coan, 1979; Kimble, 1984; Krasner & Houts, 1984). At a more general level, philosophers, historians, sociologists and psychologists have long argued that the ideal of a truly value-free science is a myth (e.g., Buss, 1979; Holton, 1973; Koch, 1981; Mahoney, 1979; Sampson, 1978).

When academic psychologists are presented with findings from parapsychology studies, it is possible that these controversial results challenge their materialist belief systems, thus creating cognitive dissonance that leads to harsh critiques in an attempt to discredit the information and reduce the dissonance (Roe, 1999; Taylor, 2019). In addition, research on the “existence bias” suggests that individuals have a tendency to believe that the status quo is good simply because it exists (McKelvie, 2013). This type of bias is highlighted in a recently published critique of a parapsychology study, in which Schwarzkopf (2018) criticized Mossbridge and Radin’s (2018) review of evidence for precognition by arguing that scientists should not develop non-materialist hypotheses about precognition, because precognition is *implausible*. Specifically, Schwarzkopf (2018) encouraged scientists to only develop plausible hypotheses, stating that, “The plausibility of a hypothesis depends on whether an observation is consistent with our current understanding of the world” (p. 95). In other words, Schwarzkopf argues that scientists should only examine hypotheses that are *plausible based on current scientific understanding*. Yet it is difficult to imagine how science would progress if researchers never investigated hypotheses that were implausible. Indeed, parapsychologists often investigate implausible hypotheses in an attempt to explore the further reaches of science. It is possible that exploring unconventional topics and hypotheses could lead to discoveries that go beyond, and advance, our current conceptualizations of science, reality and the universe.

Along these lines, researchers in the field of post-materialist science have recently begun to advocate for an alternative to materialist perspectives on the nature of science and reality. Post-materialist perspectives suggest that the nature of reality might not be physical and that consciousness might be more fundamental than matter (Beauregard et al., 2018; Taylor, 2018). While much research remains to be done to confirm these post-materialist perspectives, they offer an intriguing possibility that may help explain the findings from parapsychology studies. Post-materialist perspectives present an unconventional explanation and description of the nature of reality, however it could be argued that it is exactly these types of unconventional hypotheses that might help move science forward. If scientists consistently use confirmation and/or existence biases to discount findings that go against the prevailing materialist paradigm, it is possible that science could become “stalled” within an outdated belief system. In addition, if parapsychology research is in fact being censored (as suggested by Cardeña, 2015), this represents a serious issue with regard to scientific integrity, freedom of expression, and the advancement of science as a whole. Indeed, this type of bias goes against the most fundamental intentions of the scientific method.

Purpose of The Present Study

The aforementioned research suggests that mainstream academic psychologists may hold biases against parapsychology research, and that these biases might be impacting the integrity of the peer review process. It is also possible that strict adherence to materialist belief systems could be motivating these biases. The purpose of the current study was to explore these ideas by directly comparing evaluations of research on a post-materialist topic (parapsychology) versus a more materialist topic (neuroscience). Participants with a background in psychology were randomly assigned to read and evaluate one of two virtually identical study descriptions. The

study descriptions provided identical numbers, statistics and results, however one of the abstracts described the findings as if they were from a parapsychology study, whereas the other abstract described the findings as if they were from a neuroscience study. It was hypothesized that participants would rate the neuroscience study as having stronger findings, as being more valid and reliable, and as requiring less additional research confirmation than the parapsychology study. It is important to note that the purpose of the present study was *not* to provide evidence for or against the actual existence of psi phenomena. Rather, the current study aims to explore whether parapsychology studies are evaluated differently than neuroscience studies, regardless of whether or not the results on either topic are in fact “true.”

The current study serves as a replication and extension of previous research on bias in the evaluation of psychology studies (e.g., Goodstein & Brazis, 1970; Hergovich et al., 2010; Koehler, 1993) by directly comparing the evaluation of a post-materialist topic to a materialist topic. In contrast to the research summaries that were evaluated in Goodstein and Brazis (1970) and Hergovich et al. (2010), the topics that were evaluated in the present study (parapsychology and neuroscience) are topics that have been supported by empirical, peer-reviewed evidence that is generally available to individuals with a background in psychology (as opposed to the research on astrology used in previous studies). It is expected that the results of the current study could help academic psychologists become more aware of their potential biases, which could, in turn, facilitate more balanced peer reviews of parapsychology research.

