



## Original Article

Supernatural and secular monitors promote human cooperation only if they remind of punishment<sup>☆</sup>Onurcan Yilmaz<sup>\*</sup>, Hasan G. Bahçekapili<sup>\*</sup>

Department of Psychology, Dogus University

## ARTICLE INFO

## Article history:

Initial receipt 11 July 2015

Final revision received 16 September 2015

## Keywords:

Evolution of cooperation

Prosociality

Religious priming

Secular priming

Supernatural punishment

## ABSTRACT

People's large-scale cooperation with genetically unrelated people is widely assumed to lie beyond the scope of standard evolutionary mechanisms like kin selection and reciprocal altruism and to require mechanisms specific to human sociality. The emergence of the idea of being monitored by supernatural agents who can punish social norm violations has been proposed as one solution to this problem. In parallel, secular authorities can have similar functions with those of religious authority based on supernatural agents in today's secularized world. However, it is not clear whether it is the idea of religious or secular authority in general or the punishing aspects of both institutions in particular that leads to increased cooperation and prosociality. Study 1 showed that people reported more prosocial intentions after being implicitly primed with punishing religious and secular authorities (versus non-punishing ones or a neutral one) in a scrambled sentence task. Study 2 showed that explicitly priming the punishing aspects of God (versus the non-punishing aspects or a neutral prime) led to an increase in the level of prosocial intentions. The findings support the supernatural punishment hypothesis and suggest a similar mechanism for the influence of secular authority on prosociality. More generally, the findings are consistent with views that punishment, whether real or imagined, played an important role in the evolution of large-scale cooperation in the human species.

© 2016 Elsevier Inc. All rights reserved.

*Those who reject our Signs, We shall soon cast into the Fire: as often as their skins are roasted through, We shall change them for fresh skins, that they may taste the penalty: for Allah is Exalted in Power, Wise*  
 [(Quran, 4: 56)]

## 1. Introduction

Kin selection (Hamilton, 1964) and direct (Trivers, 1971) and indirect reciprocity (Nowak & Sigmund, 2005) are some of the mechanisms most commonly invoked to explain the evolution of cooperation among humans and non-human animals. However, those mechanisms are largely inadequate to explain the type of large-scale cooperation and norm-compliant behavior commonly seen in human societies. In this type of cooperation, non-kin sometimes come together for altruistic acts in one-shot and anonymous interactions where the possibility of reciprocation or reputation building is either minimal or non-existent.

<sup>☆</sup> We thank Ceren Naz Senaydin, Emine Hilal Hacıoğlu, Gamze Unal, Ozge Kasirga, and Ozlem Kayan for their help in data collection, and Gergely Czukor and two anonymous reviewers for their helpful comments on an earlier version of the manuscript.

<sup>\*</sup> Corresponding authors. Department of Psychology, Dogus University, 34722, Acibadem, Istanbul. Tel.: +90 216 444 7997; fax: +90 216 544 5533.

E-mail addresses: [oyilmaz@dogus.edu.tr](mailto:oyilmaz@dogus.edu.tr) (O. Yilmaz), [hbahcekapili@dogus.edu.tr](mailto:hbahcekapili@dogus.edu.tr) (H.G. Bahçekapili).

One of the recent proposals to solve the puzzle of large-scale cooperation is the supernatural punishment hypothesis (SPH; Johnson & Krüger, 2004; Johnson & Bering, 2006; Johnson, 2009, 2011; Schloss & Murray, 2011). According to this hypothesis, it becomes impossible to monitor every action and punish every transgression of group members in large groups. However, the idea of a supernatural monitor who oversees every human action and is capable of punishing every transgression can keep everyone in line. Thus, it is plausible that the idea of supernatural punishment (meted out through a supernatural agent like God) evolved to allow large scale cooperation in human societies. This implies that one major impetus in the cultural evolution of large-scale cooperation is belief in supernatural punishment (cf. Norenzayan, 2013).

The relation between religious thought and cooperative/prosocial behavior has been well-researched in the experimental literature. In one of the first studies, Randolph-Seng and Nielsen (2007) showed that religious primes presented subliminally make participants cheat less in a subsequent task. However, there was no relation between religiosity as a trait and cheating behavior in the group that did not receive religious primes. In another study, Shariff and Norenzayan (2007) demonstrated that implicit priming of both religious and secular authority in a sentence unscrambling task led to greater donations in a dictator game. Although it is known that punishment is an effective tool for large-scale cooperation (Boyd, Gintis, Bowles, & Richerson, 2003; Fehr & Gächter, 2002; Johnson, 2005; Krasnow, Delton, Cosmides, & Tooby,

2015; Sigmund, Hauert, & Nowak, 2001; Yamagishi, 1986; however, see Guala, 2012), little is known about the necessity of the punishing aspects of the supernatural agent who sets certain moral rules.

A very similar account to SPH, the supernatural monitoring hypothesis (SMH; Gervais & Norenzayan, 2012a; Norenzayan & Shariff, 2008) rests on the assumption that the idea of being watched by supernatural agents has an effect similar to being watched by other people. It is well-established that even subtle cues of being watched lead people to behave more prosocially (e.g., Bateson, Nettle, & Roberts, 2006; Haley & Fessler, 2005). Religious priming has an effect similar to being under social surveillance (Gervais & Norenzayan, 2012a; Norenzayan, 2013). These findings are consistent with the SMH. Whether the supernatural agent has to be punishing to promote prosociality is less clear (see also Johnson, 2014; Norenzayan, 2014).

