

Location, location, location: Effects of cross-religious primes on prosocial behaviour

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Abstract

Priming with religious concepts is known to have a positive effect on prosocial behavior, however the effects of religious primes associated with outgroups remain unknown. To explore this, we conducted a field experiment in a multi-cultural, multi-religious setting (the island of Mauritius). Our design used naturally occurring, ecologically relevant contextual primes pertinent to every-day religious and secular life, while maintaining full experimental control. We found that both ingroup and outgroup religious contexts increased generosity as measured by a donation task. In accordance with previous research, we also found an interaction between individual religiosity and the efficacy of the religious primes. We discuss these findings and their interpretation, and we suggest potential avenues for further research.

Introduction

Religion and prosociality have long been considered to be closely intertwined. Religious doctrines and authorities routinely aspire to regulate social conduct and set the standards of appropriate inter-personal behavior. Based on this observation, it is a common assumption—not only among the general public but also among many scholars—that religious people behave more prosocially (see [Galen, 2012](#)). However, this assumption seems both conceptually and empirically unfounded. The fact that most (though not all) religions are concerned with prosociality does not necessarily imply that religious people are more prosocial, a logical leap which has been termed the “religious congruence fallacy” (Chaves, 2012). Furthermore, it is well-documented that people’s behavior is often inconsistent with their attitudes (e.g., [DiMaggio 1997](#); [Maio et al. 2003](#); [Swidler 1986](#); [Vaisey 2009](#)), and this has long been observed in the realm of religion specifically (e.g., [Evans-Pritchard, 1965](#); [Wittgenstein, 1979](#)). Conceptual issues aside, the bulk of the available empirical evidence do

not confirm that religious people behave more prosocially, even if they say or think that they do (Chaves, 2010; Leach et al., 2008).

Although religious people have been found to score higher in various prosocial attitudes (Brooks, 2003; 2005; 2007; Friedrichs, 1960; Furrow et al., 2004; Gronbjerg & Never, 2004; Guiso et al., 2003; Lam, 2002; McCullough & Worthington, 1999; Morgan, 1983; Putnam & Campbell, 2010; Su et al., 2011), they have also been shown to score higher in a host of negative and anti-social attitudes (Batson et al., 1999; Cornwall et al., 2012; Park, 2012; Saslow et al., 2012; Stegmueller et al., 2012; Stokes & Regnerus, 2009; Victoroff et al., 2010). It is thus difficult to tell whether any prosocial effects of religion are an indication of general prosociality rather than of favouritism towards to ingroup (Hunter, 2001; Ottoni & Wilhelm, 2010), which might indeed be mirrored by hostility towards outsiders (Burriss & Jackson, 1999; Heiphetz et al., 2012; Hunsberger & Jackson, 2005).

From a methodological standpoint, the studies that have reported a positive link between religiosity and prosociality typically relied on correlational designs, which offer a low degree of internal validity and cannot establish causality. More crucially, the majority of those studies examined hypothetical or reported behavior rather than real behavior (Batson et al., 1993; Clobert et al., 2015; Clobert & Saroglou, 2013; Ellison, 1992; Koenig et al., 2007; Morgan, 1983; Pichon et al., 2007; Pichon & Saroglou, 2009; Saroglou et al., 2005). Such subjective reports are poor predictors of actual behavior (Baumeister et al., 2007; Podsakoff et al., 2003), particularly when what is being reported are socially desirable attributes like religiosity (Brenner, 2011; Hadaway et al., 1998). In fact, there is some evidence that religious individuals are particularly prone to social desirability effects (Burriss & Jackson, 2000; Gervais & Norenzayan, 2012; Leak & Fish, 1989; McCullough & Willoughby, 2009; Sedikides & Gebauer, 2010). Finally, the well-documented popular belief that religiosity and

morality are causally linked (de Dreu et al., 1995; Ellison, 1992; Gervais et al., 2011; Miller & Bornstein, 2006; Mitkidis et al., 2014; Morgan, 1983; Orbell et al., 1992; Saroglou et al., 2005; Tan & Vogel, 2008) may can act like a self-fulfilling prophecy by biasing respondents' views of themselves and others (Galen, 2012).

