
Cooperation and Commune Longevity: A Test of the Costly Signaling Theory of Religion

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The costly signaling theory of religion posits that religious rituals and taboos can promote intragroup cooperation, which is argued to be the primary adaptive benefit of religion. To test this theory, the authors collected historical data on the constraints and ritual requirements that eighty-three 19th-century U.S. communes imposed on their members. All communes must solve the collective action problem of cooperative labor to survive; thus, they are an ideal pop-

Authors' Note: *We wish to thank Candace Alcorta, Pat Barclay, Sigal Balshine, Andrew Canastar, Martin Daly, Mel Ember, Gil Greengross, James Kitts, David Waynforth, Margo Wilson, and two anonymous reviewers for reading and providing valuable comments on various drafts of the article. We thank Bill Irons for valuable discussions and encouragement. We also thank Karen Norberg and David Weakliem for useful statistical advice. We greatly appreciate the conscientious work of the following students: Erin Anderson, Amrik Brar, Christian Eusebio, Liz Fuchs, Michele Metcalf, Mel Oliveira, Laura Roland, Rose Sanon, Dipen Shah, and Kristy O'Connor. Special thanks to Miriam Lee for her extraordinary effort throughout this project.*

Cross-Cultural Research, Vol. 37 No. 2, May 2003 211-239
DOI: 10.1177/1069397103251426
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ulation to assess the impact of ritual and taboo on intragroup cooperation. The authors evaluated whether communes that imposed costlier requirements survived longer than less demanding communes and whether costly requirements and religiosity interact to promote cooperation. The results support aspects of the costly signaling theory of religion and reveal new avenues for its development. The authors discuss some of the shortcomings of the theory and explore ways to expand the theory that incorporate additional features of ritual and religious belief.

Keywords: *cooperation; costly signaling theory; group solidarity; 19th-century communes; ritual; religion; utopian societies*

A map of the world that does not include Utopia is not even worth glancing at, for it leaves out the one country at which humanity is always landing.

—Oscar Wilde, *The Soul of Man Under Socialism*

The analyses presented in this article extend earlier research published in this journal (Sosis, 2000) that examined the impact of religiosity on commune survivorship. This preliminary research aimed at evaluating hypotheses derived from Irons's (1996a, 1996b, 1996c, 2001) theory of religion as a "hard-to-fake sign of commitment." Irons has argued that the human capacity for religion may have evolved to facilitate intragroup cooperation. Anthropologists have long noted that one of the primary functions of religion is to increase intragroup solidarity and cohesion (e.g., Durkheim, 1912/1995; Hayden, 1987; Radcliffe-Brown, 1952; Rappaport, 1979; Swanson, 1978; Turner, 1969), but Irons's work moved beyond earlier research by focusing on the selective pressures that may have shaped human systems of belief and favored religion as a universal strategy to promote cooperation. Irons argued that in human history, the adaptive advantage of group living was the benefits that individuals attained through intragroup cooperation such as cooperative hunting, food sharing, defense, and warfare. However, despite the potential for individual gains through cooperation, these collective pursuits are often difficult to achieve. Intragroup cooperation is typically characterized by conditions in which individual group members can maximize their gains by refraining from cooperation when others invest in the

cooperative activity. Thus, although everyone may gain if all group members invest in the cooperative goal, attaining such large-scale cooperation is often difficult to achieve without social mechanisms limiting the potential to free-ride on the efforts of others (Dawes, 1980; Olson, 1965). Irons argued that religion is such a mechanism. He posited that religious rituals and taboos serve as reliable signals of commitment to in-group members, and thus religion can overcome free-rider problems and promote intragroup cooperation (also see Cronk, 1994; Sosis, 2000).

The potential for collective action is confronted with problems of trust and commitment (Frank, 1988; Schelling, 1960). When individuals can guarantee their participation in a cooperative pursuit, intragroup cooperation is more likely to emerge. However, in most human social interactions, it is impossible to guarantee a commitment to cooperate. Those who interact can advertise a willingness to cooperate, although this strategy is not stable. When faced with the conditions of collective action, the incentive to falsely claim that one will cooperate is especially high because individuals can achieve their greatest gains by refraining from cooperation while others cooperate. Therefore, whenever the gains for defection outweigh the costs of cooperation, the only credible commitment signals are those that are "costly-to-fake" (Zahavi & Zahavi, 1997). If commitment signals are not costly-to-fake, they can easily be imitated by free-riders who do not intend to invest in the cooperative pursuit. Several researchers (Berman, 2000; Cronk, 1994; Iannaccone, 1992, 1994; Irons, 1996a, 1996b, 1996c, 2001) have suggested that religious behaviors are costly-to-fake signals of commitment.

Adherence to a set of religious beliefs entails a host of ritual obligations and expected behavioral patterns. For example, adherents of Islam are expected to pray five times a day, donate a portion of their income to charity, avoid eating meat that is not *halal*, and partake in dozens of other daily rituals. Although there may be physical or mental health benefits associated with some ritual practices (see Levin, 1994; Reynolds & Tanner, 1995), the significant time, energy, and financial costs involved in imitating such behavior serve as effective deterrents for anyone who does not believe in the teachings of a particular religion. Religious beliefs that require ritual obligations assuage collective action problems by promoting commitment and loyalty to others who share these beliefs. As a result of increased levels of trust among group members, religious groups minimize costly monitoring mechanisms

that are otherwise necessary to overcome free-rider problems that typically plague communal pursuits.