Pichon, Boccato, and Saroglou (2007) claim that only positive religious priming, and not religious priming in general, leads to prosocial behavior. They support their claim by demonstrating that positive religious words (e.g., prayer, heaven), but not neutral religious words, increase charitable donations. Similarly, Harrell (2012) demonstrated that the priming of only reward-related religious and secular institutions increases generosity.

In a more recent study (Johnson, Li, Cohen, & Okun, 2013), benevolent and angry aspects of God were primed with religious art. It was seen that, among non-Catholic Christians, a benevolent God increased prosocial behavior whereas an angry God increased aggressive tendencies. However, although explicit primes were used, the participants' moods were not controlled. It is therefore not clear whether the participants displayed more prosocial behavior or reported more aggression because they encountered a relevant religious symbol or because their moods changed as a result of religious priming. In any case, the findings are inconsistent with the SPH because the hypothesis would predict more prosocial tendencies after the priming of an angry and fear-inducing (and thus potentially punishing) God. The study, on the contrary, found that it is the positive and reward-related aspects of religion that are associated with prosociality.

In contrast to the studies mentioned above, there are findings suggesting that the fear of supernatural punishment is what makes supernatural monitoring an effective device of social regulation. For example, people who think God has primarily a punishing and fearful character tend to cheat less on an academic task, whereas those who think God is primarily forgiving tend to cheat more (Shariff & Norenzayan, 2011). A world-wide survey indicates that national crime rate correlates negatively with belief in hell whereas it correlates positively with belief in heaven (Shariff & Rhemtulla, 2012). In a study covering 186 different cultures, belief in a punishing God was associated with increased cooperation and decreased selfish behavior (Johnson, 2005; see also Atkinson & Bourrat, 2011). These findings suggest that the relation between religion and prosociality is established through the punishment related aspects of religion. One goal of the present study is to test the necessity of the punishment aspect of the supernatural agent by seeing whether the activation of punishing and non-punishing religious authority increases prosocial tendencies.

There is also evidence that modern secular institutions can have a similar effect to religion (Norenzayan, 2013; Shariff & Norenzayan, 2007). In many modern societies, secular authority has overtaken the role of punishment from religious authority. This is especially so in societies where the role of religion has been mostly reduced to the personal sphere and where interpersonal relations are regulated on the basis of trust in secular institutions. For example, in a highly secular region like Vancouver, Canada, reminding people of secular authority reduces their distrust in atheists (Gervais & Norenzayan, 2012b). Similarly, trust in secular rules reduces political intolerance toward atheists (Norenzayan & Gervais, 2015). The implication is that, although atheists may not be trustworthy themselves, the existence of trustworthy secular institutions will keep them in check. The potential of secular institutions to increase prosocial behavior has already been mentioned (Shariff

& Norenzayan, 2007). There is evidence that government and religious authorities are interchangeable in people's minds as well, where a decrease in belief in one automatically leads to an increase in belief in the other (Kay, Shepherd, Blatz, Chua, & Galinsky, 2010). What is not clear at this point is whether it is the idea of secular institutions in general or the punishing aspect of secular institutions in particular that leads to increased cooperation and prosociality. A second goal of the present study is to provide an answer to this question.

In the present study, we examined the effect of both punishing and non-punishing aspects of religious and secular authority on prosocial behavior tendency at both implicit and explicit levels. In Study 1, a sentence unscrambling task was used to implicitly prime punishing and non-punishing religious and secular concepts. In Study 2, passages from the Quran were used to explicitly prime either the punishing or the forgiving nature of God. Both studies examined the effect of the manipulations on prosocial intentions compared to a neutral priming condition. The SPH expects increased prosocial intentions especially after the priming of the punishment related aspects of religion. In addition, we expected that, in parallel to the idea of supernatural punishment, the priming of secular institutions would lead to increased prosocial intentions especially when the punishing nature of such institutions was reminded.

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants

One hundred and sixty one undergraduate students from Dogus University in Istanbul (124 women, 35 men, two no response) participated in the study. Ages ranged between 18 and 27 (mean = 21.84,  $SD = 1.69$ ). The majority of the participants were Muslim ( $n = 103$ ). Of the remaining 58, 20 were irreligious (17 atheists, three agnostics), 36 indicated belief in God without being affiliated with an organized religion, and two did not answer. Self-report socio-economic status (SES) question indicated that about two thirds of the participants were above average, and the rest was mostly average with virtually no participants indicating a below average SES. All participants were native Turkish speakers and thus all materials were presented in Turkish. Participants were randomly assigned to the Punishing Secular ( $n = 33$ ), Non-punishing Secular ( $n = 37$ ), Punishing Religious ( $n = 30$ ), Non-punishing Religious ( $n = 30$ ), or Neutral ( $n = 31$ ) groups. One suspicion probe question asked the participants to guess the purpose of the study and a second one asked about what was being measured in the study. Anyone mentioning the relationship between religious or secular authority and generosity in either question would be coded as having correctly guessed the purpose. No one could guess the purpose of the study in these terms; therefore the entire sample was included in the analyses.

