Big Gods in small places: the Random Allocation Game in Mauritius

Dimitris Xygalatas\textsuperscript{a,b}, Silvie Kotherová\textsuperscript{c}, Peter Maño\textsuperscript{a,c,d}, Radek Kundt\textsuperscript{c,e}, Jakub Cigán\textsuperscript{c}, Eva Kundtová Klocová\textsuperscript{c,e} and Martin Lang\textsuperscript{a,c,f}

\textsuperscript{a}Department of Anthropology, University of Connecticut, Storrs, CT, USA; \textsuperscript{b}Interacting Minds Centre, Department of Culture and Society, Aarhus University, Aarhus, Denmark; \textsuperscript{c}LEVYNA Laboratory for the Experimental Research of Religion, Faculty of Humanities, Masaryk University, Brno, Czech Republic; \textsuperscript{d}Faculty of Social and Economic Sciences, Comenius University, Bratislava, Slovakia; \textsuperscript{e}HUME Lab Experimental Humanities Lab, Faculty of Humanities, Masaryk University, Brno, Czech Republic; \textsuperscript{f}Department of Human Evolutionary Biology, Harvard University, Boston, MA, USA

ABSTRACT
The relationship between religion and social behavior has been the subject of longstanding debates. Recent evolutionary models of religious morality propose that particular types of supernatural beliefs related to moralizing and punitive high gods will have observable effects on prosociality. We tested this hypothesis, comparing the effects of diverse religious beliefs, practices, and contexts among Hindus in Mauritius. We found that specific aspects of religious belief (related to moralizing gods) as well as religious practice (participation in high-intensity rituals) were significant predictors of prosocial behavior. These findings contribute to a more nuanced understanding of religious prosociality and have significant implications for the evolution of morality.

ARTICLE HISTORY
Received 30 June 2015
Accepted 21 November 2016

KEYWORDS
Mauritius; experimental anthropology; random allocation game; morality; religion; Big Gods

1. Introduction
Recent developments in the cognitive and evolutionary study of culture suggest that the historical and diachronic pervasiveness of religion may be attributed to a host of distinct mechanisms that operate independently in a variety of other domains but are successfully co-opted by religious systems to regulate human social conduct (Atran & Henrich, 2010; Norenzayan et al., 2014). Such mechanisms include a range of beliefs and practices that are commonly found in religions and can contribute to the alignment of impersonal dispositions and motivations and foster social cohesion among members of the religious ingroup (Bulbulia et al., 2013). For example, ideas about life after death, supernatural vigilance, and divine punishment may motivate conformity and moral behavior towards other group members (Johnson & Bering, 2006; Norenzayan, 2013; Schloss & Murray, 2011), while costly ritual practices can effectively signal commitment and trustworthiness, promote ingroup cooperation, and forge powerful group identities (Bulbulia, 2004; Irons, 2001; Purzycki & Arakchaa, 2013; Soler, 2012; Sosis, 2003; Sosis & Ruffle, 2003; Whitehouse & Lanman, 2014; Xygalatas et al., 2013).

Although this new scientific approach to religion has been rapidly developing, most existing empirical work has been limited to the low-hanging fruit of laboratory studies, student samples, and/or Western Judeo-Christian contexts. Despite many valuable contributions coming from this line of research, studies that rely on those populations cannot warrant any significant generalizations about the human condition. Moreover, as these samples constitute some of the historically least
representative examples of human culture (Henrich, Heine, & Norenzayan, 2010), they are particularly unsuitable for testing evolutionary hypotheses (Norenzayan, 2016). In recent years, cognitive and evolutionary approaches to religion have moved towards more ecologically valid and methodologically robust forms of experimentation by bringing laboratory methods into the field (Xygalatas, 2013, 2016). However, the need for increased control and precision requires that the effects of religious belief and practice be examined independently. To address these issues, the current study utilized an interdisciplinary team of researchers to examine the effects of both belief and practice on prosocial behavior, in a naturalistic, non-Western setting, with a sample representative of the general population.

Our study was conducted in Mauritius, which is one of the most diverse societies in the world, with a population consisting of numerous ethnic, linguistic, and religious groups (Okediji, 2005). Despite this great diversity, and in the face of ethnic and sectarian antagonisms (Carroll & Carroll, 2000a, 2000b; Eriksen, 1998), inter-group violence has been relatively rare in contemporary Mauritian history, and the island is often held as an exemplar of successful multi-ethnic cohabitation (Christopher, 1992). These conditions offer an ideal setting for testing evolutionary models of prosociality and the link between religion and morality.

To assess the relative effects of particular aspects of religion, we used a behavioral measure (the Random Allocation Game) with members of the Hindu community in the coastal village of Pointe aux Piments. We looked at a number of dimensions of religiosity related not only to quantitative (degree of belief and frequency of ritual participation) but also qualitative aspects of religious beliefs and practices (character of various deities and types of rituals), and how each of these affected behavior in this game. We further accounted for a number of key variables, such as socio-economic status and financial security, and contextual and environmental influences. To increase the generalizability of our results, we coordinated our efforts with an international team of researchers who conducted similar studies in various field sites around the world (see Purzycki et al., this volume).

We hypothesized that prosocial behavior would be positively influenced by (a) particular features of belief related to moralizing and punitive high gods (Norenzayan, 2013), (b) particular religious practices related to costly rituals (Xygalatas et al., 2013), and (c) particular contextual factors such as material security and contextual primes (Xygalatas, 2012).

2. Ethnographic setting

Mauritius is a small island nation in the Mascarene archipelago, situated approximately 500 miles off the east coast of Madagascar. With its 1.3 million inhabitants living in an area of only about 2040 km² (788 mi²), it is one of the world’s most densely populated places. Mauritius lies betwixt and between places and cultures. Geographically it forms part of Africa, although it is the most distant country from the continent, located in the middle of the Indian Ocean; historically, it has been occupied by Dutch, French, and British colonizers; and demographically, it is one of the most diverse societies in the world, with its inhabitants tracing their ancestries from a broad variety of places.