Although Irons's (2001) theory of religion as a hard-to-fake sign of commitment is compelling, there is almost no empirical research that evaluates hypotheses generated from this body of work. To test hypotheses generated from Irons's theory and further elaborations by Sosis (in press) (we will subsequently refer to this aggregate of propositions as the costly signaling theory of religion), here we extend earlier analyses (Sosis, 2000) that employed a data set on the longevity of religious and secular communal societies.

COMMUNAL SOCIETIES

Historians estimate that there have been roughly 3,000 utopian experiments in human history, the vast majority of these occurring in the United States (Oved, 1997). There have been two prolific periods of commune development in the United States: the 19th century and the 1960s. Although there are numerous comparative studies of communal life during both of these periods (e.g., Cavan, 1976; Conover, 1978; Fairfield, 1972; Zablocki, 1980), few studies have collected data systematically or pursued statistical analyses to support their assertions. The exceptions share a variety of problems: small sample sizes (Gardner, 1978; Smith, 1986), analysis of limited scope (Mowery, 1978), or results that have been statistically challenged (see Hall, 1978, 1988, for a reanalysis of Kanter's [1972] data). Thus, although a variety of determinants of communal success have been proposed, few if any have been unambiguously shown to impact the longevity or economic success of communal societies.

We limit our analysis to 19th-century communes. Although the earliest communes of the 19th century were religiously motivated, by the 1820s communes that were based on secular ideologies, mainly socialism, began to emerge. Despite their differences in goals and worldviews, both religious and secular communes during this time period were motivated by ideologies that were at odds with mainstream U.S. culture and thus resulted in their separation from mainstream U.S. life.

The comparative histories of communal societies provide an interesting database to test the idea that religion can promote intragroup cooperation, because the economic success and thus survival of these communities was dependent upon solving the

collective action problem posed by cooperative labor (Sosis, 1997). As Taylor (1982) described,

In all of these intentional communities a central problem was inequality of work effort. Every adult member of a community was expected to put in a certain number of hours of work, or to contribute as much labour as he was able; but because an individual's rewards were not dependent on the amount or quality of his work, there was always the temptation to be a free-rider on the efforts of others—to find excuses for not working some days, to put little effort into the work, to contribute the minimum amount of work acceptable. (p. 123)

All communes share the goal of survival, and thus longevity is a valid measure of a commune's ability to overcome the problems of collective action inherent in communal life. Sosis (2000) argued that if religious beliefs foster commitment and loyalty among individuals who share those beliefs, communes that were formed out of religious conviction should have greater longevity than communes that were motivated by secular ideologies such as socialism. Using a data set of two hundred 19th-century U.S. communal societies, Sosis showed that religious communes are between 2 and 4 times more likely to survive in every year of their life course than their secular counterparts. Although these results suggested a strong relationship between a group's religiosity and its ability to overcome the problems of collective action inherent in communal life, the analyses did not examine the means by which this relationship could be maintained. Here, we explore whether the costly signaling theory of religion can account for the differential success of secular and religious communes. Two main hypotheses will guide our analyses.

HYPOTHESES

Hypothesis 1: Communes that impose greater costly requirements on their members will have higher survivorship rates than communes that impose requirements that are less costly.

The costly signaling theory of religion claims that the ability of nonbelievers to free-ride on the efforts of believers will be a function of the costs of the behavioral requirements imposed on adherents of the religion. Those communes that demand the most of

their members will be the most successful at overcoming problems of collective action and will consequently have the highest rates of survivorship.¹ Although this should hold true for both religious and secular belief systems, Sosis's (2000) finding that religious communes had higher survivorship rates than secular communes suggests that religious communes will require more costly behavioral patterns.

Hypothesis 2: Communes that impose costlier requirements on their members are less likely to dissolve as a result of an inability to overcome collective action problems than communes that impose requirements that are less costly.

All communes must overcome the problems of collective action inherent in communal life. Groups with committed members are more successful at solving these problems than groups with less committed members. As Kanter (1972) noted,

Committed members work hard, participate actively, derive love and affection from the communal group, and believe strongly in what the group stands for. For communes . . . the problem of securing total and complete commitment is central. (p. 65)

We expect communes that impose greater requirements on their members to produce more committed members and thus more effectively manage the challenges of cooperation than less demanding communes. If, on average, religious communes demand more of their members than their secular counterparts, we expect religious communes to be less likely to dissolve as a result of collective action problems than secular communes.

METHOD

In the appendix of his book *Two Hundred Years of American Communes*, historian Yaacov Oved (1988) included a list of 277 communes founded between 1663 and 1937. This list is not exhaustive, as Pitzer's (1997) recent compilation of nearly twice the size has shown; however, it is certainly representative. Oved's list of U.S. communes was employed in preliminary analyses (Sosis, 2000) because it included the years the community functioned as a commune² and a classification of each commune according to

ideology (e.g., socialist, anarchist, religious). The data set that Sosis (2000) used for his comparative analysis of the survivorship rates of religious and secular communes consisted of 200 of the original 277 communes that were founded in the 19th century (88 religious, 112 secular; see Sosis, 2000, for details on method of earlier study).

To evaluate the hypotheses presented above, we developed a questionnaire aimed at collecting behavioral data on the members of 19th-century utopian communes. The survey consisted of more than 50 questions covering 14 main topics: consumption, material possessions, membership, dress, communication, communal activities, rituals and taboos, marriage and sexual relationships, family, work, social control, finances, communal knowledge, and cause of dissolution. The surveys were completed using 37 books, primarily secondary sources (see the appendix). There have been thousands of volumes and articles written on 19th-century communal societies (see Dare, 1990, and Miller, 1990, for bibliographies); thus, pragmatism greatly influenced our choice of references. We limited our sources to books on 19th-century utopian societies that were owned by the University of Connecticut library.

