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Commitment Costs and Cooperation
Evidence from Candomblé, an Afro-Brazilian Religion

Montserrat Soler

Theoretical Background
The role of religion as a cohesive social force has been the focus of extensive theoretical attention but limited empirical work. Durkheim (1915/1965) proposed the notion of collective ritual as a crucial element in the construction and maintenance of social bonds, but the mechanisms by which this occurs have remained for the most part unexplored. Recently, theorists have expanded this notion to suggest that expressions of religious devotion that require significant investments of time, effort or economic resources constitute a powerful mechanism through which members of a community monitor each other’s commitment and thus discourage cheaters and promote intra-group cooperation (Iannaccone 1994; Irons 2001; Sosis 2003). In the context of evolutionary theory, the sacrifices that individuals endure to be part of a religious community and which may appear senseless to outsiders may actually serve as “handicaps” (Zahavi 1975) or honest signals of commitment (Frank 1988) that are difficult to fake by virtue of their costliness. Thus, public and costly expressions of religiosity can serve to strengthen and maintain cooperation in a social group. For ritual to be a reliable signal, individuals who display high levels of religious commitment should also behave more cooperatively with members of their own congregation. Previous studies focused on Western religious traditions have provided support for this idea (see Sosis & Bressler 2003; Sosis & Ruff 2003; Sosis & Ruff 2004).

As a further test of this hypothesis, I conducted research on a Brazilian population that practices a religion of African origin known as Candomblé. I measured religious commitment through a self-report scale that focused on public expressions of religiosity and used an economic game as a proxy for cooperation. Recent studies have used economic games cross-culturally with interesting outcomes (e.g., Henrich et al. 2004). The research was conducted from August 2005 to October 2006 in Salvador da Bahia, the fifth-largest city of Brazil and widely considered the core of Afro-Brazilian culture. Only a portion of the results will be presented here.
Research Setting

Candomblé arose in the 19th century as a mix of faiths brought to Brazil by enslaved West Africans. Belief is centered on the cult of the orixás, deities with distinct personalities and physical representations that interfere directly in human affairs. A positive relationship with the orixás ensures the balance of axé, the life-energy of the universe. Difficulties are believed to be caused by a lack or misuse of axé and rituals are aimed at restoring the delicate balance of axé in one's life. In this way, Candomblé is a pragmatic religion primarily concerned with solving the tribulations of everyday life (see Bastide 1958/2001).

The religion centers around houses of worship or terreiros which also function as private residences for the leader of the house, family members, and often some followers. Although terreiros are self-governing, they share a well-established ritual structure and social organization. The head of a terreiro (ialorixá in the case of a woman and babalorixá in the case of a man) is the undisputed authority in both religious and secular matters and presides over a strict hierarchy. Membership in a terreiro varies on a continuum of commitment to the religion and to the house itself: there are fully initiated members, those on the path to initiation, frequent visitors, and occasional clients. Terreiros make most of their income from clients that come to the ialorixá or babalorixá in search of solutions to health problems, money troubles, or unfortunate love affairs.

Communication with the supernatural occurs through various rituals, including elaborate feasts during which the orixás possess the faithful in a music-induced trance. Feasts consume a large proportion of the terreiro’s income and require the coordination and cooperation of all members. In addition to these public occasions, there are frequent internal rituals and periods of cleansing and seclusion that can last up to several months. A devotee of Candomblé must also follow an exacting regime that includes proscriptions on food, dress, and codes of behavior related to terreiro hierarchy. The organization of Candomblé provides a natural setting in which differences in religious commitment and cooperation can be studied at both the individual and group level.

Methodology

Participants were members from 13 terreiros who responded to a questionnaire, a religious commitment scale and participated in an economic game. All activities were conducted at different terreiros on separate dates when most regular members could be present. To maximize variation in factors that could affect religious commitment and cooperation, the chosen terreiros were located in various neighborhoods, varied in size from 10 to 300
members (mean = 53.7; s.d. = 93.3) and ranged from 4 to 37 in years since foundation (mean = 19.3; s.d. = 10.8). Actual number of participants at each terreiro ranged from 11 to 30 (mean = 20.2; s.d. = 6.3).

To measure religious commitment, I created a 14-item 7-point Likert scale (Cronbach’s alpha = .87). The following is an example of an item used in the scale:

*I have never missed a feast at my terreiro.*

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely Disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Agree Completely</td>
</tr>
</tbody>
</table>

The public-goods economic game was conducted immediately after subjects had responded the questionnaire and the scale. This game is designed so that everyone wins more if more people cooperate, but individuals do better by not cooperating. It provides a measure of cooperation by evaluating each individual’s willingness to benefit others at the expense of self gain. Subjects are randomly assigned to n-person groups that remain anonymous. An equal amount of money is given to each subject, who then decides how much to keep and how much to donate to his or her n-person group. The amounts given by members of individual groups are added up and duplicated by the researcher. The resulting amounts are then divided equally among members of each n-group. Participants are allowed to keep the initial quantity they retained as well as whatever they earn from their n-person group.

