ARE RELIGIOUS INDIVIDUALS MORE GENEROUS, TRUSTING, AND COOPERATIVE? AN EXPERIMENTAL TEST OF THE EFFECT OF RELIGION ON PROSOCIALITY

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ABSTRACT

We investigated the effect of religion on generosity, interpersonal trust, and cooperation by using games developed by experimental economists (Dictator, Trust, and Public Goods). In these experiments, individuals were paired or grouped with unknown strangers to test the degree to which religion promotes prosocial behavior. We evaluated group- and individual-level effects of religion on prosocial behavior across the three games. Although playing the games in a religious setting showed no overall difference as compared to a secular setting, we did find a weak association

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between some individual-level dimensions of religiosity and behavior in some of the games. The weak association between religion and behavior is consistent with theory and empirical studies using similar measures – the anonymous pairing and grouping of the economic games may moderate individual-level effects of religion. Our research is a strong complement to the empirical literature because the three studies involved a large and diverse sample and used sensitive instruments that have been found to reliably measure prosocial behavior.

INTRODUCTION

Humans are often generous, trusting, and cooperative within large groups. Although folk sociology attributes much of prosocial behavior to religion, divergent research perspectives exist today. Dawkins (2006) believes that religion satisfies some individual cognitive problems, but he/she generally believes that religion is a source of conflict. Numerous researchers, however, argue that religious experience, participation, and belief function to promote prosocial behavior (Batson, Schoenrade, & Ventis, 1993; Beit-Hallahmi & Argyle, 1997; Momen, 1999). Some highlight the importance of religious morality and note that versions of the Golden Rule, "Do unto others as you would have others do unto you," are part of all major religions (Batson et al., 1993, p. 331; Wilson, 2002). Other researchers argue that religion mainly promotes cooperation and prosocial behavior within culturally defined in-groups (Iannaccone & Berman, 2006; Ruffle & Sosis, 2006) rather than supporting an indiscriminant propensity to behave prosocially.

The purpose of this study is to evaluate the degree to which religion promotes generosity, trust, and cooperation between anonymously paired strangers. We evaluated: (1) if individuals playing the games after a religious meeting were more prosocial than individuals playing the games after a secular meeting, (2) the degree to which individual-level religiosity measures correlate with prosocial gameplay, and (3) how much in-group boundaries influence the willingness to share with and trust a person with different religious beliefs. To measure prosocial behavior, we paired strangers with each other to play one of three types of games. The Dictator game measures generosity; the first player is given the opportunity to send some, part, or all of a $10 windfall to an anonymous second player. The second player is later given any money that was sent to them. In the Trust game, the first player can send some portion of $10 to a second player. This amount is doubled by the experimenter and allocated to the second player. Without knowing what

amount was sent, the second player then decides how much they want to return to the first player for all of the possible amounts that might have been sent to them (Camerer, 2003; Kagel & Roth, 1995). Finally, the Public Goods game is a well-known game to measure cooperation. In this game, players can contribute money to a public fund; contributions are doubled and distributed equally among all of the players regardless of their individual contribution. After completing the games, participants filled out a detailed questionnaire that included demographic information such as age and gender. In addition, the survey incorporated numerous scales designed to measure various dimensions of religiosity, as well as personality constructs such as the "Machiavellian Personality" scale that measures a propensity toward self-serving behavior (Christie & Geis, 1970). We had a great deal of empirical leverage to evaluate the association between religion and prosocial behavior; participants contributed varying amounts in the games, and scored differently on a variety of personality and religiosity scales.

The Origin and Evolution of Religious Prosociality

Early theorists from anthropology, sociology, and psychology had strong interests in religion (Durkheim, 1915; James, 1902; Tylor, 1871). Much work on the topic of religion and morality has been conducted since then (Batson et al., 1993), yet diverse perspectives remain. Social psychologists have conducted empirical research to understand the diverse social and psychological dimensions of religion. For example, Batson et al. (1993) evaluate if religion, like empathy, promotes altruistic behavior, and conclude that certain expressions of religious behavior may promote prosocial behavior. They argue that the motives leading to altruism, however, are likely to be egoistic. Researchers have also studied religion from the perspective of rational choice theory developed by economists (Stark & Bainbridge, 1997; Stark & Finke, 2000). This approach assumes that religion involves cost-benefit reasoning in which people make rational exchanges with imagined supernatural agents for scarce or unobtainable resources. Although religious participation offers benefits, the costs of ritual and other religious activities are substantial. The rational choice perspective posits that nonmaterial and humanistic rewards could maintain prosocial behavior, but does not fully account for the origins of such rewards. Finally, Durkheim (1915) favored a functionalist perspective in which prosocial behavior and cooperation were a fundamental problem for people to resolve. In this view, religion is a crucial mechanism to allow humans to

function in harmonious and coordinated units (Wilson, 2002). However, like rational choice theory, functionalist theory was vague about the origins of the institutions capable of maintaining prosocial behavior.

Whereas most of the theory from social psychology, economics, and sociology is proximate in origin, evolutionary theory seeks explanations about the ultimate origins of behavior and social institutions. For example, if religious beliefs and moral systems are assumed to generate cooperative behavior, this begs the ultimate question of how such moral systems emerged. Evolutionists seek to discover the processes by which genes, culture, or gene-culture coevolution could possibly favor prosocial psychological dispositions and adherence to prosocial norms and institutions. Darwin (1874) suggested that selection at the level of tribes during primeval times had been responsible for prosocial "instincts" such as sympathy and loyalty to the tribe. But he thought that education, public opinion, religious institutions and the like had made the most important contributions to moral advancement in more recent times. Darwin, and more recent evolutionary theorists (Alexander, 1987) generally accorded religion an important, but proximate, role in the evolution of moral systems.

Wilson (2002) reviews several evolutionary hypotheses that might account for religious behavior. The clearest division is between adaptive and nonadaptive approaches. Adaptationists assume that religion evolved because the costs of religious behavior were outweighed by the benefits. Nonadaptative approaches do not presuppose that religion offers any substantial benefits in current times – some evolutionary psychologists (Atran, 2002; Boyer, 1994; Dawkins, 2006) stress that religion is likely a by-product of other evolved cognitive processes. For example, it is plausible that human self-awareness evolved because it gave individuals a survival advantage, yet such an adaptation allowed people to worry about their own deaths. Wilson (2002) suggests that from this perspective religion might have evolved to help people deal with such fears.

Norenzayan and Shariff (2008) summarize the literature related to the origins of prosocial behavior in terms of two theoretical approaches: religion as a cultural by-product and cultural group selection. First, the cultural by-product theory posits that human psychology evolved in the Pleistocene to solve problems such as inferring the thoughts of others and having sensitivity to one's prosocial reputation within the social group. Cultural beliefs associated with religion, if compatible with this evolved psychology, could then spread via social learning mechanisms. Second, cultural group selection[1] is a process that created religious cultural norms that encouraged prosocial behavior within the group, and prevented the group's public goods from

being exploited by free riders.[2] This theory posits that religious institutions evolve to promote cooperation and sharing among in-group members more than people in out-groups (Paciotti & Hadley, 2003; Ruffle & Sosis, 2006). One reason to suspect that institutions will not evolve to favor out-group members is that it can be risky for individuals to advertise their prosocial intentions outside of their local group. Evolutionary theorists have discovered that advertising prosocial behavior can make an individual a victim of exploiters (McElreath, Boyd, & Richerson, 2003), and advertising antisocial behavior makes you a target for group-level punishment (Boyd, Gintis, Bowles, & Richerson, 2003). Thus, it is likely that people signal their intentions to be altruistic, trusting, and cooperative *within* an institutional setting, yet are cautious about this behavior when interacting with outsiders. As a result, even though a group may share common religious beliefs or experiences, they are unlikely to advertise these preferences to strangers who are outside of social networks capable of effective social control.

BEHAVIORAL STUDIES OF RELIGION AND PROSOCIAL BEHAVIOR

There is empirical support for a link between prosocial behavior and religion. People who report being more religious also report stringent moral standards (Batson et al., 1993). There is also evidence that religion tends to reduce criminal behavior (Stark & Bainbridge, 1997). Nearly all of 60 studies published on the topic of religion and crime have found strong to moderate negative relationships (Baier & Wright, 2001) – the pattern holds at the regional level in the U.S. (Stark & Bainbridge, 1997) and among a sample of 13 industrial nations (Ellis & Peterson, 1996). The experimental evidence is less clear. Batson et al. (1993) reviewed nine studies and found positive, albeit weak, correlations between self-reports of helping a stranger and involvement with religion. When behavioral measures of helping were used, however, only one in five studies was significant.