Most importantly, the biggest problem with those findings is that the self-reported prosociality does not correspond with people's real behavior. In other words, while religious people portray or see themselves as better people, they do not actually behave any better. Although a few studies have shown some correlation between particular aspects of religiosity and prosocial behavior (Branas-Garza et al., 2014; Fehr et al., 2003; Paciotti et al., 2011; Perrin, 2000; Sosis & Ruffle, 2003, 2004), the overwhelming majority of the available evidence suggests otherwise (Anderson et al., 2010; Batson et al., 1993; Batson et al., 1989; Batson et al., 1999; Burris & Jackson, 1999; Darley & Batson, 1973; Eckel & Grossman, 2004; Goldfried & Miner, 2002; Grossman & Parrett, 2011; Jackson & Esses, 1997; Johansson-Stenman et al., 2009; Malhotra, 2010; Orbell et al., 1992; Pruckner & Sausgruber, 2009; Spilka et al., 2003; Tan, 2006).

On the other hand, evidence does suggest that exposure to religious concepts and contexts can have significant prosocial effects. In other words, "the religious situation is more important than the religious disposition" (Norenzayan & Shariff, 2008: 62). A number of controlled studies have found that religious primes can bolster prosocial behaviors (Ahmed & Salas, 2008; 2011; Ahmed & Hammarstedt, 2011; Ariely, 2008; 2012; Aveyard, 2014; Bering et al., 2005; Bulbulia & Mahoney, 2008; Hadnes & Schumacher, 2012; Mazar et al., 2008; Randolph-Seng & Nielsen, 2007; Ruffle & Sosis, 2010; Shariff & Norenzayan, 2007; Tsang et al., 2012, but also see Harrell, 2012).

Similar effects have been documented in naturalistic studies that used real-life religious contexts as stimuli. For example, [Xygalatas \(2012\)](#) found that Mauritian Hindus who were randomly assigned to perform the task in a temple were more cooperative in a public goods game than those who played in a restaurant; and [Ahmed and Salas \(2013\)](#) found that randomly assigned Chilean Catholic university students who played a similar game in a university chapel were more cooperative and perceived other players to be more cooperative compared to those who played inside a lecture hall.

A recent meta-analysis that examined 93 studies across 11,653 participants ([Shariff et al., 2015](#)) showed that the prosocial effects of religious priming are robust across numerous cultures and types of behaviors, although they are more reliable specifically among religious participants. However, the boundaries of religious prosociality are less clear. In particular, the effects of contexts associated with religious outgroups have not yet been sufficiently explored. [Clobert et al. \(2015\)](#) found that priming with Buddhist concepts increased prosocial attitudes even among Christians. However, to our knowledge, no previous study has examined the effects of cross-religious primes on real behavior. Furthermore, no previous study has compared the effects of real-life ingroup and outgroup religious contexts. To examine these effects, we designed a field experiment, using real-life contextual primes while at the same time maintaining full experimental control. We compared the effects of Christian and Hindu contextual primes on generosity among a group of Mauritian Catholics. We predicted that Catholic participants would be more generous in both a Christian and a Hindu context compared to a control setting.

General Context

The location for our experiment was Mauritius, a small island located in the Mascarene archipelago, 500 miles east of Madagascar, where the lead author had been conducting ethnographic field work over a period of five years. Mauritius' 1.3 million inhabitants constitute one of the most diverse societies in the world ethnically, religiously, linguistically, and culturally ([Okediji, 2005](#)), which makes it an ideal setting for studying social interaction and ingroup and outgroup relations. The biggest ethno-religious group (almost 49%) are Hindu, members of the Indian Diaspora whose ancestors arrived in Mauritius as indentured sugar plantation labourers in the 19th century or one of the various subsequent immigration waves ([Eisenlohr, 2006](#)). Christian Creoles (mostly Roman Catholic), people of African and Malagasy origin whose ancestors were brought to Mauritius as slave workers for the plantations ([Allen, 1999](#)) make up approximately 26% of the population. Muslims of Indian and Pakistani origin constitute 17% of the population, while there are also smaller groups of Sino-Mauritians and Franco-Mauritians ([Carroll & Carroll 2000](#); [Statistics Mauritius, 2012](#)).

Religion is a core feature of personal and collective identity for Mauritians, and together with ethnicity constitutes one of two primary group markers. The proportion of people who self-identify as non-religious is no greater than 0.7% ([Statistics Mauritius, 2012](#)). Numerous places of worship of various religions can be found in every neighbourhood across the country, and religious symbols are omni-present in public and private spaces. The great variety of religious rituals performed in Mauritius ranges from private rites performed at home to the Hindu pilgrimage of Maha Shivaratri which draws half of the entire population of the country; from ritual scripts that take a few seconds (like crossing oneself while passing

by a statue of the Madonna) to week-long pujas; and from low-key collective prayers to high-intensity rites involving self-mutilation.

