

# IDEOLOGY, RELIGION, AND THE EVOLUTION OF COOPERATION: FIELD EXPERIMENTS ON ISRAELI KIBBUTZIM

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## ABSTRACT

*Despite the putative importance of ideological commitments in the evolution of large-scale cooperation among unrelated individuals, evolutionary researchers have yet to examine empirically the relationship between ideology and cooperation. We conduct an experimental game on Israeli kibbutz members to evaluate whether: (1) differences in ideological commitment can explain variation in cooperation within and across kibbutzim; and (2) whether certain types of ideologies are better at promoting cooperation than others. We use the cooperative behavior of Israeli city residents as a baseline and show that members of collectivized kibbutzim are more cooperative than city residents, while members of kibbutzim that have abandoned socialist ideology (privatized kibbutzim) are no more cooperative than city residents. Our results further indicate that among collectivized kibbutzim, members of religious kibbutzim are more cooperative than their secular counterparts. Religious males who engage in thrice-daily communal prayer display the highest levels of cooperation of any subpopulation in our sample. We discuss how the performance of sanctified rituals serves to internalize religious ideological commitment,*

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*thus enhancing the ability of religious ideology to motivate cooperative behavior.*

## INTRODUCTION

The emergence and stability of cooperation has been a central theoretical problem for those who study human social behavior (Axelrod, 1984). In an effort to solve the puzzle of human cooperation, evolutionary researchers continue to develop sophisticated models (Gintis et al., 2001; Richerson et al., 2003), conduct experiments (Fehr et al., 2002), and collect field data (Alvard, 2001; Hill, 2002; Sosis et al., 1998). Here we focus on a determinant of cooperation largely ignored by evolutionary scholars: ideological commitment (see Eibl-Eibesfeldt & Salter, 1998). Despite recent trends highlighting the similarity between human and non-human animal culture (Boesch & Tomasello, 1998; de Waal, 2001; Wrangham et al., 1994), humans remain the only ideologically motivated species. Our political, religious, economic, and leisure pursuits are often strongly influenced by our ideological beliefs, yet there has been little empirical exploration of the relationship between ideological commitment and cooperation.

Anthropologists have long noted that symbols and ethnic markers define group boundaries and delineate with whom cooperation should be pursued (Alvard, 2003; Nettle & Dunbar, 1997; cf. McElreath et al., 2003). Ideologies are the mental rationalizations behind these cultural forms and constitute the doctrines and myths of a community. They support symbolic representations of group identity and are frequently associated with elaborate ritual routines. Some researchers, especially advocates of cultural group selection (e.g. Richerson & Boyd, 1998; Wilson, 2002), have argued that ideologies can unite unrelated individuals who share common commitments and generate extraordinary levels of cooperation. While mathematical models support this assertion, controlled empirical tests are lacking. In addition, there has been little discussion among group or individual selectionists about the features that make some ideologies more successful than others at promoting cooperation. Can differences in ideological commitment explain variation in cooperative behavior within and across groups?

While these issues should be of particular interest to evolutionary theorists debating the merits of the multi-level selection approach (Sober & Wilson, 1998), we need to clarify at the outset that our motivation is more modest and our results too preliminary (at least with regard to adaptive design) to contribute significantly to this debate. We do not evaluate any relationship between ideological commitment and fitness, as individual selectionists would desire, nor do we assess how ideologies are transmitted within and across generations or

whether the differences in ideological commitments of our study populations affect their proliferation and survivorship, as would satisfy cultural group selectionists. What we do offer here is an empirical examination of the relationship between ideological commitment and cooperation that we hope can serve as a building block to address this and other significant debates in the evolutionary study of cooperation.

Our research was conducted in an ideologically motivated intentional community, the Israeli *kibbutz*. As a communal society, kibbutzim regularly face the challenge of promoting and sustaining cooperation among their members. Indeed, successful collective action is essential for the survival of the kibbutz. Unlike most of the traditional populations studied by behavioral ecologists, kibbutz members are a self-selected population; they have chosen to live their lives in a communal environment and have ample opportunity to leave their kibbutz and join the surrounding population with whom they share a common religion, language, ethnicity, and national identity. Therefore, maintaining cooperation on the kibbutz is dependent upon the kibbutz's ability to foster ideological commitment among its members. These facts, along with the naturally occurring differences in factors likely to influence the variation in cooperation across and within kibbutzim, including ideological types (e.g. economic and religious), make the kibbutz an ideal location to study the relationship between ideology and prosociality.

Cooperation refers to the coordinated efforts of individuals that are directed toward a common goal and entails mutual beneficence among participants (Dugatkin, 1997; Rothstein & Pierotti, 1988). Among the various evolutionary approaches to cooperation, behavioral ecologists have focused on how the determinants of cooperation vary under diverse ecological conditions (Alvard & Nolin, 2002; Sosis, 2000a). Behavioral ecologists aim to explain behavioral variation, which they generally measure through observational techniques such as focal or scan sampling (Hames, 1992). The nature of the kibbutz, however, renders this research strategy difficult to employ. Work and investment patterns on the kibbutz are regulated to *minimize* variation in labor effort. In most kibbutzim, members are expected to work a certain number of hours per week and jobs, including leadership and managerial positions, are rotated regularly to reduce variation in labor contributions. These institutional arrangements that censor variation in intended cooperative behavior led us to design an economic experimental game, a recent addition to anthropologists' methodological tool kit (e.g. Henrich et al., 2001), to elicit a measure of each kibbutz member's cooperative behavior toward fellow members.

In the next section, we describe our study population, the Israeli kibbutz. This is followed by a description of our experimental game and data collection

procedures. We then present the results from three sets of experiments aimed at understanding how ideological commitments affect cooperation on the kibbutz. First, we establish a baseline level of cooperation observed among non-kibbutznik Israelis and compare this to the cooperation observed on various kibbutzim. We then examine privatization as a measure of commitment to traditional kibbutz ideals of communalism to evaluate how commitment to kibbutz ideology relates to cooperative behavior. Lastly, we compare the relative success of religious and secular ideologies in promoting cooperation. Our results suggest that religious ideologies, especially those supported by communal ritual, are the most successful at fostering intra-group cooperation. We conclude with a discussion of the features of religious ideology that make it effective at enhancing intra-group cooperation and the relevance of our findings for future work on the evolution of cooperation.

## ISRAELI KIBBUTZIM

The kibbutz was originally conceived as a small collective farming settlement in which members based their social and cultural lives on the collective ownership of property and wealth. Guided by the Marxist dictum “From each according to his abilities, to each according to his needs,” kibbutz members received food, shelter, clothing, education, health care, and a small stipend for their work. The first kibbutz, Degania, was established in the Galilee in 1909. Since then, the kibbutz movement has grown to over 270 settlements located in every region in Israel, ranging in size from less than 50 to over 2000 members.

