RELIGION AND SCIENCE: SEEKING MEANING IN HIGH AND LOW CONSTRUAL LEVELS

BY

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BIS A 10-item scale that measures the extent to which one treats science as the sole source of understanding in the world

CLT A theory of psychological distance positing that individuals represent actions, events, concepts, objects, and other entities at various levels of abstraction and detail, depending on the current goal. (Trope & Liberman, 2010)

ERN An electrical signal originating near the dACC that occurs given a conflicting response or unexpected event.

MMM A model suggesting that humans are motivated to understand *something* given an unexpected occurrence, and that this motivation can be satiated through several means. (Heine, Proulx, & Vohs, 2006)

TMT A theory positing that the human awareness of mortality elicits terror, but that humans have generated buffers against the terror caused by the thought of death. (Vail et al., 2010)

UTIL A 12-item scale measuring the extent to which a person views religion or science as useful for understanding the world

ABSTRACT

The purpose of the two studies is to investigate how meaning-making motivations interact with construal level to influence the endorsement of science and religion. Past studies (Martin & Masicampo, 2013a, 2013b) suggest that religious endorsement is greater when high construals are primed than when low construals are primed, and scientific endorsement is greater when low construals are primed than when high construals are primed. Both studies aimed to replicate these findings, explore the effect of meaning-making motivation on scientific and religious endorsement, and to compare these effects to a control group. Study 1 varied construal level and meaning-making motivation, and study 2 varied construal level and whether one could satiate the meaning-making motivation. Neither study revealed the expected effects, although both studies illuminate new areas of research. Reasons why the studies failed to replicate past findings are discussed, and future directions are proposed.

INTRODUCTION

Popular thinkers (Dawkins, 2008; Harris, 2011) argue that religion and science are orthogonal endeavors. Involving oneself in one endeavor requires one to withdraw from the other. Indeed, past research suggests that science and religion may compete for explanatory space. When a scientific explanation is poor, individuals automatically prefer religion over science (Preston & Epley, 2009). Similarly, when individuals are exposed to supposed gaps in the neurological literature, they are more likely to endorse the "soul" as an explanation for consciousness (Preston, Ritter, & Hepler, 2013).

Alternatively, perhaps most people do not dichotomize the two endeavors, but instead employ them both to solve different problems, to answer different questions. For instance, religion may not be as well suited as science for explaining precise mechanisms underlying some phenomenon. When attempting to understand specifically how one event produces some outcome, the average person may employ scientific thinking or retrieve scientific understandings. Conversely, when trying to understand the purpose or ultimate cause of some occurrence, the average person may instead employ religious thinking or retrieve religious understandings.

As an example, a person may observe a distant lightning strike and interpret the phenomenon at different levels of abstraction. A person may understand lightning as the outcome of air pressure differentials and static discharge originating from the atmosphere (He, Rakov, Wang, & Wang, 2013). This mechanistic understanding is likely informed by science, as religious texts and religious teachings likely do not discuss the intricate series of events involved in the production of lightning. Alternatively, the person may understand lightning as the outcome of a powerful deity whose intent was to communicate moral discontent with the unfortunate foes below (Gray & Wegner, 2010; Stephens, Fryberg, Markus, &

Hamedani, 2013). This broader, more abstract understanding is likely informed by religion, as scientific knowledge likely does not include the "purpose" of the lightning strike. Knowing that science and religion offer different levels of understanding, perhaps a person is willing to endorse science or religion as useful tools depending on whether the current goal requires a concrete or abstract understanding, respectively. The selection of science or religion given a motivation to understand a phenemonenon at different levels is the essential inquiry of the current research.

The purpose of the current paper is to better understand how the average person conceives of both science and religion, why that person may employ one over the other, and whether the desire to use either can be manipulated. To better understand the premise, methodology, and importance of the studies, several lines of research are summarized. The specific hypotheses are guided and formalized by the meaning maintenance model (Heine et al., 2006) and construal level theory (Trope & Liberman, 2010). These frameworks are introduced and reviewed in turn. Finally, related research from our lab is reviewed.

Meaning Maintenance Model

Both religion and science are functionally useful to subscribers. Through the combination of charismatic focal points, moral prescriptions, omniscient and omnipresent monitoring by punitive gods, and ritual, religion may bind groups into moral communities that are highly cooperative (Bulbulia, 2012; Gervais & Norenzayan, 2012; Graham & Haidt, 2010; Norenzayan & Shariff, 2008; Shariff & Norenzayan, 2011; Sosis & Alcorta, 2003), which serves both the individual and the subscribing group. Clinical research suggests that religious belief generally predicts positive health outcomes (see Pargament, 2002, for a review). Recently, researchers suggest that religious beliefs and practices may improve self-regulation (Carter, McCullough, & Carver, 2012; McCullough & Willoughby, 2009; Reisig, Wolfe, & Pratt, 2012; Rounding, Lee, Jacobson, & Ji, 2012; Watterson & Giesler, 2012). The

scientific process has produced a new era of medical practice and technological feats. Both religion and science have thus seemingly benefited societies at large.

In addition to the functional benefits of religion and science, the two endeavors both attempt to inform one's understanding of the world. In the following section, the involvement of both religion and science in the meaning-making literature is summarized and critiqued. The meaning maintenance model is introduced in the context of terror management theory. Finally, religion and science are both discussed with respect to terror management theory and the meaning maintenance model.

The involvement of religion in meaning-making processes is hardly new, although research has largely attended toward meaning in the existential sense of the word. One prolific source of this research is terror management theory (TMT) (Greenberg, Pyszczynski, & Solomon, 1986). TMT posits that human awareness brought with it the awareness of death, and such knowledge elicits paralyzing terror that must somehow be suppressed or buffered against in order for a person to function adaptively. Religion could be one such system that effectively buffers against the fear of death. For instance, one solution to the paralyzing fear of death awareness is to instead believe that one never truly dies; indeed, religions often include a concept of immortality or living on beyond one's immediate life (Vail et al., 2010).

TMT predicts that in the event that mortality becomes salient, a person should affirm any system that buffers against the existential dread (Vail et al., 2010). Indeed, when primed with thoughts of mortality, religious people believe more in the afterlife and in their respective deities (see Vail et al., 2010, for a review), and are more likely to deny the validity of other religions and deities (Vail, Arndt, & Abdollahi, 2012). When mortality is salient, agnostics increased their endorsement of any religion (Vail et al., 2012), and atheistic populations tend to

increase their belief in science (Farias, Newheiser, Kahane, & de Toledo, 2013). According to TMT, religious and atheistic populations may find existential solace in their respective belief systems.

TMT has played a pivotal role in the research on motivated meaning-making. Nevertheless, recent research has illuminated some potential limitations of TMT. Past TMT research has demonstrated that increasing mortality salience predicts that individuals will affirm their moral beliefs (e.g., if given the opportunity, will affirm their belief that prostitutes should be punished by setting a higher bail). However, subtly exposing participants to nonsense word-pairs (e.g., turn-frog; Randles, Proulx, & Heine, 2011) or unexpectedly changing the appearance of the experimenter (Proulx & Heine, 2008) predicts the same increase in moral affirmation. On a more explicit level, participants affirmed their moral beliefs after reading absurdist literature (but only if told the story would be conventional; Proulx, Heine, & Vohs, 2010).

TMT would predict such effects only if one's terror management system is threatened, perhaps by mortality reminders. Incongruent word-pairs, unexpected changes in experimenters, or unexpected absurdist stories are unlikely to provoke an existential dread that necessitates buffering through moral affirmations. An alternative model is thus needed to explain why exposure to these inconsistencies motivates participants to affirm moral values.

The meaning maintenance model (MMM) is a useful and well-tested model for explaining these effects (and indeed, the studies outlined above were generated from the MMM). MMM posits three basic tenets:

1. Meaning is relation.
2. Humans are meaning-makers.
3. Disruptions to meaning motivates one to reaffirm meaning.

(Heine et al., 2006)

Essentially, the first tenet suggests that meaning is any relation between any two entities. Relations exist within a person (e.g., knowledge about oneself), between a person and the external world (e.g., knowledge about one's role in society), and between external entities (e.g., the sun travels westward). Thus, the term "meaning" encapsulates one's understanding of the relations in any or all of those three domains. The second tenet suggests that humans are motivated to maintain meaning (i.e., humans are motivated to understand their environments). Finally, the third tenet suggests that any unexpected occurrence may motivate a person to reaffirm alternative meaning frameworks.

The third tenet makes the MMM unique. Given an unexpected event, a motivated meaning-maker has a few options for dealing with the novel information. According to classical theory (see Proulx & Heine, 2010, for a review), one could assimilate the information (i.e., interpret the new information in a manner that is consistent with their expectations) or accommodate the information (i.e., modify their expectations). The MMM introduces two more tools. The first is "fluid compensation." Given unexpected information, one could satiate the need to understand by thinking of and affirming other known relations (e.g., that prostitutes should be punished). Alternatively, a person could satiate the meaning-making need by discovering new relations in the environment, this process which is called "abstraction" (e.g., threats to meaning predict better learning of an artificial grammar or arbitrary strings; Proulx & Heine, 2009; Randles et al., 2011). In any case, the person experiences something counter to their expectations, is motivated to regain a sense of understanding, and can satiate that desire through the processes mentioned above (Proulx, Inzlicht, & Harmon-Jones, 2012).

The MMM predicts the same outcomes as would TMT, but suggests that a more general process is at work. TMT posits that individuals buffer against the anxieties of death-related thoughts by affirming some related meaning-system. The

MMM instead posits that individuals can address the anxieties of any expectancy violation (one of which is the sudden salience of death), through several processes (one of which is affirming some meaning-system, regardless of its relevance). According to the MMM, being reminded about death is likely far removed from the ongoing agenda of the typical undergraduate (Proulx & Heine, 2010, p. 896). Consequently, the MMM can explain why undergraduate participants will increase the bail amount of prostitutes, regardless of whether the experimenter changed (Proulx & Heine, 2008), they saw unrelated words paired together, or they were reminded of their mortality (Randles et al., 2011). Indeed, a meta-analysis reveals that although the effects of mortality salience on affirmations are robust, they are no more robust than the effects found in the MMM studies (Burke, Martens, & Faucher, 2010).

In sum, the MMM suggests that humans are motivated to make meaning of the world, experience anxiety when their expectancies are violated (Proulx & Heine, 2008), and can resolve that anxiety through a number of palliative processes (Proulx et al., 2012). Such a process can be thought of as an adaptive response for an animal. Given some unexpected perception (even if implicit), the animal should attend (Hirsh & Inzlicht, 2008) toward and consider the information with respect to past experience (assimilation), learn the new information (accommodation), become more sensitive to new information (abstraction), or the animal can circumvent these processes and simply draw upon and affirm past knowledge (affirmation; Proulx et al., 2012). In the case of humans, the meaning frameworks that can be used in affirmation or that can conflict with new experiences and knowledge are numerous and complex.

Religion and science are both meaning-making systems. Thus, when the need for understanding is high, individuals may then affirm science or religion as alternative meaning frameworks. When mortality is salient (i.e., meaning is

threatened), religious and agnostic people affirm their religious beliefs (Vail et al., 2012), and secular individuals affirm their belief that science provides the best understandings (Farias et al., 2013). When exposed to randomness, individuals increase their endorsement of God (Kay, Whitson, Gaucher, & Galinsky, 2009), and their endorsement of orderly scientific theories (Rutjens, van Harreveld, & van der Pligt, 2013).

The palliative effects of affirming meaning frameworks are observable at the neurological level. The dACC is seemingly involved in the cascade of electrical activity that occurs given an unexpected event, this signal which is called error-related negativity (ERN) (see Proulx et al., 2012, for a review). The ERN can be thought of as a "distress signal" (Inzlicht, Tullett, & Good, 2011, p. 195) that communicates whether an unexpected event has occurred. Given an unexpected occurrence, the ERN can be observed, and this may provoke the compensatory behaviors outlined by the MMM. Being a highly accessible meaning framework, religion may act as a palliative force that suppresses the ERN. Indeed, religious conviction and primed religious thoughts predict a decreased ERN in response to errors (and this is not due to decreased motivation or inability to detect errors). When exposed to theories that suggest the universe is orderly, the ERN is decreased (regardless of whether the order can be known by humans; see Inzlicht et al., 2011, for a review). Science, which suggests the universe is orderly (albeit, complex), may therefore act as a palliative force given a need for meaning.