Our study was conducted in Pointe aux Piments, a large rural village of 9,000 people, situated 20 kilometres west of the capital city of Port Louis. Although located on the coast, Pointe aux Piments does not have sandy beaches, and as a result has not been able to fully tap into the tourism industry, one of the biggest and most rapidly growing sectors of the national economy. Most of the inhabitants are low-income workers employed locally as fishermen, in the sugarcane fields that surround the village, or in various service sectors in the area. The village has a mixed population consisting mostly of Hindus and Christians, each representing over 45% of the total inhabitants (Statistics Mauritius, 2012), and is home to numerous temples, churches, and small shrines. To examine the effects of ingroup and outgroup religious primes on prosocial behavior, we conducted a field experiment using a Catholic church and a Hindu temple dedicated to Kali as contextual primes.

Materials and Methods

Participants and general procedure

One hundred and two Catholic Mauritian Creoles (54 females) aged 18-61 (mean age 31.62 years, $Mdn = 28$, $SD = 11.77$) were recruited via a combination of random and snowball sampling.¹ We used a within-subject experimental design, where each participant

¹ In Mauritius there is a strong overlap between religion and ethnicity. Our local assistants were thus able to recruit subjects based on their physical features and dress code, as the

made economic decisions in three different locations. The statistical power of the sample size for this design is .83. Each location represented a context containing either religious prime or a control setting: a Catholic church (ingroup religious context); a Hindu temple (outgroup religious context); and a restaurant (control). The three venues were located in close proximity, within the subjects' own village. The experiment ran over the course of 12 days, but no data were collected on days with scheduled religious services (Fridays and Sundays).

Upon arriving at each location, participants were greeted by one experimenter and one local assistant, were informed about the study, and provided written consent. The order of the locations was counterbalanced, as were researchers and assistants across locations. According to the cover story, participants were told that the aim of the study was to test spatial navigation in various settings, and that for each navigational task they finished successfully, they would receive 100 Mauritian rupees (MUR) and then move on to a new location to engage in the next task. The total amount that participants could make was 300 MUR (approximately 10 USD), roughly equivalent to 3 days' salary for an unskilled worker. After completing each task and receiving their pay, participants were offered the opportunity to anonymously contribute to a charity. Short interviews were conducted after each task and a questionnaire was administered at the end of the experiment.

Robust statistical methods of analysis (Wilcox 2012) were used instead of non-parametric tests due to their higher precision and statistical power, most of them based on trimmed means instead of means: recent statistical literature (Wilcox 2012) convincingly shows that these methods are not sensitive to violations of assumptions of classical statistical

large majority of Afro-Mauritians are Christian. Our questionnaires subsequently provided confirmation that each recruited subject was indeed Christian.

methods on the one hand, and on the other hand, they have higher statistical power than non-parametric tests.

Contextual primes

All three locations were situated in the same neighbourhood near the northeast entrance to the village, and had similar size and spatial arrangements, each consisting of a front porch; a main room with seats; and a back room whose access was restricted to specialists (inner sanctuary, Garbhagriha, kitchen). The two religious locations had a similar number of representations of supernatural agents in the form of statues and icons. To control for potential priming effects of these representations ([Bateson et al., 2006](#); [Haley & Fessler, 2005](#); [Kratky et al., forthcoming](#)), we hung an equal number of agent representations on the walls of the restaurant in the form of posters of popular living and deceased actors and singers. To ensure that all locations were empty during experimentation, we obtained permission from the church and temple officials to use the premises and paid daily rent for the exclusive use of the restaurant.

Navigational task

Performance in the navigational task was not important for the purpose of this experiment, however it was crucial that the task was plausible and yet easy enough so that all participants could successfully solve it. The task consisted in using a rod approximately one meter long to navigate a paper cup through a maze without touching any of the walls of the maze or tipping the cup over (see image 1). Each maze had been taped on a plywood panel and placed in the middle of the room at each location. All three mazes were of same size, as was the width of the pathways and the overall length of the successful trajectory that led to

each exit. A repeated measures robust ANOVA based on comparing 20% trimmed means (Wilcox 1993, Wilcox 2012: 380-381) showed that there were no differences in perceived difficulty of the task between locations: $F(2,122) = 1.58, p = 0.21$. Trimmed means were used following recent statistical literature (Wilcox 2012) which strongly recommends using this method over non-parametric tests with low statistical power when some of the assumptions of classical tests are violated (esp. assumptions of normality, homoscedasticity and absence of outliers).