Method

Participants

An a priori decision was made to aim for a total sample size of 100 participants (50 participants in each experimental group). This decision was made based on two factors, one

being recruitment feasibility (i.e., access to eligible participants) as judged by the principal investigator. In addition, a sample size calculator (AI-Therapy Statistics, 2019) suggested that a total sample size of 102 participants (51 participants per group) would be required for a one-tailed test between independent groups to detect a medium effect size (0.5) with an alpha level of .05 and power of .80 (a medium effect was predicted based on the medium to large effects found in Hergovich et al., 2010). Therefore, participant recruitment continued until a total of 50 eligible participants had completed the survey in each group (see the Procedure section below for additional details regarding participant recruitment). Participants were recruited from a variety of sources that were available to the principal investigator, including: a) Faculty, undergraduate, and graduate students in the School of Psychology at the University of New York in Prague, b) The Principal Investigator's personal and professional Facebook, Twitter, Instagram and LinkedIn profiles, c) A popular Facebook group called "Psychology Research Participants – Dissertation, Thesis, Survey, Subjects," and d) Through the Western University Psychology Graduate Student Association Facebook page. As an incentive to participate, participants were offered the opportunity to be entered into a draw for a \$50 Amazon gift card in return for completing the study.

A total of 109 participants completed the survey (psi group = 53; neuroscience group = 56). One of the inclusion criteria for the present study was that participants needed to have a background in psychology (i.e., participants needed to be an undergraduate or graduate student who is majoring in psychology, or have received a Bachelor's, Master's and/or PhD degree in psychology). Three participants in the psi group, and six participants in the neuroscience group answered "No" to the survey question asking if they had a background in psychology, thus these

participants were removed from the final analyses. Therefore the final sample included 100 participants (psi group = 50; neuroscience group = 50).

The sample demographics for both groups are presented in Table 1. The majority of the sample was female in both groups, with an average age of 28.31 ($SD = 9.83$) in the psi group and 26.92 ($SD = 8.44$) in the neuroscience group. The majority of participants in both groups listed their region of birth as being from either Canada, Central or Eastern Europe (including Russia), Northern or Western Europe, or the United States. With regard to highest level of education achieved, the majority of participants in both groups reported that they had received either a high school diploma/degree, an Associate, College or Bachelor's Diploma/Degree, or a Master's Degree. With regard to current professional role, the majority of participants in both groups were either undergraduate students or graduate students (MA, PhD or MD).

Procedure

The study procedure and outcome measures were reviewed and approved by the University of New York in Prague Institutional Review Board (IRB) Committee Chair prior to distributing the survey. The current study was conducted entirely online using Google Forms. Two separate survey links were created within Google Forms: one link for the psi group and another link for the neuroscience group. Participants were randomly assigned to receive one of the two links based on the principal investigator flipping a coin before emailing or posting the link. When participants clicked on the survey link, they were first presented with an informed consent form, and they were required to click "I Agree" in response to the consent form in order to proceed with the study. After clicking "I Agree," participants completed a short demographics questionnaire and were then presented with one of two potential study summaries. One summary described research and statistics about a study of psi phenomena. The other summary provided

identical wording and statistics, however the topic of the study was about the role of the hippocampus in storing episodic memories (see the Appendix for the study summaries). After reading the study summary, participants were asked to answer four questions that assessed their opinions regarding the strength, replicability and validity of the findings (see the section on Outcome Measures for a description of these questions). After evaluating the study summary, participants were asked to complete a “Beliefs About Consciousness and Reality” questionnaire (Barušs & Moore, 1998) (described in more detail below) and were then shown the debriefing form. The entire study took approximately 5 to 10 minutes for participants to complete.

The results that were presented in both study summaries were the actual findings from a recent review of experimental research on psi phenomena (Cardeña, 2018). In other words, the effect sizes, number of meta-analyses, and other information presented in both summaries represents the current state of the evidence for psi phenomena based on a recently published peer-reviewed paper. Therefore the results presented in the study summary for the role of the hippocampus in storing episodic memories were fictitious, but the findings did accurately describe the current state of the evidence for psi.