#### 2.1.2. Procedures

Participants in all groups first solved a scrambled sentence task adapted from Shariff and Norenzayan (2007). In this task, participants are presented with five words and are asked to construct a meaningful sentence by taking out one word and re-arranging the remaining four. Each participant constructed 10 sentences in total. Five of those sentences contained a target word. The groups differed in terms of the nature of the target word. The target words were *police*, *judge*, *court*, *prison*, and *execution* in the Punishing Secular group; *contract*, *civic*, *humanism*, *democracy*, and *civilization* in the Non-punishing Secular group; *sharia*, *devil*, *sin*, *hell*, and *grave* in the Punishing Religious group; and *spirit*, *mercy*, *good deed*, *heaven*, and *grace* in the Non-punishing Religious group. The words in the Neutral group did not form a coherent theme.

To measure prosocial intentions, we used a scale adapted from Jordan, Mullen, and Murnighan (2011); see also Ma-Kellams & Blascovich (2013). The scale asks the participants to rate their

probability of engaging in each of six activities in the following month ranging from  $-3$  (very improbable) to  $+3$  (very probable). Three of the six activities are prosocial in nature (donating to charity, giving blood, volunteering for animal rights), whereas the remaining three are distractors (attending a party, going on a vacation, going to a movie). A prosocial intention score was computed for each participant by taking the mean of the response to each of the three prosocial activity questions. In addition, the participants answered several demographic questions and rated their level of religiosity on a scale from 1 (not at all religious) to 7 (highly religious).

## 2.2. Results and discussion

Fig. 1 presents the mean prosocial intentions score in each of the five groups. A one-way ANOVA revealed that the overall effect of the manipulation was significant,  $F(4, 156) = 3.99, p = .004, \eta p^2 = .093$ .<sup>1</sup> The result remained constant when the religiosity level of the participants was controlled,  $F(4, 151) = 3.50, p = .009, \eta p^2 = .085$ . Planned comparisons revealed that the Punishing Secular condition ( $M = 1.83, SD = 0.95$ ; 95% CI [1.49, 2.16]) was significantly different from both the Neutral condition ( $M = 0.91, SD = 1.37$ ; 95% CI [0.41, 1.42]),  $t(156) = 3.16, p = .002$  and the Non-punishing Secular condition ( $M = 1.24, SD = 1.29$ ; 95% CI [0.81, 1.67]),  $t(156) = 2.18, p = .033$ . In addition, the Punishing Religious condition ( $M = 1.89, SD = 0.87$ ; 95% CI [1.56, 2.21]) was significantly different from the Neutral condition,  $t(156) = 3.33, p = .002$ , and the Non-punishing Religious condition ( $M = 1.33, SD = 1.22$ ; 95% CI [0.87, 1.78]),  $t(156) = 2.06, p = .044$ . Again as hypothesized, the Non-punishing Secular and the Non-punishing Religious conditions were not significantly different from the Neutral condition or from each other (all  $p$ s  $> .217$ ).<sup>2</sup>

These results indicate that, in a secular country like Turkey where religiosity and the influence of religion in the public sphere are still widespread, reminders of punishing secular and religious authority, but not non-punishing secular and religious authority, increase prosocial intentions. The results are consistent with the SPH and suggest that the idea of secular punishment can play a similar role in a country where secular rule has been in effect for only about 90 years.

## 3. Study 2

Study 1 demonstrated an increased willingness to behave prosocially after implicit priming of religious and secular authority that has the capacity to punish. Rand et al. (2014) claim that explicit priming of religion has the same effect on prosocial behavior as the implicit and subliminal priming of religion. For this purpose, they had their participants read a passage in a churchyard from the Gospels on charitable giving and then tested their willingness to cooperate with an anonymous partner in a prisoner's dilemma game. The participants showed cooperative behavior to the extent that the passage resonated with them. One issue with this study is that it just shows a correlation between finding the religious prime moving and subsequent cooperative behavior. In a second study, Rand et al. (2014) demonstrate increased cooperation after reading a religious text but only for Christians and only after reading a similar Gospel passage (see Shariff, Willard,

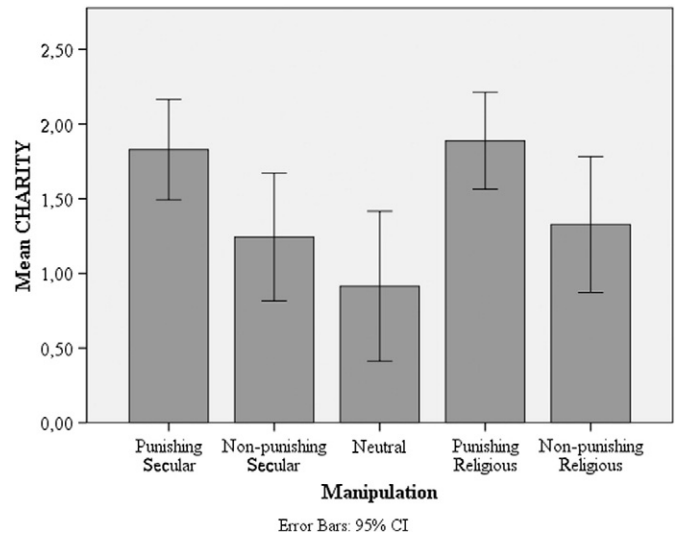


Fig. 1. Prosocial intentions scores in each of the five implicit priming groups.