Participants were informed that if they succeeded in completing the task within 30 seconds, they would receive 100 MUR and move to the next location. Time was monitored by the experimenter by the use of a chronometer not visible to the participants or assistants. The experimenter was thus able to turn a blind eye to minor violations of time limits. However, if any participants obviously broke any of the rules, they were given a second chance to finish the task, ensuring that everyone could finish the task successfully. All participants were able to successfully complete the maze task.

Charity task

Although there is no perfect measure of prosociality, our operationalization sought to quantify altruistic behavior, i.e. an unreciprocated action that benefits another at a personal cost to the self. To ensure that the behavior was truly altruistic, that is, not motivated by the hope of future reciprocation, the recipient of the behavior had to be anonymous. Towards this purpose, our dependent measure consisted in an inconspicuous dictator game ([Kahneman, Knetsch & Thaler, 1986](#)), which was framed as a real-life charity. This narrow

operationalization of prosociality allowed us to measure the exact financial cost of altruistic behavior.

Specifically, when participants completed each maze task, they received a reward of 100 MUR, which was presented in the form of 100 single-rupee coins placed in a bowl on the table. Subsequently, participants were told that funding for the study was only provided for those who were able to complete the maze task, but the experimenters had set up a charity for those who were not successful. They were then shown a second bowl and were asked if they wished to make an anonymous contribution to the charity.

To ensure that there were no anchoring effects of each donation to the next, we asked participants to allocate coins by handfuls from their own bowl to the charity bowl without counting them, although they were allowed to change the allocation until they were satisfied with the distribution. To avoid experimenter effects, the assistants were blind to our hypotheses; their interaction with participants was scripted; and donations were made in private (participants were left unattended and unobserved during the donation and told to cover the donation bowl with a lid when they finished). After the conclusion of the study, the money that participants donated was in turn donated by the experimenters to the two religious venues.

Post-experiment questionnaire

After each session, participants were asked to rate the difficulty of the navigation task. At the end of the experiment, participants filled in a questionnaire that included demographic information and a composite measure of religiosity consisting of 3 items adapted from the World Values Survey (2012, items V145-V147) in discussion with local focus groups. The first item assessed self-reported religiosity. Based on prior experience from working in this

field site and to avoid ceiling effects (see [Xygalatas et al., 2013](#)), we used a comparative formulation (“How religious do you consider yourself to be compared to other people?”) on a 5-point scale ranging from “Not at all” to “I am the most religious person I know”. The other two items assessed self-reported church attendance (“How often do you participate in events at the church?”) and frequency of prayer (“How often do you pray?”) ranging from “never” to “very often”. These three items were then combined to produce a composite measure of religiosity. Cronbach alpha for ordinal items – i.e. based on the polychoric matrix, see Gadermann, Guhn & Zumbo (2012) – is .63, which is acceptable value given that there are only 3 items, standardized item-total correlations are .48 for self-reported religiosity scale, .46 for church attendance scale, and .36 for frequency of prayer scale. A principal component factor analysis supported the use of the combined religiosity scale, as the first factor accounted for over 52% of the variance. A Kaiser-Meyer Olkin test of sampling adequacy suggested that the sample was factorable ($KMO = .61$), and Bartlett’s test of sphericity was significant ($\chi^2(3) = 21.86, p < .00$) ([Kaiser, 1974](#)). A parallel analysis ([Humphreys & Montanelli, 1975](#)) using a polychoric matrix and a minimal residual method shows that there is a single dominant factor. Revelle & Rocklin’s (1979) “very simple structure” (VSS) method and Velicer’s (1976) “Minimum Average Partial” (MAP) method both confirmed this result. A factor analysis with a polychoric matrix and minimal residual method showed that this single factor had acceptable loadings (0.70, 0.65, 0.46), and explained 37 % of the variance. The regression score of this factor was used as the composite measure of religiosity in robust analyses. Robust (percentage bend) correlations ([Wilcox, 2012](#)) between all pairs of questions were significant: Religious / Participation, $r = 0.29, p < .003$, Religious / Prayer, $r = 0.23, p < .022$, Participation / Prayer, $r = 0.21, p < .015$).