One dozen University of Connecticut undergraduate students from a variety of disciplines were recruited to collect data. All students were unaware of the hypotheses being tested and the theoretical motivations of the project. The project was presented to students as an opportunity to gain training in ethnohistorical research methods. Students were trained to fill out the surveys, and they collected these data over a 2-year period (1999-2001). Four or five surveys were completed for each commune. Students never worked on the same commune simultaneously, and all work was pursued independently. Correlations indicate fairly high agreement between students in their responses (mean $r = .81$; range = .68 to 1.00). A graduate student, who was also unaware of the hypotheses and theoretical motivations of the project, and Sosis independently evaluated disagreements between students' responses (e.g., one student claimed the commune required vegetarianism, another claimed that the commune did not). All data collected by the students were cited (book and page number), thus enabling Sosis and the graduate student to return to the sources to assess any dissimilarity between responses. If, after consulting the references, Sosis and the graduate student were in agreement, the data were coded accordingly; if they arrived at different responses,

the data were coded as missing. Data were also coded as missing if authors presented conflicting information.

For a commune to be included in the analyses, information had to be available to answer at least 10 questions in the survey. Out of 200 communes in the original database, 83 communes met this criterion (30 religious and 53 secular).³ Most of the missing information in the data set is not likely to be randomly distributed, as authors are much more likely to state the presence of a behavior than the absence of a behavior. For example, a question in the survey asks whether there is a restriction on the use of coffee in the commune. If the commune restricted coffee, it is very likely that at least one reference will discuss this constraint. However, if there were no constraints on coffee use, it is much less likely to be mentioned. Consequently, much of the data coded as missing in the data set are likely to be biased toward communes that did not engage in the respective behavioral patterns of interest. Despite this bias, it should be noted that information on the absence of a behavioral pattern or constraint was not biased with respect to commune longevity. In other words, commune duration does not affect the frequency that the absence of a behavioral pattern or constraint in a commune was mentioned in our sources ($F = 0.16$, $n = 83$, $p = .69$). Thus, the analyses below implicitly assume that if there was no information on the occurrence of a constraint, then the commune did not exhibit that constraint.

Another potential bias in our data set concerns the amount of information available on each commune: Longer surviving communes may receive greater attention in the historical record than less successful communes, and thus there may be more information available on members' behavioral patterns in long-enduring communes. We did not find this bias in our sources. Although some highly successful communes such as the Hutterites and Shakers have received considerable scholarly attention, overall, the amount of information available on the communes in our sample seemed to be random or determined by factors presumably unrelated to commune longevity, such as whether any well-known personalities ever resided at the commune or whether the commune was connected in any way to a prominent historical event. To estimate the amount of information available on each commune, we counted the number of pages on which each commune was mentioned in our 37 references. Regression analyses support our overall impression. The number of pages of information on a commune

in our sources is not correlated with commune longevity ($F = 0.39$, $n = 83$, $p = .53$).

WHAT IS A COSTLY SIGNAL?

The costly signaling theory of religion has remained untested, and thus there has been little discussion about how to operationalize costly signs of commitment. Because all behaviors entail time, energetic, and opportunity costs, how are we to determine which costly behaviors serve as signals of commitment? In addition, commitment signals are not limited to behaviors but also include behavioral restrictions such as taboos. Here, we focus on an operational definition of the costly requirements that communes impose on their members. We define costly requirements as exhibiting at least one of the following two characteristics: (a) behaviors that are *required* by a commune that entail time, energetic, and/or financial costs that are not directed toward accomplishing somatic or reproductive goals efficiently or that limit an individual's ability to achieve these benefits from nongroup members; or (b) behaviors that might have entailed somatic or reproductive benefits that are *restricted* by a commune or restrictions that limit an individual's ability to achieve these benefits from nongroup members. Behaviors or behavioral restrictions are thus costly if they stigmatize members or entail individual sacrifice. Although this operational definition lacks some precision (e.g., we do not specify the conditions for efficiency), the definition has been useful for distinguishing between costly and noncostly requirements. For example, according to our definition, the practice of eating in a communal dining hall is not a costly requirement; members need to eat, and partaking in meals communally is no less efficient than eating alone. However, restricting what a member is allowed to eat is costly because it places a limitation on the member that is not aimed at furthering the member's individual somatic or reproductive goals, and as many social scientists and religious commentators have noted (e.g., Minkin, 1987; Radcliffe-Brown, 1979), food taboos limit an individual's ability to socially interact with nongroup members.

We collected data on 22 costly requirements or constraints.⁴ These requirements are listed in Table 1. Consumption (1-5), material possession (6-8), wearing of jewelry (11), communication with the outside world (12), and gambling (17) were coded as either

TABLE 1
Costly Requirements Used in Analyses

<i>Requirement or Constraint On</i>	
1. Coffee	12. Communication with outside
2. Alcohol	13. Marriage
3. Tobacco	14. Sex (celibacy)
4. Meat	15. Family structure
5. Other foods or beverages	16. Child ownership
6. Owning photographs	17. Gambling
7. Use and ownership of certain technology	18. Trial period for membership
8. Use and ownership of other material items	19. Surrender of material belongings for membership
9. Clothing	20. Fasts
10. Hairstyle	21. Mutual criticism
11. Jewelry	22. Knowledge

