In Religion We Trust: Psychophysiological Correlates of Emotion and Trust Among Religious In-Group Members

by

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ABSTRACT

Social scientists from many disciplines have examined trust, including trust between those with different religious affiliations, emotional antecedents of trust, and physiological correlates of trust. However, little is known about how all of these factors intersect to shape trust behaviors. The current study aimed to examine physiological responses while individuals engaged in a trust game with a religious in-group or out-group member. Participants were randomly assigned to one of four conditions in which they were presented with the target's profile before playing the game. In each of the conditions the target was described as either Catholic or Muslim and as someone who engaged in either costly signaling or anti-costly signaling behavior. In addition to assessing the amount of money invested as a behavioral measure of trust, physiological responses, specifically cardiac interbeat interval (IBI) and respiratory sinus arrhythmia (RSA), were measured. I hypothesized that when playing the trust game with a Catholic target as opposed to a Muslim target, Christian participants would (1) report being more similar to the target, (2) trust the target more, (3) invest more money in the target, (4) have a more positive outlook on the amount invested, and (5) show greater cardiorespiratory down-regulation, reflected by increases in IBI and RSA. Findings revealed that Christian participants reported greater similarity and showed a non-significant trend toward reporting a more positive outlook on (greater confidence in/satisfaction with) their investment decision when playing a Catholic versus Muslim target. Additionally, Christian participants who played an anti-costly signaling Catholic target showed greater cardiorespiratory down-regulation (increases from baseline for IBI, reflecting slower heart rate, and increases in RSA) than Christian participants who played

an anti-costly signaling Muslim target. Results from this study echo previous findings suggesting that perceived similarity may facilitate trust. Findings also are consistent with previous research suggesting that religious ingroup or outgroup membership may not be as influential in shaping trust decisions if the trustee is costly signaling; for anti-signaling, however, cardiorespiratory down-regulation to a religious ingroup member may be apparent. These physiological signals may provide interoceptive information about a peer's trustworthiness.

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INTRODUCTION

Conceptualization of Trust

Trust is an essential component of social interaction. It facilitates cooperation, coordination, and is necessary for the development and maintenance of interpersonal relationships. Beyond interpersonal relationships, trust impacts other features of society. For example, trust facilitates cooperation between governments and their populace. It also impacts international politics and may be particularly important for promoting peace among nations. Given the importance of trust for a cohesive society, social scientists from economics, political science, sociology, and psychology have studied trust and its antecedents extensively.

Given that trust has been studied from a wide range of disciplines, it has many definitions within the literature. Some of the most widely accepted conceptualizations of trust view it as a psychological phenomenon in which an individual (the trustor) is willing to be vulnerable to the actions of another (the trustee; Mayer, Davis, & Schoorman, 1995; Rousseau, Sitkins, Burt & Camerer, 1998). This willingness to be vulnerable is based on inferences and positive expectations regarding the trustee's intentions (Mayer et al., 1995; Rousseau et al., 1998). These inferences and positive expectations are often based on assumed and actual attributes that the trustee possesses. In turn this information is used to form impressions of trustworthiness which impacts the decision to engage in trust behavior.

Perception of trustworthiness. Information used to determine trustworthiness depends on the relationship between the trustee and the trustor. When people are acquainted, a person's willingness to engage in trust behaviors with another individual is

based on that individual's character. For example, the trustor may ask themselves if this individual is capable of completing the task at hand, do they have pure intentions, and are they a good person. Mayer et al. (1995) referred to these factors as ability, benevolence, and integrity, respectively. Individuals who possess these attributes are perceived as being more trustworthy and are more likely to be trusted (Mayer et al., 1995).

However, we are often in situations where we put our trust in strangers. In these situations, individuals are unable to rely on their history with the trustee to inform impressions of their trustworthiness. In circumstances where the person being entrusted is unknown, the trustor may rely on heuristics to form these impressions about the trustee. Specifically, they may rely on the trustee's physical appearance – including gender (Buchan, Croson, & Solnick, 2008), the shape of their face (Todorov, Baron & Ossterhof, 2008; Winston, Strange, Doherty, & Dolan, 2002), or emotional expression (van Doorn, van Kleef, van der Pligt, 2015). The trustor may also base their impressions of trustworthiness on their social identity (Stanley et al., 2012; Tanis & Postmes, 2005; Williams, 2001). Given that individuals tend to hold a positive bias towards in-group members (Balliet, Wu, De Dreu, 2014; Dasgupta, 2004) they may be more predisposed to trust others from their in-group than they are from an out-group. Given the impact of emotions during social interactions (Keltner & Haidt, 1999; Lerner, Li, Valdesolo, Kassam, 2015) it is not surprising that emotions also play a role in trust behaviors (Dunn & Schweitzer, 2005; Schlosser, Fetchenhauer, & Dunning, 2015).

Religion and Trust

Many researchers have posited that religion is a potential determinant of trustworthiness and trust (Guiso, Sapienza, & Zingales, 2003; Orbell, Goldman, Mulford,

& Dawes, 1992; Hall, Cohen, Meyer, Varley, & Brewer, 2015; McCullough, Swartwout, Shaver, Carter, & Sosis, 2015; Ruffle & Sosis, 2007, Sosis, 2005; Tan & Vogel, 2008; Widman, Corcoran, & Nagy, 2009). It is believed that collective rituals performed in religious settings (Guiso et al, 2003; Orbel et al., 1992; Ruffle & Sosis, 2007, Sosis, 2005), promote cooperation, group harmony, and trust (Sosis, 2005). In fact, many researchers have empirically examined the impact of religion on trust (Hall et al., 2015; McCullough et al., 2015; Orbel et al., 1992; Tan & Vogel, 2008; Windham et al., 2009). Orbell et al. (1992) found that in general religious individuals were more cooperative, generous, and trusting. Using a variant of Berg, Dickhaut, and McCabe's (1995) economic trust game, often referred to as the investment game, Tan and Vogel (2008) further examined how religiosity promotes trust. Participants were paired with one another and then played multiple rounds of the investment game, with each participant having a chance to be the trustor and the trustee. Before making their investment decision, participants were presented with the religiousness rating of the trustee. Findings showed that religious trustors invested more money, a behavioral indicator of trust, in trustees who were also more religious, perhaps suggesting that religious individuals favor other religious people, enhancing trust (Ruffle & Sosis 2007, Tan & Vogel, 2008).

Costly Signaling and Trust

To the extent that religion does impact group cohesiveness, cooperation, and trust (Sosis,2005) one would presume that there must be a way for individuals to show or signal to others that they prescribe to their religion's practices and norms. Indeed, researchers believe that individuals inform others of their religiousness through what they

call costly signaling behaviors (Sosis, 2005). These behaviors are costly insofar as they require time, money, and effort, or may pose a risk to the person displaying them. There are many ways in which one can engage in costly signaling behaviors: for example, through body modifications (e.g., tatoos), engaging in certain types of prosocial behaviors (e.g., giving to charity), and dietary guidelines (e.g., eating kosher). Some have proposed that engaging in costly signaling acts not only to inform others of your group membership but also your adherence your religion's teachings, including group norms and morals (Sosis, 2005), which may be particularly important for trust decisions. Recently there has been interest among researchers in how these signaling behaviors impact the trust of others, not only between members of the same religious group but also between members of different religious groups.

Hall et al. (2015) conducted a series of experiments that explored the effect that religion and costly signaling behaviors have on trust. Their research was based on Christian participants who were presented with either a Muslim or Christian target and asked to then rate the target's perceived trustworthiness. Their findings support Sosis' (2005) ideas that those who are religious and those who engage in costly signaling behaviors are viewed as trustworthy individuals. In fact, Hall et al.'s (2015) findings showed that this trust extends beyond in-group members to outgroup members. Further, their findings suggest that trustees who engage in anti-costly signaling behavior – which are behaviors in direct contrast to the upholding of religious tradition – are trusted least of all; purposeful engagement in anti-costly signaling behavior perhaps negatively impacts the trustor's assumptions about the trustee's character.

McCullough et al. (2015) conducted a series of experiments exploring how Christian costly signaling behaviors impacted ratings of trustworthiness and investment amount during a financial trust game. In a series of experiments, Christian participants and non-Christian participants viewed neutral images of white men's faces who either did or did not show their religious affiliation through costly signaling (ash on their forehead for Ash Wednesday). Similar to Hall et al. (2015), Christian and non-Christian participants reported they trusted the costly signaling targets more than the non-costly signaling targets. Additionally, both Christian and non-Christian participants invested more in the costly signaling targets. These findings are consistent with Hall et al.'s results that trust extends beyond in-group membership if the trustee is demonstrating adherence to religious values (i.e., via costly signaling). It may also suggest that religious adherence promotes trust even among those who are not religious or who do not adhere to a Judeo-Christian faith.

Emotion and Trust

Emotional states of the trustor. As noted above, there is an extensive literature on characteristics of trustees (who people trust). Relatively fewer studies have examined the relationship between internal states, such feelings or emotions experienced by a trustor during a trust decision. There is an abundance of research surrounding emotion and decision making more generally, however, and a growing number of studies examining the impact of emotion on general trust. Dunn and Schweitzer (2005) examined the effects of four emotions – happiness, gratitude, sadness, and anger – on the trust of a coworker. There were differences in trust based on the valence of the emotion; positive emotions (i.e., happiness and gratitude) led to greater reports of trust than negative

emotions (i.e., sadness and anger). Further, those in the sadness condition reported more trust than those in the anger condition. Interestingly, when individuals had a closer relationship with the coworker, the effect of emotional experience did not impact reports of trust. This indicates that emotions may be a particularly important determinant in trust between individuals who do not have a previously established relationship.

Anticipated emotion. Additional research has explored the impact of anticipated emotion on trust, as opposed to the valence of emotion. Specifically, Schlosser et al. (2015) examined whether immediate emotions (i.e., subjective emotional experience about the current situation) as opposed to anticipated emotions were related to trust decisions. More specifically, they tried to determine whether decisions to trust were based on avoiding the potential of having negative emotions in the future should they be betrayed. Their findings suggested that immediate emotions were impacting trust decisions more than anticipated emotions and that guilt of forgoing the risk at the time of their decision was a major influencing factor. Additionally, they found this even though individuals anticipated being betrayed.

Emotion, Trust, and Autonomic Reactivity

Physiological correlates of emotion. Emotion researchers theorize that physiological fluctuations driven by the autonomic nervous system (ANS) are related to subjective emotional experiences, although, the causal order is still under much debate (Levenson, 2014). Kreibig's (2010) extensive review of the psychophysiological literature found evidence for ANS specificity – or rather the degree to which ANS responses vary between different emotions (Levenson, 2014). The pattern of findings may be particularly important for trust interactions. Anger showed patterns consistent

with sympathetic activation such as increased respiration and heart rate (HR) and parasympathetic inhibition as indicated by decreases in heart rate variability (HRV). Similarly, anxiety was associated with faster, shallower breathing, increased HR, and decreased HRV. Patterns for the positive emotions joy and contentment differed from the patterns found for negative emotions and also between each other. Specifically, experienced feelings of joy were associated with a pattern suggestive of increased cardiac vagal control (i.e., increased HRV) and increased cardiovascular activation (i.e., increased heart rate). However, contentment showed patterns of decreases in cardiovascular and respiratory activation. Lastly, feelings of suspense were associated with decreased HR and increased respiration.

Physiological correlates of trust. Mitkidis, McGraw, Roepstorff and Wallot (2015) conducted a study in which dyads engaged in a trust building activity prior to engaging in a public goods game. They measured the participants' physiology throughout the trust building exercise and during the game. Participants in the trust condition showed higher heart rates when engaging in the trust building exercise when compared to a control group. Higher heart rates among the trust condition perhaps indicated greater engagement with their assigned partner as they assessed signals of trustworthiness.