Dimensions of Religiosity: Intrinsic, Extrinsic, Quest

Social psychologists have produced an extensive literature addressing how religion and prosocial behavior interact with various dimensions of religiosity. Batson et al. (1993) used three dimensions of religiosity – *intrinsic*, *extrinsic*, and *quest* – to predict altruism and prejudice. The intrinsic dimension relates to religions as ends in themselves. Intrinsically

motivated individuals are thus thought to have a closer relationship to "God" or their version of the Divine. In addition, they adhere most closely to prosocial religious doctrines, and thus are expected to be the most helpful or cooperative. Individuals measuring high on the quest dimension of religiosity (religion as a source of ongoing exploration) are predicted to have the most universal prosocial attitudes (Ibid.). Using six clever experiments, Batson et al. (1993) concluded, like other researchers, that intrinsic religion is associated with helping behavior. They suspected, however, that the behavior is not a source of true compassion that leads to altruism as scholars had previously suggested (Allport & Ross, 1967). Although the intrinsic types often behave in a more helpful manner, they seem to be motivated by their own need to *appear* helpful; these participants stop and help a stooge even when that person denies needing help (Batson & Gray, 1981). This may explain why studies using self-reports of helping behavior are stronger than behavioral studies. Finally, Batson et al. (1993) argue that individuals scoring higher on the quest dimension may be the most helpful and have motivations that are truly "other-regarding."

Other researchers have stressed the linkage between religious and antisocial behavior such as prejudice and extremism (Allport & Ross, 1967; Dawkins, 2006; Iannaccone & Berman, 2006). This view highlights how within-group religious boundaries can promote between-group conflicts. Some evidence supports this view. Some individuals scoring low on intrinsic and quest religiosity fit into the extrinsic dimension of religiosity – religion is a means. For example, extrinsic individuals likely attend religious services or meetings for personal or social goals (i.e., babysitting services, enjoyment of singing and socializing) rather than to be closer to God. Batson et al. (1993), like many others, found that individuals scoring high on the extrinsic dimension are *less* helpful. As discussed above, organizations that provide public goods to their members are at risk of being exploited by individuals who do not contribute to the group, yet take advantage of the benefits. Individuals need not believe in their religion, as long as they display correct behavior and signal their commitment to the group. This view may explain the existence of the extrinsic dimension of religion; people see the value of displaying religious signals even if they do not really believe in them.

Evidence from Experimental Economics

Experimental economists have developed games to test the assumptions about human motivations built into economic models. A wide variety of

games have revealed a substantial amount of individual variation in strategies adopted. The use of the Ultimatum game to test whether people behave as selfish rationalists is a classic example (Kagel & Roth, 1995). Although some skepticism about the use of experimental games is warranted (Hagen & Hammerstein, 2006; Sosis, 2005), the methodology holds promise for untangling the mechanisms of prosocial behavior because the games often result in considerable individual- and group-level variation in how participants play the games. Moreover, experimental economists are devising experimental designs to explore what types of individual-level traits (e.g., personality) are associated with this individual variation.[3]

Religion has been measured in a variety of experimental games, and some authors have found religion to predict game behavior. Henrich et al. (2010) incorporated religion into a follow-up study among 15 culturally diverse populations using three experimental games (Dictator, Ultimatum, and Third-Party Punishment). The authors evaluated the impact of market integration (percentage of household calories from markets) and religion (Christianity/Islam vs. other tribal religions) on how people played the games, after controlling for other individual- and group-level factors. Similar to their previous study (Henrich et al., 2005), they found a strong positive relationship between market integration and behavioral fairness as measured by the games. In addition, religion had a substantial effect. Participation in Christianity or Islam on average increased offers in Dictator and Ultimatum between 6% and 10%. Another study explored the degree to which implicitly activated God concepts influenced prosocial behavior in an anonymous Dictator game. Shariff and Norenzayan (2007) presented participants with scrambled-sentence tasks; those in the priming condition had religious target words (e.g., God, spirit, divine, sacred). They found that participants in the priming condition gave more than twice the amount of money in the Dictator game as compared to participants in the nonpriming treatment. In a follow-up study, they added an additional priming treatment that contained words related to secular moral institutions; the secular priming had nearly the same effect as the religious priming.

Another set of studies have not found a strong association between religion and behavior in the Dictator and Ultimatum games. Ben-Ner, Putterman, Kong, and Magan (2004) found that a history of religious training leads to greater offers in a two-part Dictator game, but is not associated with reciprocation by the other player. Tan (2006), using Dictator and Ultimatum games among German participants, found that his overall measure of religiosity that combined various dimensions (belief, experience, and ritual) was not predictive of gameplay. He argued that the different

dimensions of religiosity produce counteracting effects that cancel out; offers in the Dictator game are positively associated with having a religious belief, but are negatively associated with participation in church-related activities. These results mirror the intrinsic and extrinsic dimensions described above. Using a setting similar to the Dictator game, Eckel and Grossman (2003, 2004) did not find a significant difference in the contributions to secular charities among participants who do or do not attend church services regularly.

A growing number of studies have evaluated the effect of religion on trust and cooperation. One of the first studies was conducted by Orbell, Goldman, Mulford, and Dawes (1992). They used a multiperson Prisoners' Dilemma game among participants from Logan, Utah, but did not find that religious subjects, in general, were more cooperative. Mormons with greater self-reported church attendance, however, were more cooperative. Sosis and Ruffle (2003) administered a two-person common pool resource experiment among secular and religious Israeli kibbutzim. They found that Orthodox males that went to synagogue daily were more likely than non-Orthodox members to behave cooperatively by making smaller claims on the common pool. This effect was not found among female participants, and the authors argue that this is likely the result of females having a less prominent role in the Orthodox rituals. The authors conclude that participation in religious ritual increases in-group cooperation. Tan and Vogel (2008) investigated the relationship between individual religiosity and trust. Assuming that religion is multidimensional, they used a survey instrument developed by De Jong, Faulkner, and Warland (1976) to measure three core dimensions (belief, experience, and ritual). Using a variation of the Trust game, they tested if religious people are trusted more, and if religious people are more trustworthy. A proposer was given the opportunity to send an unknown responder money, and once tripled by the experimenter, the responder could return any amount to the proposer. Proposers sent more money to responders whom they perceived to be more religious. Moreover, the effect was greater when proposers reported being religious. Religion also promoted trustworthiness; religious responders were more likely to send money back to proposers. In contrast to Tan and Vogel (2008), Anderson, Mellor, and Milyo (2010) found self-identified religious affiliation to be unrelated to behavior in Trust games, but found a weak association between church attendance and contributions in the Public Goods game. Participants who reported higher attendance of religious services offered 30% more, on average, than participants reporting lower church attendance. Contrary to the folk sociology claims of religion causing more prosocial behavior, they

argue that their findings, in general, do not provide strong evidence that religion makes people more cooperative, trusting, or trustworthy.

Johansson-Stenman, Mahmud, and Martinsson (2009) conducted a two-person Trust game to evaluate if social distance would influence trust between Hindus and Muslims in rural Bangladesh. Although there appeared to be an in-group effect associated with trust in their survey questions, in the Trust game they did not find that participants were more trusting of partners from their own groups. Finally, although religion was not the focus of their study, Fehr, Fischbacher, von Rosenbladt, Schupp, and Wagner (2002) used a bilateral Trust game among German subjects and found Catholics to be more trusting than non-Catholics.

PREDICTIONS

Norenzayan and Shariff (2008) offer three predictions relevant to this research. First, individuals who worship vigilant moral deities will have greater concerns about their prosocial reputation. Second, religious situations should activate or "prime" thoughts of moral deities, and thus increase prosocial behavior. Third, reliable signals of religious behavior and devotion should promote trust and cooperation. We agree that these are plausible predictions, but stress that these effects will be the strongest within religious groups. Thus, if religion does promote prosocial behavior such as that exemplified by the golden rule, any such effects will operate, at best, within the religious group. This thesis may help explain why in general, experiments conducted by social psychologists show a moderate effect of religion on prosocial behavior (Batson et al., 1993), whereas experimental games evidence mixed results. A general difference between these traditions is that the experiments conducted by social psychologists did not involve anonymous interactions, and often were conducted in the context of religious universities in which participants interacted with their peers. We suspect that the greater variability in results from the experimental economic studies is influenced by the anonymous pairing used in most experimental games, which causes individuals often to be paired with people from out-group populations such as different universities or villages.

In our research design people interact with strangers, and religious belief and practice should have little or no effect on prosocial behavior in our economic games. To whatever extent people are prosocial, that behavior is expected to be the outcome of innate prosocial instincts plus *nonreligious*

institutions that govern prosocial expectations and behavior in our population.

STUDY 1: DICTATOR GAME AMONG UNIVERSITY STUDENTS

The first study involved university students who played a version of Dictator in which neither the researcher nor the recipient would be able to match the identity of the proposer with their decision. The group of participants played the Dictator game among strangers in a neutral university setting. Given the strong context in this design to prevent even the researcher from knowing participants' decisions, we expected to find little or no association between gameplay and religiosity measures. As discussed by Norenzayan and Shariff (2008), we expected that individual religiosity variables would be important only when an individual's reputation could be influenced as a result of others knowing their game decision. Like the general findings from Batson et al. (1993), prosocial behavior should be uncommon among religious individuals when the social context does not allow them to gain prosocial recognition.