The kibbutz developed out of an egalitarian ideology rooted in Socialist-Zionism as well as the pragmatism of group living during the early colonization of Palestine by Eastern European Jews (Near, 1992). While the early kibbutzim were fiercely secular, by the 1930s religious Jews dedicated to socialism began to establish their own kibbutzim. Originally agriculturally based, neither religious nor secular kibbutzim were able to survive economically by farming alone. Today enterprises such as tourism, health spas, and factories manufacturing the entire gamut of imaginable products provide the majority of kibbutzim’s income. Concurrent with these economic changes, many kibbutzim abandoned their socialist roots and transferred the control of resources and costs of consumption from the kibbutz to the individual member (privatized kibbutzim), whereas other kibbutzim remained collectivized. Despite these changes, gossip and social ostracism continue to be the primary social control mechanisms used to discipline those who free ride, over-consume, or express beliefs deviating from the community’s ideals (Bet Or, 1988).

## METHODOLOGY

### *Experimental Design*

We developed an experimental bargaining game to measure cooperative behavior. The game involves two members from the same kibbutz who remain anonymous to each other during and after the experiment, and who make their decisions in the game independently of each other. Each pair member is told that there are 100 shekels<sup>1</sup> in an envelope to which both members have access. Each participant simultaneously decides how much of the 100 shekels to withdraw from the envelope and keep. If the sum of the requests to keep money exceeds 100 shekels, then both kibbutz members receive no money and the game is over. If the total requests are less than or equal to 100 shekels, then each kibbutz member keeps the amount he or she requested. In addition, the amount that remains in the envelope increases by 50% (i.e. is multiplied by 1.5) and is divided equally between the two participants.<sup>2</sup> The amount of money taken out of the envelope provides a measure of a player's cooperativeness. The more one is willing to cooperate by exhibiting self-restraint in one's request, the greater the total resources available to be divided.

This game belongs to a class of experiments commonly known as common-pool resource dilemmas (Ostrom et al., 1994). Common-pool resources are publicly accessible goods that, once consumed by an individual, are no longer available for consumption. Since common-pool resources are accessible to multiple individuals who can consume the goods to depletion, conserving these resources is problematic unless individuals exhibit self-restraint. Kibbutz members regularly face common-pool resource problems, such as the consumption of communal food, water, electricity, and the use of communal cars,<sup>3</sup> and thus our experimental design captures the notion of cooperation relevant to the social conditions of the kibbutz. Unlike other common-pool resource problems, such as fishing grounds, groundwater basins, oil fields, and grazing areas, for which licenses, externally enforceable agreements restricting access to the resource, and the assignment of private property rights are possible solutions, such measures are impractical for the kibbutz without drastically altering its fundamental nature. Rather, cooperation and voluntary self-restraint are necessary to prevent the depletion of its common-pool resources and to ensure the continuity of the kibbutz.

### *Experimental Procedures*

Having obtained permission to conduct the research from the secretary (head) of each kibbutz in our sample, we sent a letter of introduction outlining the nature of

the research to every household on the kibbutz a week prior to our visit. The letter informed kibbutz members that we would be calling them a day or two before our visit to invite them to participate in the research. For those who agreed to participate (>75% of those contacted), we arranged a specific time to meet at their home. At each kibbutz visited we conducted experiments with 24–56 members, depending on the size of the kibbutz. All data were collected between February and May 2000.

We conducted experiments and interviews at 28 kibbutzim throughout Israel. Each set of experiments described below utilizes the subset of this database that is relevant for the hypotheses being tested. All of our data collection procedures were refined during extensive pilot studies conducted at Ben-Gurion University and three additional kibbutzim not in any sample. To facilitate data collection and to reduce the chances that participants who completed the experiment could contact others scheduled to participate, 20 Ben-Gurion University graduate and undergraduate students were employed to collect data so that multiple experiments could be conducted simultaneously. Typically, about 12 researchers visited a kibbutz.

Experimenters were paired before their arrival at a kibbutz and maintained contact with each other via cellular phone throughout the stay on the kibbutz. Experimenters entered the houses of their respective participants simultaneously, so that paired kibbutz members began the experiment at the same time. Each experimenter conveyed some preliminary details concerning the experiment to the kibbutz member (e.g. decisions are to be used for research purposes only, participants will remain anonymous, etc.), and then gave them an instruction sheet to read carefully.<sup>4</sup> Once finished, the experimenter read the instructions aloud. To ensure complete comprehension of the game, two random examples were performed. In each example, a pair of numbers was randomly drawn from a bag containing numerical values between 0 and 100. The numbers were meant to be the amounts chosen by two hypothetical participants in the experimental game. Thus, for instance, if the numbers 10 and 70 were drawn from the bag, the participant was shown that the first player would receive 25 shekels and the second player would receive 85 shekels, since the 20 shekels left over would increase to 30 shekels and be split between them.

After any clarifying questions were answered, a decision was elicited regarding the amount the participant wished to remove from the envelope. The participant was then asked the amount that he or she believed the other participant would claim. The experimenter of the participant who decided first telephoned the other experimenter by cellular phone and informed the other experimenter that a decision had been reached. The experimenter did not convey the amount of the decision in this conversation in order to avoid any reaction on the part of

the second experimenter that could influence the second participant's decision. Further, immediately revealing the participant's decision might make him or her suspicious that the decision was being conveyed to the other participant who could then use this information to make a decision. After the second participant reached a decision, the experimenters exchanged decisions by cellular phone and conveyed to their respective participants the other member's decision, the amount remaining in the envelope, and the amount that he or she would receive after the amount left over in the envelope (if anything) is increased by 50% and divided between both players. Following the experiment, structured interviews were conducted to collect data on a variety of demographic and behavioral variables. At the conclusion of the interview, participants were paid their earnings from the experiment in cash.

## **SAMPLES AND RESULTS**

In the analyses described below, we examine the relation between cooperative decisions and numerous variables. [Table 1](#) presents summary information for the variables employed in each set of analyses.

### *Kibbutz Members vs. City Residents*

Does the kibbutz's socialistic ideology foster cooperation among its members? To address this question we conducted an in-group and out-group treatment of the experimental game described above. In the out-group treatment, kibbutz members and city residents were paired with one another and given precisely the same information, namely, that the person with whom they were paired was from another place.<sup>5</sup> It was important for us not to specify more precisely the location of the paired partners to avoid response biases resulting from possible stereotypes about kibbutz members or residents of certain cities. Given the demographics of Israel (kibbutz members constitute less than 2% of the population), it is most probable that kibbutz members (correctly) believed they were paired with city residents and that city residents believed they were paired with residents from different cities. The cooperation of the city residents offers a baseline level of cooperation within Israeli society to be compared with that of kibbutz members when paired with outsiders. In addition, we conducted an in-group treatment in which kibbutz members were accurately informed that they were anonymously paired with another member of their own kibbutz.