prohibited (defined as “not allowed by anyone under normal circumstances”), restricted (defined as “rules regulating free use of item; some individuals may use whereas others are prohibited”), or not prohibited or restricted. Items coded as prohibited or restricted were defined as costly because these constraints all entail individual sacrifice.⁵ Dress (9-10), membership (18-19), fasts (20), and body of knowledge (22; e.g., Bible, Fourierism) were coded as either required or not required by members. Items coded as required were defined as costly. Marriage (13) was coded as monogamous, group marriage, free love, marriage not allowed, or absolute marital freedom (anarchy). Marriage other than monogamy was defined as costly because these marriage patterns limited members’ ability to interact with nongroup members. Indeed, in the 19th century, many communes suffered a stereotype of having deviant sexual practices, and unfounded charges of “free-love” were often used to motivate anticommune sentiment (Lauer & Lauer, 1983; Muncy, 1973). Celibacy (14) was coded as required (sex is not allowed by anyone under normal circumstances), preferred but voluntary (not required for membership), or not required or preferred. Celibacy coded as required or preferred was defined as costly. The question on family structure (15) assessed whether the commune allowed the nuclear or extended family to remain as a primary social unit. If the nuclear/extended family did not reside together, it was defined as costly. The question on child ownership (16) assessed

whether parents “owned” their children or whether children were “owned” by the commune. If parents gave up rights to their children, it was defined as costly. Mutual criticism (21), the practice in which commune members gather to publicly criticize other members, was defined as costly if it occurred.

CAUSES OF COMMUNE DISSOLUTION

Communes in the data set dissolved as a result of a variety of factors, including death or incarceration of the leader, persecution, and natural disasters. Sources did not specifically indicate if communes dissolved because of their inability to solve collective action problems. However, the data that were collected on commune dissolution are suggestive. Internal dispute ($n = 48$) and economic failure ($n = 43$) were cited more than twice as often as any other causes of commune dissolution. Both of these causes can be interpreted as a measure of communal reluctance to cooperate and inability to overcome problems of collective action. Therefore, we used them as dependent variables to evaluate whether communes that impose costlier requirements on their members are less likely to dissolve as a result of an inability to overcome collective action problems than communes that impose requirements that are less costly (Hypothesis 2).

RESULTS

The mean and median life spans in years of secular and religious communes are presented in Table 2.⁶ Both religious and secular communes in this subsample survived slightly longer than in the data set used in the preliminary analyses (Sosis, 2000). Table 2 also provides summary statistics for anarchist communes and the two communal movements represented in the data set, Fourierism and Owenism. These movements are named after Charles Fourier and Robert Owen, respectively, whose teachings inspired the communes. Anarchist, Fourierist, and Owenite communes are largely secular; only one anarchist and two Fourierist communes are religious.

Logistic regression analyses were used to model the hazard of commune dissolution. In our data set, there is only one commune that is currently in existence as a communal enterprise: the

TABLE 2
Range, Median, and Mean Duration of
Secular and Religious Communes (in years)

	n	<i>Minimum</i>	<i>Maximum</i>	<i>Median</i>	M	SE
Religious	30	3	125	25	35.6	5.94
Secular	53	0	40	5	7.7	1.10
Fourierist	15	1	25	4	7.4	1.80
Owenite	5	0	3	2	1.8	0.58
Anarchist	7	1	23	9	9	2.82

Hutterites. All others have dissolved. The data set involves 83 communes over 200 possible years of existence (1800-2000). The total risk set consists of 1,556 commune years. Table 3 shows the results of a logistic regression analysis on the hazard of a commune dissolving. The religious covariate was coded as 1 if a commune maintained a religious ideology and 0 if a commune maintained a secular ideology. The model in Table 3 includes variables for the two communal movements in the sample, anarchism, population size, and year the commune was founded. If the commune was Fourierist, Owenite, or anarchist, it was coded as 1; otherwise, it was coded as 0. The covariate *population size* consists of four categories. Because the number of members typically varies over the life of a commune, population size was assessed as the number of members that a commune maintained for the majority of its existence. The four categories of population size were less than 51 ($n = 24$), 51 to 150 ($n = 24$), 151 to 500 ($n = 22$), and more than 500 ($n = 8$).⁷ For 5 communes, population data were either not found or were indeterminate due to conflicting information (hence the reduced n value in the analysis). The results indicate that maintaining a religious ideology is a highly significant predictor of commune dissolution. Secular communes were 3 times more likely to dissolve in a given year than religious communes (odds ratio = .315). The dummy variables for the two communal movements, Fourierism and Owenism, are significant and positive, indicating that communes in these movements were more likely to dissolve in a given year than communes in the rest of the sample.⁸

Sosis (2000) had previously assumed that the success of the religious communes was a result of differences in the costs of the requirements that religious communes impose on their members. Here, we estimated the costs that a commune imposes on its

TABLE 3
Logistic Regression Analyses of the Probability of Dissolution

<i>Independent Variable</i>	<i>Parameter Estimate</i>	<i>Standard Error</i>	<i>p Value</i>
Full model chi-square = 55.51, <i>df</i> = 6, <i>p</i> < .0001			
<i>n</i> = 1,490			
Intercept	-10.856	8.371	
Religious	-1.206	0.294	< .0001
Population size	-0.240	0.127	.059
Year founded	0.005	0.004	.276
Fourierist	0.717	0.354	.043
Owenite	1.753	0.690	.011
Anarchist	0.005	0.433	.991

members as the number of constraints or requirements that it demands of its members (see Table 1). Religious communes in our data set impose more than twice as many requirements on their members as secular communes (religious mean = 7.0, *n* = 30; secular mean = 3.0, *n* = 53). This difference is highly significant ($t = 1.69$, *df* = 36, *p* < .0001).