Participants

Seventy-five participants were recruited through the UC Davis psychology department subject pool (see Table 1, second column). Students were given class credit for participating, but were not informed about the possibility of obtaining money until after the experiment had begun.

Design

Upon completing consent forms, all participants were seated around a large table in an on-campus room. Participants played the Dictator game following the elaborate double-blind procedures pioneered by Hoffman, McCabe, Shachat, and Smith (1994) and modified by Ben-Ner et al. (2004). This procedure gives individuals complete privacy when making their decision, and gives them almost complete anonymity from the experimenter.[4] The experimenter first explained the rules of the game by reading word

Table 1. Summary Statistics for Study 1 and Study 2.

	Study 1	Study 2		
		Aggregate	Secular	Religious
N	75	183	73	110
Dictator amount	2.3 (2.5)	4.8 (3.1)	3.6 (2.5)	5.5 (3.1)
Trust amount			2.4 (1.6)	3.5 (1.6)
Age	20.9 (4.6)	38.9 (22.3)	41.7 (26.8)	37.1 (18.7)
Post-game	14.0 (2.7)	14.7 (2.4)	14.4 (2.7)	15.0 (2.1)
Intrinsic	13.8 (4.5)	16.1 (4.3)	13.0 (4.2)	18.2 (2.9)
Extrinsic	17.1 (4.6)	15.8 (3.6)	15.6 (3.7)	15.9 (3.6)
Quest	17.6 (4.2)	18.8 (4.5)	17.2 (4.7)	19.9 (4.1)
Mach	79.2 (6.3)	79.3 (6.4)	81.2 (7.1)	78.0 (5.6)
Female/Male (#)	42/33	97/86	34/39	63/47
White/Asian/Hispanic (#)	33/35/7	146/25/12	170/9/4	159/16/8

Mean (standard deviation).

for word from a script. Participants were informed that they had been paired with an anonymous stranger so that they could play a game with them. It was made clear that both they and the other player would receive 10 dollars as a show-up fee regardless of their decisions in the games. No information other than that given on the script was given to the participants. Second, participants were given an envelope with 10 one-dollar bills and 10 slips of paper cut in the size of bills. A ''student assistant,'' who was chosen at random from the group, then instructed individuals to go one by one to a privacy station. Having the student assistant run the experiment was designed to minimize participants' suspicion that the experimenters might be manipulating the procedures. At the privacy station, participants had the opportunity to take any number of dollar bills that they wanted to keep for themselves by putting these in an envelope, and then in their pocket or purse. Any money sent to the recipient was put in a separate envelope, along with slips of paper, so that there was a total of 10 slips: dollars, paper, or some combination. The student assistant then directed the participants to put their envelopes in a box. When all the envelopes were collected, he or she brought the box to another assistant hired by the experimenters who was waiting outside of the room. The student assistant and hired assistant then opened the envelopes and recorded the amount sent. After documenting the decisions, both assistants walked to a neighboring campus building to deliver the envelopes to the recipients waiting in another room.

Results

To reduce the problem of colinearity among our numerous independent variables we conducted a cluster analysis.[5] Table 2 provides definitions and references for the questionnaire items considered in the analysis. Like previous researchers, we found that dimensions of religiosity (intrinsic, extrinsic, and quest) were both orthogonal and reliable. A large and clearly defined cluster included intrinsic religion, early religion, religious participation, orthodox religion, and current religious category. Based on statistical and theoretical criteria, we chose intrinsic religion as the variable that best represented of all these measures. Social desirability as measured by the Marlowe–Crowne scale clustered with the Machiavellian scale. We deemed the latter scale to be the best statistical choice and the most closely associated with theory.

Because contributions were limited to amounts between 0 and 10 dollars in the Dictator game, we adopted a Tobit regression model.[6] We also fitted Tobit models with participants entered as random effects to capture unmeasured individual heterogeneity. Finally, as a method to identify the robustness of our results, we fit OLS regression models. To limit spurious results that occur when fitting many models, we adopted the information-theoretical approach advocated by Burnham and Anderson (2002). This paradigm posits the need to select a priori a subset of models based on theory and experience from prior research. Once candidate models are selected, Akaiki statistics (or other post-estimation measures) can be used to compare models. Because our samples were small, we fit the AIC_c statistic, and from this value calculated the difference between each AIC_c value and the "best" model AIC_c value, or the ΔAIC_c. AIC statistics penalize models with more parameters based on information-theoretic reasoning. Next, we calculated the relative likelihood for every model – given our data – with an Akaiki weight (w_i). Of course, the method provides no way of knowing which model might be a true model; the weighted values simply provide a probability that some models are more likely than other models to explain the data. Finally, we also assessed the model assumptions and goodness of fit for all candidate models.

Like other researchers, we find that a large proportion of participants sent at least some money in the Dictator game, even though the game was anonymous between participants and even the experimenter. Fig. 1 illustrates that although 25 subjects contributed no money, the majority of participants sent a substantial amount of money to their paired partner. We fitted a full model with all of the independent variables as well as two

Table 2. Candidate and Final Variables (Bold) Selected for Models.

Variable	Definition	Items in Scale	Reference
Age	Age in years		
Gender	Male/Female		
Secular participation (Study 1 only)	Number of secular groups participated in: (1) high school and (2) at present		
Economic classes (Study 1 only)	Number of economics courses taken		Frank et al. (1993)
Intrinsic religion	Religiosity measure: religion is an ends in itself (e.g., get close to "God")	9 items; Yes, No, Uncertain	Maltby and Lewis, 1996; Revised Age-Universal Scale
Extrinsic religion	Religiosity measure: religion is a means (e.g., attend church to meet people or get social support)	11 items; Yes, No, Uncertain	Maltby and Lewis, 1996; Revised Age-Universal Scale
Quest religion	Religiosity measure: religion as a source of ongoing exploration	12 items; Yes, No, Uncertain	Batson, Schoenrade, & Ventis, 1993
Early religion (Intrinsic cluster, dropped)	When growing up, how often did you: (1) attend religious training (2) think about God (3) say grace (4) pray (5) attend religious services	8-point scale	
Religious participation (Intrinsic cluster, dropped)	During the past year, how often did you: (1) attend religious services (2) attend religious meetings (3) read or study holy writings (4) make financial contributions to a religious organization	8-point scale	
Orthodox religion (Intrinsic cluster, dropped)	(1) Views of religious texts (2) Degree to which prayer is "speaking to God," directing thoughts to higher power, meditation, self-help, or not meaningful	10 items; 5-point Likert scale	

Table 2. (*Continued*)

Variable	Definition	Items in Scale	Reference
Religious category today (Intrinsic cluster, dropped)	Category the best describes my religion today	6 categories	
Machiavellian	Tendency to deceive and manipulate others for personal gain	20 items; 5-point Likert scale	Christie and Geis (1970)
Marlowe–Crowne scale of social desirability (Mach Cluster, dropped)	Tendency of participant to project favorable images of oneself	13 items; Yes, No	Reynolds (1982)
Post-game (Dictator and Trust games)	Degree to which participant self-reports to understand directions, and trusted that the experimenter would preserve anonymity and send money to other participant	5 items; 5-point Likert scale	Eckel and Grossman (2000)
Religious/Secular group [Rel/Sec] (Study 2 only)	Participant was recruited and participated with a: (1) religious or (2) secular group		
In-group (Study 2 only)	Participants given information about the religious beliefs of the person whom they were paired with		

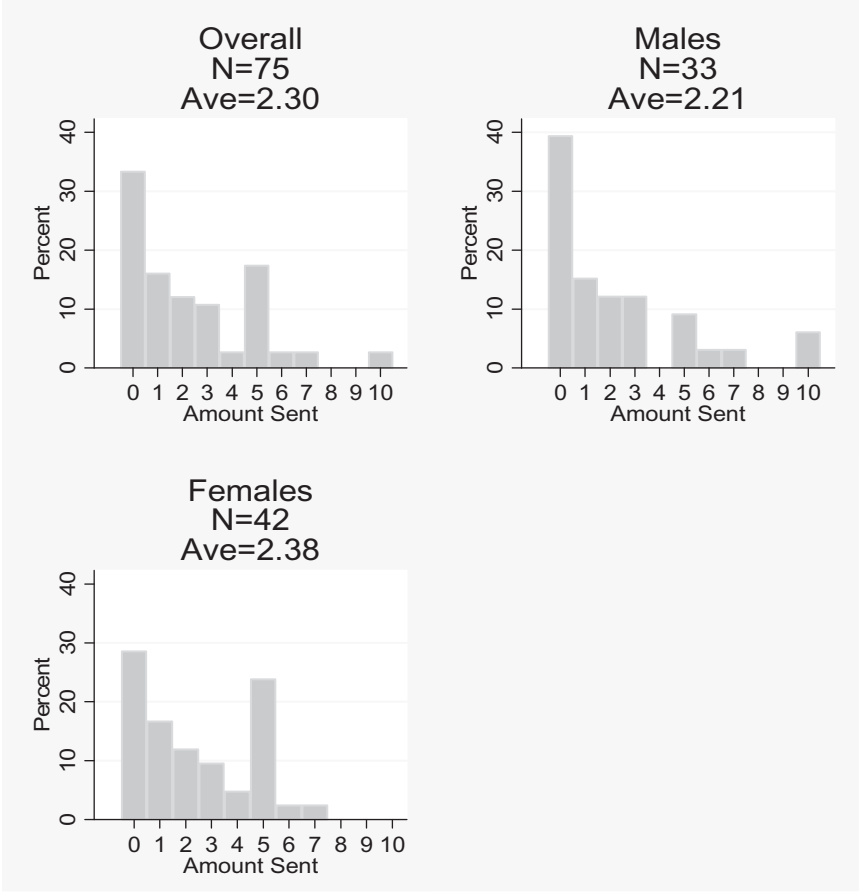

Fig. 1. Study 1 – Dictator Game.

additional models that included only demographic variables or only religious variables. Akaiki weights and goodness of fit statistics indicated that none of the models fitted the data well. Table 3 (third column) presents the results of the full Tobit regression model. We obtained similar results in both the random effects model and the OLS model. In this model, as well as other submodels (e.g., demographic only, religious only), none of the variables reached statistical significance. Since the sample is relatively small, it is worth noting that some of the variables are associated with the Dictator

Table 3. Dictator Game, Study 1 and 2 (Tobit Regression).