Outcome Measures

Demographics Questionnaire. Participants completed a six-item demographics questionnaire (created by the principal investigator). In order to ensure that participants met the eligibility criteria, the first question in this questionnaire was: “Do you have a background in psychology?” Participants were able to select one of two response options: “Yes, I am an undergraduate or graduate student who is majoring in psychology or I have received a Bachelor’s, Master’s and/or PhD degree in psychology” or “No, I do not have a background in

psychology.” The remaining questions asked about participants’ gender, age, region of birth, level of education and current professional role/position.

Study Summary Evaluation. Participants completed four questions after reading the study summary. The instructions for these questions encouraged participants to focus only on the results from the study summary (not on previous knowledge that they might have about psi or the hippocampus). The questions were created by the principal investigator and were as follows (note that the italicized text in square brackets differed depending on which study summary the participant read):

1. Based on the findings from the study summary, the scientific evidence for [*the role of the hippocampus in storing episodic memories*] OR [*psi phenomena*] is... This question was rated on a Likert scale ranging from 1 (Very Weak) to 5 (Very Strong).
2. Based on the findings from the study summary, much more research should be done before scientists can confidently establish [*the role of the hippocampus in storing episodic memories*] OR [*the reality of psi phenomena*]. This question was rated on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).
3. How likely do you think it is that the pattern of results from the study summary will replicate (i.e., be confirmed) in future studies? This question was rated on a Likert scale ranging from 1 (Very Unlikely) to 5 (Very Likely).
4. In my opinion, the topic of [*the role of the hippocampus in storing episodic memories*] OR [*psi phenomena*] is a valid research area for the field of

psychology. This question was rated on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Beliefs About Consciousness and Reality Questionnaire. Participants also completed the Beliefs About Consciousness and Reality Questionnaire (BCR-Q) developed by Barušs and Moore (1998). The BCR-Q is a 38-item questionnaire that assesses where participants fall on the dimension of materialist versus transcendent beliefs regarding consciousness and reality. Individuals with materialist beliefs tend to hold that everything in the universe is ultimately physical, whereas individuals with transcendent beliefs are more likely to endorse the idea that there is more to reality than what can be physically measured/observed. The BCR-Q is composed of six subscales (antiphysicalism, religiosity, meaning, extraordinary experiences, extraordinary beliefs and inner growth), as well as a total Transcendentalism score that consists of all of the survey items. The current study did not have specific hypotheses related to the BCR-Q subscales, thus only the total Transcendentalism score was used (see Barušs and Moore, 1998 for a description of the subscales). The first eight items on the BCR-Q are rated on a four-point Likert scale ranging from Definite No (-3.0) to Definite Yes (3.0), with sample items such as: “I have had experiences which science would have difficulty explaining” and “My spiritual beliefs determine my approach to life.” The remaining 30 items are rated on a seven-point Likert scale ranging from Strongly Disagree (-3.0) to Strongly Agree (3.0), with sample items such as: “There is no reality other than the physical universe” (reverse-scored) and “Extrasensory perception is possible.” Therefore higher scores on the BCR-Q indicate higher transcendent beliefs. In previous research, the BCR-Q has displayed high reliability and validity (Barušs & Moore, 1992; Barušs & Moore, 1998). In the current study, the Cronbach’s alpha for the total Transcendentalism score was .92 for the psi group and .89 for the neuroscience group.

Data Analysis

The current study took a three-step approach to data analysis. First, *preliminary analyses* were conducted to test whether the two experimental groups differed on several baseline variables. Specifically, a chi-square test (or Fisher's exact test for situations in which there were cells with expected counts of less than 5) was used to examine whether the two groups were different on any of the demographic variables. In addition, two independent-samples *t*-tests were used to examine if the two groups were different with regard to age and/or the total BCR-Q Transcendentalism score. The *primary analysis* consisted of a one-way MANOVA in which group (psi vs. neuroscience) served as the between-subjects factor. The four dependent variables in the MANOVA analysis were the four Study Summary Evaluation questions described previously. Finally, an *exploratory analysis* was conducted to examine the potential intercorrelations (Pearson's *r*) between the four Study Summary Evaluation questions and the BCR-Q total Transcendentalism score. The a priori alpha level was set at $p < .05$ for all analyses. The raw data for the current study is available on the Open Science Foundation website (Butzer, 2019).