Figure 1 shows that the number of costly requirements that a commune imposes on its members is positively correlated with commune duration ($F = 48.84$, *n* = 83, *p* < .0001). However, Figure 2 demonstrates that only religious communes are producing this effect. Costly signals do not have the same impact on secular and religious communes. Increasing the number of costly requirements results in greater longevity on average for religious communes but not for secular communes. Logistic regression analyses presented in Table 4 further clarify these results. The first model in Table 4 shows that the number of costly requirements imposed by a commune is an independent predictor of commune longevity. In the second model, we partition the costly signaling effects by commune ideology (religious and secular) using two interaction terms. It is clear that the number of costly signals is a predictor of longevity for religious communes but not for secular communes. In this model, religion is no longer a predictor of commune longevity; the number of costly requirements explains the success of religious communes.

As mentioned above, the frequencies with which communes dissolved as a result of internal dispute and economic failure were employed as dependent variables to evaluate Hypothesis 2. Logistic regression analyses presented in Table 5 show that the number

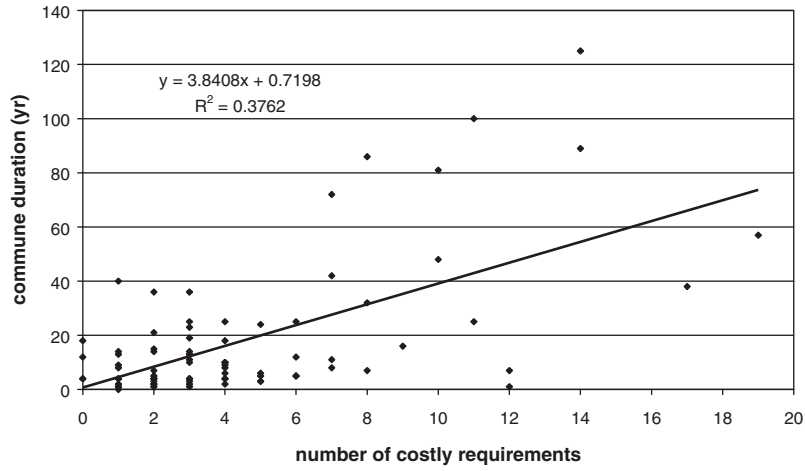


Figure 1: Commune Duration by Number of Costly Requirements

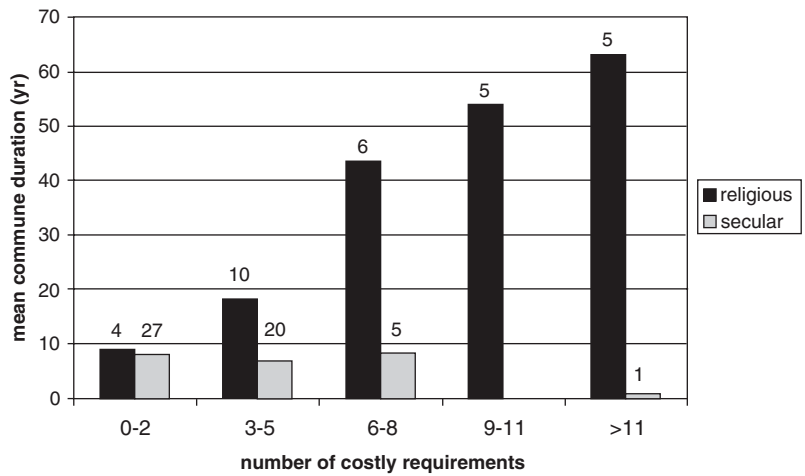


Figure 2: Secular and Religious Commune Duration by Number of Costly Requirements

of costly requirements imposed by a commune did not predict whether a commune dissolved as a result of an internal dispute or economic failure.⁹ When religious and secular communes are analyzed independently, the number of costly requirements remains

TABLE 4
Logistic Regression Analyses of the Probability of Dissolution

<i>Independent Variable</i>	<i>Parameter Estimate</i>	<i>Standard Error</i>	<i>p Value</i>
Full model chi-square = 59.49, <i>df</i> = 4, <i>p</i> < .0001			
<i>n</i> = 1,556			
Intercept	-2.006	0.199	
Religious	-0.865	0.323	.007
Number of costly requirements	-0.088	0.039	.024
Fourierist	0.509	0.316	.107
Owenite	1.686	0.585	.004
Full model chi-square = 65.86, <i>df</i> = 5, <i>p</i> < .0001			
<i>n</i> = 1,556			
Intercept	-2.438	0.275	
Religious	-0.005	0.458	.991
Religious × Costly Requirements	-0.146	0.048	.002
Secular × Costly Requirements	0.077	0.072	.286
Fourierist	0.477	0.315	.130
Owenite	1.613	0.584	.006

NOTE: "Religious" was coded as 1 if commune was religious; otherwise it was coded as 0. "Secular" was coded as 1 if commune was secular; otherwise it was coded as 0.

nonsignificant (results not shown here). However, the results in Table 5 indicate that religion is a predictor of whether a commune dissolved as a consequence of internal dispute as well as economic failure; religious communes are less likely than secular communes to dissolve because of internal disputes or economic failure.