2.1. Colonialism, sugar, and forced labor

Mauritius was one of the world’s last sovereign countries to be continuously inhabited by humans. Although previously visited and occasionally used as a base by Arab, Portuguese, and Dutch sailors (North-Coombes, 1980; Vaughan, 2005), it was not until 1715 that a sustainable settlement was created by the French. Under the rule of governor Bertrand-François Mahé de La Bourdonnais (1735–46), the island acquired an important strategic role in the competition for domination of the Indian Ocean before and during the Napoleonic Wars. Recognizing this strategic significance, the British invaded and captured the island in 1810 (Allen, 1999). The Treaty of Paris in 1814 formally ceded the island to the British, which was renamed Mauritius and remained part of the Crown until its independence in 1968.
Both the Dutch and the French had introduced sugar cane to Mauritius, but it was not until the British arrived that sugar began to play a major role in the island’s economy. At its peak, this tiny island which makes up 1/70,000 of the world’s land mass was producing 7% of the world’s sugar (Allen, 1999). As a result, the population of Mauritius continuously had to keep up with the needs of the sugar industry, which led to the massive importation of forced labor that shaped the island’s demographic makeup.

Under French rule, thousands of slaves were brought from Madagascar, Mozambique, various other parts of Africa, as well as from India to work in the sugar cane plantations. Under British rule, slavery was formally abolished in Mauritius in 1835, only to be replaced by a different form of forced labor. Over 450,000 indentured laborers arrived in Mauritius from Asia, mainly India, in three major waves until 1910, when the indenture system was terminated (Allen, 1999; Eisenlohr, 2006). Thus, the sugar trade defined Mauritian history and economy, as well as the ethnic composition of the country, as the majority of its current inhabitants are descendants of those early plantation servants.

2.2. Contemporary Mauritius and cultural diversity

Today, Mauritius is one of the most diverse societies in the world (Okediji, 2005). Lacking any indigenous population, it is a mosaic of cultural, ethnic, linguistic, and religious traditions. Since independence, Mauritian governments have promoted an overarching Mauritian identity and discouraged the use of ethnic classifications. Thus, the official census does not include ethnicity, although it does include relevant indicators like religious affiliation and ancestral language. Based on those indicators and the last national census to explicitly include ethnic origin (1962), it is estimated that about two thirds of the population are Indo-Mauritians and over one quarter derive their ancestry from Madagascar and various parts of the African continent (Afro-Mauritians). Some 3% are of Chinese origin (Sino-Mauritians) and 2% are of French origin (Franco-Mauritians), with a variety of smaller groups and people of mixed origin (Eriksen, 2007; Jahangeer-Chojoo, 2010). These groups are far from homogeneous. Afro-Mauritians are often called “Creoles,” a broad term used to describe people of Malagasy, any sub-Saharan African, or mixed descent. Indo-Mauritians derive their ancestry from people who came from India and present-day Pakistan, and the former are further subdivided into a number of culturally distinct ethnic groups (Eriksen, 2007).

Similarly diverse is the range of spoken languages in Mauritius. English and French are widely spoken, but the lingua franca is the Kreol Morisien, a creole language that evolved among slaves in the eighteenth century through a mixture of French and various African languages (Wardhaugh, 2002). This is the language spoken by virtually all Mauritians in most everyday interactions. Despite its widespread use, the Mauritian Creole does not have an official spelling system and is not formally used in education. In addition to Creole, French, and English, many Mauritians also speak their family’s ancestral language, which may be Hindi, Bhojpuri, Urdu, Tamil, Telugu, Marathi, Gujarati, Mandarin, Hakka, or others.

The Mauritian setting fosters intercultural contact and exchange. The small size of the island, the large population density, and the lack of any geographical barriers between groups mean that members of all groups are in frequent contact with one another (Eriksen, 1998; Kostick, 2008). At the same time, active attempts by the state to promote an overarching national identity while embracing diversity (for example through a uniform, multilingual educational system, political slogans like “Unity in diversity,” or the establishment of national holidays that allow each of the main religious groups to celebrate their festivals) provide institutionalized support and legitimization to the nation’s pluralist identity (Eriksen, 1998).

2.3. Religion in Mauritius

Religion is a more common classifier of people than ethnicity in Mauritius, although the two are very frequently conflated. Most Afro-, Franco- and Sino-Mauritians are Catholic (app. 26%), while
another 6% of the population adhere to a variety of Anglican, Pentecostal, Baptist, and other Christian groups. Muslims of Indian and Pakistani origin, predominantly Sunni, make up 17% of the population. Many Sino-Mauritians practice Buddhism and other Chinese religions (less than 1%), and a variety of other religions can be found. Less than 0.7% of all Mauritians self-identify as non-religious (Statistics Mauritius, 2012).

The most widespread religion is Hinduism (49%), which is practiced in several forms by various Indo-Mauritian groups. The term “Hindu” is used in a broad sense to include all those groups, as well as in a more restrictive way to denote those Indo-Mauritians originating from Northern India, where Bhojpuri (a form of Hindi) is spoken (over 78% of all Hindus). Tamils (originating from the southern state of Tamil Nadu) make up approximately 12% of Mauritian Hindus, while Telegus account for about 5% and Marathis for 4% (Statistics Mauritius, 2012). Given this ethnic heterogeneity, virtually all traditions of Hinduism are represented in Mauritius. In the 2011 census (Statistics Mauritius, 2012), Mauritian Hindus self-identified as members of 19 distinct religious groups, including a further diversified group termed “other Hindu.”

A great variety of deities are worshipped among Mauritian Hindus. The majority of Hindi-speaking Hindus are Shaivites, followers of Lord Shiva. Shiva is one of the primary deities of the Hindu pantheon, also known as Mahadeva, which means “Great God.” He is the Supreme God (God of all gods) of Shaivism, one of the major denominations in contemporary Hinduism. He is seen as an omniscient, powerful deity, known both for his benevolent and fearsome attributes. He is the Destroyer and Transformer of the Trimurti, the Hindu Trinity, which also includes Brahma the Creator and Vishnu the Preserver. Other important deities are Vishnu (particularly among Telegus), Ganesha (particularly among Marathis), Murugan (particularly among Tamils), and various forms of the Mother Goddess, who may be identified as Kali, Durga, Draupadi, Parvati, Shakti, Mariamman, and other goddesses depending on the temple and local tradition. Although Hindus honor all deities of the Hindu pantheon, they typically offer their prayers to one or a few, based on their origin and their local setting as well as individual, gender, caste, and family preferences.