Given the relationship between trust and cooperation, the literature on ANS activity during cooperation may also be insightful for how the different parts of the ANS may be activated during trust behaviors. Sarinana-Gonzalez, Romero-Martinez, and Moya-Alibiol (2018) conducted a study that explored the relationship between autonomic arousal during cooperation and competition. Participants were randomly assigned to one

of three conditions (working cooperatively, competitively, or alone). Their findings suggest that individuals who cooperated had higher heart rates when compared to those who competed or worked alone. Additionally, they found lower respiratory sinus arrythmia (RSA) scores compared to those who just worked alone. They suggest that these results may be due to stress caused by cooperating with an individual whom they had no information on which to assess their intent.

Neurobiological correlates of trust. Although not measured in the current study, much of the literature exploring physiological processes associated with trust have examined cortisol and oxytocin. Specifically, oxytocin levels appear to be related to trust and perceptions of trustworthiness (Zak, Kurzban, & Matzner, 2005); however, oxytocin does not appear to increase trust and perceptions of trustworthiness indiscriminately. Mikolajczak et al. (2010) found that participants who were administered oxytocin intranasally invested more during a trust game with trustworthy targets than did the placebo group or, importantly, those who played against an untrustworthy target. Also, it is important to note that oxytocin has been shown to increase trust for in-group members but not to reduce distrust for out-group members, again showing that increase in oxytocin alone does not automatically lead to being more trusting of others (Van IJzendoorn & Bakermans-Kranenburg, 2012). Findings from Domes, Heinrichs, Michel, Berger, and Herpertz (2007) suggest that oxytocin may increase a person's affective mind reading ability – that is, the ability to pick up on and interpret subtle social cues, particularly changes around the eye region of the face. Moreover, Keri and Kiss (2011) found a relationship between oxytocin level in the blood and habituation of autonomic

arousal. Given that greater stress and cortisol levels decrease trust, perhaps oxytocin acts as a way to reduce stress responses during trust decisions (Keri & Kiss, 2011).

Current Study

The current study aimed to examine the impact that religious affiliation and religious costly signaling behaviors had on perceptions of trustworthiness, trust behavior, and ANS reactivity. Christian and non-Christian participants were presented with one of four profile vignettes in which the individual described was either Catholic or Muslim and engaged in either costly signaling or anti-costly signaling behaviors. Participants subsequently played an investment game, ostensibly with the person described in the profile. The investment game, developed by Berg, Dickhaut, & McCabe (1995), has been widely used and is validated as a behavioral measure of trust (Houser, Schunk, & Winter, 2006; Houser, Schunk, & Winter, 2010; Johnson & Mislin, 2011). Measures of ANS responding were collected throughout. By comparing Christian and non-Christian participants in terms of self-report, investment amount, and physiological reactivity, we aim to better understand how religion and religious costly signaling impacts trust decisions.

HYPOTHESES

Based on previous research (Hall et al., 2015; Keri & Kiss, 2011; McCullough et al., 2015; Mitkidis et al., 2015; Sarinana-Gonzales et al., 2018), it is hypothesized that:

H1: Christian participants will report being more similar to a Catholic target than they will to a Muslim target.

H2: Christian participants will report trusting a costly signaling Catholic target more than an anti-costly signaling Catholic, costly signaling Muslim, or anti-costly signaling Muslim target.

H3: Christian participants will invest more in a costly signaling Catholic target than in an anti-costly signaling Catholic, costly signaling Muslim, or anti-costly signaling Muslim target.

H4: Christian participants will report having a more positive outlook on their investment when playing a costly signaling Catholic target than they would when playing an anti-costly signaling Catholic, costly signaling Muslim, or anti-costly signaling Muslim target.

H5(a-b): Christian participants will show greater cardiorespiratory down-regulation, reflected by (a) greater increases in cardiac interbeat interval (IBI), and (b) greater increases in respiratory sinus arrhythmia (RSA) from baseline while (1) reading the profile of, (2) just after investing in, and (3) while answering investment questions about, a costly signaling Catholic target, compared to an anti-costly signaling Catholic, costly signaling Muslim, or anti-costly signaling Muslim target.

H6: Greater perceived similarity between the participant and the target will be associated with greater self-reports of trust, investment amounts, confidence and satisfaction. All of

these will be associated with decreased physiological arousal while making the investment.

METHOD

Participants

The present sample comprised 162 college students (51 male, 111 female) who participated in the experiment for course credit. Data initially were collected from 177 individuals; the162 participants included in the final sample identified as Christian (Protestant, Catholic, Mormon, or other Christian; $n = 95$) or non-Christian (spiritual, atheist, or agnostic; $n = 67$). Those identifying as Muslim ($n = 8$), Hindu ($n = 1$), or Jewish ($n = 6$) were excluded because samples of these religions were too small to consider separately and there was theoretical reason to believe their responses would be different from those in the Christian and non-Christian groups. Participants ranged in age from 18 to 39 years ($M = 21.44$, $SD = 4.58$). The majority of the sample was White (45.1%) followed by Hispanic/Latino (33.3%), Asian/Asian-American (6.2%), and African American (3.1%). Religious background varied and consisted of Christian (35.9%), Catholic (22.8%), Agnostic (13.6%), Atheist (10.5%), Spiritual but not religious (9.3%), and other (8.0%), which was mostly comprised of individuals who identified as nothing or not applicable and one individual who identified as Baha'i. Of the final sample, 18.5% had completed high school, 74.7% had completed some college or had an associate degree, and 6.2% had a bachelor's degree or higher. Additionally, over half of our sample (54.9%) had annual household incomes of less than $50,000, 16.7% had annual household incomes from $50,000-$80,000, and 28.4% had annual incomes over $80,000.

Procedure

Students were recruited using the university's SONA Systems participant pool. Those interested in participating signed up for a two-part study which included a pre-experimental questionnaire and an experimental laboratory session. Upon signing up, participants were emailed a link to the pre-experimental questionnaire with instructions to complete it at least 24 hours before their scheduled laboratory session.

Upon arriving for the laboratory session, participants were greeted by a research assistant who provided a brief overview of the study. All procedures were IRB-approved and standard informed consent procedures were followed. Next, participants were instructed to wash their hands using a non-drying soap. The experimenter then attached electrodes for psychophysiological data collection (described below) to the participant's torso and non-dominant hand. They were seated comfortably in front of a computer screen. While physiological signals were checked by the research assistant, participants completed a health questionnaire to screen for recent medication use and caffeine consumption.

Instructions and tasks were presented using E-prime v2.0 software, and the research assistant also delivered instructions verbally. For the first task, participants were presented with an emotion questionnaire that contained 18 different emotions, which was used for another study. Following the emotion ratings, participants were presented with instructions on how to complete the baseline task (*Vanilla Baseline*; Jennings, Kamarck, Stewart, Eddy, & Johnson, 1992). They were assigned a color and were instructed to count rectangles of that color. A new colored block appeared every 3s for a total of 600s

(10 min). At the end of the 600s session, participants entered the number of blocks that matched their assigned color.

Once participants completed the Vanilla Baseline task, they then began a computer-based adaptation of Berg et al. (1995) Investment Game. Before beginning the game, participants were given a twenty-dollar bill to invest in a single round of the trust game with the target described in the profile. The experimenter gave verbal instructions to the participant, including that money returned to them at the end of the game would be theirs to keep following the session. Participants were asked if they understood the instructions and then began the game on the computer. Instructions for how to play the game were then presented on the screen, which included an example. Participants had to again confirm that they understood the game before the experimenter instructed them how to advance to the next screen. Following the instructions, participants were presented with a profile of the perceived person (i.e., the target) they were assigned to play the game with. Next, participants were presented with a screen instructing them to decide how much of their money, if any, they wanted to send to the second player. To advance to the next screen the participant entered the dollar amount. The following screen then informed the participant that the bank had tripled the amount they invested, before sending it to the perceived second player. They were then presented with a screen instructing them to answer a short series of questions while the target decided how much of the tripled amount they would return. Once the questions were complete a screen instructing the participant to wait while the second player sent back the money appeared on the screen for 30 seconds. At the end of the 30 seconds the screen automatically advanced to a screen instructing the participants to press the "enter" key to see how much

money was returned to them. All participants were then given 20% of the original amount they chose to invest, that is, 20% of the amount before the bank tripled it. (Responses to this betrayal portion of the study are not reported here.) After the game they were presented with an additional set of questions.

Immediately following the experimental session, the participant completed a post-experimental questionnaire. Once participants completed the questionnaire they were debriefed, paid the full $20 (irrespective of how much they invested), and given course credit for their participation.

Experimental manipulation. An experimental manipulation was designed to assess trust of religious in-group and out-group members. Two potential influences on trust were manipulated: target religion (Catholic or Muslim) and target religious signaling behaviors (costly signaler or anti-costly signaler). Participants were presented with a short profile of the target, which included other personal facts about the target in addition to their religion and their costly signaling behaviors (profiles are included in Appendix B). Participants were randomly assigned to one of the four target profile conditions (i.e., a 2x2 fully between-subjects design). Each profile included either a Catholic or Muslim target who either engaged in religious costly or anti-costly signaling behaviors. After reading the profile, participants participated in a trust game with the perceived second player described in the profile.

Measures and Apparatus

Demographics. Demographic information about the participants was collected in the pre-experimental questionnaire. Participants' age, gender, religion, education level, and household income, were gathered.

Investment amount. A single investment amount (*$0 to $20*) was used as a behavioral measure of trust.

Outlook on investment. While participants waited for the trustee to ostensibly decide how much money to return, participants were presented with two single item questions rated on a 5-point scale (*low confidence/satisfaction* to *high confidence/satisfaction*), which assessed how confident or satisfied the participant was with the amount they invested during the game. Scores from these items were averages to create a composite score for outlook on investment. Higher scores indicated a greater positive outlook on the amount invested during the game.

Perceived similarity to the target. Following the trust game, participants completed a post-experimental questionnaire. Among other items, participants rated on a 5-point sliding scale (*not similar at all* to *completely similar*) their subjective perceptions of similarity with the target.

Self-reported trust in the target. Also, as a part of the post-experimental questionnaire, participants were presented with a single item rated on a 5-point scale (*not at all to completely*) which assessed participants' retrospective level of trust in the target prior to the return on investment.

Physiological recordings. Cardiac interbeat interval (IBI) and respiratory sinus arrhythmia (RSA) were acquired and processed using MindWare Technologies Ltd.'s hardware and software (8-slot *Bionex* unit, Biolab software v3.2.1). Quick-Trace diaphoretic foam spot electrode for electrocardiography (ECG) were attached to each participant's neck and torso in a modified Lead II placement (Stern, Ray, & Quigley, 2001). We digitized the signals at 1000 Hz. The signals were edited and verified before

being scored. We derived cardiac interbeat interval based on the time in ms between successive peaks of the R-wave of the ECG. We derived respiratory sinus arrhythmia using spectral analysis.

To obtain baseline IBI and RSA, data were averaged within 1-minute epochs during the 10-minute baseline task, and these 10 epochs were then averaged. To obtain IBI and RSA responses that occurred while reading the target's profile and answering questions regarding their satisfaction and confidence in the investment, the average IBI and RSA was computed for the time between event markers for the start and end of those epochs. To obtain IBI and RSA responses immediately after the investment decision, the average IBI and RSA were computed for 30 sec after the entry of the investment amount. To obtain IBI reactivity, change scores were calculated by subtracting the mean IBI during the baseline from the mean IBI during each of the respective investment game epochs (profile reading; investment; questionnaires).

Data Analysis

I conducted a separate 2 (Participant Religion: Christian or Non-Christian) X 2 (Target Religion: Catholic or Muslim) X 2 (Target Religious Signaling: Costly Signaler or Anti-Costly Signaler) analysis of variance for each of the respective dependent variables: (1) self-reported similarity; (2) self-reported trust; (3) investment amount; (4) outlook on investment; and (5) IBI and RSA reactivity when reading the profile, after the investment, and while answering questions. Additionally, correlational analyses were conducted to test the relationship among study variables, and particularly the hypotheses that greater perceived similarity between the participant and the target will be associated with greater self-reports of trust, investment amounts, and investment outlook, and that

all of these will be associated with decreased physiological arousal while making the investment.