I explained all procedures following a script and mock practices of the economic game were carried out with volunteers from each terreiro. Subjects were then randomly assigned to 4-person groups with the other members of the terreiro present, but no one other than me was aware of who composed which group. Each person received a closed envelope containing $10 Brazilian Reais in bills of 1’s and 2’s (the daily minimum wage is equivalent to US $11.60). Subjects were told to go to a separate area and remove from the envelope any amount from 0 to 10 (i.e. 0, 1, 2, 3...10) that they wanted to retain and afterwards to return the envelope enclosing the amount they wished to donate to their anonymous group. After all envelopes had been returned, I did the calculations for each group and participants received their final amount. Two field assistants monitored the room to ensure that decisions regarding the game remained anonymous and subjects could not discuss them with each other before the end of the game.
Results

Two-hundred and forty two subjects participated (133 female; 109 males) but only 196 completed responses to the scale were used in the analysis. Sex had no effect on either the scale ($t = 172; df. 195, p = .864$) or the game ($t = -460, d.f.. 239; p = .646$). Mean age of subjects was 34.9 (s.d. 13.6) but since women were slightly older, both these variables were included in the regression model. Marital status, coded as a dummy variable, was also included (57.9% of subjects were single, 30.4% married or living with someone, and 11.7% separated, divorced or widowed) as well as race (50.4% of subjects identified themselves as “negro” or black, 20.8% as “moreno” or light brown, 12.1% as “pardo”, an older term also meaning light brown, and 7.5% as “other” including “branco” or white). Household income was collapsed into 6 categories dealing with monthly minimum wage (R $350 reais or about US $163.05). More than half the subjects reported earnings of less than 1 minimum wage (16.7% no income, 8.1% up to half a minimum wage, 30.3% half to 1 minimum wage, 29% from 1 to 2 minimum wages, 10.4% from 2 to 3 minimum wages, and only 5.4% more than 3 minimum wages). Multiple answers were not included. Subjects also reported the number of years they had been part of the religion (mean = 15.6; s.d. 12.2) and years frequenting the actual terreiro where the questionnaire was being administered (mean = 10.5; s.d. 9).

Results from the game are quantified as the offer (amount left in the envelope for donation to the 4-person group), while number responses to scale items were added to produce a single score for each individual. The mean offer was 4.8 (s.d. 3.2) with a median of 4 and a mode of 10 (16.9% of players gave the mode; the next most common offer was 2 with 15.3%). Scale responses had a mean of 69.0 (s.d. 19.8). Pearson’s correlations reveal that income is the strongest predictor of game offer ($r = .223, p = .001, n = 220$) and also significantly related to scale, but in the opposite direction ($r = -.198, p = .009, n = 175$). Thus, when game offer and the sum of the scale are correlated there is no relationship in the expected direction ($r = .030, p = .338, n = 196$), but it approaches significance when income is controlled (partial correlation, $r = .141, p = .064, n = 171$).

Table I shows the results of the OLS regression with game offer as the dependent variable and all controls in the model (adjusted $R^2 = .139$). To test if the scale was consistent with a single underlying element that accounted for religious commitment, I performed a factor analysis with the results from the research sample. This statistical procedure allows the researcher to detect the presence of underlying factors that relate items in a scale to each other.
Table I: OLS Regression Model of the Game Offer (amount left in envelope)
Including the Religious Commitment Scale

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-1.353</td>
<td>1.746</td>
<td>-.775</td>
</tr>
<tr>
<td></td>
<td>Sex</td>
<td>-.216</td>
<td>.604</td>
<td>-.034</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.081</td>
<td>.028</td>
<td>.342</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>.089</td>
<td>.213</td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td>Income</td>
<td>.608</td>
<td>.211</td>
<td>.272</td>
</tr>
<tr>
<td></td>
<td>Married or lives with someone</td>
<td>-1.803</td>
<td>.744</td>
<td>-.232</td>
</tr>
<tr>
<td></td>
<td>Separated, divorced or widowed</td>
<td>-.290</td>
<td>1.015</td>
<td>-.029</td>
</tr>
<tr>
<td></td>
<td>Moreno</td>
<td>-1.065</td>
<td>.681</td>
<td>-.145</td>
</tr>
<tr>
<td></td>
<td>Pardo</td>
<td>-.881</td>
<td>.919</td>
<td>-.090</td>
</tr>
<tr>
<td></td>
<td>Other race</td>
<td>.887</td>
<td>1.048</td>
<td>.078</td>
</tr>
<tr>
<td></td>
<td>Membership in particular terreiro</td>
<td>.005</td>
<td>.090</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td>Years in Candomblé</td>
<td>-.026</td>
<td>.031</td>
<td>-.104</td>
</tr>
<tr>
<td></td>
<td>Years in Terreiro</td>
<td>-.024</td>
<td>.036</td>
<td>-.071</td>
</tr>
<tr>
<td></td>
<td>Religious commitment scale</td>
<td>.031</td>
<td>.017</td>
<td>.181</td>
</tr>
</tbody>
</table>