The question remains of how individuals select a meaning framework to affirm. Although meaning frameworks can be unrelated to the source of meaning threat and still serve a compensatory role, perhaps individuals will more greatly affirm meaning frameworks that are most associated with the source of meaning threat. Further, perhaps relations exist at different levels of abstraction, and alternative frameworks similarly exist at those different levels. In other words, people may encounter a

phenomenon that threatens a relationship between two abstract ideas, and the most accessible and effective compensatory framework is that which also includes relations between abstract ideas. To formalize the notion of abstract and concrete understandings, construal level theory is introduced in the following section.

Construal Level Theory

The MMM suggests that humans are motivated meaning-makers, that threats to our understanding of the world motivates us to correct the threat, and one manner in which one may do so is by compensating for one's meaning threat by asserting an alternative understanding (Heine et al., 2006). However, meaning threats can occur between highly abstract understandings down to highly concrete understandings. In terms of construal level theory (CLT), an unexpected event may threaten one's high or low construal of some entity. In this section, CLT is introduced and related to the purpose of the current paper and to the MMM. Specifically, CLT is discussed with respect to the goals of religion and science. Past research relating CLT, religion, and science is discussed, including the limitations of such studies.

CLT (Trope & Liberman, 2010) argues that any given action, event, concept, and object can be construed in qualitatively different manners. Specifically, any entity can be understood at different levels of abstraction and detail, and the level at which one represents some entity depends on the context and current goal. For example, a cell phone is a communication device, a computer, a toy, or a specific combination of oils, plastics, copper, and silicon. Whether you need to construe the cell phone as any of those representations depends on your current goal. If one's goal is to understand how to fix their phone, it may be more useful to think of the cell phone as a combination of copper and silicon, if the issue lies in hardware, or to think of the cell phone as a computer, if the issue lies in the software. If one's goal is to introduce the modern smartphone to a toddler, it may be more useful to

explain to the toddler that the phone is a toy. If one's goal is to explain the purpose of a cell phone, it may be more useful to construe the phone as just another communication device.

Returning to the example beginning this paper, a lightning strike may be construed at different levels. The lightning may be understood as the result of several physical processes that leads to static discharge. Alternatively, the purpose of the lightning may be to smite the ne'er-do-wells below. The mechanistic understanding of lightning is a lower-level construal than the more abstract purpose of the lightning. The average person could understand the lightning strike at both construal levels, but may only need to use one representation at a time given the current goals.

Importantly, priming a construal level predicts increased accessibility of concepts at the same construal level. For example, priming an individual with a high construal level causes one to consider high construal features of a task more than low construal features of a task; conversely, priming an individual with a low construal level causes one to consider low construal features of a task more than high construal features of the task (Trope & Liberman, 2000). Thus, high and low construal concepts are associated with other high and low construal concepts, respectively.

Some meaning frameworks may include more relations between high construal constructs than low construal constructs, and vice-versa. Alternatively stated, some meaning frameworks may focus more on relating objects at specific construal levels. For instance, science is an epistemological framework whose primary concern is discovering relation, but the average person may assume science is focused on understanding the relations between entities at a low level. Contrast such a goal with the goals of religion, such as creating group cohesion, spreading and enforcing broad moral values, and instilling a belief in distal ontologies (e.g., agents,

supernatural environments). Religion, in comparison to science, is ostensibly apathetic to lower-level understandings of the world, but instead focuses on purposeful understandings of the environment. Science is seemingly more interested in relating lower-level construals, whereas religion is seemingly more interested in addressing high level construals of some phenomenon or object. When scientists may be "digging into the dirt" to better understand the relationship between variables and conditions, the religious person may instead focus on much broader, abstract questions.

That is not to say that scientists do not seek answers to inherently abstract or broad questions (e.g., Harris, 2011; Sagan, 2011), or that religion does not attempt to answer mechanistic questions (e.g., catholic transubstantiation, creationism). Religious individuals may simply attend to and more greatly value higher-level construals, and rarely require the lower-level construals sought by science. Conversely, scientific individuals may attend to and value low-level construals, and rarely require the higher-level construals hosted within religion. Additionally, individuals may frequently draw from either meaning system. For example, a religious person may draw low-level, mechanistic understandings of some phenomenon from science and high-level, abstract understandings from religion. Given the different domains of knowledge offered by science and religion, individuals may tend to employ scientific knowledge for different problems and different contexts than they would employ religious knowledge. Consequently, we believe that the average, westernized person associates religion with high construal relations and science with lower-level relations.

In an effort to explore whether religion and science are associated with high and low construal thoughts, respectively, we conducted a series of studies in which we prime a relatively high or low construal level and measure various religious and scientific attitudes. Researchers can manipulate construal level in a number of ways.

In our research, we have have used two manipulations. In the first manipulation, participants provide either examples of each item (e.g., dog: *Chihuahua*; low construal) or what the item is an example of (e.g., dog: *Mammal*; high construal Fujita, Trope, Liberman, & Levin-Sagi, 2006). Using this exemplar task, participants who were primed with high construal thinking subsequently reported that religion was a more useful meaning framework and indicated greater religious commitment than those in the low construal condition (Martin & Masicampo, 2013a). That is, regardless of one's religiosity, merely thinking abstractly predicts a relatively greater endorsement of religion as useful, and the religious become more religiously committed. Unfortunately, the "exemplar-finding" task did not produce the expected movements in attitudes toward science (Martin & Masicampo, 2013a).

In the second construal level manipulation, participants are given a goal (e.g., "Exercise more"). To prime low construal thinking, participants are instructed to answer "how" to complete the goal (e.g., "Run every morning"), then again "how" to complete their last answer (e.g., "Place one foot in front of the other alternatively and repeatedly"). Likewise, high construal thinking is primed by answering "why" to complete the goal (e.g., "To be healthier"), then again "why" to complete their last answer (e.g., "To live longer"). Furthermore, the low construal questions are answered in turn from top to bottom, whereas the high construal questions are answered in turn from bottom to top (Freitas, Gollwitzer, & Trope, 2004); the sense of going upward or downward is thought to further prime the concepts of "high" and "low" construal. Compared to the low construal participants, the high construal participants more greatly endorsed religion as a useful framework (if they were less religious before the task) and were more religious after the task. Conversely, compared to the high construal participants, the low construal participants more greatly endorsed science as a useful framework. In sum, the data were in the expected direction: High construal thinking predicts greater religious

endorsement and low construal thinking predicts greater scientific endorsment (Martin & Masicampo, 2013b).

To summarize, the CLT, when framed within the tenets and language of the MMM, suggests that individuals maintain low-level and high-level understandings of some entity or action. Any given entity or action can be construed abstractly or concretely. High-level construals are seemingly related to other high-level construals, and low-level construals to other low-level construals. As such, meaning frameworks may exist that primarily contain relations between high-level construals or between low-level construals. We hypothesized that religion may be understood as a relatively high construal meaning framework (i.e., a meaning framework consisting of relations between relatively high construal concepts), and science as a primarily low construal meaning framework. Based on this hypothesis, we accurately predicted that those primed with high construal concepts would endorse religion more than the low construal group, and conversely that the low construal group would endorse science more than the high construal group.

Although illuminating, the past studies are limited in two ways. First, no control group was included. The lack of a control group limits the conclusions one can draw from the study. The results were in the expected direction (e.g., the high construal group endorsed religion more than those in the low construal group). However, one cannot determine which condition produced the result (e.g., the low construal prime may decrease religious endorsement). Second, although the MMM implicitly guided the hypotheses of the studies and formed the basis for the "religious and scientific utility" measure, the role of meaning-making was not directly tested. The studies outlined below address these issues.

Present Studies

The purpose of the thesis is to better understand how the average person relates and uses both science and religion. Conceptually, we think religion is most

associated with relatively abstract knowledge, whereas science is most associated with relatively concrete knowledge. One can reframe this hypothesis using a combination of CLT (Trope & Liberman, 2010) and MMM (Heine et al., 2006).

Meaning is relation (Heine et al., 2006) between entities, entities can be represented at different construal levels (Trope & Liberman, 2000), and construal levels are associated. More formally then, we think religion is a meaning framework populated with relations between relatively high construal concepts, and science is a meaning framework populated with relations between relatively low construal concepts.

The research from the MMM (see Proulx & Heine, 2010, for a review) suggests that disruptions to meaning motivates the person to compensate by affirming an accessible, albeit potentially unrelated meaning framework. If the disruption occurs while high (or low) construal concepts are primed (or if the disruption occurs at a particular construal level), then perhaps the most associated meaning framework would most effectively compensate for the meaning threat. If religion is a meaning framework relating high construal concepts, then religion may act as a more palliative force than science when high construal meaning is threatened. Likewise, if science is a meaning framework relating low construal concepts, then science may be more palliative than religion when low construal meaning is threatened. Moreover, if the endorsement (i.e., affirmation) of science and religion acts as a function of meaning compensation at different construal levels, perhaps the past research on science and religion as competing, hydraulic systems is misleading (Preston & Epley, 2009; Preston et al., 2013). Instead, perhaps science or religion are affirmed as alternative meaning-frameworks when religion or science are threatened, respectively. That is, individuals will affirm one or the other given that one framework is threatened, but they will use both depending on the meaning-making context.

Past studies suggest that construal level primes predict the endorsement of religion and science as useful (Martin & Masicampo, 2013a, 2013b). The past studies did not include a control group or directly test the role of a meaning-making motivation on the endorsement of religion and science. Thus, the goals of the studies are to:

1. Collect and provide baseline data about attitudes toward science and religion.

2. Observe whether a need for meaning increases one's endorsement of science and religion from control.

3. Observe whether high or low construal primes increase endorsement of religion and science, respectively, from control.

4. Observe whether the increase in endorsement is strengthened by a meaning-making motivation.

5. Observe whether an unrelated affirmation will negate the need to affirm science or religion.

The design for both studies is similar. Each participant is assigned to either a control group or to a new experimental condition. Those in the experimental conditions are placed in a context in which they are primed with high or low construal concepts, and with or without a meaning-making motivation. The participants then respond to several questions about their attitudes toward science and religion, and about the utility of science and religion in understanding the world. The precise goals of each study are introduced in their own respective sections below.

STUDY 1

The purpose of study 1 is to explore whether a need to understand something while in a particular construal level context can predict the endorsement of religion or science. Unlike past studies which lacked a control group and only related science and religion to CLT (Martin & Masicampo, 2013a, 2013b), study 1 manipulates both construal level and the meaning-making motivation, and compares their effects to a control group. Because the MMM predicts that a need for meaning should increase the endorsement of an alternative meaning framework, we expected that a threat to meaning should increase religious endorsement, especially when primed with high construal understandings. Likewise, we expect that a meaning threat should increase scientific endorsement, especially when primed with low construal understandings. Note that science may be affirmed when religious frameworks are threatened or vice-versa (e.g., Preston & Epley, 2009), or either may be used when affirmation is needed, but we propose that the selection of religious or scientific frameworks to affirm is probabilistically determined as a function of the current construal level (i.e., religion is more associated with high construal concepts, and is more available for affirmation after thinking of non-religious high construal concepts).

Hypotheses

Two hypotheses are proposed:

1. Relative to the control group, high construal thinking will increase religious utility and religiosity, and this effect will be moderated by meaning-making motivation.

2. Relative to the control group, low construal thinking will increase scientific utility and belief in science, and this effect will be moderated by meaning-making motivation.

Study 1 Methods

Subjects were recruited from two sources. The first source is the Wake Forest University undergraduate pool, and the second source is Amazon Mechanical Turk (Mturk; http://www.mturk.com). Mturk is a website that allows researchers and companies to advertise "human intelligence tasks" (HITs) for Mturk "workers" to complete. Undergraduates were awarded research credits for participation, and Mturk workers were paid $.45 for their 10-15 minutes of work.

A power analysis was conducted to determine the minimum sample size. The power analysis was conducted using the "pwr" package for R (Champely, 2012). The planned regression analyses include a maximum of six predictors, and the hypotheses predict that an interaction term should be significant. To obtain a conservative estimate of the needed sample size, the lowest effect size of interest from past studies ($f^2 = .037$) was entered into the power analysis. The f^2 effect size is defined as $f^2 = \frac{R^2_{AB} - R^2_A}{1 - R^2_{AB}}$, and in this case, is the ratio of the R^2 increase to unexplained variance (Cohen, 1988). The f^2 value for the power analysis was calculated from past studies by using the smallest R^2 increase resulting from a similar interaction term (Martin & Masicampo, 2013a). With six predictors, an expected effect size of at least $f^2 = .037$, and a desired power of .80, a sample size of 365 was needed (see Figure 1).