Mauritius is home to thousands of temples and shrines. Ritual practices are plentiful and ubiquitous, and Mauritian Hindus spend hundreds of hours per year on the performance of private and collective rituals (Xygalatas, 2012). The largest religious event in the country is the Maha Shivaratri, an annual festival celebrated in honor of the god Shiva. In Mauritius, this festival involves a pilgrimage to a sacred crater lake known as Ganga Talao (Ganges pond) or Grand Bassin (great lake). The lake was discovered in 1897 after its location was revealed to a priest in a dream. According to a myth, it was formed when Shiva spilled some drops of the Ganges, which he kept in his head. In 1972, water brought from the Ganges was poured into the lake, symbolically reaffirming its connection to Hinduism’s most sacred river. Today, the Mauritian Maha Shivaratri is the largest Hindu pilgrimage outside of India, drawing hundreds of thousands of pilgrims of all Hindu denominations, as well as people of other faiths. In recent years, an enormous statue of Shiva, 108 feet tall, has been erected near the lake, welcoming pilgrims to their destination. During the pilgrimage, devotees walk for many miles, often for the entire duration of the trip, which can take several days. When they reach the lake, they make offerings to the god and collect sacred water to bring back with them. The water is transported in large, temple-shaped structures called kanwaris and is eventually poured over the Shiva Lingam (a symbolic representation of Shiva) at the pilgrims’ homes and temples.

Other important religious events include the Diwali (a Hindu festival of lights), the Ganesh Chaturthi (the Marathi celebration of Lord Ganesha’s birthday), and the Ugadi (the Telegu New Year), which involve large degrees of pageantry and are attended in large numbers. However, the most intense rituals are of Tamil origin and include fire-walking, sword-climbing, and the body-piercing ritual of Thaipusam Kavadi (see Fischer et al., 2014; Xygalatas et al., 2013). This festival celebrates the mythical occasion when the goddess Parvati gave her son Murugan a lance (vel), with which he slayed the evil demon Surapadman. The lance thus became Murugan’s emblem, and the event is symbolically represented in the festival by bodily piercings.
The Thaipusam is widely attended in Mauritius, not only by Tamils but by all Hindu groups. It is performed in honor of the Lord Murugan and consists of 10 days of fasting and prayer, which culminate on the full moon of the Tamil month of Thai. On that day, male devotees get their bodies pierced with multiple needles and skewers that can often number in the hundreds. Some of them drag enormous chariots by hooks attached to their skin and others walk on shoes made of nails. On their shoulders, they carry heavy bamboo structures called *kavadi* in a several-hours-long procession to the temple of Lord Murugan. Women and children also participate in this ritual, although they do not engage in the most painful activities. They typically join the procession carrying a small *kavadi* or a pot of milk, and either have a single piercing through the tongue or cover their mouths with a scarf.

In addition to these major festivals, Mauritian Hindus spend much of their time performing personal and group prayers (*puja*). These prayers are highly ritualized and may involve chanting psalms, performing repetitive movements, and offering incense, flowers, and fruit or other food items to a deity. Each household has a shrine built at the entrance, dedicated to Hanuman or some other deity, where prayers and worship are offered daily. Public temples are also used for prayer, both collectively several times a week, and individually throughout the day.

Syncretism is pervasive in all aspects of Mauritian society, and religion is no exception. The various Hindu groups not only attend but often even organize each other’s ceremonies – for example, the Tamil fire-walking ceremony (Thimidi) is commonly performed at non-Tamil temples. To a significant degree, this also extends across different religions. The Hindu pilgrimage of Maha Shivaratri and the Christian pilgrimage to the grave of Pere Laval, a nineteenth-century Catholic priest and missionary to Mauritius, are attended by people of different faiths. The Tamil self-mortification rituals are often attended and sometimes actively performed by Christians, Chinese, and more rarely Muslims. It is not uncommon for people to pray to the gods of other religions or fast on their holy days. In the course of our ethnographic fieldwork, we have even encountered statues of Jesus, Mary, or the Buddha inside Hindu temples (Figure 1).

In addition, beliefs and practices related to spirits are widespread and largely shared across religious groups in Mauritius. These beliefs seem to be a syncretic mix of Christian and animistic concepts of African origin, and are typically related to the idea of an immortal soul, which is called a *nam* after the French word for soul (*l’âme*). When someone dies, the *nam* leaves the corpse to continue its

*Figure 1.* Statues of Jesus and the Virgin Mary in a Hindu temple.
disembodied existence indefinitely. Funerary rites are performed to ensure the nam’s smooth transition to the afterlife, and other ceremonies are periodically performed for the dead on various occasions, for example on the anniversary of their death or festivals dedicated to ancestor worship, such as the Hindu Pitru Paksha and the Christian All-Saints Day. In exchange, the nam guide and protect the living and often appear in their dreams to reveal solutions to their problems or offer reassurance.

If the living neglect to perform the proper rites for the dead, or if one dies an “unnatural death” (a sudden or violent end caused by an accident, abortion, crime, or suicide), the soul of the deceased can be trapped between the two worlds and become a jab, which is a dangerous, often malevolent spirit that can haunt places, possess people, and cause harm, illness, or death (Colwell-Chanthaphonh & de Salle-Essoo, 2014; Johannessen, 2011). The nam often inhabit trees, but the jab wander around, frequenting cemeteries or haunting abandoned houses. They are a force to be reckoned with and avoided at all costs.

The belief that evil spirits can be manipulated for selfish purposes is also widespread in Mauritius, irrespective of religious affiliation. Witchcraft is rarely the topic of public discussion, as it is both a taboo and illegal under Mauritian law. Nonetheless, it is widely practiced by adherents of the mainstream religions, and a variety of magical practices are offered not only by specialist sorcerers but in some cases also by priests and temples.