Variable Types	Variables	Study 1	Study 2					
		Full model	Demographic	Religion (Individual)	Religion (Group)	Demographic + Religion	Interaction 1	Interaction 2
Demographic	Age	0.2	0.01			0.01	0.01	0.01
		(0.1)	(0.01)			(0.01)	(0.01)	(0.01)
	Gender	−0.28	−0.25			−0.14	−0.13	−0.13
		(0.83)	(0.67)			(0.62)	(0.62)	(0.62)
	Machiavellian	0.02	−0.06			0.02	0.02	0.01
		(0.07)	(0.05)			(0.05)	(0.05)	(0.05)
Demand characteristics	Post-game	0.25	0.40**			0.28*	0.28*	0.28*
		(0.15)	(0.13)			(0.13)	(0.13)	(0.13)
Religion (Individual)	Intrinsic	0.08		0.27***	0.20*	0.17*	0.15	0.18
		(0.09)		(0.07)	(0.08)	(0.08)	(0.11)	(0.11)
	Extrinsic	−0.07		−0.20*	−0.17*	−0.17*	−0.17*	−0.17*
		(0.1)		(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
	Quest	−0.11		0.23***	0.20**	0.18**	0.18**	0.18**
		0.11		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Religion (group)	In-group pairing				1.04	1.18*	0.5	1.17*
					(0.58)	(0.58)	(2.31)	(0.58)
	Rel/Sec group				1.28	1.34	1.36	1.66
					(0.74)	(0.75)	(0.75)	(2.83)
Interaction effects	In-group pairing × intrinsic						0.04	
							(0.14)	
	Rel/Sec group × intrinsic						−0.02	
	N	**75**	**183**	**183**	**183**	**181**	**181**	**181**
	Akaiki weight (w_i)	0.1492	0.000	0.0220	0.05	0.5614	0.1864	0.1791

*$p<0.05$; **$p<0.01$; ***$p<0.001$.Standard errors in parentheses.

game in predicted ways. The intrinsic dimension is positive and the extrinsic dimension is negative. However, unexpectedly, we find a negative, albeit nonsignificant effect for quest.

STUDY 2: DICTATOR AND TRUST GAMES IN AN ORGANIZATIONAL SETTING

This study involved groups of organizational members ranging from 6 to 14 people and was conducted in organizational settings. This study had three important features: (1) all of the groups were recruited through an organization in which they held membership (either religious or secular); (2) the experiment was conducted immediately *after* an organization service or meeting; and (3) the sample included a large number of nonstudents. Our objective with this study was, first, to prime religious versus secular organizational doctrines and values and, second, to invoke any desires people had to maintain the reputation of their group. This priming ought to increase the effects of religious and secular culture on play in the games. Similar to Norenzayan and Shariff (2008), we posit that the link between religion and prosocial behavior is context sensitive. To evaluate the degree to which religious organizations can promote prosocial behavior beyond secular ones, we played the games after an organizational meeting among comembers. We did not expect participants in the religious context to be more prosocial than participants in a secular context.

A second important aspect of this study is that we purposely gave participants information about the religious beliefs of their paired partners in an attempt to test the hypothesis that religion can promote prosocial behavior between different religious populations or out-groups. We predicted that people would be more generous and trusting to paired partners that had similar beliefs about religion.

Participants

One hundred and eighty three participants were recruited by contacting leaders of religious and secular groups (see Table 1). About half of the groups were UC Davis student organizations (churches: 5 groups, $N = 49$; secular clubs: 5 groups, $N = 41$) and the others were community organizations from Davis, CA (churches: 6 groups, $N = 62$; secular clubs: 4 groups, $N = 31$). We explained to the leaders the general goals of our experiment,

and asked them for help recruiting about a dozen of their members following an organizational meeting or service. We did not provide any particular information about our theoretical motives, and stressed that we would give all of the groups a debriefing after they had participated.

Design

Participants played the Dictator game by circling a number on a sheet of paper to instruct the experimenter how much they wanted to send the other player. After making a decision in this game, participants played the Trust game – the first player has the opportunity to send some portion of $10 to a second player. This amount was doubled by the experimenter, and allocated to the second player. Without knowing what amount was sent, the second player then decided how much they wanted to return to the first player for all of the possible amounts that might have been sent to them. The Trust game may measure a tolerance for risk, but likely reflects the degree to which the first player expects the second player to be trustworthy, and return a fair portion. To facilitate a questionnaire-style of administration, a set of recipients for the Dictator and Trust games had already filled out a questionnaire and given us a mailing address so that we could send them money at a later time. These "second-movers" had no decision to make in the Dictator game (they simply received whatever money, if any, was sent to them). However, in the Trust game, these players had to provide amounts that they wanted to *return* to the first player, for all of the possible amounts (0–5 dollars in 50-cent increments) that this person might send at a later time. Using this protocol adapted from Fehr et al. (2002), we were able to immediately pay the Dictators and the first players in the Trust games, and send in the mail any money that their paired partner had received.

This study also included an in-group framing treatment. Half of the participants in each group were given a sentence in their instructions stating that their paired partner had "Religious beliefs and a relationship with God." The other half of the participants read a statement saying that their paired partner had "No religious beliefs and no relationship with God." We acknowledge that this treatment is a simplistic way to manipulate the scope of in-group boundaries; people may be concerned about the type of religion a person is from (i.e., denominations of Christianity or Islam), or how they personally approach their religion. This treatment, however, was designed to evaluate the degree to which prosocial behavior is influenced by a general religious category that extends beyond personal social networks.

After the games were completed, participants were instructed to complete the questionnaire (averaging about 45 minutes). Each subject was then paid in cash and reminded that no deception was used in the study.

Results

Although there were no overall mean differences between the Dictator offers in the two groups, it is unusual that a large proportion of participants from the religious organizations gave away the full 10-dollar amount in the Dictator game (see Fig. 2). In the Trust game, participants from religious organizations sent slightly more money on average than those from the secular organizations (see Fig. 3).

For Dictator and Trust, we used similar statistical methods as described above to fit the full model, and a small set of demographic and religious submodels. We found that only a handful of models had a strong likelihood of being a good model. We were surprised to find that only models with religious variables had high likelihood values and associated Akaiki weights. Table 4 presents the full model that included all of the independent variables. This full model was clearly the best in the post-estimation analysis. The other models presented had small weights and are thus not plausible candidates to explain the data. The results concerning religiosity are highly consistent with Batson et al. (1993). Intrinsic and quest are fairly strong and significant predictors of Dictator gameplay, whereas extrinsic religion is negatively associated with Dictator (see Fig. 4 for bivariate correlations). These variables are consistent across all of the models. In the model that includes demographic measures and both types of religious variables, in-group pairing is also positive, reflecting that individuals who were paired with a religious person sent more money. However, we were surprised that the interaction between intrinsic religiosity and in-group pairing was not significant (Interaction 1). Thus, we found no evidence of an in-group effect; people who were more religious did not seem to favor sending more (or less) money to another religious (or nonreligious) individual. In addition, the interaction between intrinsic religion and the type of group that the respondent participated in was also not significant (Interaction 2). Finally, our ''post-game'' questions that controlled for the demand characteristics of the experiment are positive and significant. These questions measure the degree to which participants self-reported to understand the game instructions and trust that the experimenter would preserve personal anonymity and send money to other participant.

