Personality and Individual Differences 99 (2016) 113–117

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Individual differences in Need for Cognition influence the evaluation of circular scientific explanations

Jillian Minahan *, Karen L. Siedlecki

Fordham University, Psychology Department, 441 East Fordham Road, Bronx, NY 10458-9993, USA

ARTICLE INFO

Article history:
Received 16 January 2016
Received in revised form 19 April 2016
Accepted 20 April 2016
Available online 8 May 2016

Keywords:
Need for Cognition
Neuroscience
Popular press

ABSTRACT

Recent advances in neuroscience research have led to increased interest in psychological findings that offer neural or neuropsychological explanations for human behavior. Researchers have found that individuals rate scientific explanations that contain neuroscience information as more satisfying, even when the neuroscience information is irrelevant. Individual differences, such as level of expertise, have been shown to affect an individual's evaluation of an explanation. The current study examined whether the individual differences characteristic Need for Cognition (NFC) had an effect on an individual's ability to adequately evaluate a circular explanation with and without irrelevant neuroscience information with an expectation that NFC would have a moderating influence on the relationship between presence of neuroscience information in circular explanations and satisfaction with these explanations. Results indicated that the presence of neuroscience information influenced evaluations of circular explanations such that the explanations with neuroscience information tended to be rated more favorably. Results also indicated that NFC was negatively correlated with satisfaction ratings; however, no interaction effect between NFC and presence of neuroscience information was observed. These results may have important implications for the way in which researchers convey and disseminate their findings to the general public.

With advances in neuroscience research, such as the improvement of brain-imaging techniques, there has been an increased interest in psychological studies that posit neural and neuropsychological explanations of human behavior. Scurich and Shniderman (2014) cite an editorial in The Economist that echoes this excitement associated with the potential of neuroscience, stating essentially that neuroscience may beat genetics in the race to revolutionize our understanding of human nature. Weisberg, Keil, Goodstein, Rawson, and Gray (2008) suggest that nonneural cognitive psychology does not garner as much attention even though it asks similar research questions to those examined in neuropsychology and cognitive neuroscience. Since neuroscience information in the popular press as well as in scientific journals has become a source of public fascination, the way in which individuals evaluate such information must be examined more closely.

In psychology, one of the purposes of neuroscience information is to provide explanation for phenomena, especially human behavior (Weisberg et al., 2008). Though neuroscience information is valued because of its explanatory function, previous research has indicated that people have difficulty critically evaluating explanations, meaning individuals may believe they have gotten a good explanation based on reasons other than the accuracy of the information or merit of the underlying logic (Weisberg et al., 2008). As summarized by Weisberg et al. (2008), individuals have a tendency to rate explanations as more similar to experts' explanations simply because they are longer (Kikas, 2003) and have difficulty recognizing circularity in explanations (Rips, 2002). Trout (2002) asserted that individuals may feel a certain intuitive satisfaction with an explanation because it "feels right" not necessarily because it is an accurate representation of the truth (p. 212). Trout defined this experience of explanation satisfaction as the "confidence that one enjoys an accurate description of the underlying causal factors sufficient (under the circumstance) to bring about the phenomenon we are examining" (p. 214). Thus, one reason for the heightened interest in neuroscience in psychological explanations is the extent to which individuals find neuroscience language more satisfying than explanations that do not make reference to the brain (McCabe & Castel, 2008; Weisberg et al., 2008). This suggests that the mere inclusion of neuroscience may be conceived as more satisfying, regardless of whether this information adds any logical value to the explanation.

For instance, Beck (2010) suggests several factors that may contribute to the satisfying nature of neuroscience information. She argues that part of the popularity of neuroscience information is due to the simplicity of the message that it conveys. Brain references, in a psychological context especially, allow social science research to communicate in a reductionist framework like that of chemical or biological research. As such, the complex process of neuroimaging is reduced to the idea that "complicated behavior *X* lights up area *Y*" in the popular press, yielding a message that is ultimately (overly) simplistic (Beck, 2010, p. 763). Another reason that neuroscience information is considered so influential is that brain references are interpreted as having explicit explanatory

* Corresponding author.
E-mail address: jminahan@fordham.edu (J. Minahan).

http://dx.doi.org/10.1016/j.paid.2016.04.074
0191-8869/

power regardless of the other information that accompanies it, such as behavioral information. Indeed, the perceived message simplicity, the transformation toward reductionism, and the perceived explicit explanatory power of neuroscience information are significant factors that contribute to the way in which individuals interpret explanations that contain neuroscience information.

To empirically examine whether individuals find neuroscience information (even if it adds no logical value to an explanation) so satisfying, Weisberg et al. (2008) showed naïve students, introductory cognitive neuroscience students, and cognitive neuroscience experts explanations of specific psychological phenomena and asked participants to rate to what extent they were satisfied with the explanation. Importantly, half of the explanations were "good" or the genuine explanation for the phenomena while the other half were "bad" or restatements of the description with circularity. Likewise, half of the good as well as the circular explanations contained irrelevant neuroscience information that did not add any logical value to the explanation while the other half contained no neuroscience information. This information was considered irrelevant because it failed to contribute any explanatory power over and above what already existed in the explanation and, thus, was considered to lack logical value. Researchers found that nonexperts (i.e., naïve students and introductory to cognitive neuroscience students) rated circular explanations with neuroscience information as more satisfying than circular explanations without neuroscience information. However, the cognitive neuroscience experts did not rate the circular explanations with neuroscience information as more satisfying than the circular explanations without neuroscience information, implicating the role of expertise in one's interpretation of explanations that contain neuroscience information.