2.4. Our field site

Our study took place in Pointe aux Piments, where the lead author had conducted ethnographic fieldwork for a total of two years and had established a network of informants and gatekeepers. This allowed us to meet this study’s extraordinary requirements (including gaining exclusive access to private and public locations), which would have been impossible in an unfamiliar setting.

Pointe aux Piments is a large rural village consisting of a mixed population of 9000 people (about 90% Christians and Hindus, roughly equally divided). The majority of Hindus in this village are adherents of Sanatana Dharma, the mainstream Hindu movement related to the traditional practices of North Indian Hinduism. The majority of the local population is of low or middle income, employed mainly in fishing, agriculture, tourism, and other services.

As most places in Mauritius, the village is host to numerous Hindu shrines and temples. We focused on a neighborhood that lies at the north-west entrance to the village, where a Kali shrine (Kali Mai) that had been built on the coast later evolved into one of the major temples of the village. Next to the temple lies a statue of a black Madonna. Observing the foot traffic by the beach, one will often see Hindu devotees exiting the Kali Mai and approaching the statue of Mary to offer her flowers, fruit, and prayers. Conversely, upon concluding their prayers to Mary, many of the Christians stand in front of the Kali Mai and cross themselves. The statue of Mary was commissioned by the same man who built the temple. When asked about it, he said, “This is a Kali temple. Kali is a mother, Mary is a mother, so I thought she would feel at home there. And it’s always good to have one more god on your side.”

3. Methods and materials

The materials for this study were adapted from the Evolution of Religion and Morality Project (see Purzycki et al., this volume; Purzycki et al., 2016a), translated into Creole and back-translated into English by native research assistants with a social scientific background. Any conflicts between translations and back-translations were resolved through discussion with the research assistants and a local focus group.

The full dataset as well as code and scripts for analyses in R can be found in Purzycki et al. (2016a). A detailed description of the variables in this dataset can also be found in Purzycki et al.
The protocol and all study materials are available on the project website: https://goo.gl/B04tSd.

3.1. Sampling and participants

The study took place in August–September 2013. One hundred Hindus aged 17–78 (M = 36.81, SD = 15.31) were recruited by our local assistants, who were stationed in central locations around the village and approached passers-by on the spot. Given that in Mauritius there is a strong overlap between religion and ethnicity, our local assistants were able to identify Hindu subjects based on their physical features and dress code. Our questionnaires subsequently provided confirmation that all recruited subjects were indeed Hindus.

Two participants were excluded from the study because they arrived intoxicated, while two participants withdrew from the study. The analysis therefore includes a total of 96 subjects (68 males, 28 females). These participants took part in the experiment and answered the post-experiment questionnaires, which were read to them by local assistants. Although all participants had some knowledge of either English or French, the study was conducted entirely in Creole, which everyone spoke as their mother tongue. The study was approved by the Ethical Review Board of the Czech Association for the Study of Religions, and every participant provided written consent.

3.2. The Random Allocation Game (RAG)

To assess morality, we used the Random Allocation Game (RAG), which has been designed to obtain a measure of cheating (Hruschka et al., 2014; Jiang, 2013; McNamara, Norenzayan, & Henrich, 2016). This game involves rolling a die with two possible outcomes (e.g., white or black), and allocating a monetary amount to either of two recipients according to the outcome. Players must decide which recipient they wish to send the money to without revealing their preference to the experimenter. If the die lands with a black side up, they can send the money to the recipient they chose; if not, they must send it to the other recipient. Since the initial decision is never revealed to the experimenter, the players can cheat without anyone knowing. Thus, although individual cheating cannot be determined, impartial (fair) behavior is gauged at the group level by comparing the statistical distribution of all allocations to that of the binomial distribution that would be expected to arise by random chance. Since individual choices are not recorded, a large number of observations is necessary to produce meaningful results. For this study, we used 5760 observations.

In our experiment, each participant played two consecutive games, counterbalanced in order. Each game consisted of 30 throws of a die and for each throw participants allocated a 5-rupee coin to one of two recipients. The total amount allocated was thus 300 MUR (at the time of the study roughly 10 US dollars), which equaled approximately two days’ wages based on the median income reported in our sample.

The Local Community Game consisted of allocating money to either an anonymous ingroup member (LOCAL) or an anonymous co-religionist (DISTANT). The ingroup was defined as a person from the same village (without any mention of religion), while the co-religionist was defined as a Hindu from La Gaulette, a distant small village in the south of the island. In the post-game interviews, most participants reported never having visited La Gaulette. The Self Game consisted of allocating money to either oneself (SELF) or an anonymous co-religionist (DISTANT) from La Gaulette.

3.3. Contextual primes

Economic behavior is well known to be sensitive to contextual cues (Bateson, Nettle, & Roberts, 2006; Krátký, McGraw, Xygalatas, Mitkidis, & Reddish, 2016), and religious contexts are especially known to affect decision making (Ahmed & Salas, 2013; Xygalatas, 2012). To account for such effects, we conducted our experiment in two distinct locations, one religious and one secular. The
religious context was a Hindu temple devoted to Kali (Figure 2), and the secular location was a restaurant. Located opposite each other, these two venues constituted the two main areas for socializing in that neighborhood. The two venues had similar spatial arrangements and dimensions, consisting of a covered patio in the front and two main spaces inside, a large room with seating arrangements for the public and a smaller room at the back with access restricted only to specialists (the inner sanctuary [Garbhagriha] and the kitchen respectively). To secure exclusive access to the two locations during the experiment, we obtained permission from the temple authorities and paid rent to the restaurant owner.

Previous studies have shown that representations of agency, which abound in most religious temples, may deter cheating and increase prosocial behavior (Bateson et al., 2006; Haley & Fessler, 2005; Krátký et al., 2016), an effect that has been attributed to a sense of being monitored (Norenzayan & Shariff, 2008). Thus, to balance the absence of anthropomorphic cues in the secular setting, the game session in the religious setting took place in a “tree shrine,” a room inside the temple built around a living tree adorned with hundreds of colorful threads by devotees. Participants were seated so that they were not facing any anthropomorphic representations. In the secular setting, we ensured that no religious symbols were visible in the room.