**Table 1.** Independent Variables used in Regression Analyses (Variables Without Explicit Coding Schemes were Coded Directly as the Value of the Variable).

Independent Variable/Coding Schema	Kibbutz vs. City Residents				Collectivized vs. Privatized Kibbutzim				Religious vs. Secular Kibbutzim			
	Kibbutz ( <i>n</i> = 171)		City Residents ( <i>n</i> = 61)		Collectivized Kibbutz ( <i>n</i> = 312)		Privatized Kibbutz ( <i>n</i> = 206)		Religious Kibbutz ( <i>n</i> = 216)		Secular Kibbutz ( <i>n</i> = 342)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Sex (0 = female, 1 = male)	0.48	0.50	0.43	0.50	0.40	0.49	0.50	0.50	0.50	0.50	0.50	0.50
Age	50.58	17.53	40.72	13.68	48.20	15.72	50.59	16.29	49.96	18.07	47.32	15.86
Fraction of life on kibbutz	0.66	0.27	–	–	0.67	0.28	0.68	0.26	0.66	0.26	0.67	0.29
Years of education	13.73	3.22	13.87	2.75	14.30	2.74	13.73	2.64	13.89	3.03	14.06	2.64
Number of households on kibbutz with kin	2.92	1.83	–	–	2.42	2.37	2.24	2.28	2.73	2.97	2.39	2.37
Number of meals eaten per week in communal hall	–	–	–	–	8.64	5.63	2.83	3.36	9.00	5.78	8.51	5.49
Employment location (0 = work on kibbutz; 1 = work outside of kibbutz)	–	–	–	–	0.20	0.40	0.30	0.46	0.21	0.41	0.23	0.42
Kibbutz age (years)	43.00	2.83	–	–	61.60	13.66	57.00	8.33	53.09	7.65	62.92	14.75
Population size	605.2	35.7	–	–	590.6	209.2	606.1	270.4	658.3	209.3	652.8	185.1
Economic strength (1–5; very strong–very weak)	2.25	0.50	–	–	2.00	0.94	2.43	0.79	2.21	0.74	1.84	0.86
Number of privatization changes adopted by kibbutz	2.50	1.73	–	–	1.90	1.37	12.14	2.48	2.10	1.56	2.11	1.42
Synagogue attendance (1–6; never–daily)	–	–	–	–	–	–	–	–	4.59	1.20	–	–
Amount predicted partner will claim (shekels)	40.71	14.76	43.18	12.58	41.61	17.90	43.48	17.26	39.76	14.25	41.15	17.62

### Sample

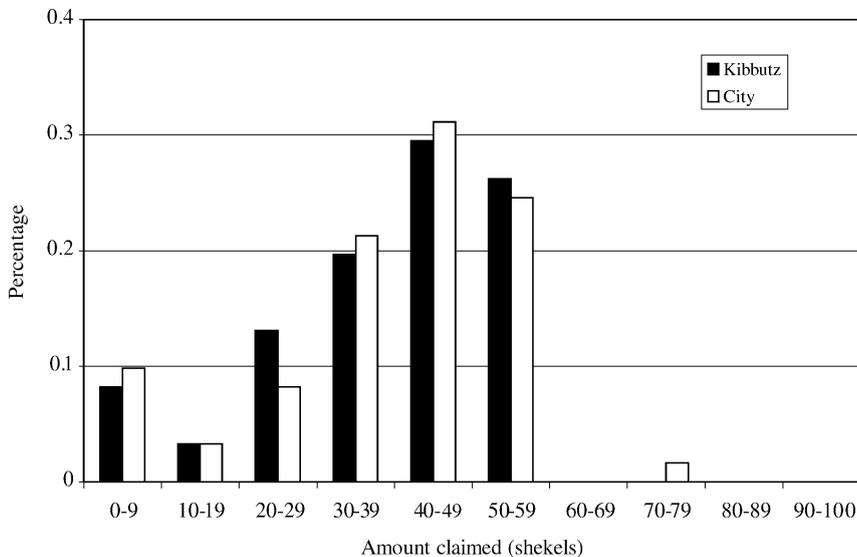
Our kibbutz sample for these treatments consists of four collectivized kibbutzim located in central and southern Israel, established between 1943 and 1949 and ranging in membership from 500 to 700 individuals. The kibbutz research institute, Yad Tabenken, constructs a measure of the economic strength for each kibbutz based on the kibbutz's assets and debt level. Three of our four sample kibbutzim are ranked as "strong (2)," while the fourth kibbutz is ranked as "fair (3)" (see Table 1). We also selected neighborhoods in seven towns and cities in central and southern Israel (Beer Sheva, Hadera, Maitar, Omer, Or Yehuda, Rehovot, and Rishon Lezion) to match the different standards of living of our four sample kibbutzim. We recruited city residents using methods similar to those employed for kibbutz members.

Sixty-one city residents participated in the kibbutz-city treatment against 61 kibbutz members. An additional 55 pairs (110 kibbutz members) participated in the kibbutz-kibbutz treatment. For each of the four sample kibbutzim, approximately two-thirds of the subjects participated in the kibbutz-kibbutz treatment, and one-third participated in the kibbutz-city treatment. By holding these proportions constant for the four kibbutzim, any possible fixed effects associated with the impact of a particular kibbutz are irrelevant for our hypotheses.

### Results

The distributions of the amounts claimed by city residents and the kibbutz members paired with them displayed in Fig. 1 suggest that city residents and kibbutz members behaved similarly on average. Indeed, city residents claimed an average of 35.6 shekels (median = 40) and kibbutz members in this treatment claimed an average of 35.2 shekels (median = 40); a *t*-test confirms that the mean amounts are not significantly different ( $t = 0.160$ ,  $df = 118$ ,  $p = 0.87$ , equal variances not assumed here and hereafter). Furthermore, the OLS regression<sup>6</sup> reported in the first column of Table 2 indicates that a dummy variable "kibbutznik," which equals "1" for kibbutz members and "0" for city residents, is not significant.

However, Fig. 2 illustrates that kibbutz members behave more cooperatively when paired with other kibbutz members (mean = 29.6, median = 35) than when paired with city residents (mean = 35.2, median = 40;  $t = 2.31$ ,  $df = 147$ ,  $p = 0.02$ ). The OLS regression results presented in the second column of Table 2 indicate that kibbutz members remove about 4.2 shekels more when paired with city residents than when paired with members of their own kibbutz,



*Fig. 1.* Distributions of Amounts Claimed in Kibbutz-City Treatment. *Note:* Histograms displaying the distributions of the amounts taken from the envelope by kibbutz members when paired against city residents (black;  $n = 61$ ) and by city residents when paired against kibbutz members (white;  $n = 61$ ).

controlling for age, educational status, the amount they believe their opponent will claim (“predict”), and the fraction of their lifetime they have lived on the kibbutz.