Andersen, & Norenzayan, 2015, for other examples of explicit religious primes). We therefore sought to demonstrate more clearly the effect of explicit religious primes on prosociality. We had our participants read a collection of verses from the Quran on the theme of either God's punishing nature or God's forgiving nature and then looked to see whether either group had increased prosocial intentions compared to a neutral group.

## 3.1. Method

### 3.1.1. Participants

Ninety four undergraduates from Dogus University (66 women, 27 men, one no answer, mean age = 22.08,  $SD = 2.57$ ) participated in this study. The majority of the participants were Muslims ( $n = 76$ ). Of the remaining 18, four identified themselves as atheists, 12 as believers in God with no religious affiliation, and two did not answer. Self-report SES question indicated that about two thirds of the participants were above average, and the rest was mostly average with virtually no participants indicating a below average SES. All participants were native Turkish speakers and thus all materials were presented in Turkish. Participants were randomly assigned to the Punishing Religious ( $n = 31$ ), Non-punishing Religious ( $n = 33$ ) or the Neutral ( $n = 30$ ) group. One suspicion probe question asked the participants to guess the purpose of the study and a second one asked about what was being measured in the study. Although most participants could guess that the study was about religion or religiosity, no one could guess either religion's relationship with generosity or the fact that religion's punishing and non-punishing aspects were investigated separately. Thus, no participant was excluded from analyses on the basis of the suspicion probe.

### 3.1.2. Procedures

Participants in all groups read a passage of about 200–210 words in Turkish. The passage in the Punishing Religious condition was a collection of verses from different chapters of the Quran emphasizing the angry and punishing nature of God (the original text read by the participants did not contain verse numbers):

Verily he who comes to his Lord as a sinner (at Judgment),- for him is Hell: therein shall he neither die nor live (20: 74). (For) the sinners will be known by their marks: and they will be seized by their forelocks and their feet (55: 41). That Day shall they be thrust down to the Fire of Hell, irresistibly (52: 13). And when they are cast, bound together into a constricted place therein, they will plead for destruction there and then! (25: 13). And in the shades of Black Smoke:

<sup>1</sup> We performed post hoc power analyses using G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007). The results revealed a power of 0.91 which is sufficiently high according to common criteria (see Cohen, 1988).

<sup>2</sup> Since the number of non-believers in our sample was too low, we could not test the influence of religious primes separately on believers and non-believers. Instead, a moderated regression analysis was performed to investigate whether the effect of our manipulation depends on the level of religiosity. After creating a dummy variable for manipulation and centering religiosity and computing the manipulation-by-religiosity interaction term, the predictor and the moderator and the interaction terms were entered into a simultaneous regression model. In three analyses, the neutral group, the non-punishing secular group or the non-punishing religious group was used as the reference group. The results revealed no significant interaction effect in any of the analyses (all  $p$ 's  $> .18$ ).



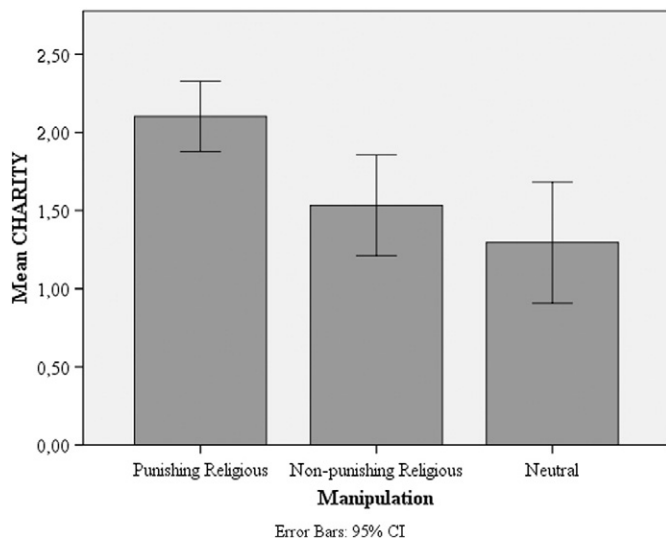


Fig. 2. Prosocial intentions scores in each of the three explicit priming groups.

Nothing (will there be) to refresh, nor to please (56: 43–44). When it sees them from a place far off, they will hear its fury and its ranging sigh (25: 12). When they are cast therein, they will hear the (terrible) drawing in of its breath even as it blazes forth (67: 7). Their wish will be to get out of the Fire, but never will they get out therefrom: their penalty will be one that endures (5: 37). Those who reject our Signs, We shall soon cast into the Fire: as often as their skins are roasted through, We shall change them for fresh skins, that they may taste the penalty: for Allah is Exalted in Power, Wise (4: 56). They ask, "When will be the Day of Judgment and Justice?" (It will be) a Day when they will be tried (and tested) over the Fire! (51: 12–13). In addition there will be maces of iron (to punish) them (22: 21). No food will there be for them but a bitter Dhari'. Which will neither nourish nor satisfy hunger (88: 6–7). The while they are given, to drink, of a boiling hot spring (88: 5). Nothing cool shall they taste therein, nor any drink, Save a boiling fluid and a fluid, dark, murky, intensely cold (78: 24–25). They will cry: "O Malik! would that thy Lord put an end to us!" He will say, "Nay, but ye shall abide!" (43: 77).