Follow-up survey

After the experiment was completed, a research assistant contacted participants by phone and conducted a debriefing session. Interviewees had the opportunity to ask questions about the experiment, and were also asked to answer a short follow-up questionnaire. 56 people agreed to complete the questionnaire. Participants were asked what they thought the purpose of our study was. Over 55% responded “I don’t know”. Specific answers included several topics related to religion (18%) (e.g. “To see if people have faith”, “To know more about other religions”, etc), charity (11%) (e.g. “To offer people an opportunity to earn extra money”, “To raise funds for a charity”, etc), and a variety of other themes, primarily related to human cognition and behavior (23%) (e.g. “to conduct a survey”, “to identify personality differences”, “to study people’s behavior”).² No participant made any explicit link between religion and charity, and only two participants correctly suspected that our study aimed to examine how people behave in different locations. Removing those two participants did not make any significant difference in any of the reported results. Overall, these answers indicate that the majority of participants were unaware of our hypotheses.

When we asked participants if they knew who else took part in the study, approximately 61% responded that it was other people from the village, and 7% that it was other people from their neighbourhood; 21% said they did not know; while 11% named specific people (e.g. “my cousin”), which indicates that they talked to other players about the experiment after their participation. These answers suggest that our cover story was convincing and that participants generally did not perceive other players to be members of their religious in-group.

² The sum is over 100% due to the fact that some participants gave more than one answer.

When we asked participants whether they had been to each of the three locations before taking part in our study, all but one stated that they had been inside the Christian church. On the other hand, only 13 had been inside the Hindu temple, while 23 had been inside the restaurant. This confirmed the locations chosen were suitable for the purpose of our study, as the outgroup and control setting were not as familiar to participants as the ingroup setting.

Finally, when we asked participants whether they knew who owned the restaurant, only 12% were able to name the owner. This confirmed that the control setting was generally not associated with a specific religious group.

Results

Participants' mean composite religiosity was 3.26 (Mdn = 3.33, SD = .66) on a 1-5 scale. There were no significant gender differences in religiosity, perceived task difficulty, time spent in each task, or donations in any of the locations (all $p > .26$).

Participants donated an average of 49.32 MUR (Mdn = 35, SD = 48.11) in all three locations combined. There was a significant order effect on the amount donated within subjects across the three settings, with donations decaying over time $F(2,192) = 11.26, p < .01, \eta_p^2 = 0.13$. However, as we used restricted randomization, the order of the locations did not have any differential effect on donations across venues: $F(10, 192) = 1.18, p = .30$. Overall donations were not significantly influenced by age ($r = .16, p = .11$, robust percentage bend correlation $r = .15, p = .13$) or education ($r = .07, p = .48$, robust percentage bend correlation $r = .11, p = .27$). Perceived task difficulty did not have an effect on donations in any of the three locations (church: $r = -.73, p = .46$, robust percentage bend correlation $r = .02, p = .87$; temple: $r = .04, p = .71$, robust percentage bend correlation $r = .09, p = .36$;

restaurant: $r = -.11$, $p = .29$, robust percentage bend correlation $r = .08$, $p = .44$), and neither did the amount of time participants spent on each location (church: $r = .03$, $p = .79$, robust percentage bend correlation $r = .16$, $p = .11$; temple: $r = .11$, $p = .27$, robust percentage bend correlation $r = .002$, $p = .98$; restaurant: $r = .09$, $p = .36$, robust percentage bend correlation $r = -.04$, $p = .73$).

Mean donation was 14.92 MUR in the restaurant; 16.31 in the Christian church; and 18.10 in the Hindu temple (table 1). A repeated measures robust ANOVA based on comparing 20% trimmed means (Wilcox, 1993, Wilcox, 2012) and using religiosity as a covariate in the model revealed significant differences between locations ($F(2, 200) = 5.15$, $p < .01$, $\eta_p^2 = 0.05$). Mauchly's test was not significant, indicating that the assumption of sphericity was not violated ($\chi^2(2) = 5.63$, $p = .06$). Planned contrasts revealed that donations in each religious location were significantly higher than in the control location, while there were no significant differences between the two religious locations (table 2).