N = 196; * p = .10; ** p = .05; *** p = .01 or below

A perfect relationship between an item and a factor is characterized as 1. In this case, results indicated that the existence of two subscales, which I termed the “group commitment sub-scale” (GCS) and the “personal commitment sub-scale” (PCS). GCS items had high loadings on factor 1 (over .5) and low loadings on factor 2 (under .3) and were related to communal activities, such as “I have never missed a feast in my terreiro”. On the other hand, PCS items had high loadings on factor 2 (over .6) and low loadings on factor 1 (under .3) and dealt with personal commitment, such as “There are certain foods I do not eat because of my orixá”. The subscales had 6 items each and good reliability scores (Cronbach’s alpha = .77; n = 215 for the GCS; Cronbach’s alpha = .79, n = 220 for the PCS).
I performed an OLS regression with each of the subscales including the controls shown in Table I. The PCS had no predictive effect on the game offer ($\beta = .087, p = .375$) although the model was significant at the .001 level (adjusted $R^2 = .117$) due to the effects of age ($\beta = .343, p = .003$), income ($\beta = .213, p = .019$), and being married or living with someone ($\beta = -.221, p = .017$). Other variables were not significant. However, as shown in Table II, the GCS did have a significant relationship with game offer (adjusted $R^2 = .150$):

### Table II:

OLS Regression Model of the Game Offer (amount left in envelope)
Including Group Commitment Subscale (GCS)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-2.055</td>
<td>1.835</td>
<td>-1.120</td>
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<td></td>
<td>Sex</td>
<td>-.398</td>
<td>.573</td>
<td>-.063</td>
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<td></td>
<td>Age</td>
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<td>Income</td>
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<td></td>
<td>Married or lives with someone</td>
<td>-1.698</td>
<td>.703</td>
<td>-.218</td>
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<td>Separated, divorced or widowed</td>
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<td>.984</td>
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<td>Moreno</td>
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<td>.642</td>
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<tr>
<td></td>
<td>Pardo</td>
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<td>.880</td>
<td>-.101</td>
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<td></td>
<td>Other race</td>
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<td>1.035</td>
<td>.070</td>
</tr>
<tr>
<td></td>
<td>Membership in particular terreiro</td>
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<td>.083</td>
<td>.022</td>
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<td></td>
<td>Years in Candomblé</td>
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<td>-.124</td>
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<tr>
<td></td>
<td>Years in Terreiro</td>
<td>-.016</td>
<td>.035</td>
<td>-.045</td>
</tr>
<tr>
<td></td>
<td>GCS</td>
<td>.081</td>
<td>.038</td>
<td>.194</td>
</tr>
</tbody>
</table>

$N = 196; *p = .05; **p = .01 or below$
Discussion

Results show that individuals with higher scores on the religious commitment scale also cooperate more on the economic game. This supports the notion that ritual functions as a reliable signal of individuals’ willingness to cooperate with members of their own group. Factor analysis revealed a data-grounded division of the results of the scale into two subscales that deal with different aspects of religiosity. While the subscale that captures elements of personal religiosity (PCS) did not have a predictive effect on results of the game, scores for the community-oriented subscale (GCS) were positively related to individual offers in the game. This further supports the idea that it is public aspects of ritual that are important to promote cooperation because they are more open to inspection and easily monitored. It may be that expressions of religiosity that are personal in nature and thus more open to cheating are associated with more sinister aspects of religion, such as deception and manipulation (see Trivers 2000). These instances are undeniably part of the repertoire of religious behavior and there has been theoretical work from an evolutionary perspective that suggests that religion-as-a-signal does not necessarily imply positive sociality (Cronk 1994).

Further research should attempt to separate aspects of ritual in more discrete categories that identify the diverse functions of ritual and the different processes by which it has become a universal referent of human societies. Religion consists of multi-layered categories of behavior, cognition and emotion and in the context of evolutionary theory this presents an obstacle to conceptualizing it as an adaptation. It is important to point out that evidence presented here tells us something about the adaptive value of religion, but not necessarily about its characterization as an evolved adaptation.

Author’s Note

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