The passage in the Non-punishing Religious condition was a collection of verses from different chapters of the Quran emphasizing the caring and forgiving nature of God:

But some of the desert Arabs believe in Allah and the Last Day, and look on their payments as pious gifts bringing them nearer to Allah and obtaining the prayers of the Messenger. Aye, indeed they bring them nearer (to Him): soon will Allah admit them to His Mercy: for Allah is Oft-forgiving, Most Merciful. The vanguard (of Islam)-the first of those who forsook (their homes) and of those who gave them aid, and (also) those who follow them in (all) good deeds,-well-pleased is Allah with them, as are they with Him: for them hath He prepared gardens under which rivers flow, to dwell therein for ever: that is the supreme felicity (9: 99–100). Others (there are who) have acknowledged their wrong-doings: they have mixed an act that was good with another that was evil. Perhaps Allah will turn unto them (in Mercy): for Allah is Oft-Forgiving, Most Merciful (9: 102). Allah turned with favour to the Prophet, the Muhajirs, and the Ansar,- who followed him in a time of distress, after that the hearts of a part of them had nearly swerved (from duty); but He turned to them (also): for He is unto them Most Kind, Most Merciful. (He turned in mercy also) to the three who were left behind; (they felt guilty) to such a degree that the earth seemed constrained to them, for all its spaciousness, and their (very) souls seemed straitened to them,-

and they perceived that there is no fleeing from Allah (and no refuge) but to Himself. Then He turned to them, that they might repent: for Allah is Oft-Returning, Most Merciful (9: 117–118).

The passage in the Neutral condition was about the properties of spoken language totally unrelated to religion or prosociality.

A primary feature of language is that it helps people's lives as social beings. People use language to convey their thoughts, feelings, wishes, plans etc. In this sense, language is a system of symbols to express thoughts, feelings and wishes. An individual becomes part of the society by learning its language. The interaction of the natural tendency of infants to verbalize and the language spoken around them leads to the acquisition of language. Thus, social interaction is indispensable for language acquisition. An important distinction in this context is between internal and external language. Internal language is the representation of linguistic knowledge in an individual's mind. External language is the manifestation of that knowledge in the form of speech or writing in interaction with other individuals. Contextual factors such as the voice, age and sex of the speaker play a key role in determining the meaning of linguistic utterances. For example, the tone of the voice helps the listener to understand whether what he hears is a sarcastic remark or is meant for real. Thus, just like morphology and syntax, pragmatics also contributes to language comprehension.

After reading the relevant passage, each participant rated how impressive they found it from 1 (not at all impressive) to 7 (very impressive).

Right after responding to the impressiveness question, we asked the participants to fill the Turkish version (Gençöz, 2000) of the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988) to control the influence of their current mood on the dependent measure. The participants rated 10 positive and 10 negative emotion words from 1 to 5 as to how accurately each word described their current mood and two scores were formed, one for positive and one for negative mood. Finally, the participants were given the same prosocial intentions questions as in Study 1. In addition to several demographic questions, a one-item religiosity question was asked to test the possible effect of religiosity level on prosocial intentions.

### 3.2. Results and discussion

When the impressiveness ratings were analyzed, it was seen that 12 participants (four in each group) had rated the passage they read with a score lower than 4 (the midpoint of the scale). We excluded the twelve participants who did not find the passage they read impressive. Fig. 2 shows the mean prosociality scores of the remaining participants in each of the three groups. A one-way ANOVA revealed a significant effect of the manipulation,  $F(2, 79) = 6.79, p = .002, \eta^2 = .147$ .<sup>3</sup> The result remained constant when the religiosity level of the participants was controlled,  $F(2, 78) = 7.02, p = .002, \eta^2 = .153$ .<sup>4</sup> The results were again independent of current mood: The groups did not differ in terms of positive or negative mood scores (both  $p$ 's > .23). Planned comparisons revealed that the Punishing Religious group ( $M = 2.10, SD = 0.56; 95\% CI [1.88, 2.33]$ ) had significantly higher prosociality scores

<sup>3</sup> We performed post hoc power analyses using G\*Power (Faul et al., 2007). The results revealed a power of 0.96 which is sufficiently high according to common criteria (see Cohen, 1988).

<sup>4</sup> Including all participants without regard to impressiveness scores, a one-way ANOVA revealed a marginally significant effect of condition on prosocial intention scores,  $F(2, 91) = 2.89, p = .061, \eta^2 = .060$ . The result remained constant when the religiosity level of the participants was controlled,  $F(2, 90) = 2.92, p = .059, \eta^2 = .061$ . The effect of condition was independent of current mood since the groups did not differ in terms of positive or negative mood scores (both  $p$ 's > .288). Planned comparisons revealed that the Punishing Religious group ( $M = 1.94, SD = 0.77; 95\% CI [1.65, 2.22]$ ) had significantly higher prosociality scores than the Neutral group ( $M = 1.40, SD = 0.96; 95\% CI [1.04, 1.76]$ ),  $t(91) = 2.38, p = .019$ , but not the Non-punishing Religious group ( $M = 1.62, SD = 0.90; 95\% CI [1.30, 1.93]$ ),  $t(91) = 1.46, p = .149$ .