These results raise the possibility that the collectivized kibbutzim’s socialist ideology is successful at promoting cooperation among kibbutz members, although it clearly does not enhance cooperation with non-kibbutz members. There are alternative explanations for these findings however. Numerous studies in social psychology and sociology have demonstrated the robustness of in-group favoritism and the ease with which group identity may be called upon or created (Hewstone et al., 2002). Perhaps our findings that kibbutz members are more cooperative when interacting with one another than with city residents, and more cooperative than city residents are toward outsiders, reflects merely an in-group bias. In other words, it is possible that ideology is not needed to create enhanced levels of cooperation within a kibbutz, but can simply be generated by an evolved psychology that favors in-group members. To evaluate this possibility we compare the levels of in-group cooperation on collectivized and privatized kibbutzim.

**Table 2.** OLS Regression Models of the Amount Removed From Envelope by Kibbutz Members and City Residents.<sup>a</sup>

Independent Variable	Treatment			
	Kibbutz-City		Kibbutz-Kibbutz	
	Parameter Estimate	S.E.	Parameter Estimate	S.E.
Intercept	7.02	5.77	-2.43	9.32
Paired with kibbutznik	-		-4.23**	2.04
Kibbutznik	1.17	2.39		-
Predict	1.43***	0.22	1.57***	0.19
Predict-squared	-0.012***	0.004	-0.015***	0.003
Sex	-2.87	2.39	-2.23	2.15
Fraction of life on kibbutz	-		5.34	3.99
Education	0.17	0.30	0.07	0.35
Age	-0.14*	0.08	-0.04	0.07
<i>N</i>	118		167	
Adjusted <i>R</i> <sup>2</sup>	0.325		0.357	

<sup>a</sup>Standard errors are corrected for heteroskedasticity.

\*  $p < 0.10$ .

\*\*  $p < 0.05$ .

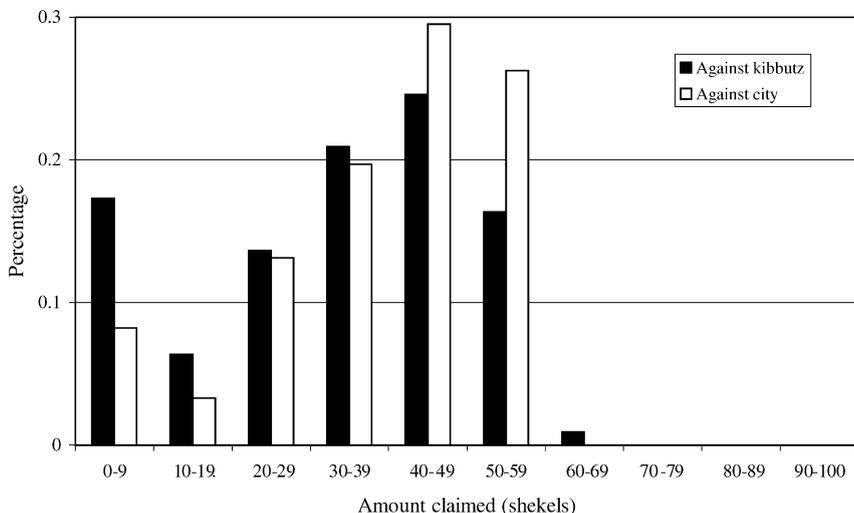
\*\*\*  $p < 0.01$ .

*Collectivized vs. Privatized Kibbutzim*

In the mid-1980s it was exposed that the kibbutzim were collectively over four billion dollars in debt. This financial crisis accelerated a dramatic ideological and social change already underway on the kibbutz (Leviatan et al., 1998). The communal nature of the kibbutz was challenged and many kibbutzim abandoned communal ownership of property in favor of privatization (Barkai, 1999; Helman, 1994). Some kibbutzim required members to pay for their own food and electricity. Others instituted differential pay scales. Differences across kibbutzim in the number of changes they have made toward privatization allow us to evaluate how variation in commitment to traditional kibbutz ideology affects cooperative behavior. As a consequence of their greater commitment to kibbutz socialist ideals, we expect members of collectivized kibbutzim to display higher levels of cooperation than members of privatized kibbutzim.

*Sample*

To evaluate the relation between privatization and cooperative behavior we constructed samples of collectivized and privatized kibbutzim that are very similar



*Fig. 2.* Distributions of Amounts Claimed by Kibbutz Members. *Note:* Histograms displaying the distributions of the amounts taken from the envelope by kibbutz members when they are paired against other kibbutz members (black;  $n = 110$ ) and against city residents (white;  $n = 61$ ).

along various dimensions believed to affect cooperation. Seven collectivized secular kibbutzim were matched with ten privatized secular kibbutzim according to their population size, year of establishment, and degree of economic success. A kibbutz's degree of privatization was determined according to the number of privatization changes (out of a total of 21) adopted by the kibbutz.<sup>7</sup> Examples of privatization changes include members (rather than the kibbutz) paying for electricity, vacations abroad, and meals in the communal dining hall, permission for individual members to own private cars, and differential salaries between members. The seven collectivized kibbutzim in our sample have made five or fewer changes toward privatization (mean = 1.90, S.D. = 1.37), whereas our ten privatized kibbutzim have made ten or more changes (mean = 12.14, S.D. = 2.48).

### *Results*

All subjects were accurately informed that they were anonymously paired with another member of their own kibbutz. The distributions of amounts claimed from the envelope for privatized and collectivized kibbutzim are shown in *Fig. 3*. Members of collectivized kibbutzim removed on average 30.9 shekels

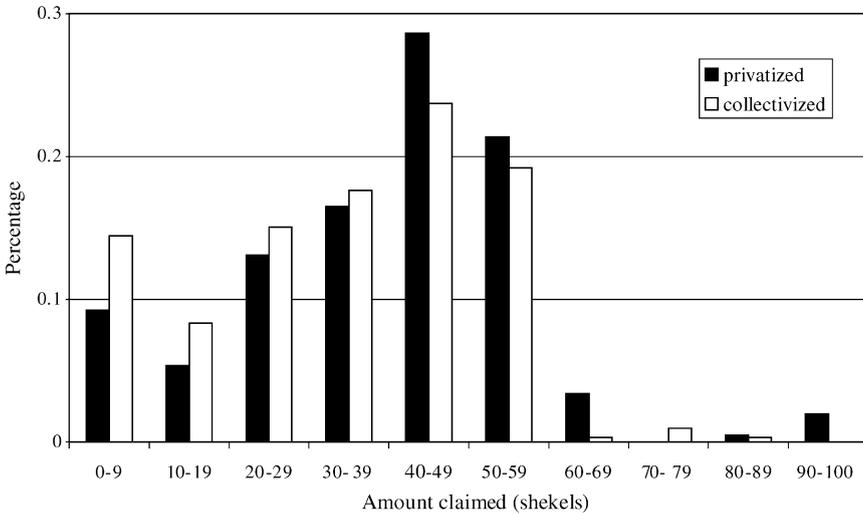


Fig. 3. Distributions of Amounts Claimed by Privatized and Collectivized Kibbutz Members. *Note:* Histograms displaying the distributions of the amounts taken from the envelope by members of privatized (black;  $n = 206$ ) and collectivized (white;  $n = 312$ ) kibbutzim.

