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Omar Sultan Haque^a, Amitai Shenhav^a & David Rand^a

^a Department of Psychology, Harvard University, Cambridge, USA

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Differences in cognitive style, emotional processing, and ideology as crucial variables in understanding meaning making

Omar Sultan Haque*, Amitai Shenhav and David Rand

Department of Psychology, Harvard University, Cambridge, USA

Neuroscientifically specifying the hypotheses of Hume, Marx, Freud, and others on the motivational sources of religion, the authors present an important case for religiosity as an anti-anxiety device to buffer against feelings of diminished certainty, order, control, and knowledge (stipulated components of meaning). The general evidence for this hypothesis is data showing a reduction in a previously well-characterized error-related neuronal response in the anterior cingulate cortex (ACC) among religious persons. The authors' interpretation of these effects as a marker of religion's inherent anxiolytic influence is an intriguing one. In addition to the paper's focus on degrees of general reactivity to perceived threats to certainty, order, control, and knowledge, we feel it would also be very interesting to consider the ways in which this conflict/uncertainty is resolved *across* individuals. Specifically, we suggest that individuals who rely differentially on fast/automatic/intuitive versus slow/controlled/reflective reasoning (Evans, 2003; Sloman, 1996) will arrive at different solutions when encountering the same questions of meaning making.

Tasks like the Stroop (used by the authors) are very useful for examining one's reactivity at the onset of an error. Examining how people choose to resolve these uncertainties, however, is more challenging in tasks where two responses (correct and incorrect) are quickly available, and furthermore, the presence of incongruence is known from the outset. A task in which one response (the incorrect one) is more readily available to all participants while another response (the correct one) requires acknowledging that the fast/automatic/intuitive choice was wrong and reflecting further, we believe, can provide a more powerful measure of an individual's preference for different kinds of solutions. Using a task with exactly these properties (Cognitive Reflection Test; Frederick, 2005), Shenhav, Rand, and Greene (2011) recently showed that individual differences in the tendency to rely on intuition versus reflection influences belief in God. Intuitive style predicted stronger present belief in God and having strengthened belief in God since childhood (but not family religiosity during childhood), and these effects were not mediated by education level, income, political orientation, or IQ. Experimentally inducing a mindset that favors intuition over reflection increased immediate reports of belief in God. Given these results, we argue that people eventually become religious at least in part because when surrounded by questions of certainty, order, control, and knowledge, they are not as likely to rely as much on slow/controlled/reflective answers to these questions. These results can supplement the authors' data on religiosity and error onset (Stroop performance), as the Cognitive Reflection Test helps shed light on the more protracted process of human meaning making.

In addition (as the authors speculate), religious individuals may also be more vulnerable to the anxieties that surround these complex questions of meaning making.

*Corresponding author. Email: omarsultanhaque@gmail.com

A constitutionally intuitive cognitive style may increase vulnerability since a more reflective cognitive style may provide a more flexible and novel set of answers that do not depend on immediate responses to the world. In addition to cognitive style, another source of vulnerability may be due to differences between religious and non-religious persons in emotional processing capabilities. For instance, compared to atheists, religious persons display more alexithymia (a deficit in clearly identifying, differentiating/categorizing, and describing emotional states). Yet at the same time, religious persons report more intense and vivid negative as well as positive emotions, for example when recalling an autobiographical experience of love or after reading a tragic news story (Burris & Petrican, 2011). Experiencing the world in an emotionally more vivid, intense, and undifferentiated manner may leave one more immediately anxious about questions of certainty, order, control, and knowledge. Less complex emotional processing may also feed back into cognitive style by making one less able to rely on slow/controlled/reflective processing of answers, and so might only further potentiate a retreat towards, and comfort in, the kinds of intuitive answers offered by religion.

As with the general prescribing of anti-anxiety medication for anxiety disorders, if religion is a palliative, people will vary not only in how much they need it to begin with (based on differences in complexity of emotional processing), but also the degree to which it is their only or best option for relief (based on differences in cognitive style). We therefore find explanations for religiosity that focus on differences in approaches to resolving uncertainty (i.e., cognitive style) and processing emotions to be very much complementary to the proposals advanced by the authors.

Finally, the essence of religion's palliative effects may derive from a deeper and more generalized phenomenon: ideology. Human motivational needs for certainty, order, control, and knowledge are needs within a social, intelligent species that existed long before there ever were monotheisms, or even organized religions. Thus, although it is one route, we should not expect that the fulfillment of these needs is an inherently religious phenomenon. These needs have been fulfilled for hundreds of millions of persons (currently 500–750 million) who are non-religious/not supernaturally inclined by alternative ideologies, such as Confucianism, communism (at one point encompassing nearly one-third of the planet's population), humanism, nationalism, and many varieties of liberal and conservative ideologies (Zuckerman, 2007). Indeed, counter to religious stereotypes, countries with non-religious majorities are the happiest, healthiest, least prejudiced, most peaceful, egalitarian, and woman-friendly places in the world (Zuckerman, 2009). If the authors' results are essentially about the deeper and more generalized variables of ideology and degrees of commitment to it, many predictions follow. In the author's data, non-believers implicitly presented with religious primes showed increases in error-related brain responses. Believers implicitly presented with alternative ideology worldview primes (non-supernatural or otherwise) should show increases in error-related brain responses, a condition not tested by the authors. One would also expect an association between ideological conviction in general and decreased error-related negativity (ERN), bodily states of distress, diminished uncertainty, and a greater sense of coherence and control. For instance, governments and gods are alternative sources of feelings of external control (Kay, Gaucher, Napier, Callan, & Laurin, 2008).

We commend the authors on their impressive synthesis, and hope we have been able to suggest how differences in cognitive style, emotional processing, and ideology may be crucial complementary variables in their account of meaning making.

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Dissonance and distress

Eddie Harmon-Jones* and Cindy Harmon-Jones

University of New South Wales, Sydney, Australia

Inzlicht, Tullett, and Good (IT&G) present a provocative model with supportive data suggesting that individuals who possess religious beliefs have lower distress in response to disruptions in meaning, as measured by lowered anterior cingulate cortex (ACC) activity to errors committed during a Stroop task. In this commentary, we consider their model and data from the perspective of cognitive dissonance theory.

IT&G suggest that when meaning or the “perceived coherence between one’s beliefs, goals, and perceptions of the environment” is disrupted, individuals feel distressed; they note that this statement is consistent with the research of cognitive dissonance theory (Festinger, 1957). According to dissonance theory, inconsistency between important cognitions has the potential to cause dissonance, a psychologically uncomfortable state that motivates one to reduce the cognitive inconsistency.

Dissonance theory has been utilized in research on religion. Consider a little-known article by Burris, Harmon-Jones, and Tarpley (1997). In one study, religious individuals’ beliefs were disconfirmed, by having them read a newspaper article that described the drive-by shooting death of an infant boy in his grandmother’s arms as she and the child’s father prayed for protection. The article highlighted the inconsistency between the tragic outcome and the belief that God answers prayers. After reading this article, participants completed a self-reported emotions scale and a measure of transcendence, which asked questions like *How often does God work in mysterious ways?* The emotions and transcendence questionnaires were completed in counter-balanced order, and participants who completed the transcendence questionnaire first experienced less distress the more they endorsed transcendence. These results supported the prediction that religious transcendence protects individuals from dissonance-related distress. A second experiment demonstrated that when

*Corresponding author. Email: eddiehj@gmail.com