RESULTS

Descriptive Results

Correlations among measures are presented in Table 1. Three-way ANOVA results are presented in Tables 2 through 11. Lastly, three-way and two-way ANOVA interaction means and standard errors are presented in Figures 1 through 12.

Similarity to Target (Hypothesis 1)

For self-reports of similarity to the target, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was not significant, $F(1, 153) = 1.22$, $p = .27$, $\eta_p^2 = .008$. The two-way interaction of Participant Religion and Target Religion was not significant, $F(1, 153) = 3.10$, $p = .08$, $\eta_p^2 = .02$.

There was a significant main effect of target religious signaling $F(1, 153) = 5.96$, $p = .02$, $\eta_p^2 = .04$ indicating that, in general, participants felt they were more similar to the anti-costly signaling targets ($M = 3.70$, $SD = 2.76$) than they were the costly signaling targets ($M = 2.89$, $SD = 2.39$).

Self-Reports of Trust (Hypothesis 2)

For retrospective self-reports of trust in the target, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was not significant $F(1, 153) = .72$, $p = .40$, $\eta_p^2 = .005$. Additionally, the two-way interaction of Participant Religion and Target Religion was not significant $F(1, 153) = .67$, $p = .41$, $\eta_p^2 = .004$. Thus, the hypothesis that Christian participants would report trusting a Catholic costly signaling target more than a Muslim or anti-signaling target was not supported.

Amount Invested (Hypothesis 3)

For investment amount, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was not significant $F(1, 153) = 1.32$, $p = .25$, $\eta_p^2 = .009$. The two-way interaction of Participant Religion and Target Religion was significant $F(1, 153) = 5.71$, $p = .02$, $\eta_p^2 = .04$. Contrary to the hypothesis that Christian participants would invest more in a Catholic Target than a Muslim Target, follow-up comparisons of Christian participants' investment amount showed no significant differences between the Catholic and Muslim conditions. Instead, the significant interaction stemmed from the finding that non-Christian participants invested significantly more money while playing a Muslim target than a Catholic target (see Figure 4).

Outlook on Investment (Hypothesis 4)

For outlook on investment, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was significant $F(1, 153) = 7.79$, $p = .006$, $\eta_p^2 = .05$. However, follow-up comparisons showed that Christian participants did not have a significantly more positive outlook on their investment when playing a costly signaling Catholic target as opposed to a Muslim or anti-signaling target, thus our hypothesis was not supported.

The two-way interaction of Participant Religion and Target Religion was not significant $F(1, 153) = .40$, $p = .53$, $\eta_p^2 = .003$.

Physiological Reactivity While Reading Target Profile (Hypothesis 5.1)

Cardiac interbeat interval. For IBI while reading the target's profile, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling

was significant, $F(1, 153) = 10.71$, $p = .001$, $\eta_p^2 = .07$. However, follow-up comparisons of Christian participants' IBI showed no significant differences between the Catholic and Muslim conditions. The two-way interaction of Participant Religion and Target Religion was not significant, $F(1, 153) = .30$, $p = .58$, $\eta_p^2 = .002$, thus the hypothesis that Christian participants would have greater increases in IBI from baseline while reading the Catholic target profile, was not supported.

Additional analyses for Cardiac interbeat interval. Follow-up comparisons exploring the three-way interaction by examining the differences for non-Christian participants showed that they had significantly greater increases from baseline for IBI while reading the target profile of the Anti-Costly Signaling Muslim than while reading the profile of the Costly Signaling Muslim, which showed decreases from baseline for IBI. Additionally, non-Christian participants had significantly greater increases from baseline for IBI while reading the target profile of the Costly Signaling Catholic than while reading the profile of the Anti-Costly Signaling Catholic, which had decreases from baseline for IBI. Lastly, non-Christian participants had significantly greater increases from baseline for IBI while reading the target profile of the Anti-Costly Signaling Muslim than while reading the profile of the Anti-Costly Signaling Catholic, which had decreases from baseline for IBI. For means and standard errors for IBI while reading target profile see Figure 3.

Respiratory sinus arrhythmia. For RSA while reading the profile of the target, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was not significant, $F(1, 153) = .33$, $p = .57$, $\eta_p^2 = .002$. The two-way interaction of Participant Religion and Target Religion was not significant, $F(1, 153) =$

.42, p = .52, , η_p^2 = .003, thus the hypotheses that Christian participants would have significantly greater increases from baseline for RSA while reading the Catholic costly signaling target profile, was not supported.

Physiological Reactivity Following Investment Decision (Hypothesis 5.2)

Cardiac interbeat interval. For IBI while making investment decisions when playing the investment game, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was significant, $F(1, 153) = 10.51$, $p = .001$, $\eta_p^2 = .06$. However, follow-up comparisons of Christian participants' IBI showed no significant differences from baseline between the Catholic and Muslim conditions. The two-way interaction of Participant Religion and Target Religion was also not significant, $F(1, 153) = .009$, $p = .92$, $\eta_p^2 < .000$, thus the hypothesis that Christian participants would have greater increases from baseline for IBI while making their investment decision when playing a Catholic target, was not supported.

Additional analyses for cardiac interbeat interval. Follow-up comparisons exploring the three-way interaction by examining the differences for non-Christian participants showed that they had significantly greater increases from baseline for IBI when making their investment decisions while playing an anti-costly signaling Muslim target than when playing a costly signaling Muslim, who had decreases from baseline for IBI. Additionally, non-Christian participants had significantly greater increases from baseline for IBI when making their investment decision while playing a costly signaling Catholic target than while playing a costly signaling Muslim target, to which they showed a decrease from baseline for IBI. Lastly, non-Christians had significantly greater increases from baseline for IBI when making their investment decision while playing an

anti-costly signaling Muslim target than when playing an anti-costly signaling Catholic target, who had decreases from baseline for IBI.

Follow-up comparisons exploring the three-way interaction by examining the differences between Christian participants and non-Christian participants found that when making investment decisions while playing an anti-costly signaling Muslim target, that non-Christian participants had significantly greater increases from baseline for IBI than Christian participants, who had decreases from baseline for IBI. For means and standard errors for IBI while making investment decision see Figure 8

Respiratory sinus arrhythmia. For RSA while making investment decisions when playing the investment game, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was not significant, $F(1, 153) = 1.14$, $p = .29$, $\eta_p^2 = .007$. The two-way interaction of Participant Religion and Target Religion was also not significant, $F(1, 153) = .25$, $p = .62$, $\eta_p^2 = .002$, thus the hypotheses that Christian participants would have greater increases from baseline for RSA while playing a Catholic target was not supported.

Additional analyses for respiratory sinus arrhythmia. For RSA when investing in the target, the two-way interaction of Participant Religion and Target Religious Signaling was significant, $F(1, 153) = 5.12$, $p = .03$, $\eta_p^2 = .03$. Follow-up comparisons showed that non-Christian participants had significantly greater increases in RSA while making investment decisions while playing the anti-costly signaling targets than when playing the costly signaling targets (see Figure 10).

Physiological Reactivity while Responding to Questions (Hypothesis 5.3)

Cardiac interbeat interval. For IBI while answering questions (i.e., entering ratings via computer keyboard) regarding their feelings about the amount they invested, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was significant, $F(1, 152) = 10.55$, $p = .001$, $\eta_p^2 = .07$. Follow-up comparisons showed that Christian participants who played an anti-costly signaling Catholic target had significantly greater increases from baseline for IBI while answering questions about their confidence and satisfaction in the amount they invested than Christian participants who played an anti-costly signaling Muslim target, who had decreases from baseline for IBI. However, Christian participants who played an anti-costly signaling Catholic target had significantly greater increases from baseline for IBI than Christian participants who played costly signaling Catholic target who had decreases from baseline for IBI. Thus, our hypothesis that Christian participants would have greater increases from baseline for IBI answering questions about the amount they invested was partially supported. For means and standard errors for changes from baseline while answering questions see Figure 11.

The two-way interaction of Participant Religion and Target Religion was not significant $F(1, 152) = .93$, $p = .34$, $\eta_p^2 = .006$.

Additional analyses for cardiac interbeat interval. Follow-up comparisons exploring the three-way interaction by examining the differences for non-Christian participants within the Muslim condition showed that non-Christian participants who played an anti-costly signaling Muslim target had significantly greater increases from

baseline than non-Christian participants who played a costly signaling Muslim target, who had decreases from baseline for IBI.

Follow-up comparisons exploring the three-way interaction by examining the differences between Christian participants and non-Christian participants within the costly signaling Catholic target condition, found that while answering questions regarding their investment non-Christian participants had significantly greater increases from baseline for IBI than Christian participant, who had decreases from baseline for IBI. Within the anti-costly signaling Muslim condition non-Christian participants had significantly greater increases from baseline for IBI than Christian participants who had decreases from baseline for IBI while answering questions.

Respiratory sinus arrythmia. For RSA while answering questions regarding their feelings about the amount they invested, the three-way interaction of Participant Religion, Target Religion, and Target Religious Signaling was non-significant, $F(1, 152) = 3.75$, $p = .06$, $\eta_p^2 = .02$.

Correlations Among Key Variables (Hypothesis 6)

To test the relationship between self-reported trust and measures of similarity, outlook, investment amount, and physiological reactivity during investment Pearson correlations were conducted. Results indicated that there was a significant positive relationship between trust and perceptions of similarity to the target, positive outlook on investment amount, and the amount invested in the target. Additionally, there was a significant negative relationship between IBI during the investment and the amount invested (see Table 1).

DISCUSSION

This study aimed to investigate the relationship between physiological activation and decisions to trust between different religious group members. It was hypothesized that Christian participants would be more trusting of a Catholic target who engaged in religious signaling and that this would be evident by greater self-reports of trust, investment amount, and greater increases from baseline for IBI and RSA. Additionally, Christian participants' trust in a Catholic target would be supported by a more positive outlook for the amount they invested. Lastly, it was expected that there would be relationships between participants' ratings of similarity to the target, self-reported trust, investment amount, outlook, and physiological reactivity during the investment.

In general, participants perceived themselves as being more similar to the anti-costly signaling targets than the costly signaling targets, regardless of the target's religion. Unexpectedly, there were no differences found among the Catholic and Muslim target conditions for Christian participants' self-reported similarity, self-reported trust, investment amount, and physiological reactivity, with the exception of IBI while answering questions about their outlook. However, the significant differences among Christian participants' IBI while answering questions were in the opposite direction hypothesized. Specifically, Christian participants had greater increases from baseline for IBI while answering questions regarding their outlook on the amount invested while playing an anti-costly signaling Catholic target as opposed to a costly signaling Catholic target. Finally, there were significant positive relationships between self-reported trust and perceptions of similarity to the target, positive outlook on investment, and amount

invested. However, there was a negative relationship between IBI during the investment decision and the amount invested.

The findings that participants rated themselves as being more similar to the anti-costly signaling targets was not surprising given that researchers examining religious development among college aged individuals has shown that college aged individuals become less engaged with their religious practices during this time period (Hall, Edwards, & Wang, 2015). Although participants still identified as being a part of a particular religion, perhaps less engagement in religious practices made them identify more so with the anti-costly signaling targets, regardless of the target's religion, because that is the expected norm among this age group.

The findings that Christian participants had greater increases in IBI from baseline indicated that they had lesser cardiac arousal while playing the anti-costly signaling Catholic. Although we expected Christian participants to have greater increases in IBI from baseline in the costly signaling Catholic condition, as opposed to the anti-costly signaling Catholic condition, these results are not surprising given that participants perceived themselves as being more similar to the anti-costly signaling targets. Because there were also no differences found among Christian participants' self-reported outlook on their investment, perhaps while reflecting on their decision, their perceived similarity to an anti-costly signaling target prompted them to feel more confident about their decision in the anti-costly signaling Catholic condition when compared to the costly signaling Catholic condition. These findings may suggest that Christian participants who played an anti-costly signaling Catholic during the trust game experienced a calmer emotional state while answering questions that required them to reflect on their

investment decision. It is conceivable that Christian participants may have felt greater levels of contentment while reflecting on their investment. In fact, our findings of greater increases in IBI from baseline may support this explanation given Kreibig (2010) found greater IBI and respiratory activation were associated with feelings of contentment. However, we found non-significant differences for RSA while answering questions so additional research is needed to further determine if feelings of contentment were causing the physiological responses we saw in this condition.