(median = 35.0,  $n = 312$ ) compared to 36.0 shekels (median = 40.0,  $n = 206$ ) for members of privatized kibbutzim ( $t = 3.08$ ,  $df = 420$ ,  $p = 0.002$ ). Of the 19 subjects who claimed more than 50 shekels, 13 were from privatized kibbutzim ( $\chi^2 = 6.76$ ,  $df = 1$ ,  $p = 0.009$ ).

Table 3 presents the results of regression analyses that assess the relation between privatization and the amount removed from the envelope. Controlling for an array of variables, members of collectivized kibbutzim remove about five shekels less than their privatized cohorts remove. The only other significant variables in the model are the amount a player predicts his or her partner will remove from the envelope, which enters the regression nonlinearly as seen by the “predict” and “predict-squared” variables, and whether a participant works on or off the kibbutz. Members who work off the kibbutz remove about four shekels less than members who work on the kibbutz. This finding further highlights the importance of ideology in motivating cooperation. Members who work outside the kibbutz are typically professionals and earn salaries well above the Israeli average, yet as kibbutz members they are required to contribute these high salaries to the kibbutz. Their choice to remain on the kibbutz rather than join mainstream Israeli society reflects their commitment to the kibbutz values of community and cooperation.

**Table 3.** OLS Regression Model of the Amount Removed from Envelope by Members of Privatized and Non-Privatized Kibbutzim.<sup>a</sup>

Independent Variable	Parameter Estimate	S.E.
Intercept	10.65	7.87
Privatized	5.19 <sup>***</sup>	1.70
Predict	0.85 <sup>***</sup>	0.14
Predict-squared	-0.005 <sup>***</sup>	0.002
Employment location	-3.99 <sup>**</sup>	1.83
Male	0.70	1.46
Age	0.05	0.05
Education	0.18	0.26
Number of kin households	0.44	0.34
Fraction of life on kibbutz	1.53	2.74
Kibbutz economic strength	-1.75	1.27
Kibbutz age	-0.04	0.09
Kibbutz population size	-0.009	0.006
<i>N</i>	502	
Adjusted <i>R</i> <sup>2</sup>	0.255	

<sup>a</sup>Standard errors are corrected for heteroskedasticity.

\*\* $p < 0.05$ .

\*\*\* $p < 0.01$ .

The higher levels of cooperation observed on collectivized kibbutzim suggest the importance of ideological commitment for encouraging cooperation. Having strayed from traditional kibbutz ideology, members of privatized kibbutzim exhibit levels of cooperation no different from those of city residents ( $t = 0.14$ ,  $df = 113$ ,  $p = 0.89$ ). Not all ideologies, however, are equally successful at promoting cooperation. Rappaport (1999) and Sosis and Bressler (2003) have argued that religious ideologies are particularly effective at enhancing trust, solidarity, and cooperation. We evaluate the efficacy of religious ideology in fostering cooperation by comparing the levels of cooperation on religious and secular kibbutzim.

### *Religious vs. Secular Kibbutzim*

The kibbutz provides natural conditions to evaluate the relative abilities of religious and secular ideologies to facilitate cooperation because of the clear distinction between religious and secular kibbutzim. Secular kibbutz members' lives are not structured by religious ritual but are otherwise very similar to those of religious kibbutzniks. Although we utilize this salient division in the kibbutz population, it

should be noted that ideologies (and rituals) do not occur in mutually exclusive religious and secular categories, but are more accurately viewed as occurring along a religious-secular continuum.

Various anthropologists have posited that religion can foster in-group solidarity and cooperation (see [Sosis & Alcorta, 2003](#)). While there is little consensus about how religion promotes cohesiveness, it is widely accepted that collective ritual is critical to the process, and we concur. [Sosis \(2003\)](#) has argued that the performative aspects of religious ritual serve to internalize supernatural beliefs, which often promote intra-group cooperation. If religious rituals and beliefs affect solidarity and cooperation, then we should expect members of religious kibbutzim to exhibit higher levels of cooperation than members of secular kibbutzim do. Further, while some rituals are performed in solitude, it is collective rituals that are believed to enhance unity among performers (e.g. [Durkheim, 1995 \[1912\]](#); [Turner, 1969](#)). Indeed, rituals performed publicly declare commitments to the community and therefore strengthen convictions in the cosmology embedded in the rituals ([Sosis, 2003](#)). We expect the frequency of collective ritual performance to influence a performer's commitment to the group and the strength of his or her conviction in the beliefs associated with the ritual performed. Therefore, we predict that religious males will exhibit higher levels of cooperation than religious females because of their greater participation in collective ritual, especially thrice daily prayer (see below), and that those men who participate in communal prayer most frequently will display the highest levels of cooperation. Moreover, we should also expect to find this correlation if public religious rituals serve to signal cooperativeness, as several researchers have suggested ([Bulbulia, n.d. a](#); [Cronk, 1994](#); [Irons, 2001](#); [Sosis, 2003](#)).

### *Sample*

The vast majority of kibbutzim are secular, and indeed, generally fiercely anti-religious. However, there are 16 religious kibbutzim (over 8000 members), which since 1935 have been represented by the Religious Kibbutz Movement (Kibbutz Dati). The religious kibbutzim were not anticipated by the formulation of an explicit and detailed ideology ([Katz, 1995](#)). Religious kibbutzim integrated the secular kibbutz culture grounded in socialist ideology and a religious culture rooted in traditional or *halachic* Judaism. In contrast to the secular kibbutzim, it was the commitment of the religious kibbutzim to traditional Judaism that fostered their socialist perspective. Despite their religious motivations, they modeled their communal lifestyle and economic structures after the secular kibbutzim that preceded them ([Fishman, 1992](#)).