DISCUSSION

The results presented here provide mixed support for the costly signaling theory of religion. It is clear that costly constraints positively impact religious commune longevity, suggesting that increases in the level of sacrifice imposed on members enhance group commitment.¹⁰ However, it is equally apparent that costly signaling has no effect on secular commune longevity. These results are surprising in light of the fact that several authors have suggested that costly requirements increase cohesiveness in secular groups; fraternity hell weeks are the most common example (e.g., Cialdini, 2001). Iannaccone, who has developed an economic theory of religious participation (1992, 1994) that shares a number

TABLE 5
Logistic Regression Analyses of the Probability of Dissolution
Resulting From Internal Dispute and Economic Failure

<i>Dependent Variable</i>	<i>Independent Variable</i>	<i>Parameter Estimate</i>	<i>Standard Error</i>	<i>p Value</i>
Internal dispute				
	Full model chi-square = 0.75, <i>df</i> = 1, <i>p</i> = .386 <i>n</i> = 79			
	Intercept	0.623	0.361	
	Number of costly requirements	-0.051	0.059	.387
	Full model chi-square = 8.86, <i>df</i> = 1, <i>p</i> = .003 <i>n</i> = 79			
	Intercept	0.944	0.315	
	Religious	-1.437	0.496	.003
Economic failure				
	Full model chi-square = 0.36, <i>df</i> = 1, <i>p</i> = .548 <i>n</i> = 79			
	Intercept	0.187	0.352	
	Number of costly requirements	-0.035	0.059	.551
	Full model chi-square = 2.98, <i>df</i> = 1, <i>p</i> = .084 <i>n</i> = 79			
	Intercept	0.323	0.287	
	Religious	-0.815	0.478	.088

of features with the costly signaling theory of religion, has also suggested (1992, p. 289) that strictness or costliness of a group's requirements should positively impact commitment within secular groups. Although we are not aware of empirical tests of this hypothesis, the intuitive appeal and seeming consistency with a number of examples, such as the Lion's Club, Greek fraternities, and military training, make our results somewhat puzzling.

These results are also surprising because many testimonials of commune members and leaders indicate they fully understood

that behavioral requirements and constraints increased group commitment. Indeed, several communes imposed more requirements and constraints on their members in times of social and economic crises. Notably, various leaders and members encouraged their fellow communalists to adopt celibacy to save their failing commune (e.g., Harmonists; see Hinds, 1975, p. 91, and Kanter, 1972, p. 78), although this survival strategy generally proved unsuccessful because members who had not entered the communes under the obligation of a celibate life were unwilling to abstain from sexual activity (e.g., Bishop Hill [Lauer & Lauer, 1983, p. 63-64; Oved, 1988, p. 102], Fruitlands [Calverton, 1941, p. 249-250; Lauer & Lauer, 1983, p. 64], and Oneida [Lauer & Lauer, 1983, p. 82]). Although many communalists apparently recognized that costly requirements such as celibacy could improve group cohesiveness and impact commune survivorship, there is no mention in our sources of anyone who believed that adopting such requirements would impact religious and secular communes differentially, as is indicated in our results.

Equally problematic for the costly signaling theory of religion is its failure to independently explain the causes of commune dissolution. Regardless of the number of constraints imposed by a commune, religious communes are less likely to dissolve as a result of internal disputes or economic failure than their secular counterparts. Cumulatively, these results indicate that costliness is not the only feature of rituals that enable them to promote solidarity. Costliness may be a necessary condition, but it is not a sufficient condition. We suggest that the shortcoming of the costly signaling theory of religion, as well as Iannaccone's (1992, 1994) theory of religious participation, is their failure to capture some critical elements of religious belief that distinguish it from belief in a secular ideology.

ROY RAPPAPORT: RITUAL AND SANCTITY

Anthropologists have long approached ritual as a form of communication (e.g., Leach, 1954; Wallace, 1966). For interpreting our results, the most informative work of this tradition is that of cultural ecologist Roy Rappaport. Unlike the costly signaling theory of religion as it has thus far been developed, Rappaport (1971) has distinguished between the communicative abilities of secular and religious rituals. He argued that

whereas the semantic content of the secular ritual is exhausted by the psychological, physiological, or social information transmitted in the ritual, this is not so in religious rituals. Religious rituals always include, in addition to messages of social import, implicit or explicit reference to some idea, doctrine, or supernatural entity. (p. 29)

It seems to us that secular rituals may occasionally include reference to a secular doctrine or ideology, and this would be especially likely among rituals performed by secular commune members whose alternative lifestyle was ideologically motivated. Rappaport, however, is undoubtedly correct that secular rituals (by definition) lack reference to a supernatural entity. We believe that this difference between secular and religious rituals is critical and may explain why secular rituals are less successful at promoting long-term trust and cooperation than religious rituals.

Rappaport (1971, 1979, 1999) has argued that rituals function to sanctify sacred sentences or postulates. These sentences, such as "Jesus Christ is the son of God" or "There is no God but Allah and Mohammed is his prophet," are unfalsifiable, a characteristic that is essential to their sanctity. Indeed, Rappaport has defined sacred propositions as statements without any material referents that are held to be unquestionably true by believers. Because these sentences lack any material referents, they are unverifiable.

Because these statements cannot be verified logically, believers verify them "emotionally." Religious rituals often increase arousal in the limbic system and generate what is typically referred to as a "religious experience" (James, 1902/1961; Otto, 1969). Similar to Jung, Rappaport (1971) has described this experience as a feeling of numinosity. He noted,

The truth of such an experience seems to the communicant to be sufficiently demonstrated by its mere occurrence, and because a sacred proposition or its symbol (e.g., the cross) is taken to be intrinsic to the experience, the sacred proposition partakes of this often powerful and compelling sense of truth. (p. 31)

d'Aquili and Newberg (1999), pioneers in the neurobiology of religion, have argued that not only are religious experiences perceived as true, they

appear to be "more real" than baseline reality and are vividly described as such by experiencers after they return to baseline reality. . . . So real do these experiences appear when recalled in baseline

reality that they have the ability to alter the way the experiencers live their lives. (p. 192)

They have claimed that these changes can last for several years. Indeed, a religious experience can be a life-altering event because increased arousal of the limbic system “is known to cause a certain degree of neural instability, allowing for the forming of new connections between neurons” (d’Aquili & Newberg, 1999, p. 192). Our understanding of the neurological effects of religious experience is just beginning (see Austin, 1998; Saver & Rabin, 1997). However, irrespective of the neurological details that will be worked out over the coming years, it is already apparent that a religious experience is the critical event that establishes genuine believers of a supernatural reality.