Measures. A "premeasurement survey" was used to quickly measure participants' attitudes toward religion, spirituality, and science (see appendix A). The premeasurements consist of 12 statements to which the participant indicates their agreement on a scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). The only responses of interest are those with respect to religious belief and scientific attitudes (questions 8 and 10). In addition, two questions were included to detect inattention toward the task (questions 11 and 12). The other questions exist solely as distractors. All items were randomized. The premeasurements have been used in

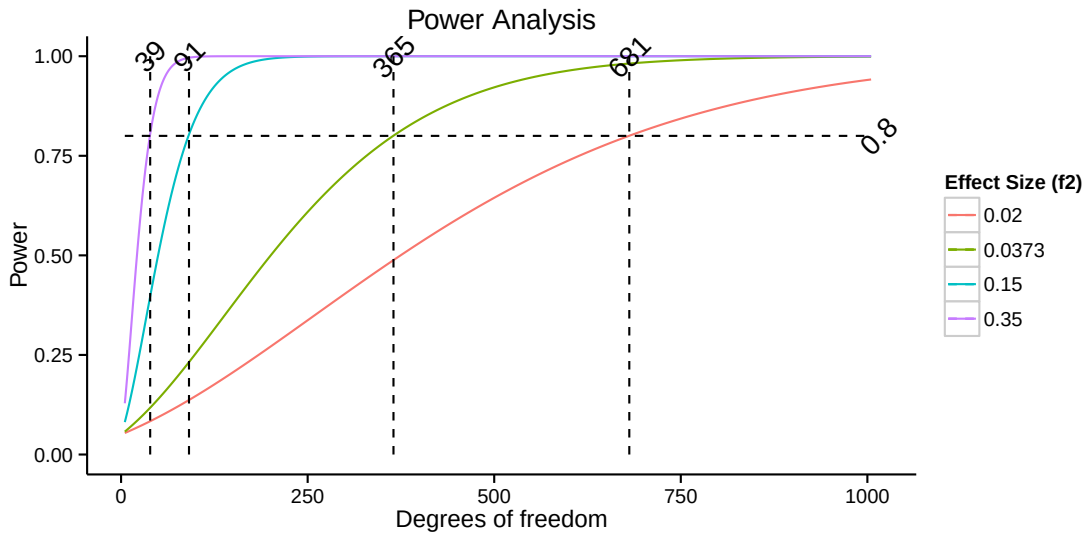

Figure 1. Power analysis. The targeted effect size of .0373 is shown in comparison to Cohen's small, medium, and large effect sizes (Cohen, 1988).

past research from our lab and modified to attain normality and acceptable variability. Although single-item measures for religiosity and scientific measures are not ideal, past studies demonstrated that the single items correlated with the 10-item religious commitment inventory ($r = .81$; Worthington et al., 2003) and a related, albeit unpublished, 12-item measure of scientific commitment ($r = .72$), respectively.

In line with past studies from our lab, we used the "utility questionnaire" (UTIL). The UTIL is a 12-item measure (see appendix B) about the utility of religion and science in making sense of the world, and is inspired by the tenets of the MMM (Heine et al., 2006). That is, it measures the extent to which a person thinks science and religion are useful for understanding themselves, how they relate to the world, and relations within the world. Six items pertain to the utility of religion, and six pertain to the utility of science. The responses range from 1 (Strongly disagree) to 7 (Strongly agree). All items were randomized.

The 16-item measure from Gervais and Norenzayan (2012) was used to assess religiosity. These items are answered on a scale ranging from 1 (Strongly disagree)

to 7 (Strongly agree), and measure intrinsic religiosity (e.g., “My faith involves all of my life”), intuitive religious beliefs (e.g., “When I am in trouble, I find myself wanting to ask God for help”), and beliefs in supernatural agents (e.g., “Angels exist”). Attitudes toward and commitment to science (i.e., a scientific analogue to religiosity measures) were measured using the belief in science scale (BIS). The BIS (Farias et al., 2013) is a 10-item scale that measures the extent to which one treats science as the sole source of understanding in the world. Past studies from our lab suggested that attitudes toward science were invariably positive, and a more sensitive measure of scientific attitudes was desired. The BIS was chosen because it more sensitively measures scientific attitudes.

Basic demographic information was obtained (e.g., age, sex, ethnicity, religion and denomination).

Procedure. All study materials were presented using a Qualtrics survey. Undergraduate participants completed the study in private rooms within the lab using lab computers. Mturk workers discovered the HIT through the Mturk marketplace, which would then redirect the worker to the Qualtrics survey. In order to cleanly separate the data of undergraduates from Mturk workers, separate surveys were created for each population. The two surveys only differed in whether a subject number was assigned by an experimenter and the presentations of the consent form and debriefing. Namely, undergraduates were assigned a subject number which the experimenter entered into the Qualtrics survey after the undergraduate signed a physical consent form. Mturk workers were not assigned subject numbers, and the consent form was presented as a picture embedded in the webpage; Mturk workers agreed by clicking the “I agree” button and advancing the survey. Undergraduates received a physical debriefing sheet, whereas Mturk workers received a picture of the same debriefing sheet and were encouraged to save or print the picture.

After consenting to the study, all participants completed the premeasurement

questionnaire (see appendix A). The premeasurement questionnaire provided premanipulation data on attitudes toward science and religion.

Subjects were then assigned to either the control group or to one of the four experimental conditions. The experimental groups are structured as a 2 (0: Low meaning motivation, 1: High meaning motivation) x 2 (0: Low construal, 1: High construal) factorial design. The control group skipped straight to the outcome measures. Although the ideal control group would complete a benign task similar to the experimental task, it is difficult to conceive of a task that has no chance of manipulating either construal level or meaning-making motivations. Participants in the experimental groups were randomly assigned to one of two tasks that both aim to manipulate meaning-motivation and construal level. The two tasks are called the exemplar task and the trivia task. Two tasks were employed for two reasons. First, the trivia task may inherently lend itself to scientific concepts; thus, if the trivia task successfully changed scientific endorsement, one could argue that it is due to primed scientific concepts rather than construal level, per se. Secondly, including both tasks provides a conceptual replication within the same dataset.

In both tasks, the meaning-making motivation was manipulated using past MMM research as a guide. The MMM suggests that humans are motivated meaning-makers who are motivated to understand when an expectancy is violated (Heine et al., 2006). To instill a meaning-making motivation, we set an expectation, then violated it. Specifically, participants were instructed that they would be completing several simple math problems on the next page, instructed about how to submit answers, and led through several example items; at the bottom of the page, participants were instructed to continue to the full math task. The next page had no mathematical problems. Instead, the next page consisted of either the exemplar or the trivia task. In addition to this expectancy violation, several items on either task featured perceptual disfluencies (e.g., subtle changes in font shape, family, or size;

subtle misspellings; occasionally poor font kerning). Past research suggests that subtle perceptual oddities produce a meaning-making motivation (Proulx & Heine, 2010). Those in the low meaning-making motivation conditions continued straight to the exemplar or trivia task, and these tasks featured no perceptual disfluencies.

Each task manipulated construal level in a different way. In the exemplar task (Fujita et al., 2006), participants are given a list of 40 words. In the low construal conditions, participants were instructed to provide an example of the word (e.g., dog: *Chihuahua*). In the high construal conditions, participants were instructed to indicate what the word is an example of (e.g., dog: *Mammal*). These tasks have successfully primed construal levels in past research (Fujita et al., 2006; Martin & Masicampo, 2013a; Trope & Liberman, 2010).

In the trivia task, participants were given 14 questions to answer (see appendix C). In the low construal conditions, the questions were "how" questions. In the high construal conditions, the questions were "why" questions. How and why questions have previously been employed to prime low and high construal thoughts, respectively, in past research (Freitas et al., 2004). The why and how questions feature largely the same content, but start with either "why" or "how." Participants were instructed to answer the questions if they were confident in their answer, and to write "I do not know" if they were not confident in their answer. Questions in the low meaning-making motivation conditions were easily answerable. Questions in the high meaning-making motivation conditions were difficult, if not impossible to answer. Difficult questions were generated by thinking of difficult or incorrect relations or human feats, then framed such that one could ask how or why such a relation or feat could exist. These difficult questions required participants to write "I do not know" repeatedly, but still prompted one to think at a low or high construal level.

Participants then completed the UTIL. Following the UTIL, participants

completed both the BIS and the religiosity measures in a counter-balanced order. Those in the experimental conditions were then asked to rate the difficulty of the trivia or exemplar task on a scale ranging from 1 (Very easy) to 7 (Very difficult). Finally, participants completed the demographics form and were given or presented the debriefing sheet. For a diagram of the study 1 procedure, see Figure 2.

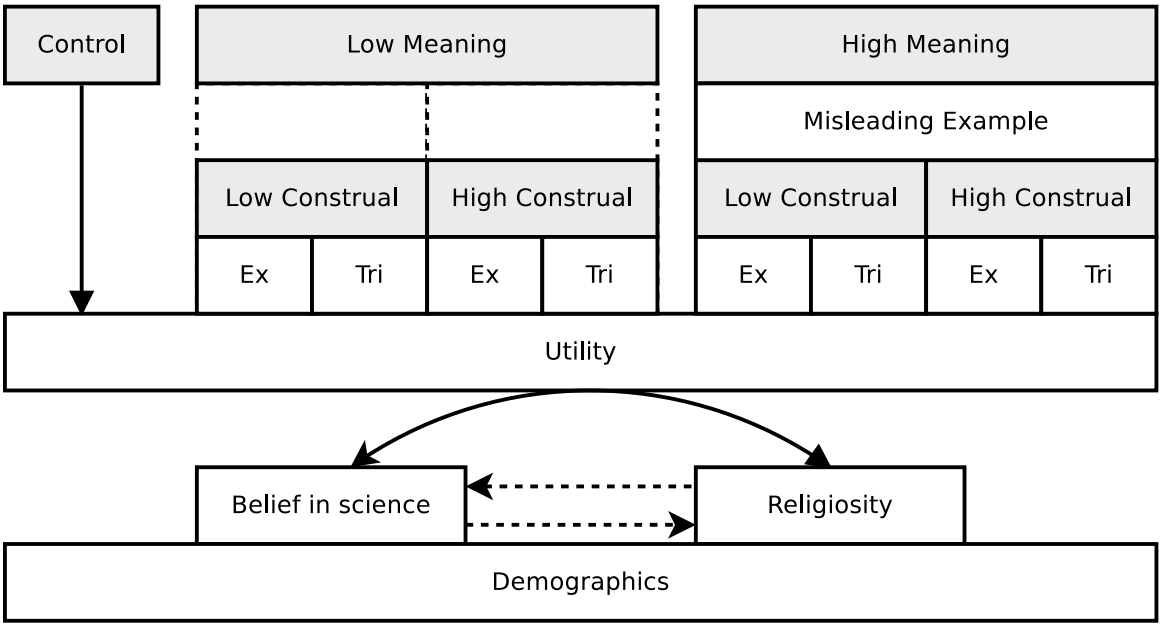

Figure 2. Procedural flow of study 1. Grey blocks depict a group assignment.

Study 1 Results

R (R version 3.1.0 (2014-04-10); R Core Team, 2014) was used for all analyses, along with the "psych" package for psychometrics (Revelle, 2014), the "car" package for specifying Type-II ANOVA (Fox & Weisberg, 2011), the "ggplot2" package for plotting (Wickham, 2009), and "xtable" and "stargazer" for creating tables (Dahl, 2014; Hlavac, 2014). Continuous predictors were centered in all statistics including them. Factors were dummy coded. Subjects who failed the filter questions from the premeasurements were excluded. The alpha level was set to .05 in all analyses.

Subjects. The sample consisted of 200 Mturk workers and 162 undergraduates. After removing those who failed the filter questions in the premeasurements, and considering that there are 5 incomplete cases, the final sample consisted of 348 individuals ($m_{\text{age}} = 28.63, sd_{\text{age}} = 13.06, 44.25\%$ male).