than both the Neutral group ( $M = 1.30, SD = 0.96; 95\% CI [0.91, 1.68]$ ),  $t(79) = 3.58, p = .001$ , and the Non-punishing Religious group ( $M = 1.53, SD = 0.86; 95\% CI [1.21, 1.86]$ ),  $t(79) = 2.61, p = .011$ . The difference between the Non-punishing and the Neutral groups was not significant ( $p > .27$ ).<sup>5</sup>

These results suggest that, as long as the participants find the passage they read impressive, an explicit punishing religious prime has a similar effect on prosocial intentions to an implicit punishing religious prime as demonstrated in Study 1.<sup>6</sup>

#### 4. General discussion

In this research, we examined the influence of punishing and non-punishing religious and secular authority on prosociality. In Study 1, we showed by using implicit priming (a sentence unscrambling task) that secular and religious authority has the power to elicit prosociality only insofar as they have the capacity to punish. Study 2 revealed similar findings with regard to religious authority using an explicit priming task. The observed effect seems to be obtained regardless of the religiosity of the participants. These results are consistent with previous findings that those who think of God as punishing cheat less in an academic task (Shariff & Norenzayan, 2011) and findings that national crime rate in the US is positively correlated with belief in heaven and negatively correlated with belief in hell (Shariff & Rhemtulla, 2012).

On the other hand, the present results show that the effect of non-punishing religious and secular priming is indistinguishable from neutral priming. This finding, together with the previous one, is consistent with the general view that punishment played a crucial role in the evolution of cooperation (Boyd et al., 2003; Fehr & Gächter, 2002). It is also consistent with the more specific view that punishment is a necessary component of supernatural monitoring (Johnson & Bering, 2006; Johnson & Krüger, 2004): Having supernatural agents in mind promotes prosociality only to the extent that those agents have the capacity to punish the failure to act prosocially. The present studies also extend previous findings to suggest that secular authority has the potential to promote prosociality to the same extent only if it has the capacity to punish failing to act prosocially. Thus the findings clarify some previous results (e.g., Shariff & Norenzayan, 2007) where both religious and secular primes were shown to promote prosociality but the punishing or non-punishing properties of the primes were not disentangled. In fact, two recent studies (Aveyard, 2014; Gomes & McCullough, 2015) could not replicate the prosocial effects of religious priming with the materials used by Shariff and Norenzayan (2007). Our results suggest that one possible reason for this failure of replication is that the original study included both punishing (*God* and possibly *prophet*) and non-punishing (*spirit*, *sacred* and *divine*) religious primes. Thus, replication attempts in the future should keep the punishing vs. non-punishing distinction in mind.

##### 4.1. Implications

The present results are also consistent with the view that societies where belief in omniscient and punishing supernatural agents is widespread promote in-group cooperation and suppress antisocial behavior

<sup>5</sup> Since the number of non-believers in our sample was too low, we could not test the influence of religious primes separately on believers and non-believers. A moderated regression analysis was performed to investigate whether the effect of our manipulation depends on the level of religiosity. After creating a dummy variable for manipulation and centering religiosity and computing the manipulation-by-religiosity interaction term, the predictor and the moderator and the interaction terms were entered into a simultaneous regression model. In two analyses, the neutral group or the non-punishing religious group was used as the reference group. The results revealed no significant interaction effect in any of the analyses (all  $p$ 's  $> .67$ ).

<sup>6</sup> Since the religiosity question was asked after the manipulations, we checked to see whether the manipulation has any effect on the religiosity level of the participants. Two one-way ANOVAs revealed no significant differences between the religiosity level of the groups in either Study 1 or Study 2 ( $p = .101; p = .605$ , respectively).

more effectively (Norenzayan, 2013; see also Laurin, Shariff, Henrich, & Kay, 2012). Another large-scale finding that is consistent with the present results is that, although there is a general negative correlation between religious attendance and economic growth, the correlation between belief in hell and economic growth is positive in the developed world (Barro & McCleary, 2003). These results suggest that the relation between fear of supernatural punishment and cooperative behavior is operative not only at the individual level but also at the societal level (see Atkinson & Bourrat, 2011; Johnson, 2005; Watts et al., 2015).

It should be kept in mind that the present results have been obtained with a predominantly Muslim sample and need to be replicated with other religious groups to see how generalizable they are. At the same time, being conducted on a Turkish sample is one of the strengths of this study. The relation between religion and prosociality has been predominantly conducted on Western and Christian samples with a few studies using Muslim samples in the Middle East. Whilst one factor that determines the effectiveness of punishment seems to be the level of trust in a society (high-trust societies being more sensitive to punishment; see Balliet & Van Lange, 2013), another might be the interaction between the nature (religious vs. secular) of punishment and the strength of secular authority in the society. Turkey has a unique place that sets it apart from both Western and Middle Eastern countries because, while having a predominantly Muslim population, it has been governed by secular authority for the past 90 years. It is thus not surprising that reminders of both religious and secular punishment promoted prosociality in our study. It might be interesting to see whether secular and religious punishment differ in effectiveness in Scandinavian societies, where secular authority has largely replaced religious authority, and traditional Middle Eastern societies, where religious authority is still very powerful (for similar research done in Austronesia, see McNamara, Norenzayan, & Henrich, 2014; Watts et al., 2015).