Results

Preliminary Analyses

The independent-samples *t*-tests revealed that the two groups were not different from each other with regard to age or total BCR-Q Transcendentalism (see Table 2). All of the chi square analyses on the demographic variables produced cells with expected counts of less than 5, thus the Fisher's exact test was used for these variables. These analyses revealed that the two groups were not different with regard to gender (Fisher's exact test = 1.72, $p = .48$), level of education (Fisher's exact test = 5.50, $p = .21$) or region of birth (Fisher's exact test = 19.87, $p =$

.11) (see Table 1). However, the Fisher's exact test indicated a difference when comparing the two groups on their current profession (Fisher's exact test = 15.60, $p = .008$) (see Table 1).

Agresti (2007) and Haberman's (1973) recommendations were used to conduct a post-hoc analysis in which the adjusted standardized residuals for each cell were examined to determine which cells differed from each other. Agresti (2007) and Haberman (1973) suggest that adjusted standardized residuals with values exceeding 3.0 for tables with many cells indicate a rejection of the null hypothesis for that cell. The adjusted standardized residuals were below 3.0 for all of the cells except "Graduate Student (Master's, PhD and/or MD)," where the adjusted standardized residual was 3.1. This suggests that there were a larger number of graduate students in the neuroscience group ($n = 21$) than the psi group ($n = 7$).

Primary Analyses

The one-way MANOVA analysis revealed a multivariate effect of group (psi vs. neuroscience), Pillais' Trace = .20, $F(4, 95) = 5.96$, $p = .000$, with a multivariate effect size (partial eta squared) of .20 for group, indicating a large multivariate effect (Cohen, 1969). Based on the multivariate effect, a series of follow-up one-way ANOVAs were conducted to compare the two groups on each of the four dependent variables (see Table 3). Three of the one-way ANOVAs indicated a difference between the two groups (for the questions related to strength of evidence, likelihood of replication and validity of research area), and one of the one-way ANOVAs indicated a potential difference between groups ($p = .053$) (for the question related to more research needing to be done on the topic). An examination of the means for the two groups shows that compared to the parapsychology abstract, the neuroscience abstract was rated as providing stronger scientific evidence, as being more likely to replicate, and as being a more valid research area. There was also a trend suggesting that participants rated the results of the

neuroscience abstract as requiring less additional research confirmation than the parapsychology abstract. The effect sizes (partial eta squared) for the dependent variables ranged from .04 (for additional research confirmation) to .14 (for likelihood of replication and validity of research area). The effect sizes for strength of evidence, likelihood of replication, and validity of research area indicate a large effect of group on these variables (Cohen, 1969).

Exploratory Analyses

The exploratory correlational analysis revealed that participants in the psi group showed positive correlations between three of the study summary evaluation questions and total BCR-Q Transcendentalism (see Table 4). In other words, for participants in the psi group, higher scores on Transcendentalism were associated with higher ratings of scientific evidence, replicability and validity of the parapsychology abstract. This positive correlation also suggests that lower scores on Transcendentalism were associated with lower ratings of scientific evidence, replicability and validity of the parapsychology abstract. In contrast, for the neuroscience group, total BCR-Q Transcendentalism was not correlated with any of the study summary evaluation questions as determined by the a priori alpha level of $p < .05$. When comparing the magnitude of these correlations, the strongest association was a negative correlation between BCR-Q Transcendentalism and validity of the neuroscience abstract (see Table 4).

Discussion

The results of the current study showed that participants rated a neuroscience abstract as providing stronger scientific evidence, as being more likely to replicate, and as being a more valid research area than a virtually identical parapsychology abstract. Participants also showed a trend toward rating the results of the neuroscience abstract as requiring less additional research confirmation than the parapsychology abstract. Taken together, these findings suggest that

individuals with a background in psychology display a bias in which the results of parapsychology research are under-valued compared to neuroscientific research. These findings have several implications for the ways in which parapsychology research is evaluated within the field of psychology, particularly during the peer review process (discussed in more detail below).