Table I
Descriptives for the control condition.

	mean	sd
Rel Before	3.61	1.97
Sci Before	5.03	1.29
Rel Utility	3.93	1.73
Sci Utility	5.53	0.92
BIS	3.77	1.09
Rel After	3.72	1.37

Baseline descriptives. The baseline data consists solely of those in the control group ($n = 71$). Table I provides descriptives of the measured variables. The difference between the reported utility of science and religion is significant, Welch's $t(107.10) = -6.86, p < .001$, with scientific utility being greater. Moreover, individuals are relatively more consistent in their rating of science as useful, $F(1, 140) = 34.96, p < .001$.

Table II provides the correlations between measured variables. As one would expect, the religiosity variables and scientific variables correlate within themselves, and religious variables tend to be negatively correlated with scientific variables. However, religious utility negatively correlates more with the belief in science measure than with one's view of science as useful, $t = 4.08, p < .001$. Likewise, religiosity negatively correlates more with the belief in science than with scientific utility, $t = 4.73, p < .001$. Regressing scientific utility on either religious utility or religiosity suggests that despite the negative relationship between the religiosity variables and scientific utility, highly religious individuals are still likely to suggest

Table II
Correlations for measured variables in control condition.

	1	2	3	4	5
Rel Before					
Sci Before	−0.19				
Rel Utility	0.86***	−0.22			
Sci Utility	−0.31 **	0.51***	−0.33 **		
BIS	−0.67 ***	0.46***	−0.66 ***	0.60***	
Rel After	0.89***	−0.22	0.84***	−0.35 **	−0.71 ***

* = .05, ** = .01, *** = .001

that science is useful (See Table III for regressions, and Figure 3). In essence, a highly religious person may not believe science to be the sole source of meaning, but they nevertheless view science as useful.

Table III
Baseline regressions of scientific utility on religiosity variables

	Dependent variable:	
	Scientific Utility	
Intercept	5.526***	5.526***
	(5.321,5.730)	(5.323,5.729)
Rel Utility	−0.176***	
	(-0.295,-0.056)	
Religiosity		−0.234***
		(-0.383,-0.084)
Observations	71	71
R^2	0.108	0.120
Adjusted R^2	0.095	0.107
Residual Std. Error (df = 69)	0.880	0.874
F Statistic (df = 1; 69)	8.336***	9.407***
Note:		* < .10;** < .05;*** < .01

Planned analyses. Hypothesis 1 stated that the high construal prime would increase the religious outcome variables, and that this effect would be

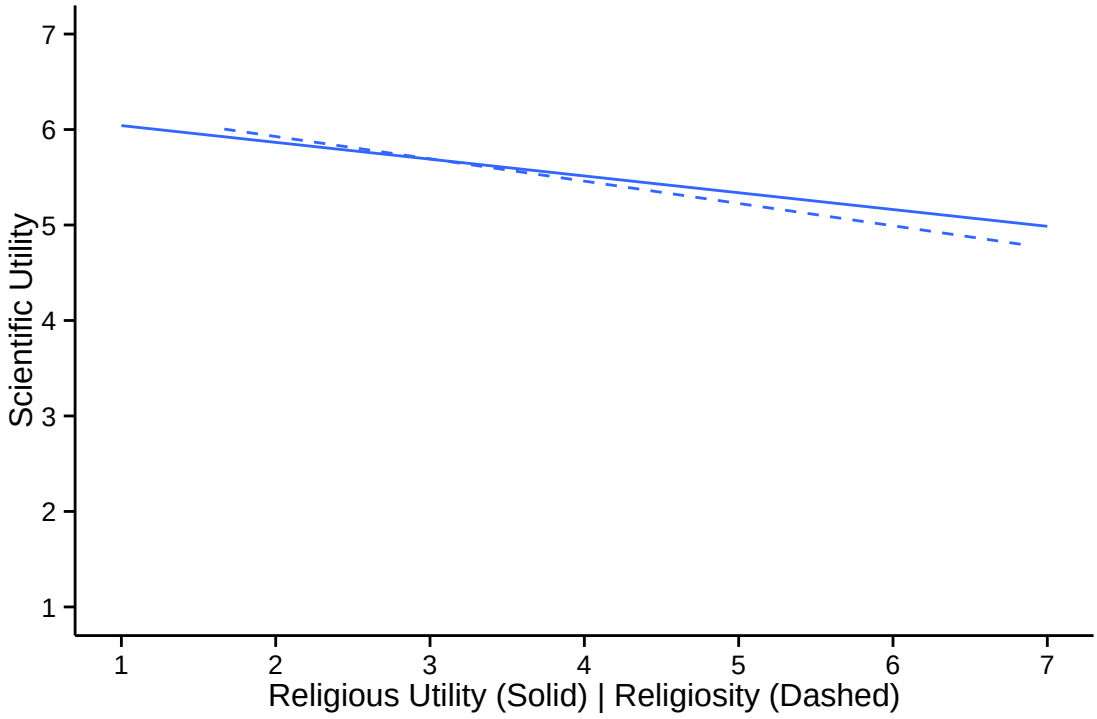

Figure 3. Scientific Utility by Religious Endorsement.

stronger when the need for meaning is high. Hypothesis 1 was explored using the two ANOVAs below. Notably, whereas other statistical packages use a Type-III ANOVA procedure, the analyses below employ the Type-II variant. The reason for using a Type-II is that the Type-III requires the intercept to be set to the overall mean, and not to the comparison group. Given that the control group is being used as a comparison group, a Type-III cannot be used (see Langsrud, 2003, for a discussion). If hypothesis 1 is correct, the interaction term should be positive, suggesting that compared to the control group, high construal thought coupled with a high need for meaning increases religious endorsement.

$$\text{Religious Utility} = b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} + b_3 x_{\text{High Meaning}} + b_{2:3} x_{\text{HighC}\times\text{HighM}}$$

$$\text{Religiosity} = b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} + b_3 x_{\text{High Meaning}} + b_{2:3} x_{\text{HighC}\times\text{HighM}}$$

Tables IV and V provide the summaries of the Type-II tests using the above

Table IV
Type-II ANOVA testing manipulations on religious utility.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	2.062	1	0.643	0.423
High Construal	1.822	1	0.568	0.452
High Meaning	0.0004	1	0.0001	0.991
Interaction	1.106	1	0.345	0.557
Residuals	1,100.143	343		

Table V
Type-II ANOVA testing manipulations on religiosity.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	0.686	1	0.312	0.577
High Construal	0.423	1	0.192	0.661
High Meaning	0.776	1	0.352	0.553
Interaction	0.816	1	0.371	0.543
Residuals	755.216	343		

models. Unfortunately, hypothesis 1 was unsupported. Neither the construal condition nor the meaning condition produced the expected effects.

The second hypothesis posited that the low construal condition would increase endorsement of science, and that the effect of construal would be stronger when the need for meaning is high. Note that the regressions below are conceptually the same as those used for hypothesis 1, but the outcome measures are related to science, and the output facilitates the interpretation of the data, given the hypothesis (e.g., the hypothesis includes information about how meaning moderates the effect of low construal). Like the analyses for hypothesis 1, hypothesis 2 was explored using a Type-II ANOVA. If hypothesis 2 is correct, the interaction term should be positive, suggesting that compared to the baseline control group, low construal primes coupled with a need for meaning increases scientific endorsement.

$$\begin{aligned} \text{Scientific Utility} = & \quad b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} \\ & + b_3 x_{\text{High Meaning}} + b_{1:3} x_{\text{LowC}\times\text{HighM}} \end{aligned}$$

$$\begin{aligned} \text{BIS} = & \quad b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} \\ & + b_3 x_{\text{High Meaning}} + b_{1:3} x_{\text{LowC}\times\text{HighM}} \end{aligned}$$

Table VI
Type-II ANOVA testing manipulations on scientific utilty.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	1.653	1	2.198	0.139
High Construal	0.483	1	0.642	0.424
High Meaning	0.0004	1	0.001	0.982
Interaction	0.608	1	0.809	0.369
Residuals	257.913	343		

Like hypothesis 1, hypothesis 2 was unsupported (See Tables VI and VII). Neither the construal nor the meaning manipulations affected the reported scientific

Table VII
Type-II ANOVA testing manipulations on belief in science.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	1.022	1	0.880	0.349
High Construal	2.877	1	2.478	0.116
High Meaning	0.933	1	0.803	0.371
Interaction	3.204	1	2.759	0.098
Residuals	398.283	343		

utility. The only trending effect for the manipulations on belief in science was in the interaction term, but the interaction term was in the opposite direction than expected ($b_{1:3} = -0.43, se = 0.26$; see Figure 4). We assume this trending effect to be a Type-I error; out of the 16 tests thus run, an alpha value of .10 would yield 1.6 Type-I errors on average.

Analyses with covariates. Past studies included premeasured religiosity and attitudes toward science as covariates and higher-order interaction terms (Martin & Masicampo, 2013a, 2013b). We repeated the above analyses, but included both premeasured religiosity and attitudes toward science as covariates. Including the premeasurements as a third-order interaction yielded no increase in explained variance (i.e., in hierarchical regressions comparing models with covariates to models with covariates and third-order interaction terms, all $p_s > .20$). Neither religiosity nor attitudes toward science influence the effects of the manipulations.

Premeasured religiosity positively predicted religious outcomes and negatively predicted scientific outcomes ($p_s < .01$), and scientific attitudes likewise positively predicted scientific outcomes and negatively predicted religious outcomes ($p_s < .09$). The predictive ability of the covariates suggests that the covariates should decrease the variability of the outcome, allowing us to better detect any effects of the manipulations. Furthermore, the sample size was chosen using a power analysis that assumes a desired power of .80 and a six predictor model.

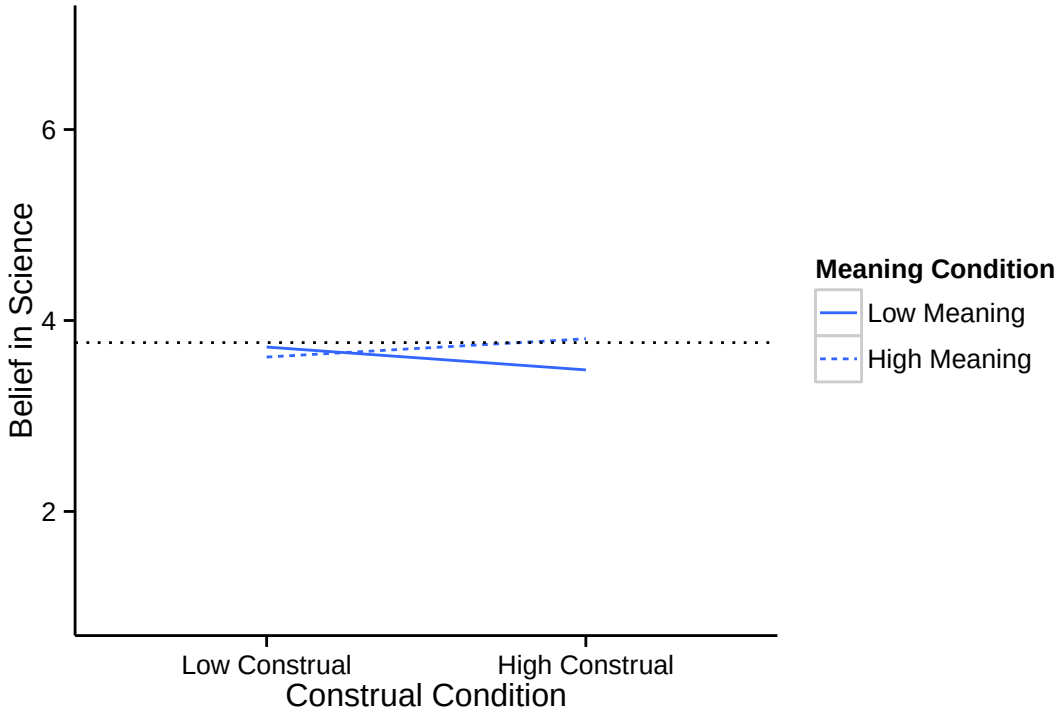

Figure 4. Interaction plot for the manipulations on belief in science. Dotted line is the control group.

Table VIII
Type-II ANOVA for scientific utility including covariates.

