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Handedness differences in information framing

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ABSTRACT

Previous research has shown that strength of handedness predicts differences in sensory illusions, Stroop interference, episodic memory, and beliefs about body image. Recent evidence also suggests handedness differences in the susceptibility to common decision biases such as anchoring and sunk cost. The present paper extends this line of work to attribute framing effects. Sixty-three undergraduates were asked to advise a friend concerning the use of a safe allergy medication during pregnancy. A third of the participants received negatively-framed information concerning the fetal risk of the drug (1–3% chance of having a malformed child); another third received positively-framed information (97–99% chance of having a normal child); and the final third received no counseling information and served as the control. Results indicated that, as predicted, inconsistent (mixed)-handers were more responsive than consistent (strong)-handers to information changes and readily update their beliefs. Although not significant, the data also suggested that only inconsistent handers were affected by information framing. Theoretical implications as well as ongoing work in holistic versus analytic processing, contextual sensitivity, and brain asymmetry will be discussed.

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1. Introduction

Previous research has shown that strongly (consistent) right-handed individuals exhibit less interaction between the left and right cerebral hemispheres than do mixed (inconsistent)-handers (e.g., Christman, 1993, 2001). For example, strong right-handers perform more poorly on tests of verbal episodic recall (e.g., Christman, Propper, & Brown, 2006; Christman, Propper, & Dion, 2004; Lyle, McCabe, & Roediger, 2008; Propper & Christman, 2004; Propper, Christman, & Phaneuf, 2005), arising from decreased interaction between left hemisphere-based encoding and right hemisphere-based retrieval processes (e.g., Habib, Nyberg, & Tulving, 2003). In general, it appears that inconsistent-handedness is associated with increased functional access to right hemisphere processes (Prichard, Propper, & Christman, 2013), reflected in the electrophysiological finding of increased right hemisphere activation in inconsistent-, relative to consistent-, handers (Propper, Pierce, Geisler, Christman, & Bellorado, 2012).

Of direct relevance to the current paper are findings of a greater ability of inconsistent-handers to update various types of mental representations in response to relevant information, including conceptual (Christman, Henning, Geers, Propper, & Niebauer, 2008; Jasper, Barry, & Christman, 2008; Niebauer, Christman, Reid, & Garvey, 2004), perceptual (Christman, Sontam, & Jasper, 2009), and bodily (Christman, Bentle, & Niebauer, 2007; Niebauer, Aselage, & Schutte, 2002) representations. These findings reflect greater interaction in inconsistent-handers between left hemisphere-based belief maintenance and right hemisphere-based belief updating mechanisms (e.g., Coltheart, 2007; Ramachandran, 1995).

Recent evidence also suggests that there are handedness differences in decision-making. Specifically, Jasper and Christman (2005) demonstrated that inconsistent-handers show larger anchoring effects than consistent-handers – but only if the anchors are seen as non-random and informative. The present paper extends this line of work to information framing effects.

Exploring individual differences in framing effects is not a new endeavor. Smith and Levin (1996), for example, were the first to identify need for cognition (NFC) as a generalizable and stable trait predictive of responses to two risky choice framing problems developed by Tversky and Kahneman (1981). Specifically, the usual framing effects were found in both problems, but only for those low on NFC; high need for cognition subjects appeared to be less susceptible to frame of reference manipulations. Even more recently, Levin and his colleagues (Lauriola & Levin, 2001; Levin, Gaeth, Schreiber, & Lauriola, 2002) and Stanovich and West (1998a,b) have demonstrated the value of using a variety of personality characteristics (e.g., neuroticism and openness to new experience) and cognitive ability, respectively, to identify the decision makers who are susceptible to these effects and those who are not.

What is new is the notion that there may be neurological differences that can explain why some decision makers are susceptible to

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these effects and others are not. The notion that handedness may be a predictor of decision behavior is grounded in two separate lines of previous research. One pertains to a growing body of evidence cited above documenting individual differences as a function of degree rather than direction of handedness in a variety of cognitive domains that implicate interaction between the left and right cerebral hemispheres, and the other pertains to the different roles of the two cerebral hemispheres in the establishment, maintenance and updating of mental representations. We refer you to Jasper and Christman (2005) for a review of this literature. In sum, the argument is that the left hemisphere is in charge of maintaining our current, status quo beliefs about the world, while the right hemisphere plays a sort of "Devil's Advocate," searching for events and facts that are inconsistent or anomalous with currently held representations (e.g., Ramachandran, 1995). Belief updating requires right-hemisphere-based mechanisms to operate on left hemisphere-based mechanisms. In turn, this implies that increased interhemispheric interaction is associated with increased tendencies to update beliefs. Since inconsistent-handedness is associated with increased interhemispheric interaction (most likely because of a larger corpus callosum; see Clarke & Zaidel, 1994; Denenberg, Kertesz, & Cowell, 1991; Luders et al., 2010; Witelson & Goldsmith, 1991), inconsistent-handers, are more likely to update their representations than consistent-handers and may be more susceptible to common "biases" in judgment and decision making, such as framing.