The current results are consistent with previous research suggesting that academic psychologists tend to evaluate research on mainstream topics (e.g., the Big 5 personality factors) more favorably than research on controversial topics (e.g., astrology or parapsychology) even when the methodological strength of the research is equal (Armstrong, 1996; Hergovich et al., 2010; Horrobin 1990; Koehler, 1993). It is unclear exactly why this bias exists, however it is possible that the prevailing materialist scientific paradigm leads individuals to hold neuroscientific findings in higher regard than parapsychology findings. This materialist perspective could lead academic psychologists to under-value parapsychology findings because there is no physical explanation for them. It is possible that this materialist bias might be particularly strong within the field of psychology, which has often focused on experimental, quantitative research in an effort to legitimize itself by aligning with “hard sciences” like physics and chemistry (Kopala & Suzuki, 1999; Sherif, 1998). Indeed, previous research has shown that psychology faculty members tend to hold less favorable opinions about parapsychology than beginner psychology students (Moss & Butler, 1978). These unfavorable opinions may result in confirmation biases in which psychologists rate other types of research more favorably than parapsychology research (Koehler, 1993).

It is interesting to note that the results of the correlational analysis suggest that for participants in the psi group, transcendentalist beliefs were positively correlated with ratings of the psi abstract. However, transcendentalist beliefs were not associated with ratings of the

neuroscience abstract. These findings provide evidence of confirmation bias in the evaluation of parapsychology research in that individuals with higher transcendentalist beliefs may be more likely to evaluate parapsychology research in a more favorable manner. It is important to point out that this positive correlation also suggests that individuals with lower transcendentalist beliefs may be more likely to evaluate parapsychology research in a less favorable manner. In other words, participants in the psi group tended to evaluate the abstract in a manner that was in line with their level of transcendentalist beliefs, whether high or low.

The results relating to the BCR-Q should be interpreted with caution, however, because the BCR-Q was administered *after* participants read and evaluated the psi (or neuroscience) abstract. It is possible, for example, that reading evidence in support of psi might have “primed” participants to report higher transcendentalist beliefs. Indeed, even though the two groups were not different on the BCR-Q Transcendentalism score, an examination of the means suggests that the psi group did report higher scores on transcendentalism. Prior research suggests that scientists may hold higher levels of belief in and experience of the paranormal than they are willing to admit publicly (Wahbeh, Radin, Mossbridge, Vieten, & Delorme, 2018), thus it is possible that reading about evidence that is supportive of psi before completing the BCR-Q might have reminded participants of paranormal experiences they have experienced, and/or given participants “permission” to endorse the transcendentalist items more highly.

The lack of correlation between BCR-Q Transcendentalism and evaluations of the neuroscience abstract is also interesting. One might have expected, for example, that lower scores on Transcendentalism (i.e., higher materialism) might have been associated with more favorable ratings of the neuroscience abstract, however this was not the case. In other words, it is not necessarily the case that individuals with stronger materialist beliefs rate neuroscience

research more favorably. However, when neuroscience research is directly compared with parapsychology research, the neuroscience research is evaluated more favorably. In summary, the current findings suggest that bias in the evaluation of parapsychology research occurs at multiple levels. First, there is confirmation bias within the evaluation of parapsychology research on its own, and second, there is a bias against parapsychology research when it is directly compared to neuroscience research.

Implications

The current findings hold several implications for the ways in which parapsychology research is evaluated by academic psychologists. First, psychologists need to be vigilant about potential biases that could impact their evaluations of parapsychology research during the peer review process. Reviewers who tend to endorse transcendentalist beliefs need to be careful that they do not evaluate psi research overly favorably, and reviewers who tend to endorse materialist beliefs need to be careful that they do not evaluate psi research overly harshly. For reviewers who tend to endorse materialist beliefs, one approach might be to imagine that you were reading an identical article about a topic or theory that you agree with. In other words, how would you evaluate the study if it was about a topic/theory that you endorse? On the other hand, for reviewers who tend to endorse transcendentalist beliefs, it is important to pay careful attention to potential methodological and/or statistical limitations of parapsychology studies, as well as to ensure that you (and/or the authors) do not overstate the strength of the findings. In addition, when sending out parapsychology research for peer review, journal editors could try to obtain an equal number of “psi-proponent” and “psi-skeptic” (and/or “psi-neutral”) reviewers. Journal editors themselves should also be aware of potential biases that they might hold that could

influence their ultimate decision to accept or reject a parapsychology article (or to even send the article out for peer review in the first place).