	Sum Sq	Df	F value	Pr(>F)
Rel Before	4.439	1	7.518	0.006
Sci Before	44.746	1	75.783	0
Low Construal	3.493	1	5.917	0.016
High Construal	1.852	1	3.136	0.077
High Meaning	0.107	1	0.181	0.671
Interaction	0.297	1	0.504	0.478
Residuals	199.571	338		

With the exception of the scientific utility outcome, the results remained unchanged by including religiosity and scientific attitudes as covariates. That is, including the covariates did not reveal the expected effects. Confusingly, after including the covariates, both low and high construal conditions increase scientific utility (See Table VIII). Merely being assigned to an experimental condition

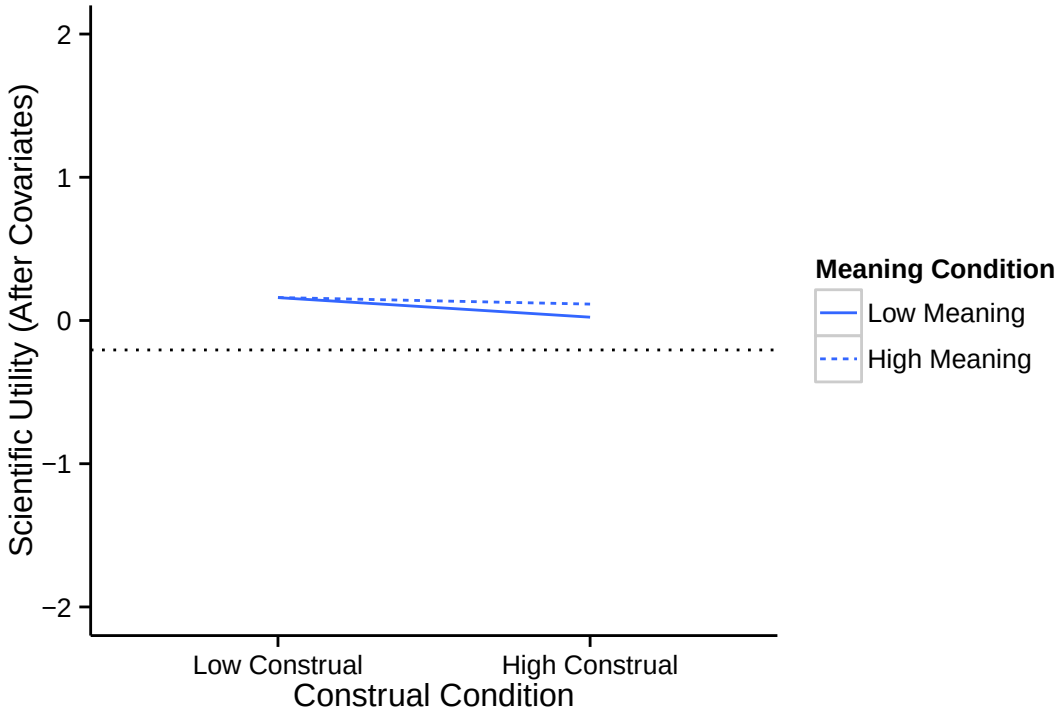

Figure 5. Interaction plot for the manipulation on partialed scientific utility. Dotted line is the control group.

increased the perceived utility of science (See Figure 5).

Replication check. As elaborated upon in the introduction, past studies suggested that those in high construal conditions endorse religion more and science less than those in the low construal condition. One of these studies employed the exemplar task (Martin & Masicampo, 2013a); the high construal condition of the exemplar task predicted greater religious commitment and religious utility relative to the low construal condition. The present study did not include the religious commitment measure, but did include the same religious utility measure and another measure of religiosity.

To test whether we replicated past findings, we ran the same tests from Martin and Masicampo (2013a) on a subset from our sample that most resembled the previous conditions (i.e., those without a meaning threat who completed the exemplar task). We regressed the religious outcome measures on construal condition

after entering the covariates. The results from past studies failed to replicate (See

Table IX
Regressions testing for replications of past studies

	Dependent variable:	
	Rel Utility	Religiosity
	Exemplar Only	
Intercept	4.198***	3.986***
	(3.870,4.525)	(3.781,4.191)
Rel Before	0.655***	0.638***
	(0.552,0.758)	(0.573,0.702)
Sci Before	−0.139	−0.126**
	(-0.310,0.033)	(-0.233,-0.019)
Construal	−0.027	−0.135
	(-0.490,0.435)	(-0.424,0.154)
Observations	68	68
R^2	0.724	0.863
Adjusted R^2	0.711	0.857
Residual Std. Error (df = 64)	0.966	0.604
F Statistic (df = 3; 64)	56.063***	134.483***
Note:	* < .10;** < .05;*** < .01	

Table IX for the regressions). The subset consisting only of those in the meaning threat condition who completed the exemplar task only contained 68 participants, which could limit the power of replication. However, including those in the other construal task increased the subset to 135 and the effect of construal was still indiscernible from zero ($p_s > .34$).

Study 1 Discussion

Study 1 explored whether a need to understand something while in a particular construal level context predicts the endorsement of religion and science. Two hypotheses were proposed. The first hypothesis, that high construal thinking

would increase religious endorsement and especially when the individual has a high need for meaning, was unsupported. The planned tests revealed no effect of construal or meaning condition on the religious outcome measures, even after entering premeasured attitudes toward religion and science as covariates. Moreover, the previous data suggesting that the exemplar task influences religious endorsement failed to replicate.

The second hypothesis, that low construal thinking would increase scientific endorsement and especially when the individual has a high need for meaning, was unsupported. Again, the planned tests revealed no effect of construal or meaning condition on the scientific outcome measures. After controlling for premeasured religious and scientific attitudes, merely participating in the experimental tasks seemingly increased the utility of science from baseline.

Study 1 may have failed for several reasons. First, despite the greater sample size, the failure to replicate past findings may have been a power issue. The power analysis for study 1 assumed a desired power of .80, meaning there would theoretically exist a 20% chance of obtaining a sample that fails to confidently reveal the expected effects. Two (of three) past studies from our lab found the expected effects (one-sided $p_s < .025$), which under a null hypothesis only has a probability of $< .1\%$ of occurring. When one compares the probability of obtaining such a sample (20%) to the probability of obtaining two type 1 errors in a row ($< .1\%$), the evidence remains in favor of past hypotheses. Thus, the evidence for the relationship between construal level and science or religion is understated in study 1, despite the high power and null results.

Second, the strength of the meaning manipulation may have rendered it ineffective. Those in the meaning conditions were falsely instructed that they would complete a math task, then continued to answer several very difficult questions with occasionally obvious font inconsistencies. The false instruction was intended to set

an expectation which is broken by the exemplar or trivia task. However, it is possible that the false instruction led to either confusion about the subsequent task or an assumption about the quality of the survey and its creator. If that is correct, then the perceptual disfluencies too could be attributed to the quality of the survey and its creator. Additionally, the difficulty of every question may have caused participants to stop thinking about each question and assume they do not know it. The meaning manipulation would thus be ineffective, because all oddities could then be attributed to the creator or survey platform (negating any need to affirm), and the construal manipulation would be ineffective because participants stop thinking about the questions.

In sum, the hypotheses were unsupported. We found no evidence that construal level or meaning threats affected the endorsement of science or religion. However, several methodological concerns obscure the interpretibility of the null results. Namely, those in the low meaning groups likely failed to replicate past findings due to Type-II error, and the high meaning manipulation may have been ineffective at manipulating either meaning or construal level. Interestingly, the baseline data suggest that the relationship between religiosity and scientific endorsement is nuanced. Although religiosity measurements negatively correlate with scientific endorsement, highly religious people are still likely to view science as useful, but not as the sole source of meaning.

STUDY 2

The purpose of study 2 is to explore the relationship between construal level and meaning-making motivations in a different manner and to correct for the potential methodological concerns inherent in study 1. In study 1, we expected that inducing a meaning-making motivation while in different construal level context would affect religious and scientific endorsement. In study 2, we explore the role of MMM in a different manner. Unlike study 1, participants were all given a meaning-making motivation, and we varied whether individuals could affirm a meaning framework before endorsing religion and science. Specifically, we allowed participants to affirm moral values by setting the bail amount of various criminals (Proulx & Heine, 2008; Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989). Note that moral values are presumably highly related to religiosity, but we expect that moral affirmation will decrease, not increase, religious endorsement. In sum, study 2 explored the role of fluid compensation in the increased endorsement of either endeavor. If allowed to compensate with another framework, they should not need to compensate by endorsing religion or science.

Hypotheses

Two hypotheses were proposed for study 2:

3. Any increase in religious endorsement as a result of high construal thinking will be attenuated if given the opportunity to affirm a separate meaning framework.

4. Any increase in scientific endorsement as a result of low construal thinking will be attenuated if given the opportunity to affirm a separate meaning framework.

Study 2 Methods

Due to time constraints, only Mturk workers were recruited. Because we are again interested in an interaction term, we aimed for the same number of participants (see Figure 1). Mturk participants were paid $.45 for their time.

Procedure. All measures from study 1 were reused, and all stimuli were presented through a Qualtrics survey. Like study 1, Mturk workers discovered the HIT through the Mturk marketplace.

After consenting, all participants completed the premeasurement questionnaire (see appendix A). Subjects were then assigned to either the control group or to one of four experimental conditions. The experimental groups are structured as a 2 (0: Low construal, 1: High construal) x 2 (0: No affirmation, 1: Affirmation) factorial design. The control group skipped to the no-affirmation number-entry task articulated below.

Unlike study 1, subjects in study 2 only completed the trivia task. The trivia task was modified from study 1. These changes aimed to solve several problems. First, the meaning manipulations in study 1 may have been ineffective because the participant could attribute the very obvious oddities to an ostensibly incompetent survey creator. Second, the persistent difficulty of all trivia questions in the high meaning condition may have caused participants to stop attempting the questions; thus, the construal and meaning threat manipulations would have failed.

Because the misleading example task may have produced assumptions by the participant about the competence of the researchers and quality of the survey, the misleading example task was removed. A need for meaning was instead primed using two methods. The first method is the use of perceptual disfluencies from study 1; however, we made the disfluencies more subtle from study 1 by replacing any instance of superscripts and subscripts to minor changes to font family or size. The second method lies in the sequence and difficulty of questions. Whereas the high meaning trivia task in study 1 consisted of 14 difficult questions to which they should respond “I do not know,” the trivia task in study 2 consists of four easy questions (the first four questions from the low meaning trivia task; see appendix C) and two hard questions (randomly selected questions from the high meaning trivia

task). Instead of writing "I do not know," the subjects were instructed to leave the text box blank unless they can confidently answer the question. Construal level was primed in the same manner (i.e., "how" and "why" questions). Meaning threat was primed using perceptual disfluencies and suddenly difficult questions to which they can supply no response. Therefore, participants in the experimental groups were primed with a high meaning-making motivation and either high or low construal level.

Unlike in study 1, some participants were able to satiate the need to understand by affirming a meaning framework other than religion or science. Past studies from the TMT and MMM literature (Proulx & Heine, 2008; Proulx et al., 2010; Rosenblatt et al., 1989) measured the affirmation of a framework by asking participants to set the bail amount for criminals (e.g., a prostitute). Similarly, we provided those in the affirmation group the opportunity to affirm moral beliefs about the punishment of criminals before they proceeded to the outcome measures of interest (see appendix D for the full task). Those in the control group and in the no-affirmation experimental conditions completed an analogous task in which the participant entered the specified number into the corresponding textbox. Because the effects of the experimental manipulations on the outcome measures were likely to be small even before the no-affirmation and affirmation tasks, participants were only presented four random items from the items listed in appendix D; with a task that is too long, we risked losing the effect of the prime as a function of time.

Whereas in study 1, the control group served solely as a baseline for the outcome measures, we wanted the groups in study 2 to be as similar as possible, varying only construal level and the opportunity to affirm a meaning framework. The control group is a more accurate control group for the other groups, because the control group is the same as the experimental groups sans the construal level manipulation. In addition, the act of doing any task between the construal level

task and the outcome measures may produce unneeded variability in the outcome measures; by assigning the no-affirmation number task to the control group, we minimize theoretically uninteresting variability between groups. In sum, all participants entered the same quantity of numbers into corresponding textboxes, but the numbers from the affirmation group subjects reflect their attitudes toward criminals, and the numbers from the other subjects are predetermined.

All participants then completed the outcome measures from study 1. Subjects completed the UTIL, followed by both the religiosity measures (Gervais & Norenzayan, 2012) and the BIS (Farias et al., 2013) in a counter-balanced order. Finally, participants answered demographic questions and received the debriefing sheet. For a diagram of the study 2 procedure, see Figure 6.