There was no correlation between religiosity and donations ($r = .09$, $p = .39$). To further assess the potential role of religiosity, we used a factor analysis to compute a scale score for religiosity and then dichotomized the variable to compare donations between highly religious and less religious participants. There were no significant differences in donations between the two groups in any of the three locations (all $p > .43$), nor in overall donations: $t(100) = .09$, $p = .93$.

To assess whether there was any interaction between religiosity and the religious primes, we compared how well donations were fit by a set of generalized linear multilevel regression models (Table 3). The null model (model A) included only the intercept; model B

included a single prime condition (donations in the restaurant as the baseline, and donations in the church and in the temple as fixed effects); and model C included a prime condition in interaction with religiosity. All models included random effects for individual subjects (respondent ID) to compensate for the fact that each participant contributed to three donations. The religiosity variable was a continuous factor score as described above.

We evaluated model fit using the Deviance Information Criterion (DIC) (Lunn et al., 2012) and DIC weights (Burnham & Anderson, 2002). DIC allows us to estimate the out-of-sample prediction error of a model by penalizing a model for its complexity, therefore smaller values of DIC indicate better-expected out-of-sample predictions, and more complex models must overcome a substantive penalty to be deemed better than simpler models. DIC weight, on the other hand, is a transformation of DIC that can be thought of as the probability that a particular model is the best out of the set of models being considered. DIC weights allow a group of models to be mutually compared rather than requiring that individual models be accepted or rejected.

We fitted the models in the R Environment for Statistical Computing (R Development Core Team, 2015), using Stan (Stan Development Team, 2015), a Hamiltonian Monte Carlo sampler. Results are based on 5,000 samples each from five chains, after 5,000 adaptation steps in each. Convergence was assessed by the R-hat Gelman and Rubin statistic. Model code was generated and DIC calculated using `glmer2stan` (McElreath, 2015), a package for Rstan. The data were analyzed using uninformative (flat) priors.

Model C has a DIC weight of 0.99, therefore it has a 0.99 probability of being the best model (table 3). Looking at its parameters and their confidence intervals (table 4), we can see that only the interaction between donations and religiosity is significant. In other words,

while higher religiosity did not lead to higher donations overall, more religious individuals were significantly more affected by the religious primes.

Discussion

Our study offered the first naturalistic investigation of the effects of cross-religious contextual primes. Using a real-life context and an innovative design, we found that both ingroup and outgroup religious settings increased generosity among participants compared to the control setting. In accordance with previous studies, we did not find any main effects of individual religiosity on prosocial behavior. However, we did find a significant interaction between religiosity and the effects of the religious primes.

Previous work on religious priming has for the most part consisted of laboratory studies that used WEIRD (an acronym for “Western, Educated, Industrial, Rich, Democratic”) populations of university students (Henrich et al. 2010), who are both synchronically and diachronically among the least representative examples of typical human behavior. In this study, we used a field experiment recruiting from the general population of a non-Western country, while still maintaining a high degree of control, random assignment, and for the first time using a within-subject field design to study religious prosociality.

The majority of previous studies in this area have used formalized and often complicated economic games to measure prosocial behavior. Although such games are widely used as measures of inter-personal behavior, they are not representative of most types of economic interaction, let alone of prosociality in general. An additional concern with standard economic games has to do with the internal validity of the measures. For example, previous field experiments used cooperation games (Ahmed & Salas, 2013; Sosis & Ruffle, 2003; Xygalatas, 2012), where each player’s decision also depends on expectations about the

behavior of others. Although these studies typically also control for such expectations by asking participants to predict the behavior of other players, it is possible that such conscious and self-reported estimates do not accurately correspond to more intuitive assumptions or that such assumptions interact with prosocial tendencies in more intricate ways, as has been shown by Ahmed and Salas (2013).

Addressing these concerns, our study used a simple, unreciprocated act of charity, which provided a more straightforward measure of altruistic behavior that resembled naturally occurring acts of charity. To increase relevance, participants were not simply given the money by the experimenters but won it through their performance in the navigational task (Harrison & Mouden, 2011; Muehlbacher & Kirchler, 2009), while the stakes were high (approximately three days' salary of an unskilled worker) so that contributions carried a significant financial cost (Henrich et al., 2005). However, despite the near-universal relevance of money in contemporary human societies, many areas of human interaction do not involve monetary transactions. It is thus important for future studies to extend religious priming research to include other forms of prosocial behavior.