Previous research examining intergroup trust has found that people are more trusting of individuals from their own in-group than they are of individuals from an out-group (Tanis & Postmes, 2005). Preference for trusting members of one's in-group is often attributed to positive views that individuals' hold towards their in-group (Brewer & Kramer, 1985), which may be due to perceived similarity in goals and values (Williams, 2001). It is surprising that we found very little group differences among Christian participants on our measures of trust. This suggest that perhaps there is something else about religious affiliation, other than group membership, that impacts trust behaviors. In fact, Moon, Krems, and Cohen (2018) found that individuals may be less concerned with the specific religion of the individual but rather what they can infer about the individual's trustworthiness based on their religious affiliation. Specifically, their findings suggested that slower life history of religious individuals may be one of many factors that positively impact trust decisions. However, this does not explain why we found difference among those in the anti-costly signaling condition. Although these targets did not adhere to the dietary restrictions prescribed by their religion, it is possible that simply identifying as following a religion, even if not perfectly, promotes trust. Additionally, perceived

similarity among engagement in religious behaviors, or in this case a lack there of, may further enhance positive feelings and thus trust among college aged individuals.

Non-Christian Participants

While non-Christians were not the main focus of this study, their results may provide further insight into how religion, religious signaling behaviors, and physiological reactivity impact trust decisions. Unlike Christian participants, we found a significant difference for non-Christian participants in the amount they invested and physiological reactivity.

Although there were no differences for investment amount between target religion among the Christian participants there were differences for non-Christian participants. In fact, non-Christian participants invested more money when playing the Muslim target than they did when playing the Catholic target. Perhaps non-Christian participants, who are considered religious minorities in the United States, found another religious minority (i.e., the Muslim target) to be more trustworthy than a someone who is a part of the religious majority in the United States which in turn impacted the amount they invested while playing the trust game.

We found an interesting and consistent pattern for non-Christian participants' physiological reactivity. While reading the profile and making their investment decision, non-Christian participants had greater increases in IBI from baseline when playing an anti-costly signaling Muslim target as opposed to an anti-costly signaling Catholic target. A similar pattern of increases in IBI from baseline again appeared for non-Christian participants while reading the target profile and while making the investment decision while playing an anti-costly signaling Muslim as opposed to the costly signaling

Catholic. These findings may suggest that non-Christian participants were less emotionally aroused, as indicated by decreases in heartrate from baseline, when compared to non-Christian participants in the costly signaling Muslim and the anti-costly signaling Catholic conditions. Again, perhaps perceptions of similarity to the anti-costly signaling target and religious minority status jointly impacted participants' emotional reactivity and thus physiological reactivity during the trust game.

Limitations

There were a number of limitations in the present study. First, the sample was relatively small for the number of conditions tested. This may have contributed some of insignificant findings as well as the inconsistencies within some of the findings. A larger sample size would have allowed for greater power to detect group differences in autonomic arousal and trust behaviors. Second, having two distinct and homogenous religious groups would have also allowed me to more accurately test the in-group and out-group effects on autonomic arousal and trust behaviors. Although past studies have had consistent and significant findings while treating Protestant Christians and Catholics Christians as in-groups, distinctions in belief and practice among different denominations may impact thoughts, feelings, and behaviors during trust interactions. Third, including validated measures of similarity, trust, satisfaction, and confidence instead of single question items may allow for better measurement of these constructs. This may be particularly true for trust, which may vary depending on the given situation. Although, participants both rated their trust and engaged in behavior indicative of trust, this may allow us to better understand the limits of trust among in-group and out-group members. Lastly, participants may have been aware or suspicious that they were not playing an

actual person during the simulated game. Although great care was taken to give the impression of a second player, the use of confederates may improve the ecological validity of the findings.

Conclusion

Understanding trust among religious groups, particularly Christians and Muslim, is important especially in today's political climate. This is especially true given that conflicts in the Middle East, an area with a large concentration of Muslim individuals, has a large United States military presence. This study showed that although results from previous studies indicated that individuals trust those who are religious, especially when they signal their religious commitment, this may not always be the case. In fact, among younger populations, religious signaling may hinder trust of religious minorities. It also provided some insight into the role of autonomic processes during trust assessments and decisions between religious groups. However, further research is needed to better understand the role that autonomic nervous system plays in trust decisions and how diverse situational factors may impact emotion and thus arousal differently.

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TABLES

Table 1. Pearson correlations among key study variables.

	Amount Invested	Similarity to Target	Retrospective Trust	Outlook on Investment	IBI During Investment
Amount invested	-				
Similarity to Target	.12	-			
Retrospective Trust	.22**	.23**	-		
Outlook on Investment	.15	.10	.17*	-	
IBI During Investment	-.29***	-.02	-.14	-.14	-
RSA During Investment	-.08	.13	-.06	-.01	.42***

*$p < .05$; **$p < .01$; ***$p < .001$

Table 2. Analyses of variance results for perception of similarity to the target.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	.01	.91	.000
Target Religion	.18	.67	.001
Target Religious Signaling	5.96	.02	.04
Participant Religion X Target Religion	3.10	.08	.02
Participant Religion X Target Religious Signaling	1.10	.30	.01
Target Religion X Target Religious Signaling	.02	.90	.000
Participant Religion X Target Religion X Target Religious Signaling	1.22	.27	.01

Table 3. Analyses of variance results for retrospective reports of trust.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	2.87	.09	.02
Target Religion	.23	.63	.002
Target Religious Signaling	.71	.40	.01
Participant Religion X Target Religion	.67	.41	.004
Participant Religion X Target Religious Signaling	.21	.65	.001
Target Religion X Target Religious Signaling	.01	.92	.000
Participant Religion X Target Religion X Target Religious Signaling	.72	.40	.01

Table 4. Analyses of variance results for the amount invested while playing the trust game.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	2.89	.09	.02
Target Religion	1.30	.26	.01
Target Religious Signaling	.07	.79	.000
Participant Religion X Target Religion	5.71	.02	.04
Participant Religion X Target Religious Signaling	1.58	.21	.01
Target Religion X Target Religious Signaling	1.07	.30	.01
Participant Religion X Target Religion X Target Religious Signaling	1.32	.25	.01

Table 5. Analyses of variance results for outlook on the amount invested during the game.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	.03	.86	.000
Target Religion	.13	.72	.001
Target Religious Signaling	.07	.80	.000
Participant Religion X Target Religion	.40	.53	.003
Participant Religion X Target Religious Signaling	.000	.98	.000
Target Religion X Target Religious Signaling	.03	.87	.000
Participant Religion X Target Religion X Target Religious Signaling	7.78	.006	.05

Table 6. Analyses of variance results for cardiac interbeat interval while reading target profile.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	.92	.34	.01
Target Religion	.74	.39	.01
Target Religious Signaling	.23	.63	.001
Participant Religion X Target Religion	.30	.58	.002
Participant Religion X Target Religious Signaling	.01	.94	.000
Target Religion X Target Religious Signaling	2.39	.12	.02
Participant Religion X Target Religion X Target Religious Signaling	10.71	.001	.07

Table 7. Analyses of variance results for respiratory sinus arrythmia while reading target profile.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	.01	.92	.000
Target Religion	.43	.51	.003
Target Religious Signaling	.004	.95	.000
Participant Religion X Target Religion	.42	.52	.003
Participant Religion X Target Religious Signaling	.06	.80	.000
Target Religion X Target Religious Signaling	.07	.79	.000
Participant Religion X Target Religion X Target Religious Signaling	.33	.57	.002

Table 8. Analyses of variance results for cardiac interbeat interval while making investment decision.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	1.14	.29	.01
Target Religion	.01	.95	.000
Target Religious Signaling	1.31	.25	.01
Participant Religion X Target Religion	.01	.92	.000
Participant Religion X Target Religious Signaling	.32	.57	.002
Target Religion X Target Religious Signaling	2.48	.12	.02
Participant Religion X Target Religion X Target Religious Signaling	10.51	.001	.06

Table 9. Analyses of variance results for respiratory sinus arrythmia while making investment decision.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	1.06	.30	.01
Target Religion	.38	.54	.002
Target Religious Signaling	.21	.65	.001
Participant Religion X Target Religion	.25	.62	.002
Participant Religion X Target Religious Signaling	5.12	.03	.03
Target Religion X Target Religious Signaling	.01	.93	.000
Participant Religion X Target Religion X Target Religious Signaling	1.14	.29	.01

Table 10. Analyses of variance results for cardiac interbeat interval while responding to questions regarding their outlook on the amount they invested.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	1.57	.21	.01
Target Religion	.57	.45	.004
Target Religious Signaling	1.84	.18	.01
Participant Religion X Target Religion	.93	.34	.01
Participant Religion X Target Religious Signaling	.37	.55	.002
Target Religion X Target Religious Signaling	.45	.50	.003
Participant Religion X Target Religion X Target Religious Signaling	10.55	.001	.07

Table 11. Analyses of variance results for respiratory sinus arrythmia while responding to questions regarding their outlook about the amount they invested.

Source	F	p	η_p^2
Between subject effects			
Participant Religion	.41	.53	.003
Target Religion	.002	.96	.000
Target Religious Signaling	1.42	.24	.01
Participant Religion X Target Religion	1.82	.18	.01
Participant Religion X Target Religious Signaling	.11	.74	.001
Target Religion X Target Religious Signaling	.002	.97	.000
Participant Religion X Target Religion X Target Religious Signaling	3.75	.06	.02

FIGURES

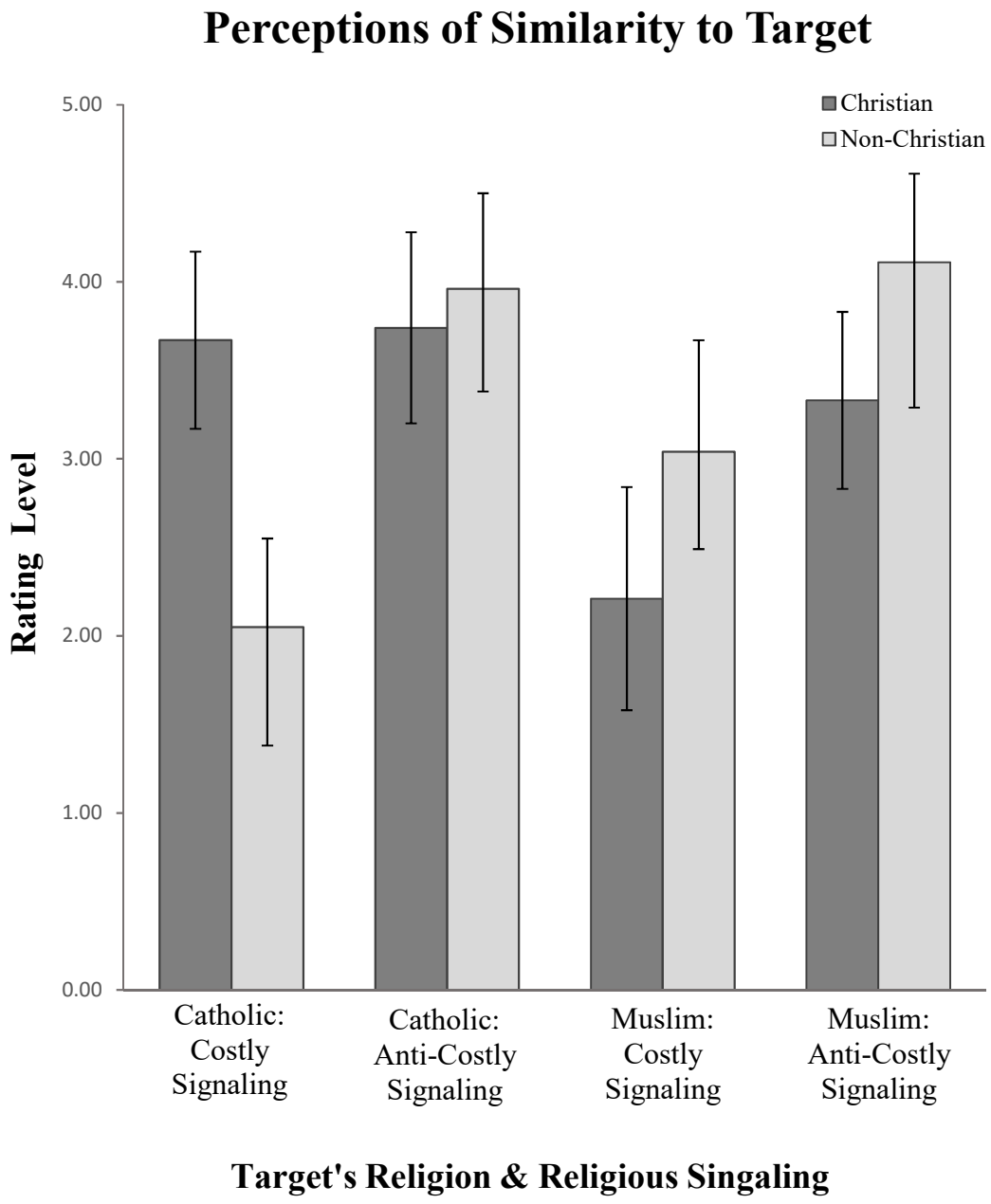

Figure 1. Means and standard errors of the three-way interaction for perception of similarity to target.