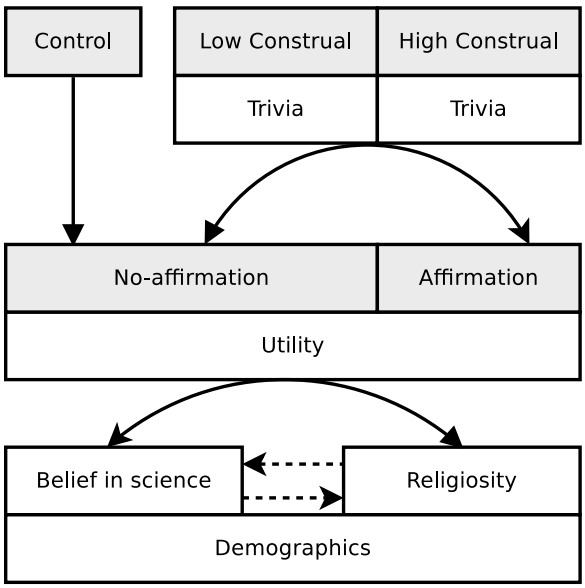

Figure 6. Procedural flow of study 2. Grey blocks depict a group assignment.

Study 2 Results

R (R version 3.1.0 (2014-04-10); R Core Team, 2014) was used for all analyses using the same list of packages from study 1. Continuous predictors were centered in all analyses including them. Factors were dummy coded. Subjects who failed the

filter questions in the premeasurements were excluded. The alpha level was set to .05 in all analyses.

Subjects. All subjects ($N = 367$) were recruited through Mturk. After removing those who failed the filter questions from the premeasurements, the sample consisted of 349 subjects ($m_{\text{age}} = 35.38, sd_{\text{age}} = 12.75, 49.28\%\ Male$)

Planned analyses. Hypothesis 3 stated that the effect of construal on the religious endorsement measures would be attenuated if given the opportunity to affirm. Hypothesis 3 was explored using the two Type-II ANOVAs below. If hypothesis 3 is correct, the interaction term should be negative, suggesting that the effect of high construal on religious outcomes is attenuated by the affirmation task.

$$\begin{aligned}\text{Religious Utility} = \quad & b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} \\ & + b_3 x_{\text{Affirm}} + b_{2:3} x_{\text{HighC}\times\text{Affirm}}\end{aligned}$$

$$\begin{aligned}\text{Religiosity} = \quad & b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} \\ & + b_3 x_{\text{Affirm}} + b_{2:3} x_{\text{HighC}\times\text{Affirm}}\end{aligned}$$

Table X
Type-II ANOVA testing manipulations on religious utility.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	0.216	1	0.060	0.807
High Construal	1.707	1	0.472	0.493
Affirm	0.810	1	0.224	0.636
Interaction	6.693	1	1.851	0.175
Residuals	1,240.594	343		

Tables X and XI show the results of the ANOVAs. Hypothesis 3 was

Table XI
Type-II ANOVA testing manipulations on religiosity.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	0.547	1	0.241	0.624
High Construal	3.447	1	1.521	0.218
Affirm	0.649	1	0.286	0.593
Interaction	2.067	1	0.912	0.340
Residuals	777.257	343		

unsupported. Like study 1, the construal level manipulation failed to affect religious endorsement, and this did not depend on the opportunity to affirm.

Hypothesis 4 states that the effect of construal on scientific endorsement will be attenuated if given the opportunity to affirm. Similar to past tests, hypothesis 4 was explored using the following Type-II ANOVAs. If hypothesis 4 is correct, the interaction term should be negative, suggesting that the effect of the low construal condition on scientific endorsement depends on the opportunity to affirm.

$$\begin{aligned}\text{Scientific Utility} = \quad & b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} \\ & + b_3 x_{\text{Affirm}} + b_{1:3} x_{\text{LowC}\times\text{Affirm}}\end{aligned}$$

$$\begin{aligned}\text{Belief in Science} = \quad & b_0 + b_1 x_{\text{Low Construal}} + b_2 x_{\text{High Construal}} \\ & + b_3 x_{\text{Affirm}} + b_{1:3} x_{\text{LowC}\times\text{Affirm}}\end{aligned}$$

Tables XII and XIII show the results of the above ANOVAs. Hypothesis 4, too, is unsupported. The construal conditions failed to affect the science endorsement measures, regardless of the opportunity to affirm.

Entering the covariates (premeasured religiosity and scientific attitudes) into the above analyses produced no difference in the observed effects of the

Table XII
Type-II ANOVA testing manipulations on scientific utility.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	1.044	1	1.113	0.292
High Construal	0.015	1	0.016	0.900
Affirm	0.003	1	0.003	0.955
Interaction	0.395	1	0.421	0.517
Residuals	321.764	343		

Table XIII
Type-II ANOVA testing manipulations on belief in science.

	Sum Sq	Df	F value	Pr(>F)
Low Construal	0.804	1	0.671	0.413
High Construal	0.029	1	0.024	0.876
Affirm	1.747	1	1.458	0.228
Interaction	1.281	1	1.069	0.302
Residuals	410.930	343		

manipulations ($p_s > .13$).

Replication check. As in study 1, we analysed whether we replicated our past studies by removing the control group and testing whether the construal conditions differed from each other. We tested a subset of the data who completed the trivia task and did not affirm afterward ($n = 139$). Once again using the same analyses used in our past studies (Martin & Masicampo, 2013a, 2013b), we regressed the religious outcome measures on the covariates and construal condition. Like study 1, study 2 failed to replicate the past studies ($p_s > .76$).

Perceived difficulty. In studies 1 and 2, we asked participants to rate the difficulty of the trivia questions on a scale from 1 (Very Easy) to 7 (Very Difficult). Initially intended as a covariate to partial out the effect of item difficulty from the meaning manipulation, the variable revealed an interesting relationship in study 2. First, "how" questions were perceived as more difficult than "why" questions (See Table XIV and Figure 8). Second, religious endorsement positively correlates with

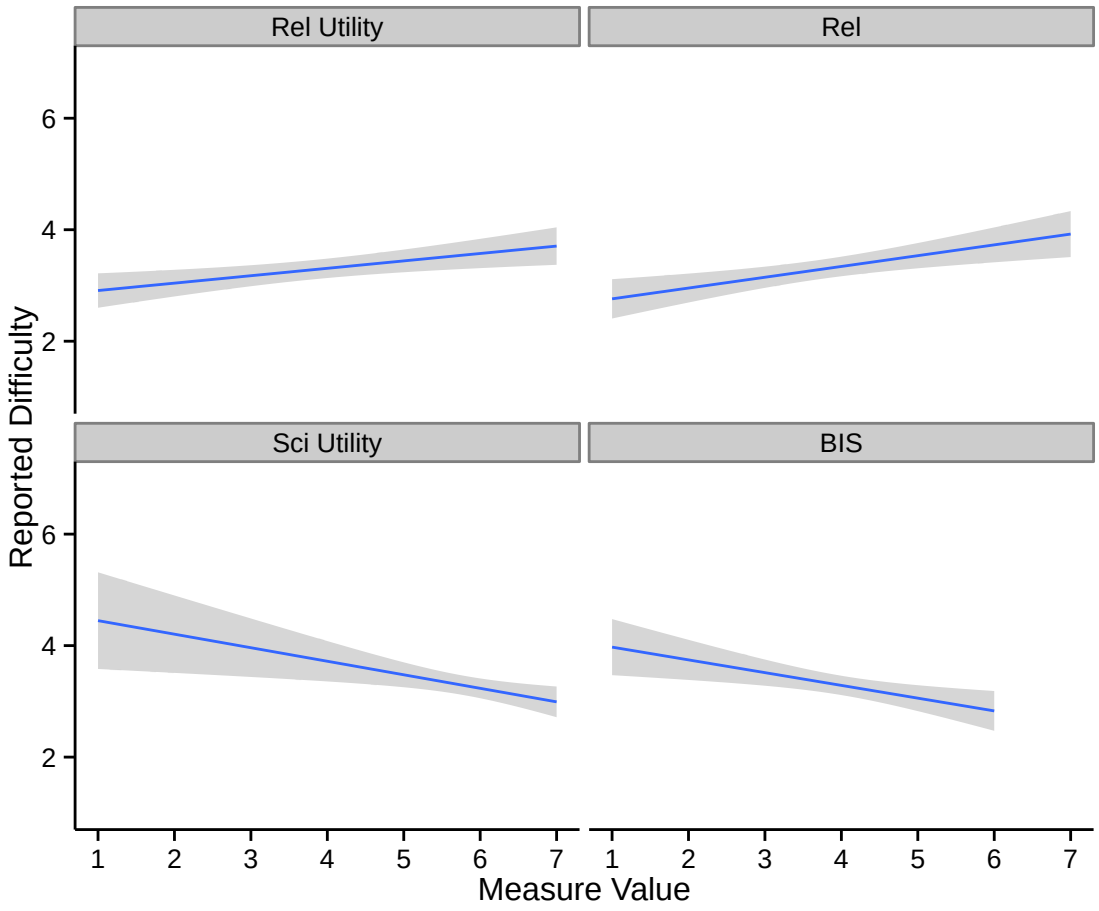

Figure 7. Perceived difficulty by religious and scientific variables.

reported difficulty, whereas scientific endorsement negatively correlated with difficulty (See Table XIV and Figure 7).

Study 2 Discussion

Study 2 explored whether the increased endorsement of science and religion following a meaning threat in a construal level condition could be attenuated by first affirming an alternative framework. Two hypotheses were proposed. Neither hypothesis was supported. Specifically, the trivia task failed to produce any increase in religious and scientific endorsement, regardless of the opportunity to affirm.

Like study 1, study 2 failed to replicate past findings that construal level shifts religious and scientific attitudes. Once again assuming that we had 80% power, the

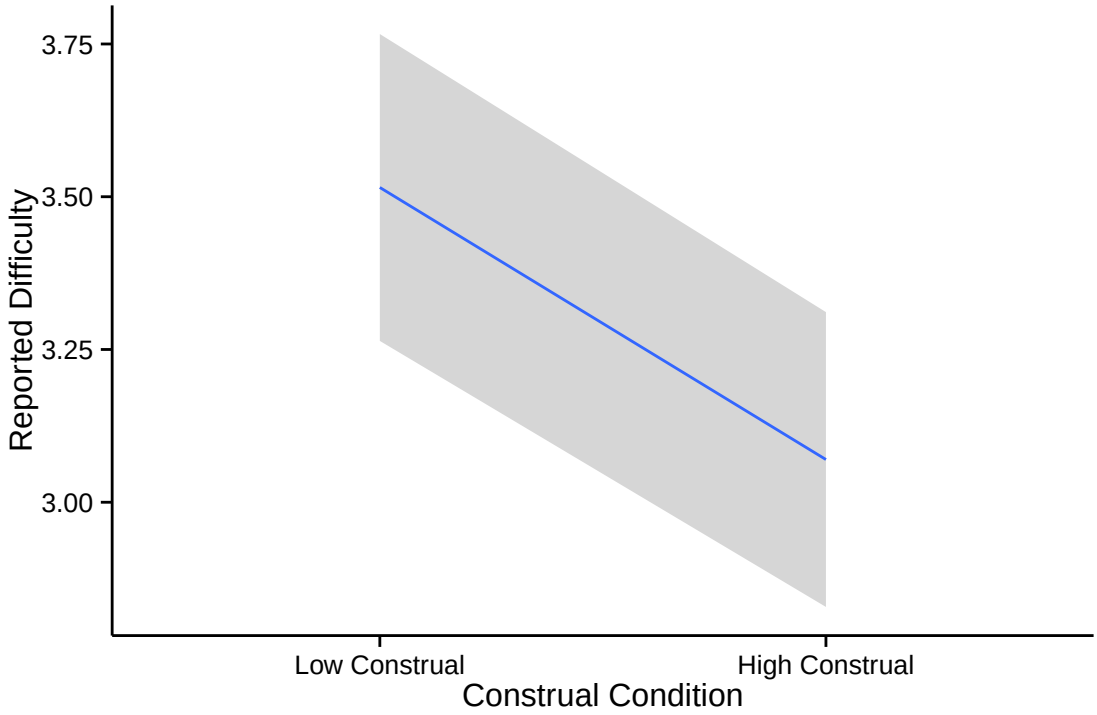

Figure 8. Perceived difficulty by construal condition.

likelihood of obtaining two type-II errors is approximately 4%. Although small, 4% is nevertheless greater than the probability of obtaining two type-I errors in past studies ($< .1\%$); specifically, obtaining two type-II errors is theoretically 64 times more likely than obtaining two type-I errors in past studies. That is not to say we are disregarding the current data. Instead, we are acknowledging that, although the current data do not support the relationship between construal level and religious or scientific endorsement, the favor is toward such a hypothesis (albeit, the support is diminishing).