An additional suggestion would be for parapsychology researchers (as well as all researchers) to engage in the types of open science and early acceptance procedures outlined by Armstrong (1996) and Munafò et al. (2017). These practices encourage transparency, replicability, and quality by encouraging pre-registration and peer review of study designs before the study is conducted, making data publicly available, and partnering with multiple labs in an attempt to replicate effects. It is encouraging to note that researchers within the field of parapsychology have advocated for the pre-registration of studies for some time (Wiseman, Watt, & Kornbrot, 2019), with current parapsychologists continuing to emphasize practices such as pre-registration (Watt & Kennedy, 2015) and independent replication/analysis (Guerrer, 2019; Tremblay, 2019). A final recommendation would be for scientists to engage in skeptic-proponent collaborations when conducting parapsychology research. These types of collaborations have proven fruitful in the past, particularly with regard to highlighting potential experimenter effects (Schlitz, Wiseman, Watt, & Radin, 2006).

In conclusion, the harsh critiques of parapsychology could be a blessing in disguise, in that parapsychology researchers are being encouraged (perhaps more so than others) to carefully evaluate their methodological procedures and to participate in open science initiatives. These practices could help improve the quality of research, and reduce bias, both within parapsychology and psychology as a whole.

Limitations

The current study has several strengths, including random assignment to conditions, a relatively large sample size, and a sample that includes participants from a wide variety of

countries around the world. However, several limitations also need to be acknowledged. First, the sample cannot be considered to be truly representative of all academic psychologists. Indeed, the majority of participants (83/100) self-identified as undergraduate or graduate students, suggesting that the current sample is not primarily composed of professional scientists. However, it is important to keep in mind that these students represent the future of psychology, as some of them will likely transition into academic careers. In addition, while the two experimental groups were not different on the majority of the demographic variables, the Fisher's exact test suggested that the neuroscience group was comprised of more graduate students than the psi group. It is difficult to know if or how this difference might have impacted the results. Future research should attempt to recruit a more representative sample of academic psychologists, with participants evenly distributed with regard to current profession/role.

It would have also been useful to counterbalance the order of the BCR-Q such that some participants completed the questionnaire before reading the abstract, whereas other participants completed it afterward. This design would have allowed for the testing of potential order effects. In addition, it might have been worthwhile to use (or develop) a questionnaire that more strongly evaluates materialist beliefs (or perhaps even "neuroscientific beliefs"). While low scores on the BCR-Q are hypothesized to indicate materialist beliefs, it might not be the case that the opposite of transcendentalism is materialism. For example, just because someone has not experienced parapsychological phenomena, this does not mean that they endorse materialist beliefs. Only a small number of items on the BCR-Q are worded such that they actually represent materialist beliefs, while the remaining items represent a variety of transcendent beliefs and phenomena. Measuring materialist beliefs more accurately might help future researchers identify the ways in which materialist ideas could bias the evaluation of parapsychology research.

Conclusion

The current study suggests that rather than being entirely neutral and objective, individuals with a background in psychology are prone to bias when they evaluate research. Indeed, the ideal of a completely objective scientist, and a value-free scientific enterprise, are myths (Braud & Anderson, 1998). While it might not be possible to be 100% bias free, the current study suggests that individuals with a background in psychology should pay closer attention to the ways that they evaluate research, particularly within the field of parapsychology. Paying attention to these types of biases is not easy. It requires that we do our best to evaluate all studies equally – regardless of whether the results confirm our prior beliefs or not. It requires high levels of vigilance and scientific integrity, as well as the humility to admit when findings might not be as strong (or as dismissible) as we expect. If we are going to hold parapsychology studies up to a high level of scrutiny, then it behooves us to apply this same level of scrutiny to all research within the field of psychology as a whole. Indeed, it is in the best interest of our discipline, and the best interest of science, to hold ourselves to the highest standards possible.

Conflict of Interest and Funding Statement

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Compliance With Ethical Standards

This article does not contain any studies with animals performed by any of the authors. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional review board at the University of New York in Prague and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

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Appendix

Note that the text in square brackets differed between the two study summaries.