Religious kibbutz members practice a form of Judaism known as Modern Orthodoxy, which means that they do not shun modernity (e.g. in contrast to the Ultra-Orthodox, they watch TV, read national newspapers, and participate in Israeli society), yet they adhere to *halacha*, or traditional Jewish law. As Modern Orthodox Jews, ritual plays a central role in how religious kibbutz members organize their lives. Although a variety of requirements are imposed equally on males and females, such as keeping kosher and not working on the Sabbath, Modern Orthodoxy is not sexually egalitarian with respect to all ritual obligations. Male ritual requirements are largely publicly oriented whereas female requirements are generally pursued privately or in the home. Indeed, of the three major requirements imposed exclusively on women (namely, the laws of family purity such as attending a *mikveh* or ritual bath, separating a portion of dough when baking bread, and lighting Sabbath and holiday candles), none are publicly performed. Males, on the other hand, regularly engage in a variety of collective rituals, most notably public prayer, which occurs three times daily. While females also attend synagogue occasionally, there is no religious obligation for them to pray in a group. They sit separately from the men who do not see them. These gender differences in ritual practice provide an opportunity to compare directly how group and private ritual performance correlates with cooperative behavior.

To test the hypotheses presented above, we constructed samples of religious kibbutzim and secular kibbutzim that are very similar along various dimensions believed to affect cooperation. Seven religious kibbutzim were matched with 11 secular kibbutzim according to their population size, year of establishment, degree of economic strength, and degree of privatization. On average religious kibbutzim are economically more successful (Fishman & Goldschmidt, 1990) and much less privatized than secular kibbutzim. Thus, our sample of secular kibbutzim is not representative of the secular kibbutz movement, but consists of some of the most successful and least privatized secular kibbutzim in a movement that is otherwise economically struggling and becoming much less communal (Barkai, 1999; Helman, 1994; Leviatan et al., 1998).

### *Results*

On average, religious males removed 29.9 shekels ( $n = 108$ ) from the envelope, religious females removed 33.7 shekels ( $n = 108$ ), secular males removed 30.1 shekels ( $n = 170$ ), and secular females removed 30.5 shekels ( $n = 172$ ). In order to compare these subpopulations we conducted OLS regression analyses and controlled for a host of variables that we thought might correlate with cooperativeness (see Table 4). The kibbutz-level variables (kibbutz age,

**Table 4.** OLS Regression Model of the Amount Removed from Envelope by Members of Religious and Secular Kibbutzim.<sup>a</sup>

Independent Variable	Religious Kibbutzim						Secular Kibbutzim	
	1		2		3		4	
	Parameter Estimate	S.E.	Parameter Estimate	S.E.	Parameter Estimate	S.E.	Parameter Estimate	S.E.
Intercept	11.75	8.97	4.91	4.97	3.04	6.71	-1.09	6.11
Sex	-4.26**	2.34	-	-	-	-	2.99	1.86
Predict	0.92***	0.29	0.87***	0.25	0.87**	0.41	0.99***	0.11
Predict-squared	-0.007	0.004	-0.010*	0.004	-0.006	0.006	-0.007***	0.002
Fraction of life on kibbutz	10.53**	4.51	9.14**	4.14	-	-	-1.57	3.28
Age	-0.09	0.07	-	-	-	-	0.09	0.06
Employment location	-0.50	3.06	-	-	-	-	-6.25***	2.40
Education	-0.23	0.38	-	-	-	-	0.22	0.32
Number of kin households	0.04	0.38	-	-	-	-	0.37	0.39
Number of meals	-0.09	0.21	-	-	-	-	-0.31*	0.18
Male × synagogue daily	-	-	-5.76**	2.35	-	-	-	-
Male × synagogue not daily	-	-	-2.20	3.08	-	-	-	-
Fraction of life on kibbutz × female	-	-	-	-	11.37**	5.40	-	-
Fraction of life on kibbutz × male × synagogue daily	-	-	-	-	3.81	4.66	-	-
Fraction of life on kibbutz × male × synagogue not daily	-	-	-	-	8.78*	5.28	-	-
<i>N</i>	186		198		198		290	
Adjusted <i>R</i> <sup>2</sup>	0.202		0.225		0.222		0.286	

<sup>a</sup>Standard errors are corrected for heteroskedasticity.

\**p* < 0.10.

\*\**p* < 0.05.

\*\*\**p* < 0.01.

membership size, economic strength, and degree of privatization) do not appear in the table; there is too little variance along all kibbutz-level variables in this sample, and therefore none of them are significant (see Sosis & Ruffle, 2003).<sup>8</sup>

Table 4 presents the results of separate regressions performed on the religious and secular kibbutz samples, where the amount removed from the envelope is the dependent variable. As hypothesized, within the religious kibbutz sample sex is a significant predictor of the amount claimed. Controlling for a variety of explanatory variables, religious males on average take 4.3 shekels less than females (column 1). Secular male and female kibbutz members do not remove significantly different amounts from the envelope (column 4); thus, the significant sex difference observed in the religious kibbutzim is unlikely to be a consequence of inherent differences in the way males and females respond in this experimental game.

In both the religious and secular kibbutz samples, the amount a participant expects his or her partner to remove from the envelope (“predict”) is a highly significant predictor of actual claims. The other significant variables differ across samples. For the secular kibbutz sample, the “predict-squared” and “employment location” variables are strong predictors of cooperative decisions, as was also found in the collectivized-privatized sample. The frequency with which secular kibbutz members eat in the communal dining hall is negatively correlated with the amount removed from the envelope, although it is only marginally significant. In the religious kibbutz sample, the fraction of one’s life spent on the kibbutz is a significant predictor of claims. Those who move to a kibbutz are typically motivated by a strong ideological commitment to socialism and communal life. This suggests that individuals who believe passionately enough in the values associated with communal life to move to a kibbutz initially cooperate more than those who have spent more of their lives on the kibbutz (we discuss this further below).

Data on synagogue attendance were collected during the post-experiment interviews. Participants from religious kibbutzim were asked to indicate their synagogue attendance on a six-point scale with the following categories: daily (6), several times per week (5), Sabbath and holidays (4), holidays only (3), seldom (2), and never (1). The average male response was 5.5 and the average female response was 3.7 ( $t = 16.23$ ;  $df = 203$ ;  $p < 0.0001$ ). Male synagogue attendance is negatively correlated with the amounts claimed from the envelope (Pearson  $r = -0.18$ ,  $n = 102$ ,  $p = 0.036$ ), whereas female synagogue attendance is unrelated to claims (Pearson  $r = 0.05$ ,  $n = 102$ ,  $p = 0.626$ ). Controlling for variables shown to be significant in the religious sample (Table 4, column 1), the OLS regression in column 2 of Table 4 shows that religious males who attend synagogue daily remove about 5.8 shekels less from the envelope than religious females do. There

is no significant difference in the amounts claimed by religious males who do not attend synagogue daily and religious females.