Despite the failure to support the hypotheses, the data illuminated a possible relationship between endorsements and perceived difficulty of the chosen trivia questions. Religious endorsement predicts greater perceived difficulty of the trivia questions; scientific endorsement predicts lesser perceived difficulty of the trivia questions. One explanation for this relationship could be that religious individuals

Table XIV
Trivia difficulty by construal condition and utility measures.

	Dependent variable:	
	Difficulty	
Intercept	3.515***	3.293***
	(3.265,3.765)	(3.121,3.464)
High Construal	−0.445**	
	(-0.792,-0.099)	
Rel Utility		0.107**
		(0.013,0.200)
Sci Utility		−0.185**
		(-0.367,-0.002)
Observations	275	275
R^2	0.023	0.044
Adjusted R^2	0.019	0.037
Residual Std. Error	1.465 (df = 273)	1.452 (df = 272)
F Statistic	6.336** (df = 1; 273)	6.197*** (df = 2; 272)
Note:		* < .10;** < .05;*** < .01

are less intelligent (Ganzach & Gotlibovski, 2013), and scientific individuals more intelligent. The perceived difficulty of the questions may reflect the intelligence of the person. Given the nature of the rated questions, we propose an alternative interpretation.

The trivia questions consisted of four very easy questions and two extremely difficult (or impossible) questions. Intuitively, intelligence seems unlikely to influence one's ability to answer "how one peels an orange," or to answer questions whose premises are purposefully inaccurate (e.g., "how Spanish bears hang upside down from trees"). Nevertheless, religious and scientific endorsement predict the perceived difficulty of answering such questions. Perhaps those who are highly interested in science are more motivated to answer such questions, are better

practiced at answering such questions, or believe that such questions are easily answerable through science. Conversely, perhaps highly religious individuals are motivated and better practiced at thinking about and answering different classes of questions; specifically, perhaps religious individuals would find questions involving social cognition and moral judgments easier than the irreligious, given that religion is heavily involved in addressing such questions.

In sum, study 2 failed to support our hypotheses. The construal manipulation failed to influence the endorsement of religion or science, regardless of the opportunity to affirm. Interestingly, religious and scientific endorsement differentially predict the perceived difficulty of the trivia questions, despite the questions being either very simple or unanswerable. The relationship between the perceived difficulty of questions and the failure to support the hypothese of both studies is discussed in the following section.

GENERAL DISCUSSION

The primary purpose of studies 1 and 2 was to explore the relationship between science, religion, meaning-making, and construal level, and we did so by applying the meaning maintenance model and construal level theory. The MMM research suggests that individuals are motivated to maintain a sense of understanding about the world. When confronted with unexpected, disfluent occurrences, they will affirm alternative meaning frameworks (e.g., moral beliefs; Proulx et al., 2012). CLT posits that understandings exist on a continuum ranging from low-level, concrete representations to increasingly abstract representations, and that the selection of a representation depends on the goals and context (Trope & Liberman, 2010). Based on this position, we hypothesized that individuals perceive religion as associated with the relatively abstract representations, and science with the relatively concrete representations. Prior studies from our lab provided support for this hypothesis – those primed with high construal thoughts endorsed religion more than those in the low construal groups, and those primed with low construal thoughts endorsed science more than those in the high construal groups (Martin & Masicampo, 2013a, 2013b). In the present studies, we expected to replicate these past findings and extend them by exploring whether inducing a meaning-making motivation while in a low or high construal context would cause individuals to more greatly endorse science or religion, respectively.

We attempted to emulate contexts in which a person is primed with high or low level construals and with a low or high meaning-making motivation. We manipulated construal through the exemplar task (Study 1) and the trivia task (Studies 1 and 2). Meaning making motivation was manipulated through misleading directions (Study 1), item difficulty, and perceptual disfluencies (Studies 1 and 2). The role of meaning-making motivation in the endorsement of religion and science

was explored in two different designs. In one design (Study 1), we manipulated the meaning motivation along with construal, and measured any effects on the endorsement measures. In the alternative design (Study 2), we manipulated only construal, then provided some participants a chance to affirm their moral beliefs (Proulx & Heine, 2008), and measured any effects on the endorsement measures. Both designs tested the role of construal and meaning-making motivation, but from different ends.

Neither study revealed the expected effects. In study 1, neither meaning threat nor construal prime influenced the endorsement of religion and science. The baseline data were nevertheless illuminating. Religious and scientific endorsement were negatively correlated. The negative relationship between religious endorsement and the belief in science as the sole, ultimate source of meaning is expectedly high. This negative relationship was greater than that of religious endorsement and scientific utility. Thus, religious individuals were more consistently against the idea of science as a sole source of meaning than they were against the idea that science is useful. Moreover, the negative correlation between religious and scientific utility is potentially misleading. Even the highly religious rated science as highly useful, albeit less so than those who are less religious (see Figure 3).

In study 2, again, construal prime failed to influence the endorsement of religion and science, regardless of whether they were allowed to affirm before endorsement. However, an unexpected finding opens the door for a new line of research. Participants were asked to rate the difficulty of the four very simple questions and two very difficult questions that they encountered. First, "how" questions were perceived to be more difficult than "why" questions. Second, perceived difficulty of the questions covaried positively with religious endorsement and negatively with scientific endorsement. Although past studies have revealed a negative relationship between intelligence and religiosity (Ganzach & Gotlibovski,

2013), the rating of the trivia questions used in the present studies seems unlikely to be related to intelligence. The questions consisted of four questions that everyone could answer and two questions that were extremely difficult or impossible to answer with confidence (e.g., because the questions were created on false premises). Nevertheless, regardless of scientific endorsement, religious endorsement predicts perceived difficulty, and regardless of religious endorsement, scientific endorsement predicts less perceived difficulty.

Perhaps then, highly scientific individuals who are irreligious are better rehearsed at answering such trivia questions, or in the least believe they are not difficult to answer, even if they themselves do not have the answers. On the other hand, perhaps highly religious, unscientific individuals are not well practiced at thinking about such questions; in the contrary, due to the common content encountered in religious systems, they may perceive questions involving moral judgments, social norms, and belief as easier than the trivia questions they encountered here.

The failure to replicate past studies and to find the expected effects could be caused by a few reasons. Both study 1 and study 2 should have replicated the prior finding that high construal predicts relatively greater religious endorsement and lesser scientific endorsement when compared to the low construal groups. Considering the assumed 80% power of both studies, there is theoretically a 4% chance of a type-II error, which is 64 times greater than the .0625% chance of a type-I error in both prior studies. This suggests that the evidence is still in favor of the hypothesis that construal level, religion, and science are related, but that evidence is diminishing. It is possible that the prior studies had strikingly low power and the real effect is even lower than the detected effect. If so, the power analysis assumed by both studies would yield an overestimated power. That is, we may have calculated the sample size for the desired power assuming an overestimated true

effect, meaning the power of each study is less than 80%.

Additionally, the manipulations may have been largely ineffective. In study 1, both the exemplar task and the trivia task were employed for the manipulations. The exemplar task was used in a prior study with the expected outcomes (Martin & Masicampo, 2013a). The trivia task was introduced in the present studies. In study 1, the meaning manipulation may have been too obvious; instead of priming the need to understand, the participants may have assumed the survey was flawed and misformatted. Additionally, the questions were all intended to be unanswerable, but as a result, participants may have stopped attempting the questions, leaving the construal manipulation ineffective. In study 2, we only employed a trimmed version of the trivia task; the trimmed version only listed six items, two of which were intended to be unanswerable. We expected that answering four questions easily and suddenly encountering two hard questions would increase the meaning-making motivation. Instead, perhaps the trivia task is simply ineffective at manipulating the desired constructs (a problem which would plague 40% of the data from study 1). One possible reason for this is alluded to above. Namely, non-scientific individuals may have been uninspired by such questions; the lack of interest may decrease the motivation to think and care about the questions. A past study (Martin & Masicampo, 2013b) used a why-how task, but the structure was considerably different. In the why-how task, participants are given a fairly common, value-neutral goal of "Exercise More"; they are then asked why or how to achieve that goal, then again why or how about their first response, and again about their second response, and finally about their third response. Regardless of one's religiosity and attitudes toward science, a person could answer and think about such a neutral goal. Thus, the trivia task may be ineffective, and the why-how task effective, at manipulating construal level.

The failure to replicate and extend past findings nevertheless introduces new

future directions. Given the failure to replicate past findings, one line of research could explore the circumstances under which construal, religiosity, and scientific attitudes all relate. For the sake of the the CLT literature, one could explore why manipulations of construal level vary in their effectiveness. Alternatively, one could manipulate construal level through proxies, such as psychological distance. Past research in CLT (Trope & Liberman, 2010) suggests that high construal is associated with psychologically distant concepts (e.g., a perceptually distant point in a picture, a distant friend), and low construal is associated with psychologically close concepts (e.g., a perceptually close point in a picture, a close friend). Religious and scientific endorsement could thus vary as a function of psychological distance.

Second, one could investigate the relationship between meaning, science, and construal in a reversed order – priming religion or science and measuring construal level. There exist several high and low construal constructs, and presumably several meaning systems that are primarily concerned with each construal level (e.g., politics as another relatively high construal system). Thus, the meaning systems and concepts that are made prepotent by the construal prime are numerous. The probability of a construal prime manipulating specifically science or religion may be smaller than the probability of manipulating construal level as a function of religion or science primes. If there is a relationship between science, religion, and construal level, one may be able to better detect it by examining this reversed relationship.

Third, the role of meaning-making in the endorsement of science and religion could be explored using other methods of threatening meaning. Past research manipulated meaning threat by changing the experimenter, having participants read an unexpectedly absurd short story, and presenting incongruent word-pairs (Proulx & Heine, 2010) Future studies could incorporate these manipulations in the context of a construal prime to once again test whether a meaning threat in a construal context increases religious or scientific endorsement (e.g., by changing experimenters

following the exemplar task; by presenting incongruent word-pairs in an apparently distant location).

Fourth, the relationship between endorsement and perceived difficulty of the trivia questions begs further exploration. Perhaps questions about world knowledge, world relations, and reasoning are perceived to be easier by those who endorse science. Similarly, there may exist questions that religious individuals perceive to be simpler. One idea is that questions of moral judgments, social norms, and social cognitions may be perceived as easier to highly religious individuals, given that religions are concerned with such topics. Conversely, such questions may be perceived as difficult to highly scientific individuals, given the inherent complexity of moral and social systems. If asked questions about what individuals should or would do, or whether some action is right or wrong, the relationship between question difficulty and endorsements may be reversed. A follow-up question would then be whether the perceived ease of the questions is due to a practice effect of sorts (scientific individuals frequently think about and answer questions about history and mechanism; religious individuals think about moral norms), or is due to the belief that their most accessible meaning system can answer such questions even if they themselves are uncertain.

Fifth, the apparent conflict between scientific thinkers and religious groups should be further explored. If it is the case that the average person views both science and religion as useful meaning frameworks, why do certain groups view them as incompatible endeavors? One possibility is that groups who use either religion or science for understanding both low and high construal concepts are the groups who conflict. In other words, religious individuals who use their religious systems for both abstract and concrete understandings conflict with scientific thinkers who use science for both abstract and concrete understandings.

Finally, given the decreasing evidence, construal level may not be selectively

associated with science or religion. Regardless, both meaning systems may be employed depending on the goal. To the extent that the goal requires one to understand mechanism and reality, one may invoke scientific understandings. Religious systems may be employed when the goal requires moral judgments and evaluating socially normative behavior. Within each system, low and high construal representations may exist. That is, science includes broad abstract understandings (e.g., evolutionary histories) and low level understandings (e.g., epigenetic processes). Similarly, religion includes broad abstract understandings (e.g., downfall of humanity) and low level understandings (e.g., murder is wrong). Moreso than we assumed, the average individual may recognize that each system hosts low and high construals of an action or situation, and draw from each system depending on the specific meaning-making goal (see Figure 9). Although religious systems may host construals that are generally higher level than most scientific construals, the use of either system may not depend on the desired construal level per se, but on the domain of meaning desired (e.g., moral, political, mechanistic).