Because expertise, an individual difference characteristic, has been shown to influence one's ability to evaluate explanations, it is likely that other individual differences also play a role in how one evaluates an explanation (Weisberg et al., 2008). Differences in cognitive engagement have been linked to differences in deliberation about substantive arguments of a persuasive message (See, Petty, & Evans, 2009) and may be implicated in the interpretation of neuroscience information.

The individual differences characteristic Need for Cognition (NFC; Cacioppo & Petty, 1982) has been used to account for differences in the way in which individuals engage in cognitive activities, such as reading and evaluating explanations. Cacioppo and Petty (1982) define NFC as "the tendency for an individual to engage in and enjoy thinking" (p. 116), and individuals high in NFC are intrinsically motivated to think and those low in NFC avoid expending energy on cognitive tasks (Cacioppo, Petty, Feinstein, & Jarvis, 1996). Related to NFC, elaborative processing is characterized by the ability to formulate explanations relevant to target concepts (Coutinho, Wiemer-Hastings, Skowronski, & Britt, 2005), and Sadowski and Gulgoz (1996) found that participants higher in NFC generated more complex explanations of target concepts thereby engaging in more elaborative processing than participants low in NFC.

Similarly, previous research has indicated that there is a difference in the way that individuals high in NFC as compared to individuals low in NFC approach the evaluation of arguments and explanations. Individuals high in NFC are more likely to use analytical processing of information (Haugtvedt & Petty, 1992) and to be persuaded by strong arguments. They are influenced by the quality of the message of the arguments and the merit of the evidence rather than other less cognitively-demanding cues, such as the use of humor or the attractiveness of the individual conveying the message (See et al., 2009; Priester & Petty, 1995). For instance, Cacioppo, Petty, and Morris (1983) presented participants with either strong or weak arguments for the institution of comprehensive exams for seniors as a requirement for graduation. They found that individuals with higher NFC reported using more cognitive effort when considering the argument with which they had been presented compared to individuals with lower NFC. They also found that the quality of the argument influenced evaluation ratings (e.g., how convincing, effective, well-written, and favorable the message was) more for individuals with higher NFC than individuals with lower NFC. It is evident that NFC plays a role in message and argument evaluation; thus, in the present study, we examined the potential impact that NFC has, not on message and argument evaluation, but on explanation evaluation.

While Weisberg et al. (2008) systematically examined the role that irrelevant neuroscience information played in evaluating scientific explanations and administered the study to three samples of individuals to study how different levels of knowledge influenced explanation evaluation, NFC was not examined within these subsamples. However, NFC seems to be closely related to the way in which one engages and critically (or uncritically) evaluates the information posed in an explanation. Thus, one purpose of the present study was to examine whether individuals are influenced by the inclusion of logically irrelevant neuroscience information in circular psychological explanations based on their level of NFC. For the purposes of the present study, based on the experimental stimuli utilized in Weisberg et al. (2008), only the circular (e.g., poor) explanations that contained circular reasoning were included in the survey since Weisberg et al. (2008) found that the presence of neuroscience in the circular explanations had a larger effect on participant satisfaction ratings of the explanations than its presence in the good explanations did.

Weisberg et al. (2008) asserted that individuals are particularly uncritical of explanations if neuroscience information is present. This argument was recently further substantiated by Fernandez-Duque, Evans, Christian, and Hodges (2015) who found that the inclusion of superfluous neuroscience information increased reader perception of scientific argument quality. In contrast, several other research studies have failed to replicate similar findings regarding the satisfying nature of neuroscience information (e.g., Hook & Farah, 2013; Michael, Newman, Vuorre, Cumming & Garry, 2013; Scurich & Shniderman, 2014), indicating that this information may not be as powerful as originally suggested. Thus, one aim of the current study was to replicate the findings of Weisberg et al. (2008) in order to further explore the allure (or lack of in the case of null findings) of neuroscience information in scientific explanations.

Integrating the aforementioned aims of the study, it was hypothesized that 1) explanations with neuroscience information would be rated as more satisfying overall than explanations without neuroscience information (Weisberg et al., 2008) and that 2) individuals with higher NFC would rate the explanations as less satisfying overall than individuals with lower NFC (Cacioppo et al., 1983; See et al., 2009). Thirdly, it was also hypothesized that there would be an interaction effect, such that the impact of the irrelevant neuroscience information would be greater in individuals who score lower in NFC as compared to those score higher in NFC. That is, while we hypothesized that satisfaction ratings of both NFC groups would be influenced by the neuroscience information, those lower in NFC would be impacted more by the seductive allure than those higher in NFC.

1. Method

1.1. Participants

Participants for the present study were 65 undergraduate students from a private university in New York City. The sample comprised 44 females (67.7%), 20 males (30.8%), and one unreported (1.5%) with a mean age of 20.08 years and a standard deviation of 3.08. Thirty-seven participants were randomly assigned to the With Neuroscience condition while 28 participants were randomly assigned to the Without Neuroscience condition. Unequal distributions resulted from the randomization process. Participants in the With Neuroscience condition only received explanations that included neuroscience information while the Without Neuroscience participants only received explanations that did not include neuroscience information.