3.4. Interviews and questionnaires

In the months preceding the experiment, we conducted structured interviews with a separate sample of 25 Hindu informants from the village, which were later used to generate the emic (locally relevant) categories upon which our subsequent interviews were based. Specifically, we administered a Religious Landscape Interview (see Purzycki et al., 2016c; Purzycki et al., this volume) to determine the most important supernatural agents and ritual practices in the local context. Interviewees were asked to freely list up to five deities (gods or spirits) and then rank them in order of personal importance to them. Then, they were asked to judge whether these deities were knowledgeable and concerned about human affairs and whether they rewarded or punished human behaviors. Deities that met this profile were coded as Big Gods, while those less knowledgeable and moralizing were coded as Local Gods.

Analysis of these interviews revealed the most important deity in people’s lives to be Shiva (see section 2.3). Since Shiva was described by our participants as knowledgeable, morally concerned, punitive, and rewarding, this deity was used as the Big God in the surveys that were administered after the experiment (see below). As our sample was drawn from adherents of Hinduism, which is a polytheistic religion, the free lists were saturated by the major figures of the Hindu pantheon,
and Local Gods were rarely mentioned in our sample. Thus, to determine the most salient Local Gods, we conducted consultations with four local focus groups, each consisting of four informants representing a different age group: 18–25; 25–35; 35–45; and 45 and above. During the consultations, each group was asked to describe the most salient supernatural agents in their culture who: (a) do not always know everything people do and think, and (b) do not reward or punish people for their moral conduct. Each group was asked to discuss the topic and reach a consensual decision. The ethnographer (first author) facilitated the discussion and offered clarification when necessary. All four groups indicated that the most important local deity was a “nam,” which is best translated as “soul” or “spirit” (see section 2.3).

Finally, informants were asked to free list the most important communal and private rituals in which they participated, and then rank them in order of personal importance to them. Analysis of the results showed that the two most widely performed communal rituals were the annual pilgrimage of Maha Shivaratri and the painful ordeal of the Thaipusam Kavadi, while the most common personal ritual was prayer (see section 2.3).

Immediately after the experiment, participants completed a post-game questionnaire. The questionnaire included standard demographic information such as age, sex, occupation, educational level, household and family size. We also included measures of income, existential and material security, and evaluations of secular authorities (the police), as such factors may influence both religiosity and economic behavior. For example, countries with a strong rule of law and well-trusted public authorities have lower religiosity rates and lower prejudice towards outgroups (Gervais et al., forthcoming; Norenzayan & Gervais, 2015). Moreover, previous studies (Hruschka et al., 2014; McNamara et al., 2016) have found that material insecurity increased cheating in the Random Allocation Game, while favorable views of the police decreased cheating.

Crucially for our hypotheses, we used the results of the preliminary interviews to construct a series of questions of individual belief and practice. Since Shiva emerged as the most relevant Big God in those preliminary interviews, participants were asked a series of questions designed to assess how strongly each participant believed in this deity as well as how moralizing and punishing they considered him to be. The same questions were asked about the Local God (nam). Finally, we asked participants how frequently they participated in each of the three rituals that emerged as most significant in the preliminary interviews: personal prayer, Maha Shivaratri, and Thaipusam Kavadi.

To ensure that the results were not driven by acquiescence bias, the interviews also contained questions related to how the experiment was perceived by participants. When asked what they thought the purpose of our study was, respondents produced a great wealth of interpretations, ranging from studying various aspects of cognition, behavior, and culture to teaching participants about issues like religion, morality, or social problems, and from missionizing to social interventions, or simply having fun. Coding these answers into thematic categories showed that most participants associated the game with helping or charity, followed by morality, fun, gambling, and then a variety of other themes. Due to this great variety of explanations, no clear pattern seemed to emerge that might have systematically influenced allocations (but see Purzycki & Kulundary, this volume). This was further confirmed by our models, which showed that associating the game with charity did not significantly improve any of the fit models.

### 3.5. General procedure

The experiment took place over the course of 14 days. However, no data were collected on four days with scheduled religious services. An analysis of variance (ANOVA) using the date of playing each game as factor showed no order effects on allocations. Participants were recruited in groups and led to the study site, where they were randomly assigned a unique ID card determining their placement at either the religious or secular location (N = 48 at each location) as well as the order of the two games and the placement of the cups. Each participant received a show-up fee of 50 MUR at the beginning of the study, which they could keep in addition to their earnings from the economic game.
To minimize communication between players about the experiments, participants were asked to wait for their turn in a designated place, separated from those who had finished the study, and to not disclose any information about the details of the study until its completion. When their turn came, participants were individually invited into their respective locations, where they were greeted by one of our five native research assistants, who were trained in the experimental procedure but blind to the hypotheses of the study. Participants were informed about the procedure and signed a consent form. They were offered examples of how to play the game and given a comprehension test, in which they were asked questions about the procedure. All participants were able to pass the comprehension test. The median number of examples used was two for the first game ($M = 3.28, SD = 2.46$) and one for the second game ($M = 1.70, SD = 1.24$).

Participants received a small transparent plastic bag with 30 coins and a tray with two pairs of cups (one pair for each game) in a quadrilateral arrangement. Cups were labeled according to the possible allocations for each game (a: Someone from your village – a Hindu from La Gaulette; b: Yourself – a Hindu from La Gaulette) and placed in such a way that only one pair was visible at any time. Each cup was closed with a lid that had a slot for inserting coins. The order of the games as well as the placement of the cups (left–right) was counterbalanced.

Participants were given the tray and were left alone to play one of the two games. When they indicated that they were finished with the first game, the research assistant entered the room and turned the tray 180 degrees, thus revealing the second pair of labeled cups, and provided another bag of coins. Participants continued with the second game after the experimenter had left.

Following the second game, participants completed the post-game questionnaires (see section 3.4). The questionnaires were administered by local research assistants in the form of interviews in one of four designated (roped) areas in a nearby grove. This allowed us to maximize the use of the experimental locations and to prevent contact between those who had completed the game and those who were waiting for their turn. During this time, participants kept the tray with them, ensuring that no one could tamper with their earnings. Upon completing the interview, participants brought their trays to a mobile payment station, where they received their earnings from one of the experimenters. The entire process took approximately 90 minutes per participant.