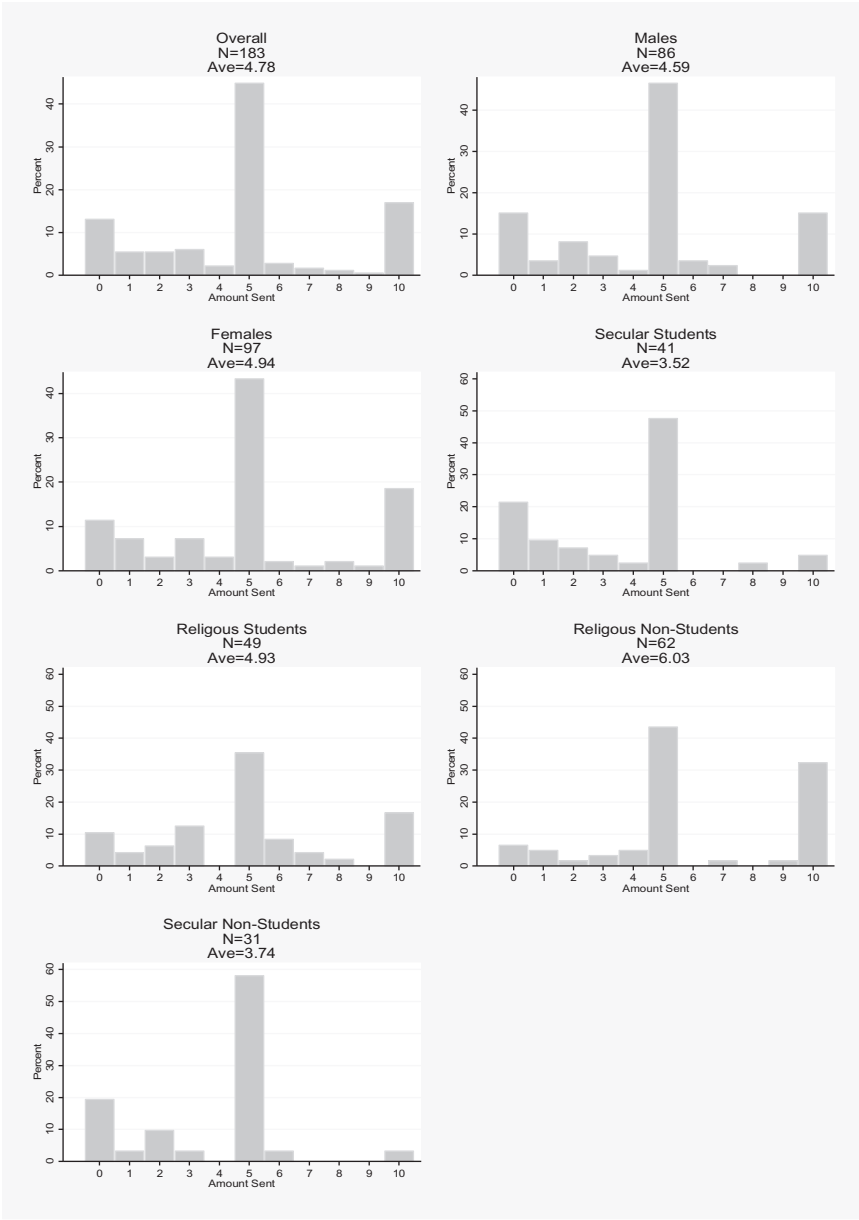

Fig. 2. Study 2 – Dictator Game.

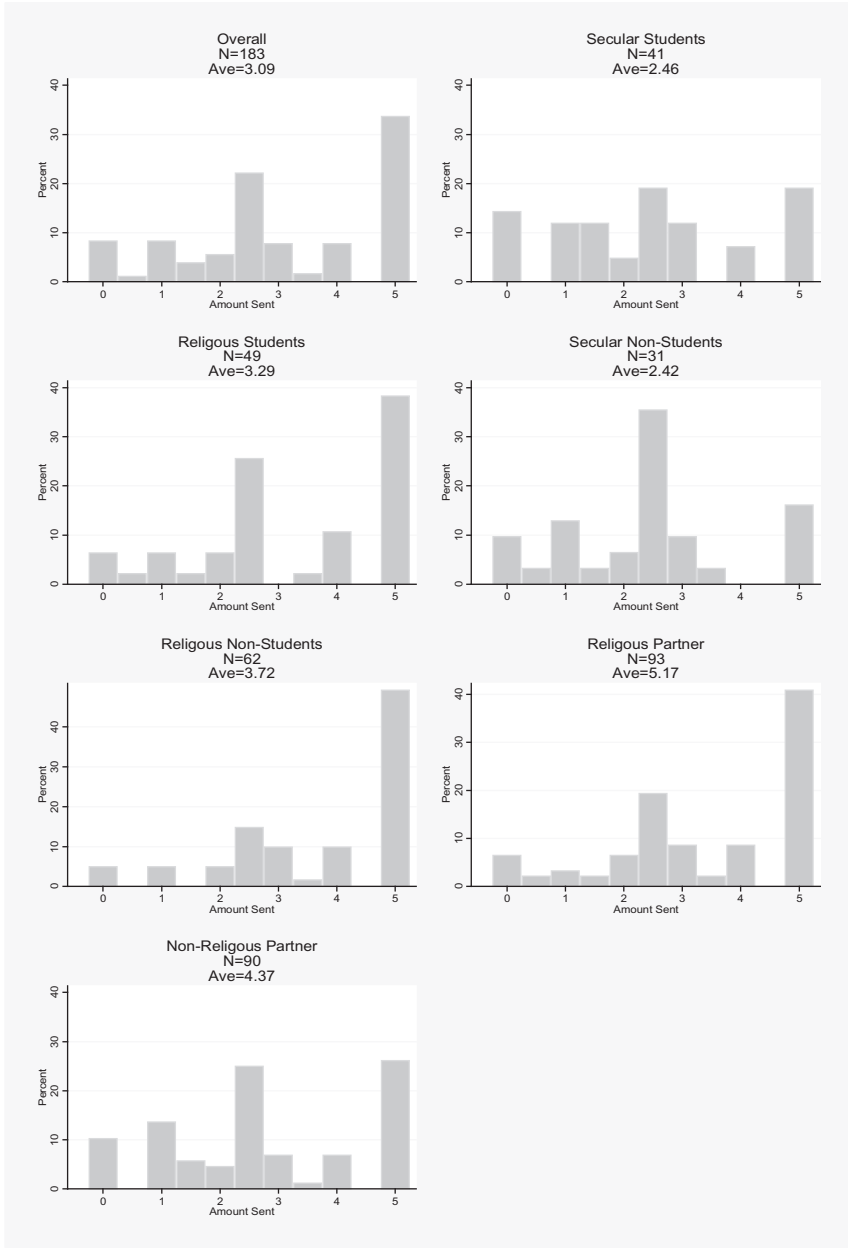

Fig. 3. Study 2 – Trust Game.

Table 4. Trust Game, Study 2 (Tobit Regression).

Variable Types	Variables	Demographic	Religion	Religion + Demographic	Interaction 1	Interaction 2
Investment game	Amount invested	0.18		0.16		
		(0.10)		(0.09)		
Demographic	Age	0.0		0.01	0.01	0.01
		(0.0)		(0.01)	(0.01)	(0.01)
	Gender	0.15		0.18	0.14	0.09
		(0.27)		(0.25)	(0.26)	(0.26)
	Machiavellian	0.0		0.03	0.03	0.04
		(0.02)		(0.02)	(0.02)	(0.02)
Demand characteristics	Post-game	0.12		0.08	0.08	0.07
		(0.06)		(0.07)	(0.07)	(0.07)
Religion (Individual)	Intrinsic		0.06	0.05	0.08	0.01
			(0.03)	(0.03)	(0.05)	(0.05)
	Extrinsic		−0.06	−0.06	−0.07*	−0.06
			(0.03)	(0.03)	(0.03)	(0.04)
	Quest		0.06	0.04	0.05	0.05
			(0.03)	(0.03)	(0.03)	(0.03)
Religion (Group)	In-group pairing		0.66**	0.71**	1.24	0.67**
			(0.25)	(0.24)	(0.95)	(0.24)
	Rel/Sec group		0.74*	0.86**	0.86**	−0.88
			(0.32)	(0.31)	(0.32)	(1.20)
Interaction effects	In-group × intrinsic				−0.04	
					(0.06)	
	Rel/Sec group × intrinsic					0.11
						(0.07)
	N		181	179	181	181
	Akaiki weight (w_i)	0.000	0.000	0.9885	0.0030	0.0082

*$p<0.05$; **$p<0.01$; ***$p<0.001$. Standard errors in parentheses.