The regression specifications in [Table 5](#), which include all kibbutz members (religious and secular), control for the significant predictors found in the above analyses ([Table 4](#)). Column 1 provides a controlled comparison of the cooperative behavior of the four subpopulations. Three of the four subpopulations are represented with dummy variables, with religious males as the base category. The results in column 1 show that, controlling for significant predictors, religious males take out about 4 shekels less than religious females (similar to the results in [Table 4](#)), 11 shekels less than secular males, and 8 shekels less than secular females. The results in column 2 indicate that, controlling for significant predictors, religious kibbutzniks on average take out 6.8 shekels less than secular kibbutz members. Column 3 shows that this is largely a result of males who attend synagogue regularly. When male synagogue attendance is included in the regression, the religious dummy variable is no longer significant, whereas the male daily synagogue attendance interaction term is highly significant (similar to the regression results on religious kibbutz members only in [Table 4](#), column 2). Column 4 includes dummy variables for secular males and females, while the religious male population is divided between those who attend synagogue daily and those who do not; religious females are the base category. The results indicate that religious females claim 7.5 shekels less than secular males and 5.4 shekels more than males who attend synagogue daily, but they do not claim significantly different amounts from secular females or males who do not attend synagogue daily. Overall, these results provide strong support for the thesis that collective ritual, such as thrice-daily communal prayer, can promote cooperation and may serve as a reliable signal of cooperativeness.

If collective ritual performance positively affects cooperation, it is curious that in the religious kibbutz sample the longer one spends on the kibbutz the less cooperative one becomes. However, a closer look at the data reveals that males who do not attend synagogue daily and females are largely responsible for this effect. In the regression shown in column 3 of [Table 4](#) we break down the fraction of one's life spent on the kibbutz by sex, and synagogue attendance for males. The results indicate that the fraction of one's life spent on the kibbutz is a significant predictor of the amounts claimed among female religious kibbutz members and males who do not attend synagogue daily, but not among the males who attend synagogue daily. It is understandable that among those who join the kibbutz enthusiasm for cooperation wanes as one's initial idealism gives way to the actual challenges of living communally; however, collective ritual appears to counteract this effect.

**Table 5.** OLS Regression Models of the Amount Removed from Envelope by Members of Religious and Secular Kibbutzim.<sup>a</sup>

Independent Variable	1		2		3		4	
	Parameter Estimate	S.E.						
Intercept	-0.86	3.74	8.34	2.84	8.72	3.43	2.69	3.46
Predict	0.93***	0.11	0.93***	0.11	0.92***	0.14	0.92***	0.14
Predict-squared	-0.006***	0.001	-0.006***	0.001	-0.006***	0.001	-0.006***	0.002
Religious	-	-	-6.79**	3.38	-5.79	3.44	-	-
Fraction of life on kibbutz × religious	8.04**	4.09	7.31*	4.09	8.77**	4.54	8.74*	4.55
Employment location × secular	-5.88***	1.97	-5.82***	1.98	-5.82***	2.11	-5.88***	2.15
Number of meals × secular	-0.28*	0.16	-0.24	0.16	-0.25	0.16	-0.28*	0.17
Religious × female	3.87*	2.09	-	-	-	-	-	-
Secular × male	10.89***	3.78	-	-	-	-	7.46**	3.67
Secular × female	8.15**	3.69	-	-	-	-	4.72	3.47
Religious × male × synagogue daily	-	-	-	-	-5.47**	2.45	-5.43**	2.45
Religious × male × synagogue not daily	-	-	-	-	-2.35	2.87	-2.37	2.88
<i>N</i>	497		497		491		491	
Adjusted <i>R</i> <sup>2</sup>	0.264		0.258		0.266		0.268	

<sup>a</sup>Standard errors are corrected for heteroskedasticity.

\**p* < 0.10.

\*\**p* < 0.05.

\*\*\**p* < 0.01.

## DISCUSSION

Our results show that when city residents and members of collectivized kibbutzim were paired against one another, they displayed similar levels of cooperation. Moreover, members of privatized kibbutzim were no more cooperative than these groups, even though they were paired with fellow privatized kibbutz members. However, members of collectivized kibbutzim exhibited higher levels of in-group cooperation than members of privatized kibbutzim, suggesting the importance of ideological commitment in promoting cooperation and making it unlikely that our kibbutz-city results are solely a consequence of inherent in-group biases. Our results further show that members of collectivized religious kibbutzim, especially males engaged in thrice-daily prayer, exhibited higher levels of in-group cooperation than members of collectivized secular kibbutzim.

One may argue that these differences across populations are due to risk aversion, and not a consequence of some groups of individuals choosing to behave more cooperatively than others. In other words, individuals who claimed small amounts did so out of fear that the sum of the requests would exceed 100 shekels; to avoid this possibility they settled for a modest claim. To assess this alternative explanation, we examined the relationship between the amounts claimed and predicted. If risk aversion underlies participants' choices, then we would expect those who claimed small amounts to predict that their opponents would remove relatively large amounts, and vice versa. However, the findings that the coefficient on the "predict" variable is positive and highly significant and the "predict-squared" variable is either not significant (Table 4, columns 1 and 3) or only marginally significant (Table 4, column 2) confirm that religious kibbutz members were motivated by the belief that others will behave cooperatively. In all other samples, the coefficient on "predict-squared" is negative and highly significant, implying an inverted-U relationship between the amounts claimed and predicted. For the secular kibbutz members (Table 4, column 4), for instance, consistent with the cooperation motive, a positive relation between "predict" and the amount claimed holds as long as "predict" is less than 70.7 shekels.<sup>9</sup> For values of "predict" greater than 70.7, an increase in the amount predicted accompanies a decrease in the amount claimed supporting the risk-aversion hypothesis. In our sample, only 9/342 secular kibbutz members predicted that their opponents would remove more than 70.7 (six other members predicted exactly 70 shekels), indicating that the vast majority of members were not motivated by fear but by their belief that others would behave cooperatively.

Our data are incapable of fully distinguishing the causal relationship between any of our significant variables and cooperative behavior. For example, although we have shown that members of collectivized kibbutzim are more cooperative

toward each other than members of privatized kibbutzim, it would be hasty to argue that privatization causes a decrease in cooperation. Although we believe this to be the case, it is also plausible that privatized kibbutzim chose to privatize as a consequence of waning cooperation on these kibbutzim. Likewise, although we propose that collective rituals enhance the social bonds that connect their participants, it is also possible that those who perceive greater levels of cooperation on the kibbutz are more likely to participate regularly in collective ritual. For instance, maybe males who are dissatisfied with the direction of their kibbutzim (all of which are undergoing considerable social change) are not only less cooperative than others because of their disaffection, but are also less likely to attend communal functions such as public prayer; and maybe religious females are more dissatisfied with recent changes than males, which may explain why they are less cooperative toward their fellow members than their male counterparts who attend synagogue daily. Contrary to this interpretation of our results, however, interview data indicates no difference in the levels of satisfaction with recent changes on their kibbutzim between males who attend synagogue daily and those who do not ( $t = 2.00$ ;  $df = 55$ ;  $p = 0.294$ ), and religious females are *more* satisfied with the changes on their kibbutzim than males who attend synagogue daily ( $t = 1.98$ ;  $df = 131$ ;  $p = 0.012$ ; see Sosis & Ruffle, 2003).