### 3.6. Analyses

The relationship between predictors and the amount allocated to LOCAL (Local Community Game) or SELF (Self Game) was analyzed in R (version 3.0.3; R Core Team, 2014). Since our data came from a series of Bernoulll trials ($N = 30, p = 0.5$; that is, 30 die rolls with binary outcomes), we fitted three models with binomial distribution using the generalized linear models (glm function) and generalized linear models with random effects (glmer function). In the first two models, allocations to LOCAL (Model 1) and SELF (Model 2) were selected as dependent variables. We first added fixed effects stepwise on the basis of their overall improvement of the model using Akaike Information Criterion (AIC), and later compared the results of this bottom-up approach with a top-down selected model (West, Welch, & Galecki, 2007) to arrive at the final model. The order in which we added predictors was as follows: demographic variables; treatment variable; game association with charity; variables related to belief in a Big God; variables related to belief in a Local God; and ritual participation (see Figure 3 for specific variables and their order). The BG (Big God) and LG (Local God) variables were created by aggregating two binary variables on belief in watchful and punishing Big/Local Gods (in this case, Shiva and nam, respectively). Although the treatment variable did not significantly improve any of the models, we kept it in the final model due to its theoretical importance.

To compare differences between allocations to LOCAL and SELF (Local Community Game vs. Self Game), we fitted a third model with RAG Type as the main predictor and assessed which predictors interact with RAG Type, thereby influencing the Local Community Game vs. Self Game difference (in this model we considered only predictors significant in Model 1 and Model 2). Due to the clustered
nature of our data (RAGs were nested within participants), we included random intercepts for each participant into the model.

4. Results

4.1. Demographics

The socio-economic distribution of our sample seemed to be consistent with that of the most recent census for the area (Statistics Mauritius, 2012), suggesting that our sample was fairly representative of the general village population. The average participant had 8.01 years of formal education ($SD = 2.98$). The median family size was four individuals, and the median individual income was 5000 Mauritian rupees per month (app. 150 US dollars at the time) ($M = 8349, SD = 6590$). Overall, 60% of our sample was active in the job market, and the rest were students, retirees, housewives, or unemployed. Among those who were employed, about one third were unskilled manual laborers, about 30% worked in the tourism industry, and approximately 10% in fishing. The most common occupations for men were fisherman, gardener, and waiter. The most common occupation for women was housewife.

4.2. Allocations

The order that the games were played in had no effect on any of the allocations (all $r < .14$, all $p > .20$). Similarly, the number of examples used for each participant until they sufficiently understood the procedure ($M = 3.28, Mdn = 2.00, SD = 2.46$) had no effect on any of the allocations (all $r < .13$, all $p > .15$). Table 1 presents Pearson’s correlations between key demographic variables and allocations. Gender and education do not seem to have an effect on any of the allocations, while age and household size are significantly correlated with allocations to LOCAL and SELF.
4.3. Local Community Game

In the first version of the RAG, the mean allocation to the DISTANT was 14.34 (SD = 3.41), and the mean allocation to the LOCAL was 15.71 (SD = 3.49). Note that the two values do not amount to 30, because one participant seems to have kept 5 MUR instead of placing them into the cup, while another seems to have added 10 MUR from his/her show-up fee. These values differ significantly from those predicted by the binomial distribution (z(95) = 2.53, p = 0.01; see also Figure 4, A–B), suggesting that players showed some favoritism towards the LOCAL. The results of the best fit model are shown in Table 2 (model LOCAL) and plotted in Figure 5.

We did not observe a main effect of either treatment or sex, or an effect of the interaction between the two. On the other hand, we observed a significant negative effect of age (younger people allocated more money to the LOCAL cup) and a positive effect of household size (the larger their household, the more people favored the LOCAL group). Moreover, we found a significant effect of the BG variable. That is, people who endorsed a version of Shiva as a watchful and punishing Big God (BG) tended to divide the money more fairly between the LOCAL and DISTANT cups. There was a significant correlation between age and BG (r = .21, p = .04), and although age was negatively correlated with education (r = −.46, p < .001), education did not explain a significant amount of variation in this model, suggesting that the observed effect of BG on allocations is irrespective of age or education. Furthermore, a marginally significant positive correlation between BG and police evaluation (r = .18 p = .07) suggests that the variability explained by evaluation of police was already accounted for by BG. This may be the reason why police evaluation did not improve the model fit despite its significant correlation with allocations to the LOCAL cup (r = −.22, p = .022). Finally, participation in the Kavadi ritual significantly improved the model fit, although its effect did not reach statistical significance.

4.4. Self Game

In the second version of the RAG, players allocated an average of 13.71 MUR (SD = 3.30) to the DISTANT and an average of 16.29 (SD = 3.30) to the SELF, deviating significantly from the expected binomial distribution (z(95) = 4.62, p < 0.001; see Figure 4, C–D). The best fit model once again does not show a significant effect of treatment or any significant interaction between treatment and sex. On the other hand, we do observe a significant effect of sex on allocations, with females showing more fair behavior. Furthermore, endorsement of a punishing moralizing Big God (BG) was a significant predictor of fairness in allocations, and so was frequency of participation in the high-intensity collective Kavadi ritual (see Table 2, model: SELF; and Figure 5, C). On the contrary, the frequency of participation in the low-intensity collective ritual of Maha Shivaratri and of personal

---

**Table 1. Correlations for demographic variables.**

<table>
<thead>
<tr>
<th></th>
<th>LOCAL</th>
<th>SELF</th>
<th>LOCAL vs. SELF</th>
<th>Gender</th>
<th>Age</th>
<th>Education</th>
<th>Household size</th>
<th>Material insecurity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELF</td>
<td>0.331***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCAL vs. SELF</td>
<td>−0.609***</td>
<td>0.546***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>0.078</td>
<td>−0.117</td>
<td>−0.168</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>−0.261*</td>
<td>−0.194</td>
<td>0.069</td>
<td>−0.032</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.015</td>
<td>−0.044</td>
<td>−0.051</td>
<td>−0.075</td>
<td>−0.461***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td>0.230*</td>
<td>0.255*</td>
<td>0.010</td>
<td>−0.037</td>
<td>0.064</td>
<td>−0.024</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Material insecurity</td>
<td>−0.057</td>
<td>−0.066</td>
<td>−0.005</td>
<td>−0.090</td>
<td>0.141</td>
<td>−0.037</td>
<td>0.075</td>
<td>1</td>
</tr>
</tbody>
</table>

*p < 0.05.