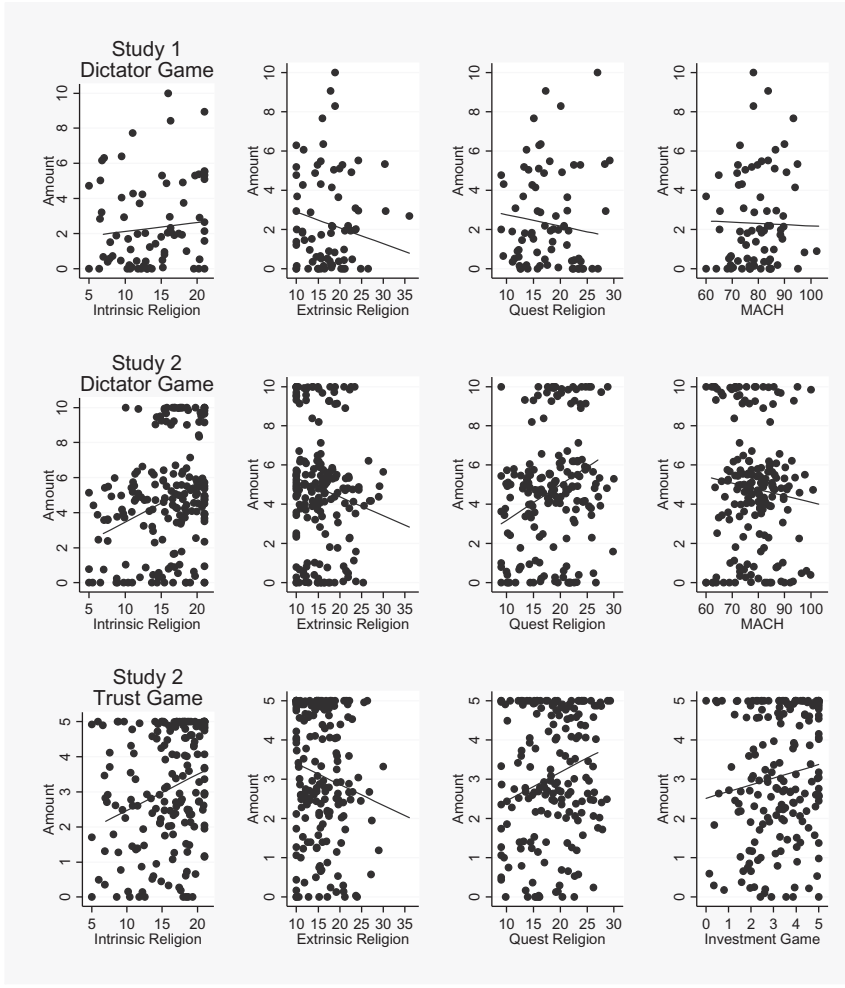

Fig. 4. Studies 1 and 2 – Summary Scatter Plots.

We interpret this to mean that individuals who think the games are easy to understand, and who trust that the experimenter will do as he or she said, send more money in the Dictator game.

The Trust game results differ substantially. The parameter estimates in Table 4 show that no individual-level variables were associated with Trust,

even when the full model was the winner of the post-estimation process. The demand characteristics, or having more trust in the experimental setup, led to slightly more money sent in the full model. Concerning religion, both the in-group pairing variable and group-level variable were significant. This suggests that people were more likely to send money to someone who reported to be religious. In addition, people who played the game with religious comembers were more likely to send money to the second player. Overall, being in a religious group situation, and being paired with a religious person, led to greater interpersonal trust. However, like the results above, we were surprised that we did not find positive interaction effects between individual-level measures of religiosity and the group-level religious variables. Finally, we had participants play an investment game to measure their preference for risk.[7] This allowed us to assess the degree to which the game really measures trust in contrast to risk. Since the risk game was not associated with trust, we are confident that we measured interpersonal trust rather than risk aversion.

STUDY 3: PUBLIC GOODS GAME

We used a Public Goods game that doubled contributions to a public account and distributed payoffs equally among participants. The participants had initial endowments of 5 dollars, participated in five-person groups, and each experiment ran for 10 rounds (with the end time known to all participants). All decisions and communications were anonymous. Our study differed from other PGG studies in the literature in three ways: AU :4 (1) participants sat around a table facing one another; (2) interactions did not involve computers; and (3) all decisions were made with real money. For a project related to the evolution of cooperative institutions, we conducted numerous experimental treatments that varied the context of the Public Goods game. In general, we varied the opportunity to (1) communicate with written messages; (2) reward and punish with two types of sanctions; and (3) obtain written advice from a previous group. Although the experimental treatments are complex and multifaceted, the experiments are general enough to be analyzed together in this chapter to evaluate the degree to which religious and personality variables are associated with cooperative behavior. Given the anonymity of decisions in this experiment, and few social cues to prime religious or secular institutions, we did not expect to find any strong relationship between religiosity and cooperation.

Table 5. Summary Statistics for Study 3.

	Aggregate	Baseline	Communication	Positive Sanctions	Neutral Sanctions	Advice
N	255	35	30	75	60	55
Contribution	7.3 (3.5)	5.6 (3.7)	7.9 (3.2)	7.2 (3.5)	7.3 (3.5)	8.3 (3.3)
Age	19.6 (2.3)	19.3 (1.2)	19.6 (1.3)	19.5 (1.8)	20.1 (3.6)	19.4 (1.5)
Intrinsic	15.0 (4.4)	15.0 (4.1)	15.2 (4.4)	14.1 (4.6)	15.4 (4.2)	15.8 (4.4)
Extrinsic	21.0 (4.1)	21.0 (3.5)	20.8 (3.9)	20.0 (4.2)	21.8 (4.4)	21.3 (4.1)
Quest	20.8 (4.3)	21.5 (4.5)	20.2 (3.8)	20.7 (4.2)	20.8 (4.4)	20.6 (4.3)
Mach	75.0 (8.3)	74.8 (6.2)	75.3 (8.6)	76.3 (7.8)	73.8 (9.0)	74.3 (8.7)
Female/Male (#)	159/96	24/11	21/9	44/31	35/25	35/20

Mean (standard deviation).

Participants

Two hundred and fifty-five participants were recruited from a subject pool operated by the Department of Psychology at the University of California, Davis (see Table 5). Each student received one experimental credit used toward his or her class, as well as any money in cash earned in the experiment. Similar to Study 1, participants were not told that they might earn money in the study until after they had arrived.

Design

Participants sat around an 8-foot square table. Each was seated in front of cardboard box to conceal his or her choices and messages during the course of the experiment. To prevent suspicions that real money was not involved, we created ''transaction boxes'' for the subjects that allowed them to transfer real nickels in each experimental round while hiding their decisions from other subjects. These were constructed using plastic boxes with foam inserts. Inside the lid of the box was a map to illustrate how nickels should be moved to transfer money to the public account and how nickels would be returned from the public account. The subject placed nickels into a row of slots cut into the foam for ''Contributions to the Public Account,'' and, when sanctions were included, into another row of slots labeled ''Option Payments'' to pay for the use of an option. Finally, when options were included, an additional row was filled with an initial endowment of 20 nickels from the individual's private account before the start of the game.

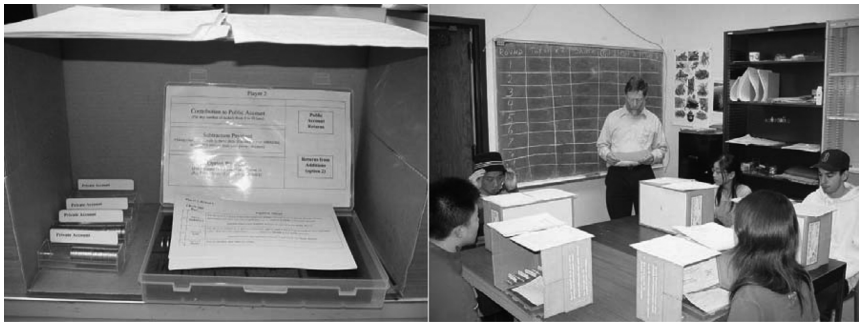

Fig. 5. Study 3 – Experimental Setup.

These allowed the researcher to subtract nickels from the subject if another participant's rule specified subtraction. Two small bins were cut out of the foam and labeled, ''Public Account Returns'' and ''Returns from Additions,'' respectively. Any money earned from the public account or from the reward option was returned to the subject in these bins. In this way, each subject would be able to count the number of nickels received each round from the public account and from the option producing additions to other people's accounts. The researcher carefully showed each participant how to use the box, and any errors were quietly corrected when the researcher collected the boxes (see Fig. 5).

Each participant also had a manila ''communication folder'' that contained pages with numbered spaces to allow the writing of a message after each round. In the treatments with advice, the last page included instructions and a full page of space to leave advice for the next group about how to play the game. In the treatments with sanctions, each subject also had a stack of option sheets on which he or she checked one of three options: subtraction (punishment), addition (reward), or neither. The boxes for punishment and reward included space for indicating the contributions below or above which sanction should occur.

Public Goods Game

After giving consent, five participants sat around the table, each in front of a cardboard box. To explain the game, the experimenter read word for word from a script. The script pointed out that each participant's cardboard box

contained four plastic trays labeled "Private Account" and that two of these held nickels totaling 5 dollars. The script emphasized that this was their money and that this fund could either grow or diminish depending on the decisions made by them and the other participants. Next, they were told that the experiment involved no deception; all of the information was true, and they would receive in cash their final amount at the end of the experiment.