Another implication of the present set of studies is that implicit and explicit primes work in similar ways. This is consistent with the meta-analysis conducted by Shariff et al. (2015), which showed that, although effect sizes differ, both implicit and explicit primes are effective in promoting prosociality and other behaviors. However, if the explicit priming is done through texts, the extent to which the participants are impressed by or agree with the material in the text influences whether the priming works as revealed by the current study and by Rand et al. (2014).

##### 4.2. Limitations

Although our sample is non-Western, it is still comprised of university students who are psychological outliers (cf. Henrich, Heine, & Norenzayan, 2010). Additionally, the small sample size of the study precluded the evaluation of the possible differences between religious believers and non-believers as well as the differences between males and females. Another limitation, exacerbated by our relatively small sample size, is the barely significant difference between the punishing and non-punishing conditions (.044 for the religious and .033 for the secular primes) obtained in Study 1 (see Simonsohn, Nelson, & Simmons, 2014). Finally, prosociality in the present set of studies was measured at the intentional, rather than the behavioral, level. To see whether our primes influence actual prosocial behavior, economic games such as the dictator game or the ultimatum game might be used.

##### 4.3. Conclusion

The present studies demonstrate that only punishment-related religious and secular primes promote prosocial intentions. The results are in line with several previous studies suggesting a similar role for punishment, whether real or imagined, in cooperative interactions (e.g., Fehr & Gächter, 2002; Johnson, 2011; Johnson & Krüger, 2004; Shariff & Norenzayan, 2011; Shariff & Rhemtulla, 2012; Snarey, 1996). It appears that the idea of being watched by agents or institutions capable of

punishing norm violations lies at the heart of the evolution and maintenance of a cooperative, harmonious society (see Norenzayan, 2013).