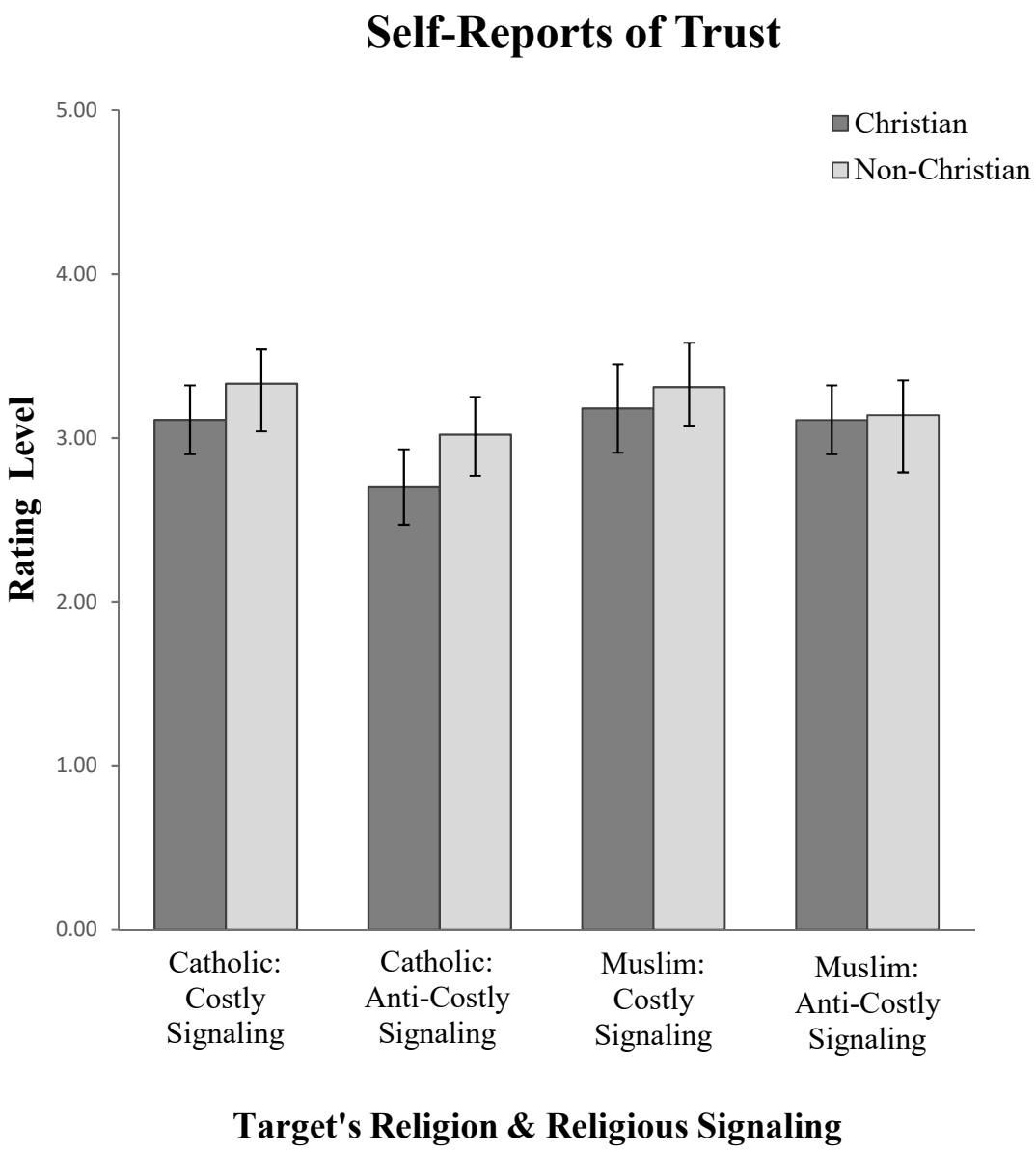

Figure 2. Means and standard errors of the three-way interaction for self-reported trust.

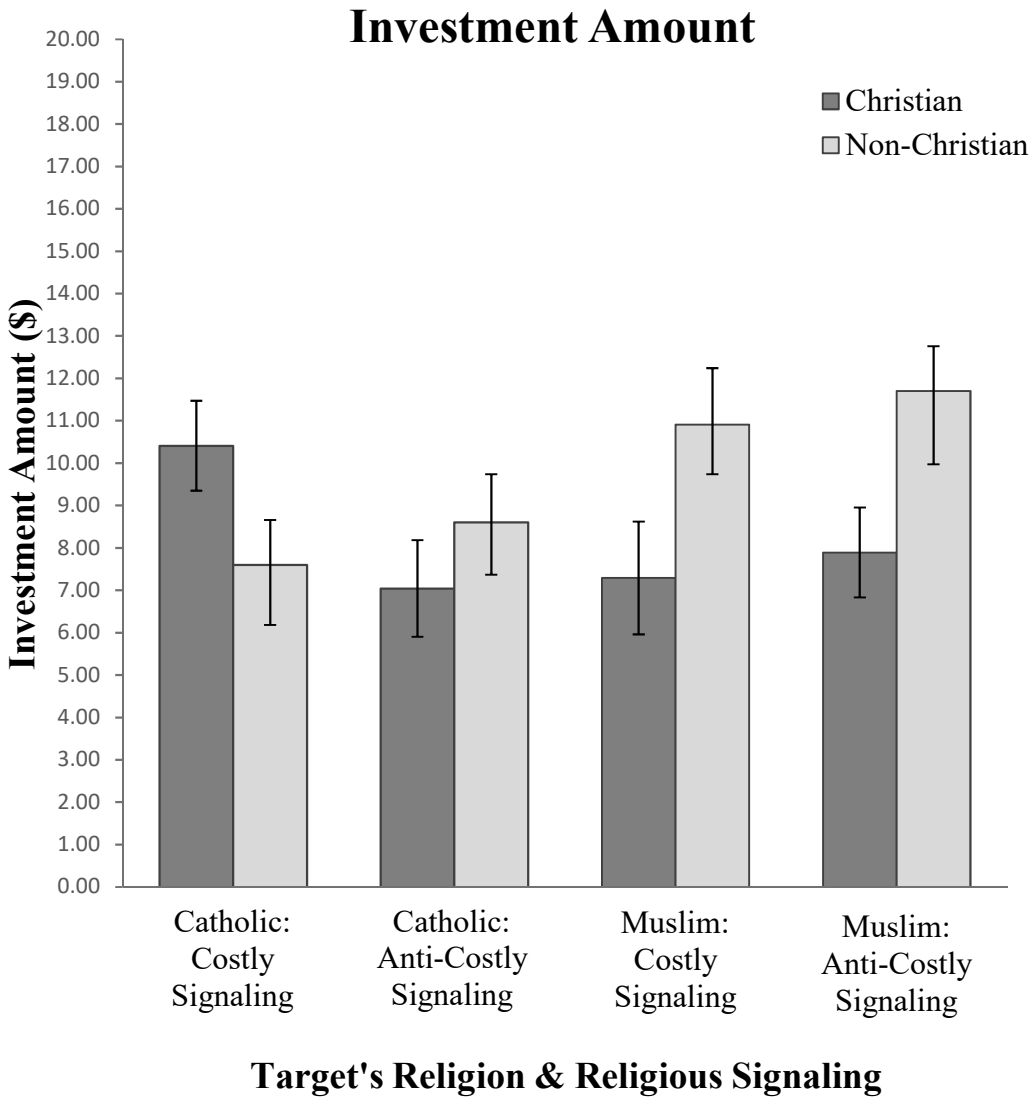

Figure 3. Means and standard errors of the three-way interaction for investment amount.

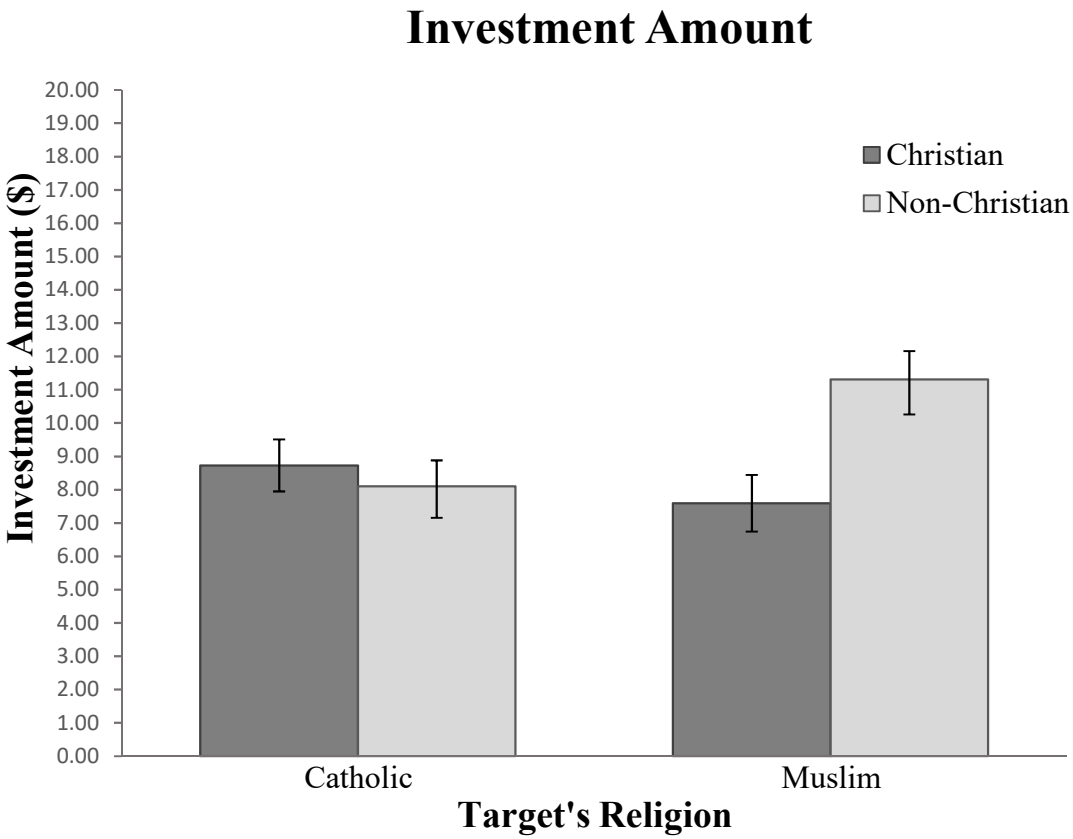

Figure 4. Means and standard errors of the two-way interaction for investment amount while playing the trust game with target.

