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Brief article

Neuroscience and the soul: Competing explanations for the human experience

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ABSTRACT

The development of fMRI techniques has generated a boom of neuroscience research across the psychological sciences, and revealed neural correlates for many psychological phenomena seen as central to the human experience (e.g., morality, agency). Meanwhile, the rise of neuroscience has reignited old debates over mind–body dualism and the soul. While some scientists use neuroscience to bolster a material account of consciousness, others point to unexplained neural phenomena to defend dualism and a spiritual perspective on the mind. In two experiments we examine how exposure to neuroscience research impacts belief in the soul. We find that belief in soul decreases when neuroscience provides strong mechanistic explanations for mind. But when explanatory gaps in neuroscience research are emphasized, belief in soul is enhanced, suggesting that physical and metaphysical explanations may be used reflexively as alternative theories for mind. Implications for the future of belief in soul and neuroscience research are discussed.

1. Introduction

Belief in the soul—a non-physical essence of a being—has been an important subject of philosophy and science for thousands of years (e.g., Plato, 2005; Descartes, 1641/2000). Some scholars have recently argued that belief in souls is culturally universal and hard-wired in cognitive processes used in agency detection (Bloom, 2004; Bering, 2006). But more than just a way to understand other minds, belief in the soul also helps people to explain the experience of their own mind. Whenever one thinks, feels emotion, or exercises free will, subjective experience seems to magically occur and is not obviously tied to any physical event (Wegner, 2003). The very act of introspection suggests a qualitative difference between the mental and the physical, and so it feels as though we are made of two parts: mind and body (Descartes, 1641; Ryle, 1949). Although the physical origin of the body is intuitively understood, the origin of the mind is less clear; indeed, the mind appears to arise from some extra-physical force, and the concept of the *soul* is commonly evoked as the source of this ineffable essence of self.

To the extent that belief in the soul is used as a metaphysical explanation for the mind, this belief may be threatened by physical explanations for the mind. The present research examines how belief in the soul is affected by neuroscience research that implies a physical origin of the mind. fMRI studies have uncovered neural correlates for many psychological phenomena seen as central to the human experience, including moral judgments (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001), emotion (LeDoux, 1996), and personal agency (Farrer & Frith, 2002). Accompanied by vivid images of the brain "lighting up" during mental activity, fMRI research appears to finally provide hard evidence that the mind is grounded in the physical. Moreover, the appeal of fMRI research extends beyond academia and has captured the attention of the general public. Laypersons express greater interest and belief in psychological research when it also contains neuroscience information (McCabe & Castel, 2008), even if that information does not provide additional support

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for the theory beyond what the behavioral data demonstrate (Weisberg, Keil, Goodstein, Rawson, & Gray, 2008). Widespread acceptance of fMRI as an explanatory tool may also have an important effect on general beliefs about the soul. Work on causal discounting demonstrates that alternate explanations for the same phenomenon can compete with each other on a cognitive level, such that increasing belief in one diminishes belief in the other (Morris & Larrick, 1995; Sloman, 1994). For example, reading scientific explanations for important phenomena (e.g., evolution) reduces belief in religious explanations (e.g., creationism) (Lawson & Weser, 1990; Shariff, Cohen, & Norenzayan, 2008), but when scientific explanations are framed as weak, they can actually bolster belief in supernatural explanations (Preston & Epley, 2009). We propose that a similar reflexive relationship may also occur for physical vs. metaphysical explanations of the mind, with implications for neuroscience research on the belief in the soul. As neuroscience continues to discover neural correlates of more and more essential psychological processes, the brain could edge out the soul as the prevailing explanation for the mind (Clark, 2010; Farah, 2005).

On the other hand, if neuroscience seems limited in its ability to explain psychological experiences, exposure to that research could enhance belief in the soul. Despite the many impressive breakthroughs of fMRI studies, there remains one epistemological issue of the mind that neuroscience may not be able to solve, dubbed the "hard problem of consciousness" (Chalmers, 1996) or the "explanatory gap" (Levine, 1983). In sum, although neuroscientists can identify neural correlates associated with mental processes, they are still unable to explain precisely how activity in the brain creates the *experience* of these mental phenomena. This issue can have some important implications for belief in the soul. If the neural activity captured by fMRI serves to demystify the mind, awareness of an explanatory gap may only re-mystify the mind. Indeed, while some scientists use neuroscience to bolster a material account of consciousness (e.g., Crick, 1994), others point to unexplained neural phenomena to defend dualism and a spiritual perspective on the mind (e.g. Schwartz, Stapp, & Beauregard, 2005). Whether a legitimate concern or not (for a discussion, see Dennett, 1991; Nagel, 1974), an apparent explanatory gap leaves some aspects of the mind unexplained and so re-opens the intuitive plausibility of metaphysical explanations.

1.1. Research overview

The present research examines how neuroscience explanations for psychological phenomena can impact lay belief in soul, guided by two complementary hypotheses:

H1. Exposure to neuroscience research with strong mechanistic explanations for psychological experience will decrease belief in the soul as an alternative explanation for the mind.

H2. Exposure to neuroscience research with weak mechanistic explanations for psychological experience (i.e., research highlighting the explanatory gap) will increase belief in the soul as an alternative explanation for the mind.

2. Experiment 1

2.1. Method

One hundred fifty-one undergraduates (95 women) volunteered to participate for partial course credit. Participants were randomly assigned to one of three conditions: psychology information, neuroscience information, or a control condition. All participants were told that they would complete three unrelated studies for credit. The first task was framed as a study to measure students' judgments about college course descriptions. Subjects read brief course descriptions, selected the best title for the course between two options we provided, and rated their interest in the course. All participants first read a course description on introduction to geology, then a survey course on Shakespeare. In the psychology and neuroscience conditions, subjects then read two additional course descriptions: one on the study of love and one on morality. Both the Love and Morality course descriptions raised a number of questions about the psychological phenomenon (e.g., *Why do people fall in love at first sight? Are some people inherently good or bad?*). In the neuroscience condition, the descriptions also referred to recent evidence for the neural basis of love/morality (see Supplementary materials). The psychology description therefore raised the same questions regarding the phenomenology of the mind without providing any physical mechanism for the psychological experiences. As with the two previous course descriptions, subjects selected the best name for each course description between two options. For the Love course, two options were: "Mechanisms of Love" or "Mystery of Love". For the Morality course, the two options were: "Moral Mechanisms" or "The Moral Compass". These items therefore served as a manipulation check, as the first options suggested a mechanistic explanation for the phenomena, whereas the second options suggested the presence of some explanatory gap in the understanding of the phenomena.

After the course description task, participants completed some filler tasks (spatial reasoning items, and four 4 items taken from "Reading the mind in the eyes" test), which they were told would measure visual processing as the second part of the study.

2.1.1. Body–soul dilemmas

In the third part of the study, participants played a game called "Staying Alive" with two hypothetical dilemmas involving trade-offs between different forms of the self (materials adapted from www.philosophersnet.com/games/). Dilemma 1 described a scenario in which participants could choose to travel to Mars by spaceship, or to be replicated by a transporter that would destroy their body but recreate an exact copy of it on Mars (see Supplementary materials). Dilemma 2 described a scenario in which participants were asked to imagine they had a fatal illness, and that although scientists were working on a cure, it