STUDY SUMMARY #1:

The Experimental Evidence for [Parapsychological Phenomena]: A Review

This article presents a comprehensive integration of current experimental evidence about [parapsychological phenomena.] [Parapsychological phenomena (hereafter referred to as psi phenomena), are defined as events that seem to violate the common sense view of space and time, including extrasensory perception (ESP; also known as anomalous cognition) and psychokinesis (the potential effect of mental events, such as intention, on physical objects).]

Over the past several decades, numerous meta-analyses have been conducted on experimental studies of [psi phenomena]. The purpose of a meta-analysis is to statistically combine the results from separate studies in order to calculate an overall effect size of a phenomenon, which gives an indication of the statistical strength of the findings across multiple experiments.

Taken together, the majority of meta-analyses of [psi phenomena] yield statistically significant effect sizes. Specifically, based on a comprehensive literature search, the current paper reviewed 18 meta-analyses of [psi phenomena], which represent the combined results of 1,461 studies conducted on thousands of participants. Of the 18 meta-analyses, 15 yielded statistically significant effect sizes that are supportive of [psi]. The statistically significant effect sizes were typically small (ranging from .007 to .50), however the findings suggest that results pertaining to [psi phenomena] do replicate across a variety of experimental procedures and research labs. The majority of the meta-analyses reviewed in this article maintained statistically significant effect sizes even after accounting for variables that might have impacted the data, such as design quality, homogeneity of studies, and potential publication biases (i.e., file drawer effects).

In summary, the evidence reviewed in this paper provides cumulative support for [the reality of psi], which cannot be readily explained away by the quality of studies, fraud, selective reporting, or experimental/analytical incompetence. Given that many meta-analyses within the field of psychology also tend to find small, statistically significant effect sizes, the authors conclude that the evidence for [psi] is comparable to that for other established phenomena in psychology.

While the evidence presented in this paper is promising, additional research needs to be conducted, such as continuing to improve methodological rigor, using principles of open science including publicly available project and data repositories, developing additional falsifiable theories, and conducting multidisciplinary studies with enough statistical power to detect effects.

STUDY SUMMARY #2:**The Experimental Evidence for [The Role of The Hippocampus In Storing Episodic Memories]: A Review**

This article presents a comprehensive integration of current experimental evidence about [the role of the hippocampus in storing episodic memories.] [The hippocampus is a part of the brain that is located in the temporal lobe. Episodic memories are autobiographical memories from specific events in our lives, such as meeting a friend for lunch last week.]

Over the past several decades, numerous meta-analyses have been conducted on experimental studies of [the role of the hippocampus in storing episodic memories]. The purpose of a meta-analysis is to statistically combine the results from separate studies in order to calculate an overall effect size of a phenomenon, which gives an indication of the statistical strength of the findings across multiple experiments.

Taken together, the majority of meta-analyses of [the role of the hippocampus in storing episodic memories] yield statistically significant effect sizes. Specifically, based on a comprehensive literature search, the current paper reviewed 18 meta-analyses of [the role of the hippocampus in storing episodic memories], which represent the combined results of 1,461 studies conducted on thousands of participants. Of the 18 meta-analyses, 15 yielded statistically significant effect sizes that are supportive of [the role of the hippocampus in storing episodic memories]. The statistically significant effect sizes were typically small (ranging from .007 to .50), however the findings suggest that results pertaining to [the role of the hippocampus in storing episodic memories] do replicate across a variety of experimental procedures and research labs. The majority of the meta-analyses reviewed in this article maintained statistically significant effect sizes even after accounting for variables that might have impacted the data, such as design quality, homogeneity of studies, and potential publication biases (i.e., file drawer effects).

In summary, the evidence reviewed in this paper provides cumulative support for [the role of the hippocampus in storing episodic memories], which cannot be readily explained away by the quality of studies, fraud, selective reporting, or experimental/analytical incompetence. Given that many meta-analyses within the field of psychology also tend to find small, statistically significant effect sizes, the authors conclude that the evidence for [the role of the hippocampus in storing episodic memories] is comparable to that for other established phenomena in psychology.

While the evidence presented in this paper is promising, additional research needs to be conducted, such as continuing to improve methodological rigor, using principles of open science including publicly available project and data repositories, developing additional falsifiable theories, and conducting multidisciplinary studies with enough statistical power to detect effects.