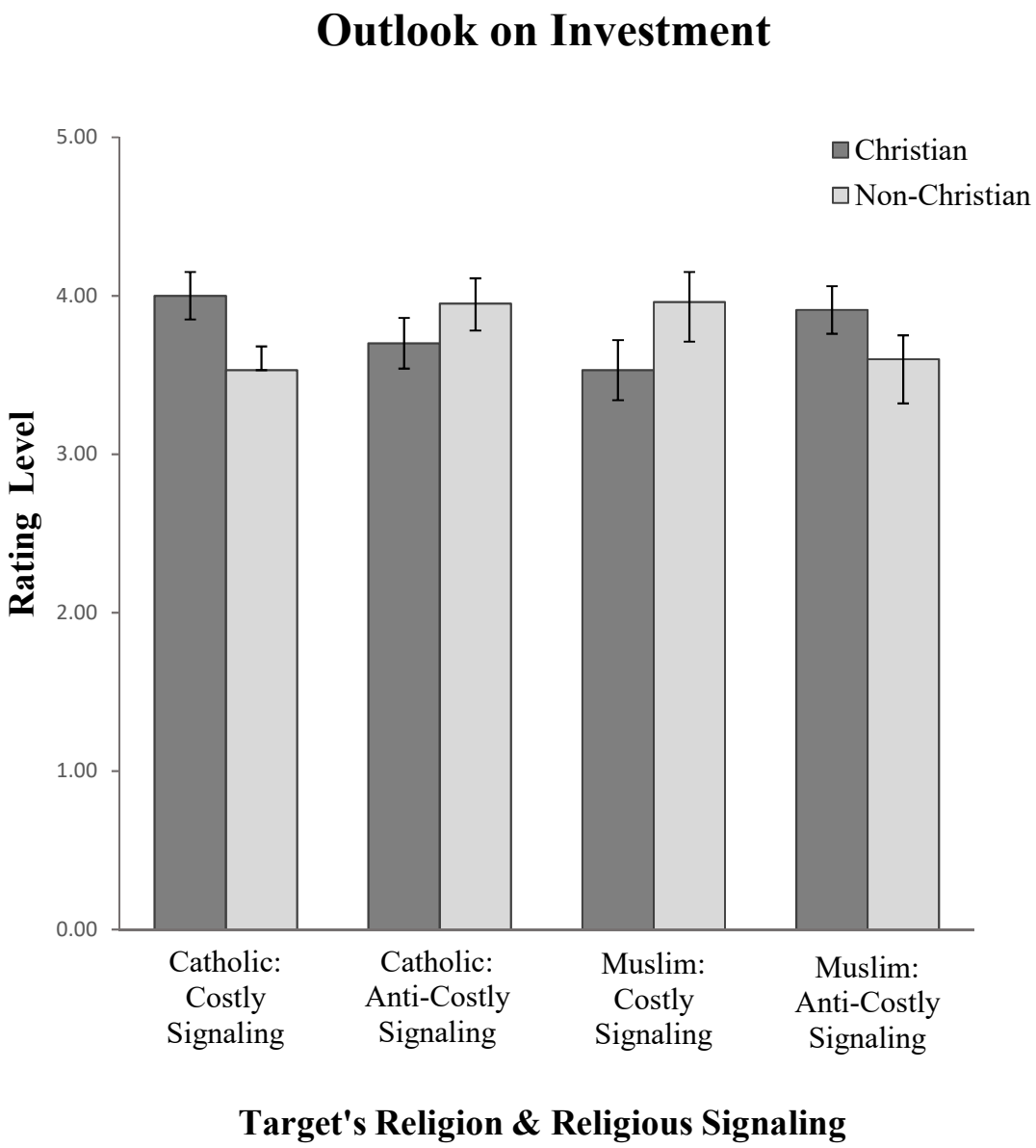

Figure 5. Means and standard errors of the three-way interaction for outlook on investment amount during the investment game

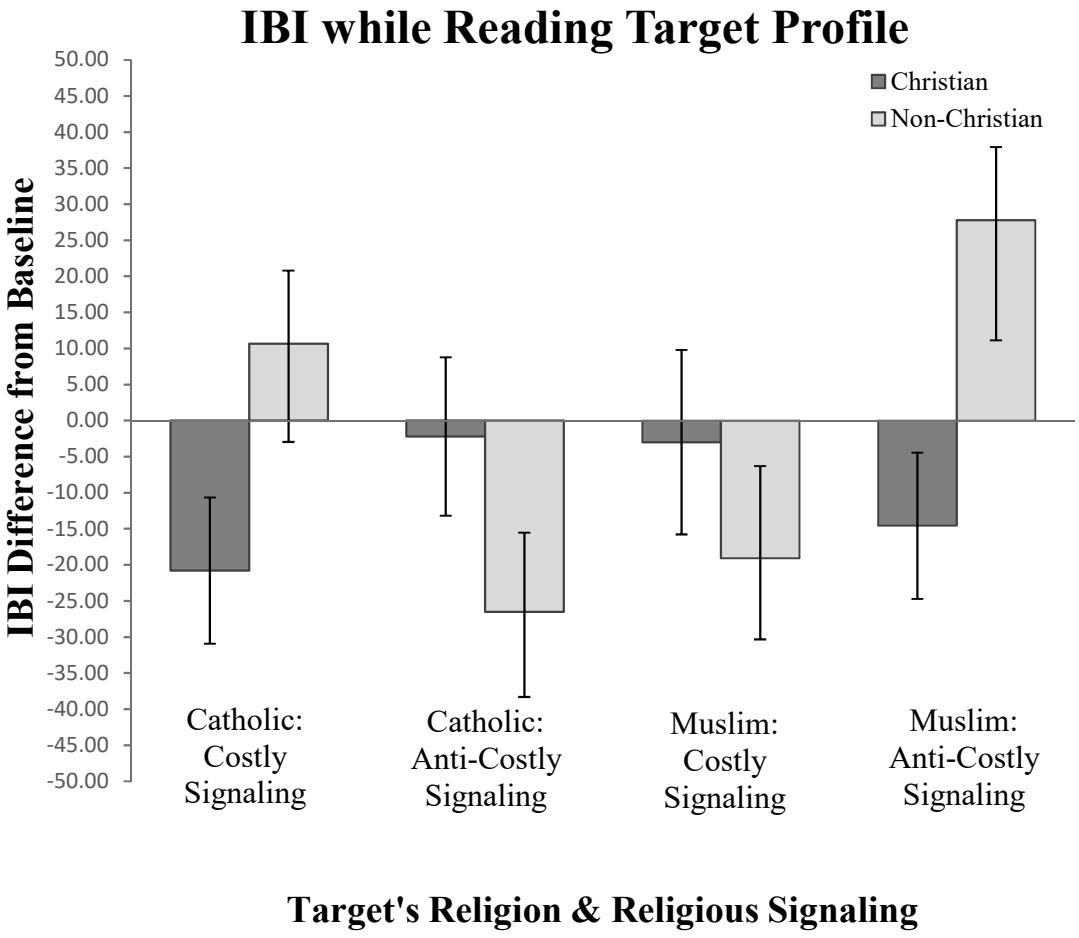

Figure 6. Means and standard errors of the three-way interaction for IBI while reading target profile.

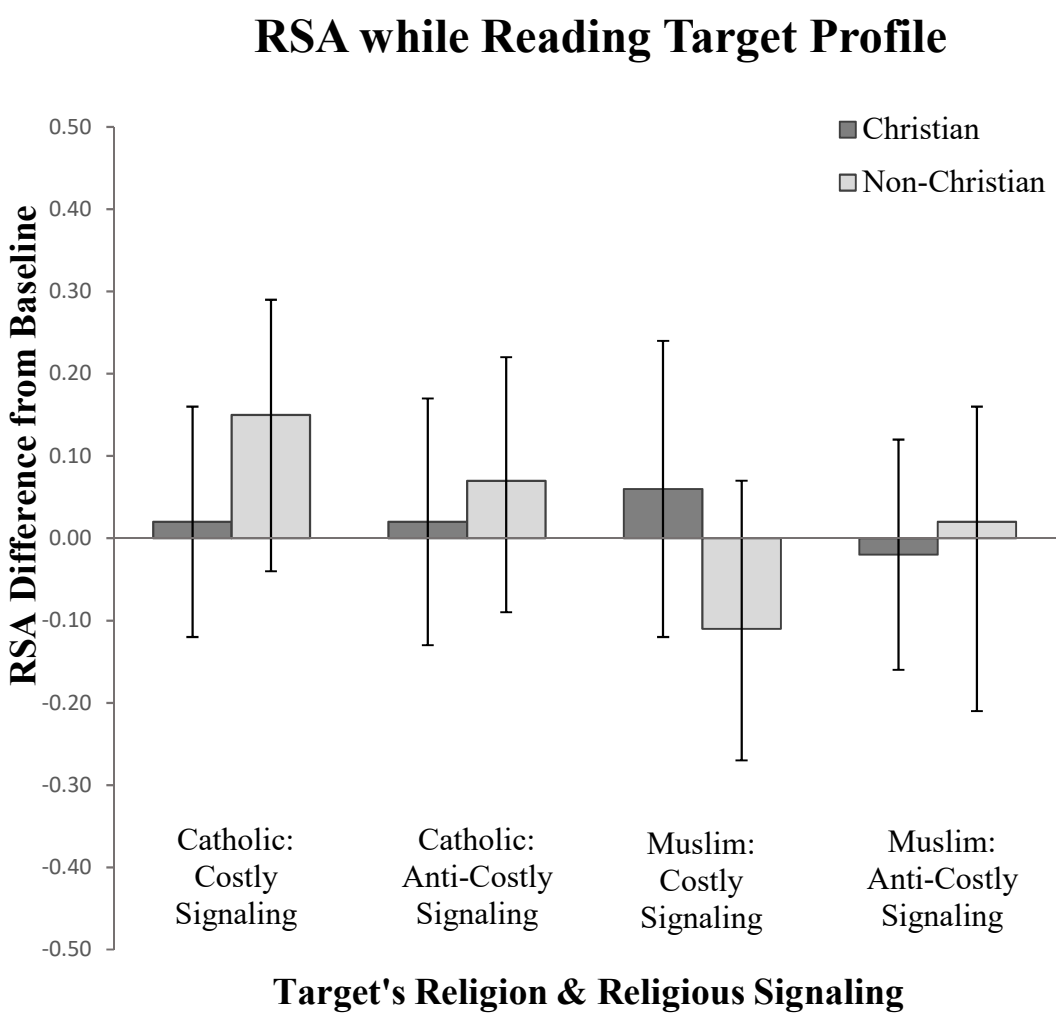

Figure 7. Means and standard errors for the three-way interaction for RSA while reading target profile.