Participants were told to consider making a contribution to the pubic account. They were to take between 0 and 10 nickels from their "Private Account," and place them in the transaction box slots labeled "Contribution to Public Account." The script read: "At end of each round, the researcher will sum all of the public account contributions, double this amount, and then distribute it equally to each individual." The researchers displayed on a chalkboard the aggregate results of the round [total contribution to the public account (n), double that amount, the share that each individual received ($n/5$), and the total number of individuals that chose each option]. Finally, individuals were asked to open up their "communication folder" and write a message to the other participants "concerning how decisions should be made in this experiment." If they had nothing to say, they were asked to write "no message" to help preserve anonymity in the event that only a few people chose to write messages. When complete, the researcher gathered the folders from participants, shuffled the folders to preserve anonymity, and read aloud word for word all of the messages. As discussed below, in some of the treatments, participants had the opportunity to use "options" in which they could reward and punish other players.

Experimental Treatments

There were five types of treatments (number of 5-person sessions in parentheses): Baseline (7), Communication (6), Positive Sanctions (12), Neutral Sanctions (15), and Advice (11). First, in the *Baseline* treatment, groups were not allowed to communicate, and did not have any options to influence the payoffs of other participants. All of the other treatments allowed participants to communicate with written messages. In the treatment called *Communication*, participants only had the option to communicate with written messages, and could not use any sanctions. We created two treatments that varied the costs and types of rewards and punishments that participants could use. In the *Positive Sanctions* treatment, participants could earn revenue directly from the reward system. In the

Neutral Sanctions treatment, the sanctions offered the opportunity to increase levels of cooperation, but participants could not gain money by rewarding one another. In both of these treatments, individuals had the opportunity to add, subtract, or take no action. The options labeled "Subtract" and "Add" stated that the participant could pay a specific number of nickels to have the researcher take away (or add) money to individuals' accounts who contributed less (or more) than a specific amount to the public account. Finally, in the *Advice* treatment, we gave groups the opportunity to transmit advice to another group about how the game should be played. After a group had participated in 10 rounds, they were instructed to write a message in their communication folder that would be read aloud to a future group of participants. Except for the first (progenitor) generation, each group heard all five pieces of advice from the previous generation read aloud before the first round.

Results

A participant's contribution in round $T+1$ is likely influenced by a number of factors that occurred in round T (and possibly earlier rounds). For example, it is possible that contributions by other players in previous rounds might lead a participant to contribute more or less in the following round. Our design adds the additional complexity of experiencing communication, rewards, and punishments in each round. Thus, it is also plausible that communication and various sanctions in previous rounds influence future decisions. To understand the role of these forces, we adopted a panel data regression design (Ashley, Ball, & Eckel, 2003). Random-effects Tobit models were used to predict the degree to which contributions were influenced by a variety of variables that were lagged to account for behavior in the previous rounds ($T-1$, $T-2$, $T-3$). These include (1) a participant's own contribution in earlier rounds; (2) the deviation of a player's contribution from the group average; (3) the amount and type of messages; and (4) the amount and type of sanctions administered. The models accounted for numerous "nuisance" variables such as round, overall contributions in early rounds, and dummy variables to control for all of the various treatments involving communication and sanctions. The individual-level questionnaire data were then treated as static trait variables for each subject, and allowed us to explore the degree to which such factors contribute to game dynamics.

Scatter plots (not shown) did not evidence any strong relationship between individual-level variables and contributions to the public fund. Because the Public Goods game involves interdependent decision-making processes, it is important to evaluate the degree to which such forces influence behavior after controlling for the behavior and decisions of others in the group. Table 6 shows the results from the Tobit regression models. The model labeled "Aggregate" contains all of the treatments in one model. With 2,550 total decisions, the model illustrates that intrinsic religion and Machiavellian personality have marginally significant, and very small, positive associations with contributions to the public account controlling for the decisions of others in the game. The other models are stratifications of the treatments. The Baseline model is the most interesting in that all three of the religion variables are significant, yet not in the directions expected by previous research. Batson et al. (1993) and many others show that extrinsic religion is negatively associated with prosocial behavior, whereas quest is found to be positive. The other models differ with regard to effect sizes and significance, thus it is plausible that sampling error is partly driving the results. The strongest effects occur in the Baseline treatment where the individual-level variables are less constrained by the institutional forces added in the other treatments. Overall, the effects are small and inconsistent, and we conclude that personality and religious variables are not strongly associated with contributions in the Public Goods game.

DISCUSSION

Group-Level Effects: Religious versus Secular Institutions

Like Darwin (1874), we suspect that secular institutions can promote prosocial behavior just as well as religious institutions. The effect of Christianity and Islam beyond tribal religions in the study by Henrich et al. (2010) might be related to the weaker secular institutions in many of these societies. To test this idea among Western participants, in Study 2 we purposely primed participants from both religious and secular organizations by having them play the games directly after one of their organizational meetings. For the Dictator game, as expected, we found no striking difference between these groups, although more participants offered the full 10-dollar amount following a religious meeting. Similar to the findings of Shariff and Norenzayan (2007), the priming of secular institutions seems to promote prosocial behavior equally well as the priming of religious

Table 6. Public Goods Game, Study 3 (Tobit Regression).

Variable Types	Variables	Aggregate	Baseline	Communication	Positive Sanctions	Neutral Sanctions	Advice
Game rounds	Time	−5.60***	−1.37	−6.55***	−7.44***	−7.21***	−6.00**
		(0.47)	(0.78)	(1.41)	(0.97)	(0.82)	(1.91)
PG contributions	Deviance from group (Lag 1 round)	0.59***	0.51***	0.68*	0.58***	0.52***	0.53
		(0.07)	(0.12)	(0.27)	(0.15)	(0.13)	(0.37)
	Own contribution (Lag 1 round)	1.74***	1.25***	2.02***	1.58***	1.55***	2.56***
		(0.06)	(0.1)	(0.25)	(0.13)	(0.11)	(0.37)
Religiosity	Intrinsic	0.07*	0.20***	0.12	−0.12	−0.04	0.24
		(0.03)	(0.06)	(0.09)	(0.08)	(0.06)	(0.16)
	Extrinsic	0.04	0.16*	0.07	0	0.08	0.1
		(0.03)	(0.07)	(0.11)	(0.07)	(0.06)	(0.15)
	Quest	−0.05	−0.20***	−0.15	0.19**	−0.02	−0.27
		(0.03)	(0.05)	(0.12)	(0.07)	(0.05)	(0.15)
Personality	Machiavellian	0.03*	0.06	0.11*	0.02	0.02	−0.02
		(0.02)	(0.04)	(0.05)	(0.03)	(0.03)	(0.08)
	Constant	−3.80*	−6.61	−10.72	−2.71	−1.24	−1.37
		(1.66)	(3.63)	(5.91)	(2.96)	(2.89)	(7.6)
	Sigma constant	5.40***	3.65***	5.17***	5.40***	5.06***	8.98***
		(0.15)	(0.19)	(0.43)	(0.3)	(0.24)	(0.8)
	N	2550	350	300	600	750	550

*$p<0.05$, **$p<0.01$, ***$p<0.001$. Standard errors in parentheses.

institutions. In contrast, greater interpersonal trust was found among participants in the religious group situation, and when people were told that they had been paired with a responder who reported to be religious. Thus, we have some evidence that group- or institution-level forces influence trust.

Weak Effect of Religiosity Measures on Prosocial Behavior

In general, our religiosity measures are not consistently associated with behavior in the games, and when they are, the effect sizes are small. Indeed, behavior in the Trust game was not associated with individual-level variables at all. Thus, after holding constant other demographic forces, religiosity is not a strong predictor of gameplay among strangers. It is also important to note the lack of strong explanatory power among the demographic and personality variables. We did not find age or gender to be a significant factor in our experiments. From our theoretical perspective these results make sense; visible personal traits such as gender or religion would make people vulnerable to exploitation and punishment for prosocial or antisocial behaviors. Concerning personality, a substantial literature suggests that Machiavellian personality traits may associate with antisocial behavior (Wilson, Near, & Miller, 1996). However, similar to Gunnthorsdottir, McCabe, and Smith (2002), we find no evidence of this in either of our experiments. This is surprising since this scale intuitively ought to predict behavior in the Dictator game; people sending a small amount of money would seemingly rationalize their behavior with the constructs specified in the Machiavellian scale.

Although we believe that our main result is that the association between religiosity and prosocial behavior is weak, it is important to note that in the experiments that included organizational context (Study 2), we did find some small effects of religiosity. Using the Dictator game, we found like others (Batson et al., 1993), intrinsic and quest dimensions are positive predictors of Dictator gameplay, whereas extrinsic is negatively associated with Dictator. In contrast, these variables were not significant in Study 1. We conducted a power analysis for the multiple regression coefficients to identify what power we had to detect a 0.27 correlation for intrinsic religion as was found in Study 2. Given our models and sample size of 75, we have a power of about 0.60 to detect this effect – it is unlikely that we are missing strong real effects of religiosity in Study 1.