Secular rituals also seem capable of evoking an emotional experience, but these sensations appear to be fundamentally different from religious experiences. Although, to our knowledge, neuroscientists have not studied the neurological effects of secular ritual performance, we suggest that secular rituals do not generate a sense of the numinous because their referents are not supernatural or sacred. In other words, secular rituals do not induce supernatural experiences, although they may generate emotional experiences that engender a sense of community among their performers. This unity, however, is not supported by any unfalsifiable propositions and is consequently ephemeral; the propositions they support, if any at all, can be subjected to critical evaluation. Secular propositions do have material referents and can thus be disproved; by definition, secular rituals are not “otherworldly.” For example, the Marxist proposition “From each according to his ability, to each according to his need” is a statement that can be supported by ritual performances, but life under this regime will have genuine consequences for its pursuers. Up until a decade ago, many Israeli kibbutzniks would have considered this statement sacred, in other words, beyond question. However, it is not beyond question because the validity of this statement, namely, whether this system of resource distribution is successful, can be evaluated by living according to its directives. As the economic situation on the kibbutzim has worsened, this fundamental proposition of kibbutz life has been challenged and is now disregarded by many kibbutzniks who are pushing their communities to accept differential pay scales (Ben-Raphael, 1997; Gavron, 2000).

Thus, it appears that the relative success of religious communes is a result of religious rituals and constraints being imbued with sanctity, whereas the rituals and constraints of secular communes are not consecrated. As Rappaport (1971) stated, "to invest social conventions with sanctity is to hide their arbitrariness in a cloak of seeming necessity" (p. 36). Sanctified rituals define what it is to be human for the believer. Although secular rituals can generate a sense of community and obligation toward group members, their performers perceive them as capricious. For example, fraternity hell weeks are effective at promoting group solidarity; however, the actions performed by the pledges are arbitrary and are perceived to be arbitrary by everyone involved. We suspect the most successful hell weeks infuse a sense of loyalty and commitment among their participants by incorporating mystical (i.e., supernatural) elements into their rituals. One expedient practice is to claim that a long-deceased "mythical" member, whose commitment and dedication to the fraternity was supranatural, established the rituals. Such a strategy eliminates the arbitrariness of the rituals and shrouds them in mystery.

The relative success of religious ritual is also partially due to how communication within the ritual language occurs. Secular ritual communication occurs directly between individual communicants; there is no intermediary. In contrast, religious rituals generally pose a supernatural being as an intermediary. In other words, the rituals themselves are directed toward a supernatural being, regardless of the individual with whom trust will ultimately be promoted. Trust emerges because participants direct their ritual efforts toward the same deity or spirit. The ritual action itself signals belief in this nonmaterial supernatural entity, an entity whose existence can accordingly not be demonstrated. By directing rituals' referents toward the unfalsifiable, religions attach themselves to ultimate beliefs that are unverifiable and hence potentially eternally true. These ultimate sacred postulates are not subject to the vicissitudes of examination; they are beyond examination, making them much stabler referents than those employed by secular rituals.

DIRECTIONS FOR FUTURE RESEARCH

Although Rappaport (1979) ironically claimed that his argument rests on "logical necessity rather than empirical demonstration"

(p. 173), his insights must be incorporated into a more comprehensive evolutionary theory of religion that can generate testable hypotheses. Future work must explore the relationship between sanctity and ritual's ability to promote trust and cooperation among its performers. If Rappaport is correct, we are likely to see a correlation between the cohesiveness of a religion's adherents and theological reliance on the supernatural. "Rationalistic" religions (e.g., Liberal Protestantism) should be less successful at promoting trust and cooperation than "otherworldly" religions (e.g., Pentecostals). Understanding the proximate mechanisms that enable religion to promote cooperation is also likely to provide insights into the selective pressures that have enabled humans to universally employ religion as a cultural strategy. Neurological studies that can explain how religious experiences promote belief in a supernatural reality are eagerly awaited.

In addition, future work will look to extend the analyses presented here. In our analyses, it was assumed that each constraint has an equal impact on increasing trust and commitment. It is clear, however, that some constraints are costlier than others, although it is not obvious how to operationalize the differential costs of constraints. Celibacy is undoubtedly costlier than vegetarianism, but how much costlier is it? In what currency should these constraints be evaluated? How are we to determine the relative costs of constraints such as growing a distinctive beard, abstaining from coffee, and experiencing public humiliation in a session of mutual criticism? Future work will need to address how to measure and evaluate these costs. It should be noted that any subsequent analyses that employ estimates of ritual costliness are unlikely to affect the results presented here. In every category of constraint used in the analysis ($n = 22$), a greater proportion of religious communes exhibited the constraint than secular communes. Therefore, even if future analyses weighted constraints according to their costliness, religious communes would still exhibit a higher level of costly signaling, and costly constraints would positively impact religious commune longevity and have little effect on the longevity of secular communes. Indeed, an informal glance at the data indicates that less than 1% of all secular communes exhibit any of what are probably the three costliest constraints: celibacy, relinquishing "ownership" of children, and constraints on communication with nongroup members. In contrast, 48% of religious communes exhibited celibacy, and 24% exhibited constraints on outside communication and child ownership.