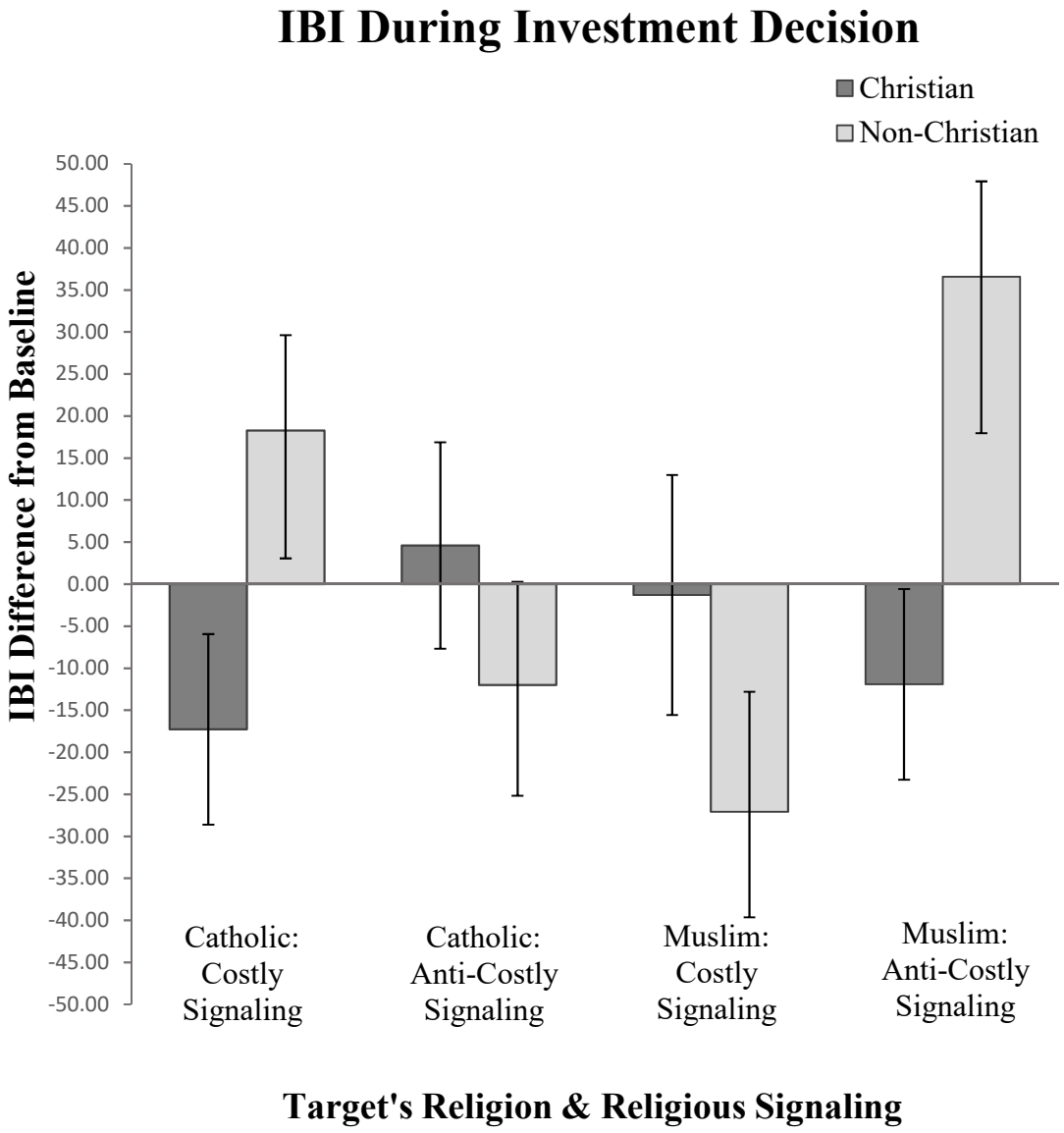

Figure 8. Means and standard errors of the three-way interaction for IBI while deciding how much to invest in the target during investment game.

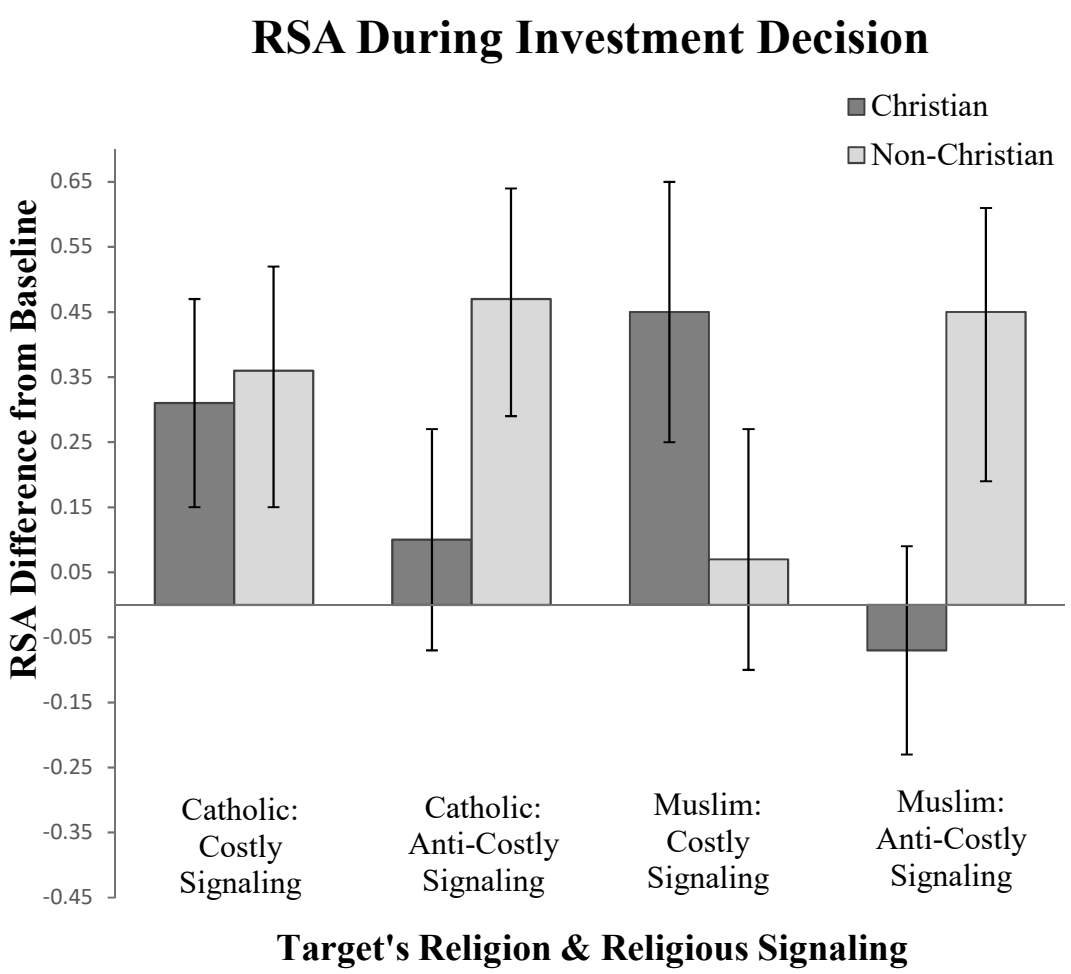

Figure 9. Means and standard errors of the three-way interaction for RSA while deciding how to invest during the investment game.

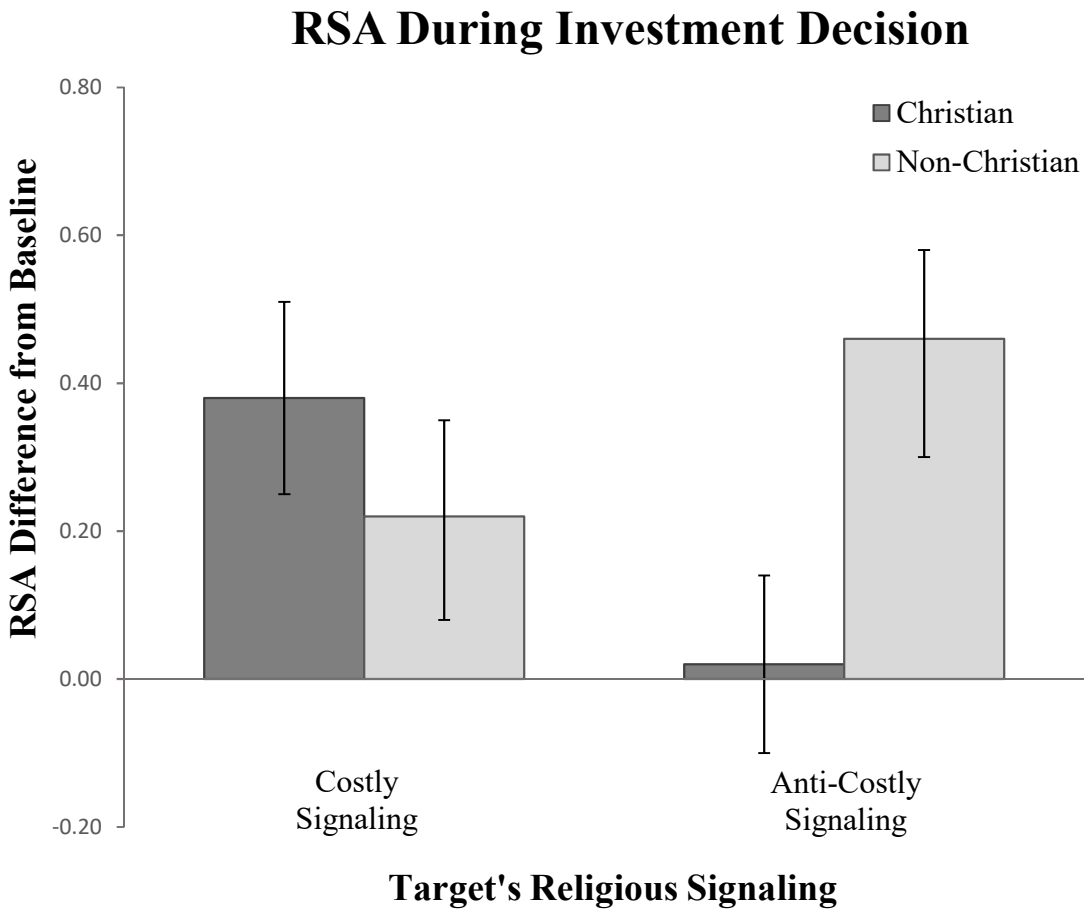

Figure 10. Means and standard errors of the two-way interaction for RSA while deciding how much to invest in the target during the investment game.

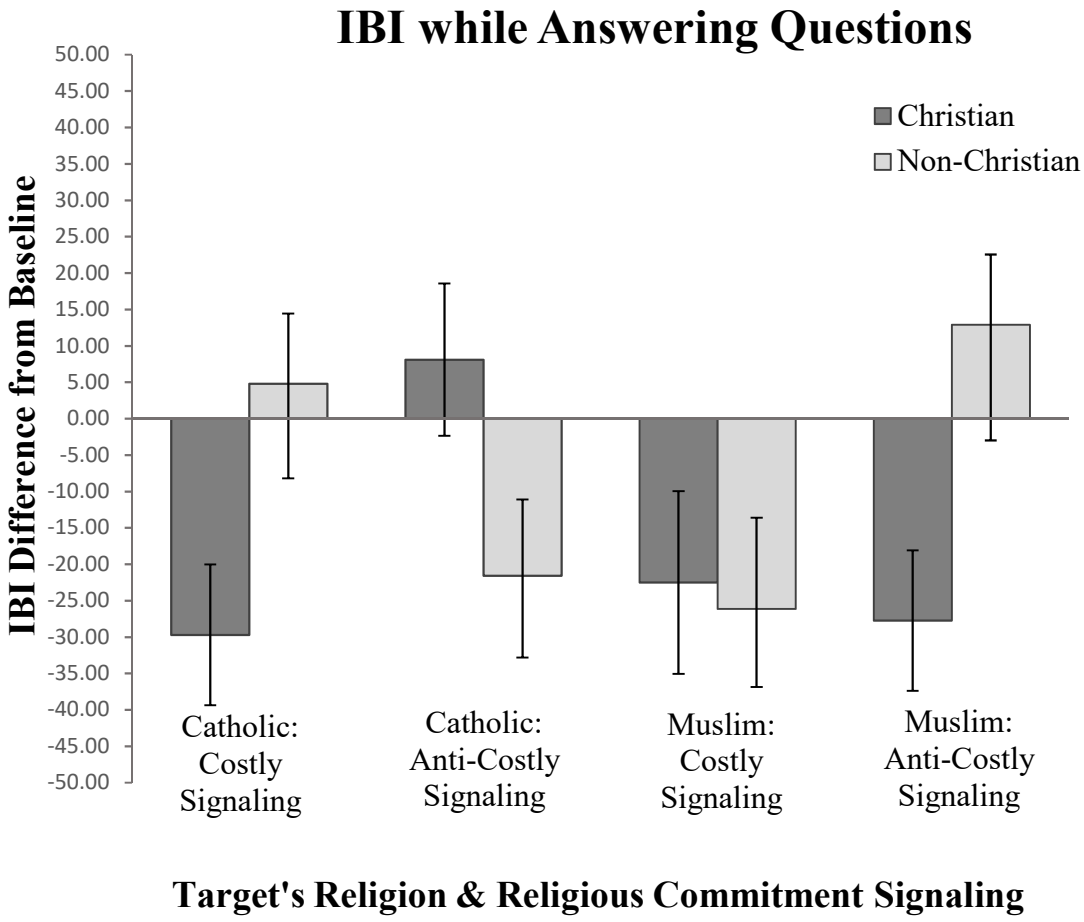

Figure 11. Means and standard errors of the three-way interaction for IBI while answering questions regarding their outlook on the amount investment.