***p < 0.001.
Figure 4. Frequency of money allocation to LOCAL/SELF plotted against the expected binomial distribution. (A) Allocation to LOCAL in religious setting; (B) Allocation to LOCAL in control setting; (C) Allocation to SELF in religious setting; (D) Allocation to SELF in control setting.

Table 2. Odds ratios with CIs for models LOCAL and SELF.

<table>
<thead>
<tr>
<th>Model</th>
<th>LOCAL</th>
<th>SELF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.095 (0.986–1.217) †</td>
<td>1.192 (1.107–1.283) ***</td>
</tr>
<tr>
<td>Sex (0/1)</td>
<td>1.002 (0.834–1.197)</td>
<td>1.270 (1.062–1.519) **</td>
</tr>
<tr>
<td>Age</td>
<td>0.990 (0.985–0.995) ***</td>
<td>0.992 (0.987–0.997) ***</td>
</tr>
<tr>
<td>Household size</td>
<td>1.057 (1.015–1.100) *</td>
<td>1.052 (1.011–1.095) *</td>
</tr>
<tr>
<td>Treatment (0/1)</td>
<td>1.010 (0.869–1.174)</td>
<td>1.101 (0.946–1.280)</td>
</tr>
<tr>
<td>Big God belief (0–2)</td>
<td>0.824 (0.719–0.944) **</td>
<td>0.762 (0.663–0.874) ***</td>
</tr>
<tr>
<td>Kavadi participation (0–4)</td>
<td>0.946 (0.881–1.015)</td>
<td>0.913 (0.850–0.981) *</td>
</tr>
<tr>
<td>Hosmer &amp; Lemeshow R²</td>
<td>0.193</td>
<td>0.269</td>
</tr>
<tr>
<td>Cox &amp; Snell R²</td>
<td>0.275</td>
<td>0.332</td>
</tr>
<tr>
<td>Nagelkerke R²</td>
<td>0.339</td>
<td>0.427</td>
</tr>
</tbody>
</table>

†p < 0.1.
* p < 0.05.
** p < 0.01.
*** p < 0.001.

Notes: For Sex (0/1): Female = 0; for Treatment (0/1): Religious = 0; for Big God (0–2): no belief = 0, watchful/punishing = 1, watchful and punishing = 2; Kavadi participation (0–4) is Never–All the time. Age is centered at its mean.
prayer did not have any effect. There was no significant correlation between belief in a punishing Shiva and participation in the Kavadi ritual, suggesting that the two variables independently influenced allocations. Finally, similar to the model for LOCAL, age and household size also have a significant impact on fair behavior.

4.5. Local Community Game vs. Self Game

The comparison between Local Community Game and Self Game revealed that players allocated on average 0.58 MUR (SD = 3.93) more to the SELF cup compared to the LOCAL cup. Inclusion of the RAG Type into Model 3 did not significantly improve the model, yielding a non-significant difference between contribution to LOCAL and SELF (z(189) = 1.49, p = 0.14). Similarly, none of the interactions between game type and other predictors significantly improved the model, with gender being the predictor closest to significance (p = 0.09; see also Figure 5(B) and Willard, this volume) Thus, Model 3 includes only a fixed intercept plus random intercepts for each participant.

5. Discussion

Our results showed that participants on average tampered with the allocations in order to favor their ingroup, and even more in order to benefit themselves. In line with recent research in behavioral economics (Mazar, Amir, & Ariely, 2008), we found that this effect was not driven by a few outliers.
who cheated a lot but was rather due to many people cheating just a little bit (see Figure 4). It has been argued that this pattern, which is well documented cross-culturally (Ariely, 2012), is the result of two distinct cognitive mechanisms: cheating is motivated by external rewards associated with monetary benefits, but at the same time is constrained by internal rewards related to the desire to maintain a positive self-concept (Jiang, 2013; Mazar & Ariely, 2006). On the other hand, we observed that not everyone cheated. In fact, a perfectly balanced distribution (15–15 split) shows up in our sample much more frequently than would be expected by random chance (the binomial expectation for this allocation is 14.4%, while in our sample it occurs 20.3% of the time). Therefore, it seems that several participants intentionally broke the rules of the game in favor of a fair (50/50) allocation.

The religious prime had no significant effect on allocations. Previous research using contextual primes showed positive effects on prosocial attitudes (LaBouff, Rowatt, Johnson, & Finkle, 2012; Pichon & Saroglou, 2009; Sagioglou & Forstmann, 2013) as well as behaviors (Ahmed & Salas, 2013; Xygalatas, 2012; Xygalatas et al., 2015), and in a recent meta-analysis (Shariff, Willard, Andersen, & Norenzayan, 2016) contextual primes were found to have the strongest effects on promoting prosocial behavior compared to any other form of religious priming (also see McNamara’s and Willard’s articles in this volume, as well as Cohen, Baimel, & Purzycki; McNamara & Henrich; Purzycki & Kulundary; Willard, this volume for other priming studies). Previous studies found the effects of contextual religious primes on curbing antisocial behavior (cheating) to be relatively subtler (Lang et al., 2016). It is thus possible that different psychological mechanisms are involved. Furthermore, it is possible that the statistical intricacy introduced by the design of the Random Allocation Game (as we were not able to assess individual cheating) might have made any effects less detectable, or that the task might have been too cognitively demanding, as suggested by the relatively low level of overall cheating. To settle these questions, further research is needed (see Purzycki et al., this volume).