As is true of any field study, it is not readily apparent whether our results are specific to the Mauritian context or can be generalized to other populations or religious traditions – a matter which can only be resolved by cross-cultural comparative research and replication. Mauritius is one of the most heterogeneous societies (Okediji, 2005) as well as one of the most densely populated countries in the world, which means that inter-religious contact is abundant and thorough. This context might be historically atypical, although at the same time useful for projections of future arrangements, as it seems more characteristic of current trends in global immigration and population growth patterns. Mauritius' long history of multiculturalism and limited inter-group tensions may also contribute to those results. In a

conflictive setting, symbols associated with an outgroup might be likely to trigger suspicion or hostility. To the contrary, Mauritius constitutes a well-known example of successful multi-ethnic coexistence where ethnic or religious tensions have traditionally been limited relative to most places (Christopher, 1992).

More specifically, religious beliefs and practices in Mauritius tend to be highly syncretistic (Eriksen, 1998; Xygalatas, 2012). It is not uncommon, for example, to see Christians crossing themselves in front of a Hindu Temple, Buddhists participate in a Christian pilgrimage, or Hindus making fruit offerings to the Virgin Mary. It is thus possible that this syncretism increases the familiarity with and relevance of outgroup religious traditions. Indeed, recent evidence from Mauritius suggests that participation in certain ritual practices may increase prosocial attitudes towards both ingroup and outgroup members (Xygalatas et al., 2013).

Several possible mechanisms may be underlying the effects of religious cues on prosociality, and it is likely that they can all act independently to add to the effect. One such potential mechanism is linked to the perception of being monitored, which can activate evolved sensitivities related to reputational management (Haley & Fessler, 2005) and is known to have positive effects on prosocial behavior (Bateson, Nettle, & Roberts, 2006; Kratky et al., forthcoming). Indeed, most places of worship are replete with material representations of agency, whether in the form of decorative artwork or embedded in the architecture itself, for example statues and icons, frescoes, and gargoyles. Both Catholic and Hindu places of worship make abundant use of them, as was the case in our experimental locations. To control for these priming effects of agency, we manipulated agent representations in the control setting to match those of the religious ones. Although there inevitably remained some qualitative differences between the various depictions, our findings

seem to indicate that the effects of religious contexts extend beyond the influence of such agentive representations. For a stronger demonstration, future research might attempt to replicate these findings in religious contexts lacking such explicit agentive portrayals (e.g. mosques).

Whether divine beings are visibly depicted or not, a place of worship by its very nature evokes associations of those beings, which in turn may trigger a sense of vigilance and notions of supernatural reward or punishment (Bering, 2011; Bulbulia, 2009; Johnson & Bering, 2006; Rossano, 2007; Shariff & Norenzayan, 2007). In addition, religious primes may trigger semantic associations with normative themes related to religious doctrines and narratives (Bargh et al., 1996; McKay et al., 2011). As Shariff and Norenzayan note (2007: 807), such notions are “semantically and dynamically associated with acts of generosity and charitable giving.” It should further be noted that these effects are not inherent or unique to religion. Priming with secular concepts associated to justice (Shariff & Norenzayan, 2007) or even science (Ma-Kellams & Blascovich, 2013) is known to similarly increase prosocial behavior and attitudes.

A related question with regards to the religious priming literature is whether the observed effects are due to the religious nature of the prime or simply due to their association with group membership. In a recent study, Thomson (2015) found that priming participants with ingroup affiliation increased self-reported morality, whether that affiliation was religious or secular. Our findings show that even outgroup religious primes may promote prosociality, and that this effect manifests in actual behavior. It would be interesting for further research to examine whether outgroup secular primes might have the same effect on behavior.

Recent research (Shariff et al., 2015) suggests that the interaction between individual religiosity and religious primes might be crucial for the effectiveness of those primes. Our

sample in this study consisted entirely of religious participants (to varying extents), and our results confirmed that more religious participants were more susceptible to the effects of the religious primes. This raises the question of whether such effects would still be significant among atheists, which will have to be answered by future research.

A recurrent question in the literature on religious priming is whether its observed effects constitute instances of generalized prosociality or are merely limited to ingroup favouritism (Galen, 2012; Martin & Wiebe 2014; Ruffle & Sosis, 2006). Our study was conducted in a multi-ethnic, multi-religious setting where participants did not know the recipients of their donations, which was also confirmed by our post-experiment survey. In fact, given that Christians are a minority group in Mauritius, players would be statistically more likely to be donating their money to a religious outgroup rather than an ingroup member. Therefore, we take our charity measure to be an indicator of prosocial behavior that extends beyond the religious ingroup, at least for most participants. On the other hand, participants knew that other players were from the same village, which is another kind of ingroup. We therefore cannot know whether the observed effects would generalize to completely unrelated strangers.