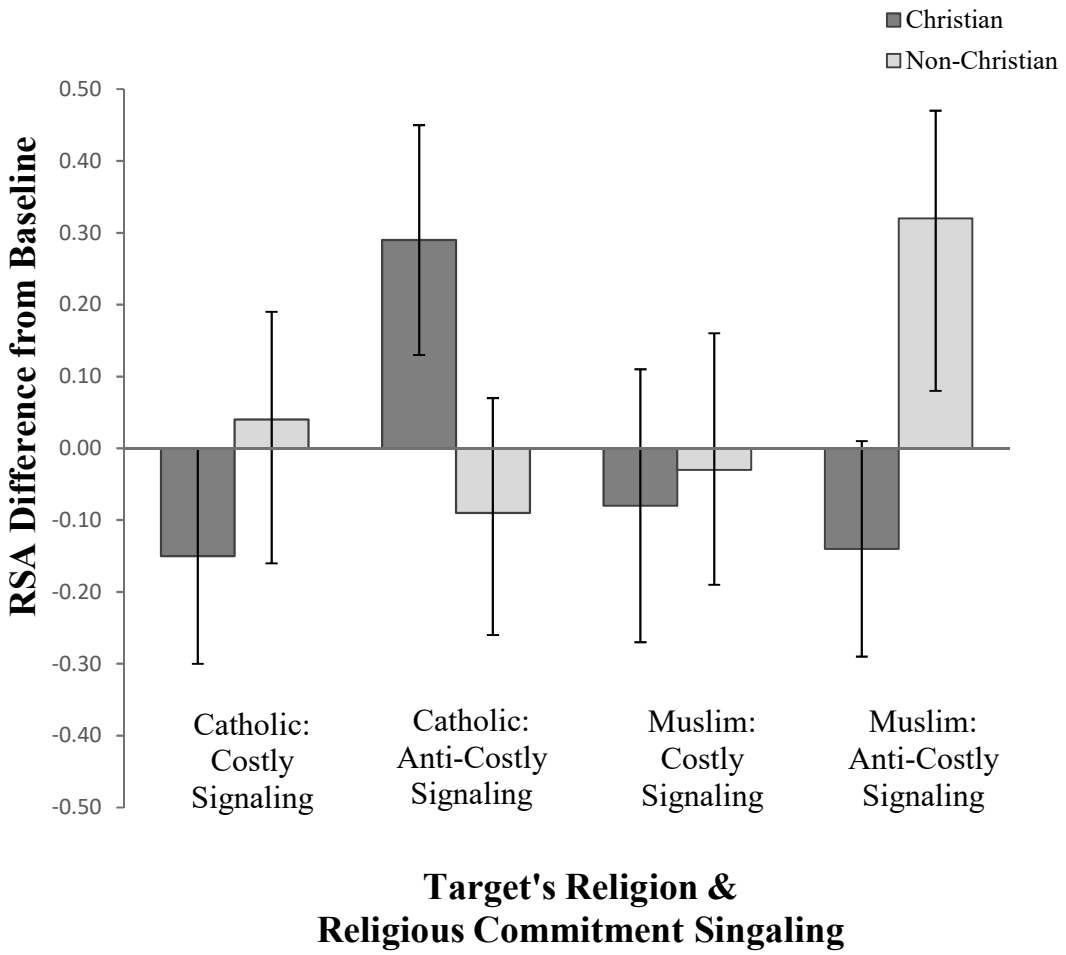

Figure 12. Means and standard errors of the three-way interaction for RSA while answering questions regarding their outlook on the amount investment.

APPENDIX A

STUDY MANIPULATION

Profile for Experimental Manipulation

ENTER INSTRUCTIONS (if there were)

I am an ASU junior. I am majoring in psychology and really want to go into some kind of research and/or helping profession. I realize that I need to figure that out pretty soon. One thing I love about ASU is the desert landscape that Arizona has, because I really enjoy hiking and outdoorsy sports like rock climbing. Being at a multicultural school like ASU, I really want to learn a lot about other cultures and religions, and get along with member of other religious groups. **I am a Muslim but I do not observe all my religion's rules. I do not go to Mosque, and I eat food that is not religiously ok for Muslims to eat (non-halal food). For example, I consume pork products and drink alcoholic beverages.**

I am an ASU junior. I am majoring in psychology and really want to go into some kind of research and/or helping profession. I realize that I need to figure that out pretty soon. One thing I love about ASU is the desert landscape that Arizona has, because I really enjoy hiking and outdoorsy sports like rock climbing. Being at a multicultural school like ASU, I really want to learn a lot about other cultures and religions, and get along with member of other religious groups. **I am a Muslim and I observe all my religion's rules. I go to Mosque weekly, and I only eat food that is religiously ok for Muslims to eat (halal food). For example, I do not consume pork products or drink alcoholic beverages.**

I am an ASU junior. I am majoring in psychology and really want to go into some kind of research and/or helping profession. I realize that I need to figure that out pretty soon. One thing I love about ASU is the desert landscape that Arizona has, because I really enjoy hiking and outdoorsy sports like rock climbing. Being at a multicultural school like ASU, I really want to learn a lot about other cultures and religions, and get along with member of other religious groups. **I am a Catholic but I do not observe all my religion's rules. I do not go to church weekly, and I eat things that Catholicism says are not ok (like, I eat meat on Fridays during lent).**

I am an ASU junior. I am majoring in psychology and really want to go into some kind of research and/or helping profession. I realize that I need to figure that out pretty soon. One thing I love about ASU is the desert landscape that Arizona has, because I really enjoy hiking and outdoorsy sports like rock climbing. Being at a multicultural school like ASU, I really want to learn a lot about other cultures and religions, and get along with member of other religious groups. **I am a Catholic and I observe all my religion's rules. I have been going to church weekly, and I eat things that Catholicism says are ok (like, I eat do not meat on Fridays during lent).**

APPENDIX B

SINGLE ITEM STUDY MEASURES

While the other person decides how much to return to you, we would like to ask you a few questions.

1. Please rate how CONFIDENT you feel about the amount of money you invested:

Not at all		*Neutral*		*Completely*
1	2	3	4	5
○	○	○	○	○

2. Please rate how SATISFIED you feel about the amount of money you invested:

Not at all		*Neutral*		*Completely*
1	2	3	4	5
○	○	○	○	○

Now we are going to ask your impression of the person you played the investment game with. You may or may not have learned this information in their "About Me" paragraph, but we are interested in your recollections and impressions regardless.

3. How much did you trust the person you played the investment game with BEFORE they returned your investment?

Not at all				*Completely*
1	2	3	4	5
○	○	○	○	○

Please select the position on the slider that best represents the individual you interacted with in the investment game based on the "About Me" profile and your impression.

4. How trustworthy was the person you played the investment game with?

Not at all Trustworthy 0 |----------|---------- *Very Trustworthy* 100

5. How similar do you feel the person you played the investment game with is to you?

Not at all 0 |----------|---------- *Very* 100

APPENDIX C

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL

APPROVAL:CONTINUATION

Adam
Cohen
Psycholo
gy
480/965-
7345
Adam.Cohen@asu.

edu Dear Adam

Cohen:

On 6/20/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Continuing Review
Title:	The Impact of Religion and Culture on Trust
Investigator:	Adam Cohen
IRB ID:	STUDY00001071
Category of review:	(4) Noninvasive procedures, (7)(b) Social science methods, (7)(a) Behavioral research
Funding:	Name: DOD-USAF-AFRL: Air Force Office of Scientific Research (AFOSR)
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Cohen - consent_credit Final.pdf, Category: Consent Form; • changed in payment consent form, debriefing, Category: Consent Form; • Cohen - consent_paid final.pdf, Category: Consent Form; • debriefing.pdf, Category: Consent Form;

The IRB approved the protocol from 6/20/2017 to 6/14/2018 inclusive. Three weeks before 6/14/2018 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 6/14/2018 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Gene Brewer Gene Brewer

Derek Ellis Amal Fakhouri
Christopher Blais Kimberly Wingert Cayla Duncan Marin Schmitt Nicole Roberts
Stephanie Billingsley Adam Cohen

APPENDIX D

INFORMED CONSENT

Dear Participant:

CONSENT FORM

The Cognitive Neuroscience of Trust

I am Dr. Adam Cohen and I am a Professor in the Department of Psychology at Arizona State University. [Please note: If you are participating in the study at ASU's West campus, the parts below in *gray/italics* do not apply.]

I am conducting a research study wherein you will be asked to evaluate other people, *while wearing an EEG cap that will measure neural activity. In addition, we will be collecting other physiological measures that will require that sensors be attached to you.* **You will be asked to wear these sensors for the entire time while you are completing the task. Small sensors will be attached to your hand, just below your collar bone, on your lower rib cage, on your neck, and on your back using adhesive tape or self-stick sensors. These sensors measure your heart rate and sweat on the skin, and give us a measure of how your body systems are functioning as you visualize. A belt attached with Velcro also will go around your torso (outside of your clothing) to measure respiration rate. These sensors produce minimal discomfort. They may feel similar to wearing stickers or band-aids and are attached and removed quickly and easily. After the sensors are attached, the experimenter will ask if you are experiencing any discomfort. If you let the experimenter know you are uncomfortable, the sensors will be readjusted until you are more comfortable. Finally, we will also ask you to wear a blood pressure cuff on your left arm. The expected duration of the study is *3 hours*. [West campus lab session is ~1.5 hrs, with ~30-45min of questionnaires beforehand]**

You will be asked to answer *interview and* survey questions before and after the study. You may also choose to skip any question you do not wish to answer.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty (i.e., it will not affect your grade). *You must be 18 years of age or older to participate in this study*.

To participate in this study, you must not have dyed hair. The EEG cap will be soaked in a saline solution (Potassium Chloride; KCl), which can remove hair color or damage dyed hair. KCl should not affect non-dyed hair (and may not affect certain hair dye) and is used in common shampoo products (e.g., Suave, Sunsilk).

There may be no direct benefits to you, but the possible benefits of your participation in the research include extending your knowledge about research within the field of psychology and gaining experience as part of the scientific process., it is possible there may be some slight discomfort associated with wearing *the EEG cap*, **sensors and blood pressure cuff, and you may experience fatigue due to the length of the study. The risks involved in this study are no greater than what you would experience in your daily life. The data we collect will only be attached to your randomly-assigned participant number. Your responses, therefore, will be confidential. The results of this study may be used in reports, presentations, or publications, but your name will not be used.**

This research is being sponsored by the US Federal government and they may have access to data and research records, for the purpose of protecting human subjects. All data from this project will be confidential and kept in password protected files, accessible only by the research team. If you choose to withdraw from the study, you must do so before you leave your experimental session today, because we will not be able to remove your data after you leave, because of its confidential nature.

If you have any questions concerning the research study, please contact the research team at: 480-965-7345 or email adamcohen@asu.edu. [WEST CAMPUS CONTACT: Dr. Nicole Roberts, 602-543-4524, Nicole.A.Roberts@asu.edu] If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human

Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.
You will receive a minimum of $20 or, for particular courses, Sona research credit, for participating in this study.

Sincerely,
Adam Cohen, Ph.D. [West campus contact: Nicole A. Roberts, Ph.D.] I have
read this consent form and would like to participate.

By clicking the red button to proceed to the next page you indicate your consent and willingness to participate in this study