The Big God variable had a significant effect on cheating. Those who believed that Shiva can see everything and punishes people’s wrongdoings cheated less in both games. We did not observe such effects for our Local God variables, which is consistent with theories stressing the role of Big Gods in large-scale societies (Atran & Henrich, 2010; Norenzayan, 2013; Norenzayan & Shariff, 2008). Interestingly, in comparison to the significant binary predictor of punishing Shiva, a composite variable of punishing Shiva (consisting of questions regarding specific transgressions) did not have any effect on allocations. This might suggest that the binary variable captured attitudes towards divine punishment better than the scales did, or, alternatively, that cheating was seen as a particularly culpable act in the eyes of gods.

The “evaluation of police” variable did not significantly predict allocations in our models, although there was a trend to divide the money more fairly among those who held positive views of the police, in accordance with previous findings (Hruschka et al., 2014; McNamara et al., 2016). However, “evaluation of police” was weakly correlated with our Big God variable, and thus this variable already accounted for much of the variance explained by police evaluation. This suggests that the observed effects might be driven by common traits related to obedience to authority.

Another interesting finding is related to the differential influence of the ritual participation variables. While neither the frequency of personal prayer nor that of participation in the Maha Shivaratri pilgrimage had any significant impact on allocations, we observed a significant effect of participation in the Kavadi ritual in the SELF model. Although this correlation might be due to personality factors that underlie both costly ritual participation and honesty, this finding is in accordance with previous research in Mauritius, which showed that participation in this onerous ritual increased prosocial behavior and that the level of ritual intensity (pain) predicted the level of prosociality (charity) across participants (Fischer & Xygalatas, 2014; Xygalatas et al., 2013).

Compared to most other rituals, the cost of participation in the Kavadi is very high, involving significant investments of time and resources, fasting and preparations, and prolonged suffering and self-mutilation. It has been argued that bearing these costs may signal commitment and trustworthiness to others (Bulbulia, 2004; Irons, 2001). In addition, psychological research shows that such signaling may also operate on ritual actors themselves. Enduring substantial costs to participate
in group activities can lead to more positive views of the group and its members (Aronson & Mills, 1959) and performing a selfless act may lead to the re-evaluation of the self as more altruistic (Gugdagno, Lankford, Muscanell, Okdie, & McCallum, 2010). What is more, people often re-evaluate their own attributes by association to those of the people they feel they share an identity with (Goldstein & Cialdini, 2007). In other words, if performers of costly rituals are seen as more prosocial, engaging in a costly ritual may lead to the re-evaluation of the self as more prosocial (Rappaport, 1999; Sosis, 2003). It is therefore possible that the physical and emotional intensity involved in the Kavadi makes it a particularly suitable signal.

That is not to say that costly signaling can only operate through concentrated, exceptionally large expenditures of energy. Cumulative, long-term investments in low-cost practices such as weekly temple attendance can also become effective markers of commitment to the group and indicators of socially desirable personality traits (Power, 2017). However, the current study cannot assess this hypothesis, as we do not have data on the performance of high-frequency public rituals. Thus, the current findings suggest that supernatural punishment and ritual participation are two independent and complementary mechanisms through which religious prosociality operates, although a more nuanced picture will have to come from further studies.

Finally, we observed a significant difference between males and females in the SELF model. While this difference was not significant in the LOCAL model, a marginally significant effect of the interaction between RAG number and gender in Model 3 indicates that there were opposite trends between the two RAG games. In the first game, females tend to prefer LOCALs more than males, but in the second game males tend to prefer SELF more than females (see also Figure 5B). This may suggest that women are more likely to cheat in favor of their group than for themselves while men are driven by more selfish motives. Previous research using the Random Allocation Game (Muehlheusser, Roider, & Wallmeier, 2014) has similarly found that males cheated more than females when they could receive direct payoffs, although that research did not examine cheating in order to favor the group.

Our findings from this study suggest that particular aspects of religiosity, specifically belief in moralistic and punitive gods and participation in effortful ritual activities, may contribute to the expansion of prosociality. However, we are by no means proposing a monocausal model of human prosociality driven by religious factors. As we already noted, a series of political, geographical, and historical circumstances contribute to peaceful coexistence in Mauritius. Long exposure to multiculturalism and a population consisting entirely of immigrants, top-down policies of integration and the promotion of an overarching national identity, sustained economic growth and the presence of a welfare state that have significantly improved living conditions are only a few such factors (Frankel, 2014).

Given the complexity of the Mauritian context, we do not know whether our findings would extend to other ethnic and religious groups on the island. Furthermore, we do not know how Hindu participants would behave towards religious outsiders (e.g., Muslims). Although we are currently tackling some of these questions specifically with regards to the Mauritian context in further studies, the contributions to this special issue show significant convergence between findings in field sites around the world.

Overall, our results offer a more refined view of religious prosociality: rather than treating religion as a monolithic category, we were able to pinpoint specific aspects of religion that seem to drive prosociality. Specifically, the current study is the first to examine the effects of supernatural punishment beliefs and extreme ritual participation simultaneously, showing that these two aspects of religion may independently converge to increase prosocial behavior and to expand the social circle beyond kin. We hope that future studies will examine these processes more closely. Overall, our findings provide a more nuanced picture of religious prosociality and contribute to a larger set of cross-cultural studies of unprecedented scope, which aims to cast new light on the puzzle of the evolution of religion and morality.
Acknowledgments

We wish to thank Prakash Bissessur, Sooluma Bhaugeeruttty, Vyash Bhaugeeruttty, Nethyanand Chunwan, Heshinee Gungaram, Sharvesha Ramphul, Manesha Soneea, and Abhinav Sukhoo for their invaluable help in the execution of this project. We are grateful to the Maha Kali Mata Mandir and the restaurant Langouste Grillée in Pointe aux Piments for allowing us to use their premises for the experiment. We thank Coren Apicella, Joseph Henrich, Ara Norenzayan, Ben Purzycki, and Aiyana Willard for reading and commenting on earlier versions of the manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This study was funded by the Social Sciences and Humanities Research Council of Canada (SSHRC) project “The Evolution of Religion and Morality.” Additional support was provided by the Faculty of Arts and the LEVYNA Laboratory for the Experimental Research of Religion at Masaryk University, co-financed by the European Social Fund and the state budget of the Czech Republic; and the “Technologies of the Mind” project at the Interactive Minds Centre at Aarhus University, financed by the Velux Foundation.

References