Overall, contextual priming studies bring much-needed ecological validity to this area of research. Although the experimental task was inevitably artificial, the contextual stimuli were naturally occurring, which is crucial given that religious stimuli are highly sensitive to cultural and environmental particularities (Aveyard, 2014). Nonetheless, there is inevitably a trade-off between this increased realism afforded by naturalistic environments on the one hand and the higher level of control over variables afforded by laboratory settings on the other, as naturalistic designs do not always allow to exclude or control for extraneous and confounding variables. For example, research reveals subtle differences in the way concepts

related to “religion” and those related to “god” may affect prosocial behaviour (Preston et al. 2010). Thus, bringing our field results back to the lab may help refine these findings further.

Our study has examined a hitherto unexplored aspect of religious prosociality, and we hope that future research will clarify further aspects of this topic. For example, a highly relevant and related question is how religious settings may affect behaviors specifically towards outgroups. A study by LaBouff et al. (2012) found that religious contexts may increase negative attitudes towards religious outgroups. Further research needs to examine whether this translates into anti-social behaviors towards outgroup members.

On another matter, given that we have already argued against the validity of self-reports for measuring religious prosociality, an ever-accumulative body of behavioral research reveals a most intriguing pattern: on the one hand, religious primes seem to be effective in increasing prosocial behavior, while on the other hand religious people, who should be expected to be more exposed to religious primes, do not behave more prosocially. One potential explanation for this apparent contradiction is that the effects of religious primes on prosociality are short-lived (see Malhotra, 2010), and we hope that future research will examine the decay rates of such effects. On the other hand, it is also possible that non-religious people are more prone to the positive influence of secular primes (Norenzayan, 2013). That too needs to be determined by future research. The study presented here is not sufficient to answer these questions. However, it adds to a growing body of evidence which has begun to use precise methodologies in order to address such issues empirically.

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Table 1: Donations in each venue

| | Mean | Median (SD) |
|------------------------|-------|-------------|
| Donation in restaurant | 14.92 | 10 (18.51) |
| Donation in church | 16.31 | 12 (17.78) |
| Donation in temple | 18.10 | 11 (22.61) |

Table 2: planned contrasts between locations

| | Donation in the restaurant | Donation in the church |
|----------------------------|--|----------------------------|
| Donation in the restaurant | - | - |
| Donation in the church | $F(1,100) = 6.55, p < .02, \eta_p^2 = 0.06$ | - |
| Donation in the temple | $F(1,100) = 7.64, p < .008, \eta_p^2 = 0.07$ | $F(1,100) = .55, p = 0.46$ |

Table 3: Multilevel linear regression models FE: fixed effects, RE: random effects, DIC: deviance information criterion

| Model | Model parameters | Hypothesis | [DIC(weiht)] |
|--------------|---|--|---------------------|
| A | FE: Intercept RE: Respondent ID | null model | 2 570 (0.00) |
| B | FE: Prime RE: Respondent ID | differences among primes | 2 544 (0.01) |
| C | FE: Prime, Prime : Religiosity RE: Respondent ID | differences between primes in interaction with religiosity | 2 496 (0.99) |

Table 4: Parameters of the best fitting model

| Independent variables | Model C β coefficient (95 % CI) |
|-----------------------------------|---|
| Intercept | 14.96 (11.68: 18.26) |
| Prime 2 (church) | - 4.28 (- 7.44: 1.14) |
| Prime 3 (temple) | 1.80 (- 1.34: 4.96) |
| Prime 1 (restaurant): Religiosity | - 0.29 (- 4.47: 3.92) |
| Prime 2 (church): Religiosity | 7.14 (2.91: 11.34) |
| Prime 3 (temple): Religiosity | 4.27 (- 6.74: 15.33) |
| Variance parameter | SD (95 % CI) |
| Intercept Respondent ID | 12.49 (11.50: 13.57) |

image 1: the position of the maze task on the floor of the Hindu temple. For the experiment, the maze was placed on a plywood panel to avoid effects of anomalies on the floor surface.



image 2: A local assistant and two of the experimenters testing the maze task.



Accepted