## References

- Atkinson, Q. D., & Bourrat, P. (2011). Beliefs about God, the afterlife and morality support the role of supernatural policing in human cooperation. *Evolution and Human Behavior*, 32(1), 41–49.
- Aveyard, M. E. (2014). A call to honesty: Extending religious priming of moral behavior to Middle Eastern Muslims. *PLoS One*, 9(7), e99447, <http://dx.doi.org/10.1371/journal.pone.0099447>.
- Balliet, D., & Van Lange, P. A. (2013). Trust, punishment, and cooperation across 18 societies: A meta-analysis. *Perspectives on Psychological Science*, 8(4), 363–379.
- Barro, R. J., & McCleary, R. M. (2003). Religion and economic growth across countries. *American Sociological Review*, 68(5), 760–781.
- Bateson, M., Nettle, D., & Roberts, G. (2006). Cues of being watched enhance cooperation in a real-world setting. *Biology Letters*, 2, 412–414.
- Boyd, R., Gintis, H., Bowles, S., & Richerson, P. J. (2003). The evolution of altruistic punishment. *Proceedings of the National Academy of Sciences*, 100(6), 3531–3535.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191.
- Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature*, 415(6868), 137–140.
- Gençöz, T. (2000). Pozitif ve negatif duygu ölçeği: Geçerlik ve güvenilirlik çalışması [Positive and negative affect scale: A study of validity and reliability]. *Türk Psikoloji Dergisi*, 15(46), 19–26.
- Gervais, W. M., & Norenzayan, A. (2012a). Like a camera in the sky? Thinking about God increases public self-awareness and socially desirable responding. *Journal of Experimental Social Psychology*, 48(1), 298–302.
- Gervais, W. M., & Norenzayan, A. (2012b). Reminders of secular authority reduce believers' distrust of atheists. *Psychological Science*, 23(5), 483–491.
- Gomes, C. M., & McCullough, M. E. (2015). The effects of implicit religious primes on dictator game allocations: A preregistered replication experiment. *Journal of Experimental Psychology: General*, <http://dx.doi.org/10.1037/xge0000027> [Advance online publication].
- Guala, F. (2012). Reciprocity: Weak or strong? What punishment experiments do (and do not) demonstrate. *Behavioral and Brain Sciences*, 35(1), 1–15.
- Haley, K. J., & Fessler, D. M. T. (2005). Nobody's watching? Subtle cues affect generosity in an anonymous economic game. *Evolution and Human Behavior*, 26, 245–256.
- Hamilton, W. D. (1964). The genetical evolution of social behaviour II. *Journal of Theoretical Biology*, 7(1), 17–52.
- Harrell, A. (2012). Do religious cognitions promote prosociality? *Rationality and Society*, 24(4), 463–482.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2–3), 61–83.
- Johnson, D. D. (2005). God's punishment and public goods. *Human Nature*, 16(4), 410–444.
- Johnson, D. D. P. (2009). The error of god: Error management theory, religion, and the evolution of cooperation. In S. A. Levin (Ed.), *Games, groups, and the global good* (pp. 169–180). Berlin: Springer.
- Johnson, D. D. P. (2011). Why God is the best punisher. *Religion, Brain & Behavior*, 1(1), 77–84.
- Johnson, D. D. P. (2014). Big Gods, small wonder: Supernatural punishment strikes back. *Religion, Brain & Behavior*, 25–33. , <http://dx.doi.org/10.1080/2153599X.2014.928359>.
- Johnson, D. D., & Bering, J. M. (2006). Hand of God, mind of man: Punishment and cognition in the evolution of cooperation. *Evolutionary Psychology*, 4(1), 219–233.
- Johnson, D., & Krüger, O. (2004). The good of wrath: Supernatural punishment and the evolution of cooperation. *Political Theology*, 5(2), 159–176.
- Johnson, K. A., Li, Y. J., Cohen, A. B., & Okun, M. A. (2013). Friends in high places: The influence of authoritarian and benevolent god-concepts on social attitudes and behaviors. *Psychology of Religion and Spirituality*, 5(1), 15–22.
- Jordan, J., Mullen, E., & Murnighan, J. K. (2011). Striving for the moral self: The effects of recalling past moral actions on future moral behavior. *Personality and Social Psychology Bulletin*, 37(5), 701–713.
- Kay, A. C., Shepherd, S., Blatz, C. W., Chua, S. N., & Galinsky, A. D. (2010). For God (or) country: The hydraulic relation between government instability and belief in religious sources of control. *Journal of Personality and Social Psychology*, 99(5), 725–739.
- Krasnow, M. M., Delton, A. W., Cosmides, L., & Tooby, J. (2015). Group cooperation without group selection: Modest punishment can recruit much cooperation. *PLoS One*, 10(4), e0124561, <http://dx.doi.org/10.1371/journal.pone.0124561>.
- Laurin, K., Shariff, A. F., Henrich, J., & Kay, A. C. (2012). Outsourcing punishment to God: Beliefs in divine control reduce earthly punishment. *Proceedings of the Royal Society of London B: Biological Sciences*, 279, 3272–3281.
- Ma-Kellams, C., & Blascovich, J. (2013). Does "science" make you moral? The effects of priming science on moral judgments and behavior. *PLoS One*, 8(3), e57989, <http://dx.doi.org/10.1371/journal.pone.0057989>.
- McNamara, R. A., Norenzayan, A., & Henrich, J. (2014). Supernatural punishment, in-group biases, and material insecurity: Experiments and ethnography from Yasawa, Fiji. *Religion, Brain & Behavior*, <http://dx.doi.org/10.1080/2153599X.2014.921235>.
- Norenzayan, A. (2013). *Big gods: How religion transformed cooperation and conflict*. Princeton University Press.
- Norenzayan, A. (2014). Big questions about big Gods: Response and discussion. *Religion, Brain & Behavior*, <http://dx.doi.org/10.1080/2153599X.2014.928359>.
- Norenzayan, A., & Gervais, W. M. (2015). Secular rule of law erodes believers' political intolerance of atheists. *Religion, Brain & Behavior*, 5(1), 3–14.
- Norenzayan, A., & Shariff, A. F. (2008). The origin and evolution of religious prosociality. *Science*, 322(5898), 58–62.
- Nowak, M. A., & Sigmund, K. (2005). Evolution of indirect reciprocity. *Nature*, 437(7063), 1291–1298.
- Pichon, I., Boccato, G., & Saroglou, V. (2007). Nonconscious influences of religion on prosociality: A priming study. *European Journal of Social Psychology*, 37(5), 1032–1045.
- Rand, D. G., Dreber, A., Haque, O. S., Kane, R. J., Nowak, M. A., & Coakley, S. (2014). Religious motivations for cooperation: An experimental investigation using explicit primes. *Religion, Brain & Behavior*, 24(1), 1–15.
- Randolph-Seng, B., & Nielsen, M. E. (2007). Honesty: One effect of primed religious representations. *The International Journal for the Psychology of Religion*, 17(4), 303–315.
- Schloss, J. P., & Murray, M. J. (2011). Evolutionary accounts of belief in supernatural punishment: A critical review. *Religion, Brain & Behavior*, 1(1), 46–99.
- Shariff, A. F., & Norenzayan, A. (2007). God is watching you: Priming God concepts increases prosocial behavior in an anonymous economic game. *Psychological Science*, 18(9), 803–809.
- Shariff, A. F., & Norenzayan, A. (2011). Mean gods make good people: Different views of God predict cheating behavior. *The International Journal for the Psychology of Religion*, 21(2), 85–96.
- Shariff, A. F., & Rhemtulla, M. (2012). Divergent effects of beliefs in heaven and hell on national crime rates. *PLoS One*, 7(6), e39048, <http://dx.doi.org/10.1371/journal.pone.0039048>.
- Shariff, A. F., Willard, A. K., Andersen, T., & Norenzayan, A. (2015). Religious priming: A meta-analysis with a focus on prosociality. *Personality and Social Psychology Review*, 1–22, <http://dx.doi.org/10.1177/1088868314568811>.
- Sigmund, K., Hauert, C., & Nowak, M. A. (2001). Reward and punishment. *Proceedings of the National Academy of Sciences*, 98(19), 10757–10762.
- Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: A key to the file-drawer. *Journal of Experimental Psychology: General*, 143(2), 534–547.
- Snarey, J. (1996). The natural environment's impact upon religious ethics: A cross-cultural study. *Journal for the Scientific Study of Religion*, 35, 85–96.
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology*, 46, 35–57.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063.
- Watts, J., Greenhill, S. J., Atkinson, Q. D., Currie, T. E., Bulbulia, J., & Gray, R. D. (2015). Broad supernatural punishment but not moralizing high gods precede the evolution of political complexity in Austronesia. *Proceedings of the Royal Society of London B: Biological Sciences*, 282(1804), 20142556. , <http://dx.doi.org/10.1098/rspb.2014.2556>.
- Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology*, 51(1), 110–116.