While there are three different kinds of framing (see Levin, Schneider, & Gaeth, 1998), for the purposes of the present paper, we limit our discussion of framing effects to attribute framing manipulations. Attribute framing, according to Levin et al. (1998), is a simple valence framing manipulation that focuses on a single attribute or characteristic of an object or event to cast the same critical information in either a positive or negative light. For example, a medical treatment could be described in terms of its survivability rate, e.g., 90% chance of living, or its mortality rate, e.g., a 10% chance of dying (see McNeil, Pauker, Sox, & Tversky, 1982); in a like manner, hamburger could be described as 75% lean or 25% fat (see Levin & Gaeth, 1988). The standard finding is that the same object or event is rated more favorably when described positively than when described negatively.

Jasper, Goel, Einarson, Gallo, and Koren (2001) replicated this finding in a population of pregnant women available through the Motherisk Program at the Hospital for Sick Children in Toronto, Canada. The Motherisk Program is a counseling service that provides evidence-based information to pregnant women (or women contemplating pregnancy) and their health care professionals about fetal and maternal safety/risks associated with drug, chemical, radiation, and infectious exposure during pregnancy and lactation. The goal of that study was to explore whether an attribute framing manipulation would affect the perceptions and decisions of women inquiring about the teratogenic risk of allergy-related medications during pregnancy. After completing a standard Motherisk intake form and agreeing to participate in the study, callers were randomly assigned to receive baseline teratogenic risk information in the positive or negative frame. Callers who received negatively framed baseline information (the standard form of counseling at Motherisk) were told: "In every pregnancy, there is a 1–3% chance that a woman will give birth to a child who has a major birth defect. This/these drug(s) {insert applicable drug name} has/have not been shown to change that." Callers receiving positively framed baseline information were told: "In every pregnancy, there is a 97–99% chance that a woman will give birth to a child who does not have a major birth defect. This/these drug(s) {insert applicable drug name} has/have not been shown to change that."

During follow-up a few days later, women were asked, among other things, to (1) rate their likelihood of having a child with a birth defect as a result of using allergy-related medications on a 100-point scale ranging from 0, "0% or absolutely no chance," to 100, "100% or definite chance," and (2) indicate whether or not they were going to take the medication(s) in question.

In sum, as predicted, Jasper et al. found that framing attribute information (in terms of baseline teratogenic risk) does influence women's beliefs about harm to their unborn child and may influence decision behavior regarding the usage of medication during pregnancy. Also, consistent with previous research, positive framing was shown to be more effective than negative framing.

The current study was an adaptation of the Jasper et al. Motherisk study. Instead of using pregnant women, however, we utilized undergraduate university students who pretended (via a scenario) to have a friend who was pregnant and was looking for advice. Thus, one goal of the study was to replicate the Motherisk results in a laboratory situation. However, the primary goal was to explore handedness differences in attribute framing. Specifically, there were three questions that piqued our interest.

First, to what extent are risk estimates influenced by the provision of factual information (regardless of frame) concerning teratogenic birth risk? That is, how much do individual decision makers update their beliefs? People have pre-existing (if often implicit) beliefs about such risks, and we were interested in whether inconsistent-handers, given the belief-updating framework outlined in Jasper and Christman (2005), would exhibit a greater tendency to revise (or update) those beliefs about risk in response to the information provided.

The second question concerned the format in which the information was provided. That is, above and beyond the prediction that mixed handers should exhibit a greater updating of beliefs in general, the question arises as to whether the hypothesized individual differences would relate to the way in which the information was presented? Would both groups be equally susceptible to the framing manipulation? A recent study by McElroy and Seta (2004) suggests that the answer is No. They presented framed information about the lean–fat content in hamburger to either the left or right ears of participants. Their results showed that attribute framing effects occur only with right-hemisphere based holistic processing (left ear presentation). Given that inconsistent-handers have greater access to the right hemisphere, one would expect them to show a greater framing bias than consistent-handers.

The third question involves potential handedness differences in risk aversion. Drake has presented evidence that the right hemisphere is more risk-averse than the left (Drake, 1985; Drake & Ulrich, 1992). Similarly, Davidson (2000) has argued for hemispheric differences in emotional processing and implicated the right hemisphere as specializing in negative emotions, which then lead to withdrawal-related behaviors. To the extent that inconsistent-handers have greater interhemispheric access to right hemisphere processing, it is possible that inconsistent-handers may be more risk-averse, as suggested by a recent study showing that mixed- versus strong right-handers' likelihood to engage in risky behaviors is driven primarily by perceived costs versus benefits, respectively (Christman, Jasper, Sontam, & Cooil, 2007). It is thus predicted that inconsistent-handers will have higher overall *a priori* risk estimates in the uninformed control condition.

2. Method

2.1. Subjects

Sixty-three students from an undergraduate psychology class at a large Midwestern university were recruited for the experiment.

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