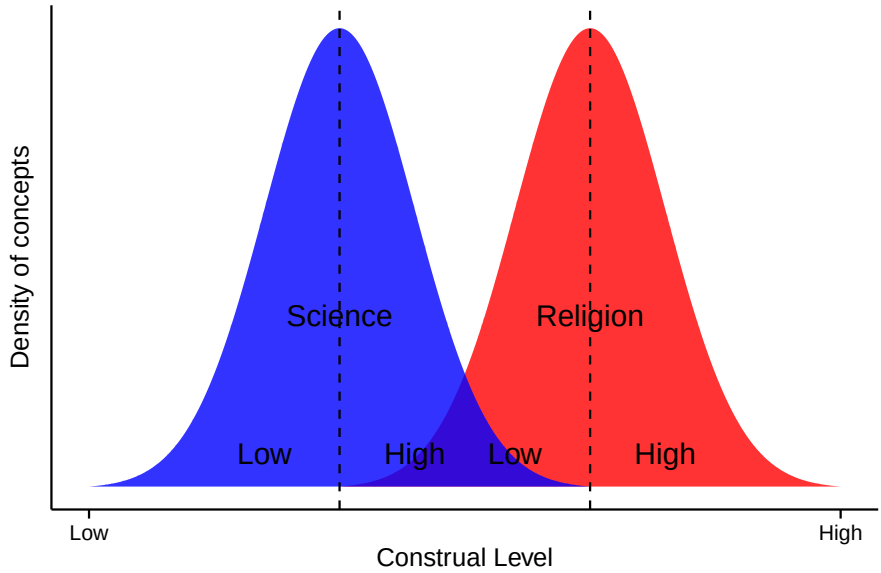

Figure 9. Concept of how religion and science vary by construal level

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In sum, the purpose of the studies was to better understand the relationship between the endorsement of science and religion, meaning-making motivations, and construal level. Although the present studies did not replicate and extend past studies with regard to construal level and endorsements, the studies nevertheless reveal new venues for future research. Importantly, future studies may refine the previously detected relationship between construal level and endorsements by testing whether science and religion are selected more generally through construal level or more specifically through domain knowledge; e.g., science may not be selected because it provides understandings at a low level, but rather because it provides mechanistic understandings that are required by the current context. Secondly, future research should explore how certain classes of questions are perceived to be easier by subscribers of various meaning systems; e.g., moral questions may be perceived as simpler to highly religious individuals than to highly scientific individuals. Finally, the present studies reveal that religious endorsement and the perceived utility of science is expectedly negative, but that the negative trend is slight – the most religious individuals nevertheless endorse science as useful. Such a finding should inform those who engage in the larger cultural debate involving the role of science and religion in policy and education; although religious and scientific systems may compete for explanatory space (Preston & Epley, 2009), individuals likely find both to be tremendously useful, despite the occasionally conflicting understandings each system offers.

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Appendix A

PREMEASUREMENT SURVEY

Instructions: For each item, indicate on a scale from 1 (Strongly disagree) to 7 (Strongly agree) how accurately the sentence reflects your opinion.

1. The visual arts are valuable for society.
2. Engineering is interesting to me.
3. Literature is a valuable addition to education.
4. I value music more than the average person.
5. Philosophy is an important field of study.
6. I am interested in craft making as a hobby.
7. Economics is an important and useful field of study.
8. Religious beliefs are important to me.
9. Spirituality is important to me.
10. I value science and scientific thinking more than the average person.
11. Every person should receive at least some education.
12. Nobody should receive education.

Appendix B

UTILITY QUESTIONNAIRE

Instructions: For each item, indicate how much you agree with each statement.

1. I think religion is useful for making sense of the world.
2. I think religion is helpful for seeing how everything is related.
3. I think religion is valuable for providing a sense of order and certainty.
4. I think religion is a helpful tool for understanding one's self.
5. I think religion is a helpful tool for understanding one's mind and body.
6. I think religion is helpful for understanding how one relates to the world.
7. I think science is useful for making sense of the world.
8. I think science is helpful for seeing how everything is related.
9. I think science is valuable for providing a sense of order and certainty.
10. I think science is a helpful tool for understanding one's self.
11. I think science is a helpful tool for understanding one's mind and body.
12. I think science is helpful for understanding how one relates to the world.

Appendix C

TRIVIA

Low Meaning, Low Construal

Instructions:

Think carefully about each question below.

If you can confidently answer the question, write your answer in the provided textbox.

If you cannot confidently answer the question, write "I do not know."

1. How does one peel an orange?
2. How does one wash clothes?
3. How does one hang up a picture frame?
4. How does one make a sandwich?
5. How does one ride a bicycle?
6. How does one introduce oneself to another person?
7. How is hair cut?
8. How does one clean dishes?
9. How does one turn on a cell phone?
10. How does one open a wine bottle?
11. How does one run?
12. How does one wash one's hands?
13. How does one brew a cup of tea?
14. How does one open a can of soda?

Low Meaning, High Construal

1. Why would one peel an orange?
2. Why would one wash one's clothes?
3. Why would one hang up a picture frame?
4. Why would one make a sandwich?

5. Why would one ride a bicycle?
6. Why would one introduce oneself to another person?
7. Why would one cut hair?
8. Why would one clean dishes?
9. Why would one turn on one's phone?
10. Why would one open a wine bottle?
11. Why would one run?
12. Why would one wash one's hands?
13. Why would one brew a cup of tea?
14. Why would one open a can of soda?

High Meaning, Low Construal

1. How do Australian sharks hunt h$_{\text{un}}$t birds?
2. How is the metal yytrium harvested$^{?}$
3. How did a g$_{\text{ro}}$up in the 1990s create the new language called Noxilo?
4. How did t*h*e ancient Chiawa people relocate their entire nation evrey 40 years?
5. How did the amateur astrophysicist Ti Fila$_{\text{m}}$ona launch his own satellite `last year?`
6. How did the men in some Native Amerinac tribes create circular patches on their scapls in which hair would no longer grow?
7. How di$_{\text{d}}$ some early Eskimos create orange-colored blocks of ice to keep next to there igloos?
8. How does one convert light into sound?
9. How do computer programmers learn the dvorak keyboard?
10. How do some Spa*n*ish bears hang upside down from trees?
11. H$_{\text{o}}$w do Saudi royals im$_{\text{port}}$ snow from Siberia?
12. How did 16th century Indonesians

make purple pastes?

13. How do lady b$_{ugs}$ fly with their bodies turned sideways$^{?}$

14. How did Marcus Ros$_{enf}$els `scream` for over 80 seconds?

High Meaning, High Construal

1. Why do Australian sharks hunt h$_{unt}$ birds?

2. Why is the metal yytrium harvested$^{?}$

3. Why did a g$_{ro}$up in the 1990s create the new language called Noxilo?

4. Why did t*h*e ancient Chiawa people relocate their entire nation evrey 40 years?

5. Why did the amateur astrophysicist Ti Fila$_{m}$ona launch his own satellite `last year?`

6. Why did the men in some Native Amerinac tribes create circular patches on their scapls in which hair would no longer grow?

7. Why di$_{d}$ some early Eskimos create orange-colored blocks of ice to keep next to there igloos?

8. Why would one convert light into sound?

9. Why do computer programmers learn the dvorak keyboard?

10. Why do some Spa*n*ish bears hang upside down from trees?

11. H$_{o}$w do Saudi royals im$_{port}$ snow from Siberia?

12. Why did 16th century Indonesians make purple pastes?

13. How do lady b$_{ugs}$ fly with their bodies turned sideways$^{?}$

14. How did Marcus Ros$_{enf}$els `scream` for over 80 seconds?

Appendix D

MORAL AFFIRMATION TASK

Control Task

Instructions:

Below are several items.

For each item, enter the given dollar amount into the corresponding text box.

1. $489
2. $1500
3. $642
4. $739
5. $901
6. $1395
7. $1172
8. $600
9. $3917
10. $400

Affirmation Task

Instructions:

Below are several items.

Each item asks you to set the bail amount for an accused person.

Each person was accused of a certain crime, and only that crime.

For each accused person, set the bail* amount you think is fair, given the crime they are accused of.

Enter your response into the text box below the crime of the accused person.

*:*Bail is the amount of money one is required to pay the court if they wish to leave the holding cell. Bail serves as a security to the court that the accused will return for their court date, if nothing else to retrieve the bail money. Accused*

persons might "jump bail," meaning they go into hiding after setting bail, and never return for their court date.

1. Prostitution
2. Store robbery
3. Petty theft
4. Grand theft auto
5. Vandalism
6. Domestic violence
7. Spousal abuse
8. Public disturbance
9. Public nudity
10. Property damage

Stephen Ross Martin

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Education

Bachelor of Science in Psychology
Furman University, Greenville, SC
Magna Cum Laude

Master of Arts in Psychology
Wake Forest University, Winston-Salem, NC

Research Interests

- Religion, scientific thinking and endorsement, and meaning-making
- Cognitive and social advantages afforded by religious beliefs
- Cognitive processes enabling or predicting religious beliefs
- Religion and self-control

Publications

Martin, S. R. & Masicampo, E. J. (In prep). Religion and science: Looking for meaning in high and low construal levels.

Martin, S. R. & Masicampo, E. J. (In prep). How endorsement of religion affects scientific commitment.

Masicampo, E. J., Martin, S. R., & Anderson, R. A. (Under review). Understanding and Overcoming Self-Control Depletion. *Social & Personality Psychology Compass*

Relevant Skills

- R, SPSS, and JMP statistical packages
- Medialab, directRT, and MouselabWeb
- HTML, MySQL, and web hosting
- Linux systems (Arch Linux, Fedora, Ubuntu)
- Bash and zsh scripting; learning Python
- LaTeX

Presentations

Martin, S. R., & Masicampo, E. J. (2014, February). *How endorsement of religion affects scientific commitment*. Poster will be presented at SPSP, Austin, TX.

Martin, S . R., & Horhota, M. (2011). *The positivity effect: Does positive information influence decision making?*. Poster presented at the Society for Southeastern Social Psychologists Conference, Johnson City, TN.

Martin, S . R., & Horhota, M. (2011) *The positivity effect: Does positive information influence decision making?*. Poster presented at the Davidson-Furman Conference, Greenville, SC.

Martin, S . R. & Horhota, M. (2010). *The positivity effect and decision making: Do emotionally-salient options affect the decisions of older adults?*. Poster presented at the Davidson-Furman Conference, Charlotte, NC.

Stephen Ross Martin

Research Experience

Graduate Research
Psychology Dept, Wake Forest University
Supervised by Dr. Masicampo

Jun 2013 -
Religion and science: Looking for meaning in high and low construal levels

Jan 2013 -
Scientific people do not devalue religion, but do the religious devalue science?

Aug 2012 - Jan 2013
Implicit attitudes toward science and religion

Aug 2012 -
Religiosity, views of temptation, and consequential self-control

Undergraduate Research
Psychology Dept., Furman University
Supervised by Dr. Michelle Horhota

Jan 2011 – Jan 2012
The Positivity Effect: Does Positive Information Influence Decision Making?

May 2010 – Jan 2011
The Positivity Effect on Decision Making: A Preliminary Study

Jan 2010 – May 2010
Emotional Salience on Decision Making: Stimulus Pilot

Related Experiences

Childrens' Residential Program at Marshall Pickens
http://www.ghs.org/ Aug 2011 – May 2012
Supervised by Lori Smith
- Assisted in the psychometric assessments of children.
- Assisted in behavioral management

Teacher's Assistant Aug 2010 – May 2012
Psychology Department, Furman University
Assisted Dr. John Batson
Research Methods and Statistics Parts I and II

Evaluator for CDSA and ICN at Amos Cottage
http://www.amoscottage.org/Home.html Aug 2012 -
Supervised by Gail Hounshell, PhD, LP

Organizer for WFU SiSR Seminars and Colloquia
http://psych.wfu.edu/sisr/ Aug 2013 -

Honors and Activities

Member of Phi Eta Sigma national honor society
Member of Phi Beta Kappa national honor society
Member of Psi Chi international honor society
2012 Recipient of the Furman Allport Scholar in Psychology award

Grants and Funding

Furman Advantage Research Fellowship Summer, 2010

Stephen Ross Martin

Professional Memberships

Graduate affiliate of APA
Graduate affiliate of APS
Graduate affiliate of SPSP