Future work will also assess the impact of social structure and leadership style on commune longevity. Religious communes may be more likely than secular communes to be organized around a charismatic leader who can encourage costly ritual behavior. Our initial attempts to collect data on how charismatic commune leaders are and their importance to communal stability were unproductive, primarily because of the difficulty in measuring these variables from historical texts.

CONCLUSION

Religion is a ubiquitous feature of human societies, and some have argued that it is an essential component of human sociality (e.g., Deacon, 1997; Rappaport, 1999; Rodseth, Wrangham, Harrigan, & Smuts, 1991). Understanding its purpose and evolutionary history is obviously critical for understanding human social life, yet the complexity of religion has rendered a comprehensive theory explaining the varieties of religious activities elusive. Evolutionary research on religious behavior is in its infancy, and thus there are many questions that remain to be addressed. Here, we have simply evaluated hypotheses generated from one evolutionary theory of religion. The mixed results of our analyses suggested several shortcomings in this theory and afforded us an opportunity to further develop it.

In future analyses, it will be important to recognize that although the costliness of rituals enables them to signal commitment and promote intragroup cooperation, this is only one critical feature of ritual communication. The beliefs that give meaning to ritual action differentially impact ritual's ability to create a sense of community. Rituals that support nonmaterial beliefs that cannot be falsified appear to be most effectual at elevating group cohesiveness. The sanctity of religious rituals assists them in their role as an instrument of human communication. Furthermore, religious rituals directed toward a supernatural being create a sense of numinosity that is not experienced by performers of secular rituals. What is important for the argument presented here is that those who experience this numinous sensation perceive the incident to be undeniably true. Because secular rituals do not generate this feeling of numinosity, and the ideology that provides meaning to secular rituals can be evaluated through experience, the ability of these rituals to promote trust and cooperation is ephemeral.

Future theoretical development of the costly signaling theory of religion must incorporate these proposals into a more comprehensive theory of the evolution of religion.

APPENDIX

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Notes

1. The costly signaling theory of religion does not predict that increases in the costliness of rituals will always result in enhanced group cohesion. The theory predicts that there is an optimal level of costliness that is determined by the opportunities that are available to group members in other groups (Sosis, in press). Specifically, the costs perceived by in-group members must be less than the difference in benefits that they could receive from switching groups and remaining in their own group. Thus, groups that impose requirements that exceed their optimal level of costliness will not fare any better than groups that impose less than their optimum. We expect, however, that because imposing requirements upon group members is challenging, groups will tend to impose less than their optimal level of costly requirements rather than more. In other words, although the theory predicts a curvilinear relationship between costly requirements and commune longevity, we expect to observe only the increasing end of this distribution. Hence, we predict that the greater the number of costly requirements imposed by a commune upon its members, the longer the commune will survive.

2. Throughout their history, many communal societies abandoned communalism but maintained their economic pursuits. Oved's (1988) data only include the years during which a group functioned communally. Thus, the years of existence in Oved's data measure how long a community was able to live cooperatively.

3. All Hutterite colonies and Shaker communities were respectively treated as a single commune. The strong similarities across communities

within each of these religious sects suggested that they should respectively each be represented as a single commune in the analysis. This is not to deny that there is variation in behavioral patterns among Hutterites across colonies (e.g., some colonies are more conservative than others; Wilson, 2000) or between Shaker communities (e.g., Shaker colonies in Kentucky permitted alcohol, whereas those in New England did not), but each of these sects do exhibit a variety of main features and, consequently, their communities are typically treated in the literature as homogeneous groups (e.g., Deets, 1975; Hostetler, 1997; Peter, 1987). Indeed, in Kanter's *Commitment and Community* (1972), which is the measuring stick of all comparative communal studies, the Shakers were treated similarly (the Hutterites were not in her sample).

4. Data were also collected on several other constraints, such as observing a Sabbath, required prayer services, and prayers at meals. However, these constraints were not used in the analyses because religious communes exclusively imposed them. No communes required several other constraints that were included in the survey, such as circumcision and tattoos.

5. It is interesting to note, and indicative of the sacrifice faced by members, that these restrictions occasionally have unintended consequences. For example, Hutterite girls and women are forbidden from wearing jewelry; however, many have turned to wearing eyeglasses for adornment, even when they are not needed for visual purposes. As one Hutterite girl explained, "We girls love our glasses. They're our jewelry" (Wilson, 2000, p. 28).

6. As was argued in Sosis (2000), the use of means and medians to evaluate longevity is misleading if some communes are still in existence. In the sample used here, however, only the Hutterites continue to live communally.

7. These categories were chosen because of natural break points in the data.

8. Although population size was not significant here, in analyses conducted using a larger sample of American communes, Kitts (1999) found population size to be positively correlated with commune longevity.

9. Data are missing on the causes of dissolution for four communes.

10. As discussed above, Sosis (in press) argued that increases in the costliness of rituals should not always enhance intragroup cooperation; there is likely to be a curvilinear relationship between the costliness of rituals and intragroup cohesion and cooperation. Therefore, communes that impose too many costly requirements may negatively impact their survivorship. We assumed that communes generally impose less than their optimal level of requirements, rather than more; thus, we did not expect to observe this effect. However, our data do suggest that the communes exhibiting the highest number of costly requirements did not survive the longest. Indeed, a polynomial trend ($y = -0.28x^2 + 9.1065x -$

8.3518; $R^2 = .4159$) provides a slightly better fit to our religious commune data than a linear model ($y = 4.1174x - 6.641$; $R^2 = .3697$).

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