Although our research designs in Study 1 and Study 2 differ substantially, we cautiously compare the results between the studies.[8] Given that

participants played the games in the context of their organization, Study 2 conforms to Norenzayan and Shariff's (2008) prediction that people who have immediate access to their religious thoughts are more prosocial. Moreover, when playing the games with organizational members, participants may have behaved more in congruence with how they really behave within their churches and secular clubs; intrinsics give more, whereas extrinsics give less. When framed in the perspective of one's organizational history, participants might have been less wary of displaying their real prosocial and antisocial markers. This follows the game theoretic assumption that displaying group affiliations and associated traits such as being generous (or stingy) can leave a person vulnerable to exploitation or punishment. As a result, when people are outside of known social networks, their religious traits are not expected to be associated with prosocial behavior.

Effect of In-Group Pairing

We expected to find evidence that giving players information about the religious beliefs of their paired partners would affect gameplay in Dictator and Trust. However, there was no significant interaction between a player's reported religion and who they were paired with in the Dictator game. Yet in the Trust game, only group-level variables seemed to have any influence: trust in the experimental setup, being in a religious group while participating, and being paired with someone religious. Since we found no evidence of an in-group effect (i.e., sending more money to someone with similar beliefs as your own), we interpret the results to mean that both religious and secular people trust religious people, and people who are around their religious peers feel more trusting. Once again, the effects are weak, but it is plausible that religious (and nonreligious) people have experienced the cooperative nature of religious individuals, and are thus more likely to trust them. Overall, the effect of religious pairing is inconsistent and likely complex, yet the results do not allow us to reject the theoretical assertion that religion generates patterns of prosocial behavior among people from similar cultural in-groups. Our results are consistent with Anderson et al. (2010) who found no association between religiosity measures and the Trust game. In contrast, Tan and Vogel (2008) did find a significant relationship between religiosity and trust. Their design gave information about the level of religiosity of the other players using a 5-point scale. This information, as well as other subtle characteristics of their study

design, may have reduced the effects of anonymity found in our study design. More research will be required to fully understand how the context of study designs influences the effect of religion on trust.

CONCLUSIONS

We administered the Dictator, Trust, and Public Goods games to a large and diverse sample of participants. Like many other researchers, we found that many people are prosocial; participants share money in the Dictator game, are trusting in Trust, and are often very cooperative in the Public Goods game. In this research, we conducted three studies. First, we were interested in evaluating how individuals' religiosity impacts generosity. We used a double-blind Dictator game in which neither players nor the researcher knows game decisions. This design reduces the reputation-effects as stressed Norenzayan and Shariff (2008), but also provides little real-world context; student participants play the game among strangers in a neutral university setting, and have no information about their paired partners. Given this design, we were not surprised that religious variables were not associated with Dictator game offers. In our second study, individuals played the Dictator and Trust game with comembers following a religious or secular organizational meeting. Secular and religious participants were about equally prosocial in the Dictator game, thus we find little evidence that religious institutions promote more generosity as compared to secular institutions. We did, however, find that participants who played the Trust game in a religious setting or who were paired with a religious person were slightly more trusting. In this study, we also included an in-group treatment in which we provided information about the religious beliefs of the paired partners. We found no evidence of an in-group effect – religious participants were not more generous or trusting of paired partners with similar beliefs. Although it is difficult to compare our results to our first study, we did find that individual religiosity variables were associated in predicted ways with gameplay. It is possible that religiosity dimensions are mainly important when people are within the context of religious organizations, and our experiment provided some of this context. Finally, we have a large sample of students playing various treatments of a Public Goods game that allowed face-to-face individuals to communicate via written messages, reward and punish others, and receive advice from other groups of students about how to play the game. We found a weak relationship between religion and cooperation in our Baseline treatment, and no effect in the other treatments.

Although we found a few weak effects of religiosity in the study that added organizational context, we believe that our sample as a whole provides evidence for our hypothesis that religious institutions, and the effect these have on individual dimensions of religiosity, are not a strong force to explain generosity, trust, and cooperation among individuals paired within unknown social networks. Although many of these individuals reported to be religious (and in some of our treatments, they were in real religious settings), their proclivity for prosocial behavior was similar to that of secular participants. Based on evolutionary theory, we are not surprised by these results. Although humans may have group-level adaptations that promote prosocial behavior within social groups such as church organizations, individuals may be cautious not to let such behavior spill over to other social transactions where they might be exploited. It can be dangerous to advertise our prosocial or antisocial intentions as these allow people to be exploited for their generosity or punished for their uncooperativeness.

Overall, these results conform to the majority of experimental economic studies, and are consistent with recent cross-cultural results. Cross-cultural studies using economic games show large effects with sensible interpretations (Henrich et al., 2005). In cross-cultural studies using economic games, individual-level variables explain much less total variation than does group-level variation. We think it is likely that, when playing with fellow students and fellow citizens, people from a diverse civil society use nonreligious norms and expectations to guide their play in the games. Our participants play the games much the way student and nonstudent Americans and Western Europeans do.

NOTES

1. Group selection on *cultural* variation is much more probable than group selection directly on genes (Boyd & Richerson, 1985). Cultural differences between groups are large, evolve rapidly, and often lead to sharp adaptive differences between groups. In the late Pleistocene, sophisticated cultural systems led to the evolution of social institutions mandating a certain amount of cooperation beyond the ancient systems of reciprocal altruism and nepotism. These cultural institutions favored genotypes that were capable of cooperation, and gradually the coevolutionary process built human "social instincts" that were adapted to living in tribal-scale social systems much larger than families (Richerson & Boyd, 2005).

2. Some scholars are not convinced that social institutions are necessary to police free riders and achieve cooperation. They observe that participation in religious rituals and meetings is often costly, and such behavior serves the purpose of defining

religious groups, and to keep the public goods inclusive to only those members who make public sacrifices (Alcorta & Sosis, 2005; Iannaccone, 1992, 1998). In addition to costly signaling, cultural group selection is likely to be an important force because individual-level mechanisms by themselves are unlikely to maintain cooperative behavior (Paciotti & Hadley, 2004).

3. Researchers have explored the links between behavior in experimental games and personality scales developed by psychologists. Kurzban and Houser (2001) used a circular pubic goods game and found that player types are correlated with self-monitoring, self-esteem, neuroticism, and conscientiousness. De Cremer and Van Lange (2001) used the three categories of social value orientation – prosocial, individualistic, and competitive – to predict variation in public goods games. Individuals who were typed as "prosocials" contributed more to the public fund than did the "proselfs." Brandstätter and Konigstein (2001) used a variant of the Ultimatum game and found that some dimensions of the Cattell's personality dimensions predict bargaining behavior. Proposers scoring higher on independence and tough-mindedness demanded more money in the game. Rejection of Ultimatum game offers was associated with persons who were emotionally unstable and extroverted or emotionally stable and introverted. In other research, Boone, De Brabander, and van Witteloostuijn (1999) looked at behavior in five Prisoner's Dilemma games. They found that personality measures of internal locus of control, high self-monitoring, and high sensation seeking were associated with cooperative behavior in repeated games, but not in games with noninteractive settings. Gunnthorsdottir et al. (2002) use a Machiavellian scale to predict behavior in a two-person Trust game. They found that the Mach-IV scale does not predict trusting behavior. Those who score low on the scale, however, are more likely to reciprocate trust.

4. The procedures used by Hoffman et al. (1994) forbid the researcher from even knowing the decisions made by particular individuals. In our procedures, however, we include a questionnaire. Thus, depending on the characteristics of our groups, it might be possible for the researchers to learn the decisions made by individuals by using information related to age, gender, and ethnicity and other identifiable traits.

5. To reduce the problem of colinearity among the remaining variables, we conducted a cluster analysis using *Proc Varclus* in SAS software. Once clusters were formed, we chose a number of final clusters based on analyses of eigenvalues and the cumulative proportion of variance that was explained for each cluster (Pasta & Suhr, 2004). We then selected one variable from each multicluster group. This selection was based on theoretical importance, as well as the variable that had the strongest correlation with its own cluster and weakest correlation with other clusters. We also performed principal components and factor analyses to compare the results. Overall, we found very similar patterns using these conceptually similar methods.

6. Tobit regression models assume that a latent variable extends beyond the censored ranges. Censoring is especially important in the upper limit because a large fraction of participants choose the highest amount to send, and a few participants informed us that they would have liked to send the other player more money than was allowed. All models were fit using STATA software version 9.1.

7. Before completing the questionnaire, participants played an investment game designed to be a measure of risk tolerance. We used this game to help us interpret the

degree to which the Trust game is driven by risk, or by interpersonal trust. In this game, players could choose to invest in an old or new variety of corn. Any money from the 5-dollar amount invested in the old variety would be paid to the participant (with no risk) at the end of the experiment. The payoff for the new variety was decided by the random selection of one number from six. Each number was clearly described in the game script to correspond to a multiplier (0, 0.5, 1, 1.5, 2, and 2.5) that would be multiplied by the amount of money invested. For example, a person who invested \$2.50 in the new corn and drew a "3" would receive $(2.5 \times 1) + 2.5 = \$5.00$.

8. Study 1 involved mainly undergraduates who were recruited for class credit, whereas participants from Study 2 were offered money and recruited based on their organization. In addition, the game methodology differed substantially (double-blind vs. survey), and the social context was substantially different (university lab setting vs. organizational context).

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