### *Religious Ideology and Ritual*

The most cooperative subpopulation in our entire sample are males who attend synagogue daily. This finding is consistent with analyses demonstrating that 19th century U.S. religious communes that imposed the greatest ritual demands on their members survived the longest, a testament to their ability to sustain long-term cooperation despite the inherent potential for free riding and resource exploitation in communal societies (Sosis, 2000b; Sosis & Bressler, 2003). Moreover, Brumann (2001) has shown that religious communes that maintain dualistic theologies (i.e. they “draw a clear boundary between the sacred and the profane, meaning that they explicitly mark out ritual from everyday activities” (2001, p. 92)), are more successful than those that adhere to theologies that do not distinguish between sacred rituals and mundane activities. Secular ideologies also often support ritual behavior, especially in intentional communities, yet secular worldviews appear to have less of an impact on cooperation than their religious counterparts (Sosis & Alcorta, 2003; Sosis & Bressler, 2003). Why might religious theologies complemented by sacred ritual actions be more successful at promoting cooperation than secular ideologies?

In order to address this question we must first understand the role that ritual plays in enhancing and internalizing associated beliefs among performers. Rituals are not empty routines; they are always embedded with symbolism and endorsed by cosmological explanations that provide significance, insight, and appreciation for the performers. Rappaport (1999) points out that these theological rationalizations inextricably bind ritual's performers to the moral code of the community. Although ritual behaviors appear to be shrouded in mystery, their message to other adherents is clear: participation in a ritual performance signals acceptance<sup>10</sup> of the moral values encoded in the ritual. For example, during a wedding ceremony the bride and groom send a public signal that they accept the moral values, as defined by the community, incumbent upon the institution of marriage. Since collective ritual performance is unambiguously associated with overt group values, only those who accept the ritual's message will be willing to perform it regularly.

While secular ideologies and rituals can generate a sense of community and obligation toward group members, the bonds forged through a common secular ideological belief, even when supported by ritual activity, do not appear to create the long-term trust and commitment achieved within religious communities. In explaining the reasons for this difference, Rappaport (1999) has argued that religious creeds are grounded in more stable propositions than secular ideologies. The cores of religious cosmologies are based on what Rappaport refers to as ultimate sacred postulates. These statements, such as "Jesus Christ is the son of God," lack material referents and are thus unverifiable and beyond evaluation. Rappaport claims that since religious beliefs and behaviors cannot be verified logically, adherents verify them "emotionally" through the "religious experience" (James, 1961[1902]), the truth of which "seems to the communicant to be sufficiently demonstrated by its mere occurrence" (Rappaport, 1971, p. 31). This ability of religious ritual to evoke such an experience differentiates it from both animal and secular ritual and lies at the heart of its efficacy in promoting and maintaining intra-group cooperation and commitment (Sosis & Bressler, 2003).

Secular rituals also seem capable of evoking an "emotional experience," but because their referents are not supernatural or sacred, they do not elicit a sense of the numinous in the way that religious rituals can. 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. For example, until a decade ago many kibbutz members would have considered the Marxist proposition "From each according to

his ability, to each according to his need” to be “sacred,” in other words, beyond question. However, it is not inherently 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 kibbutzniks have done. As the economic situation on the kibbutzim has worsened, many kibbutzniks have challenged and ultimately rejected this fundamental proposition of kibbutz life, as evidenced by their decision to privatize their kibbutzim (Ben-Rafael, 1997; Gavron, 2000). In short, because secular ideologies are exposed to greater vicissitudes of examination, they are less durable than religious ideologies and less successful at promoting long-term commitment and cooperation among adherents. As mentioned above though, religious and secular ideologies should be viewed as two ends of a continuum. Many reputed secular organizations, including governments, armies, and fraternities, infuse their ideologies with supernatural elements. In addition, while religious postulates are occasionally falsifiable (e.g. messianic prophecies), some secular propositions verge on the unfalsifiable, such as ideas of liberty, freedom, and brotherhood (C. Alcorta, pers. comm.). Indeed, we suspect that secular ideologies often adopt unfalsifiable and supernatural elements specifically because of their effectiveness at motivating collective action.

Religious rituals not only internalize ideologies that promote intra-group cooperation, in contrast to secular ideologies they also support unverifiable beliefs in supernatural punishment, in either this life or a perceived afterlife. Fear of supernatural punishment may prevent adherents from deviating from community norms. Noting deficiencies in traditional evolutionary explanations of large-scale cooperation such as reciprocity and kin selection, Johnson and colleagues (Johnson & Bering, n.d.; Johnson & Kruger, 2004; Johnson et al., 2003) posit that belief in supernatural retribution is the key to solving the puzzle of the evolution of cooperation in humans. They note that across a wide distribution of societies supernatural sanctions are employed to deter defection from community public goods problems. In numerous societies, participation in painful and frequently dangerous adolescent rites of passage emotionally associates religious beliefs with such sanctions (Alcorta & Sosis, n.d.). Johnson & Bering (n.d.) argue that humans are adapted not only to be receptive to supernatural agents, but also to attribute the cause of negative life events to these agents.

To summarize, we have focused on two factors that contribute to the ability of ideological commitments to motivate cooperation: the unfalsifiability of ideological tenets, and the extent and nature of rituals that support and internalize these tenets among adherents. The greatest cooperation can be achieved when frequent and emotionally evocative rituals are employed to bolster postulates that are highly unfalsifiable.

## CONCLUSION

Throughout history ideological commitment has served as a powerful catalyst for human behavior. Indeed, modern human history devoid of nationalism, communism, Nazism, feminism, Islam and Christianity, among many others, would be almost unrecognizable. Large-scale cooperation among unrelated individuals, which many consider a hallmark of humanity (Richerson & Boyd, 1999), generally follows from ideological motivations. Nevertheless, modern evolutionary scholars have largely ignored the relationship between ideological commitment and building cooperation. Behavioral ecologists, for example, have primarily focused on material payoffs, such as caloric gains, rather than less tangible determinants of cooperation that affect material gains only indirectly (see Bird & Smith, n.d.). Perhaps their, as well as other selectionists', neglect of ideology results from a perception that it is irrelevant in prehistoric contexts, despite its obvious relevance for discerning historical behavioral trends. Yet, the influence of ideology and our willingness to submit to its directives are surely an integral part of our evolutionary past (Richerson & Boyd, 2001). The first ideological commitments may have been religious in character (Rappaport, 1999). As ritual has long served to increase trust and solidarity among humans and other species, especially primates (e.g. greeting rituals, see Watanabe & Smuts, 1999), it should not be surprising that ideologies buttressed by ritual performance provided a foundation for large-scale human cooperation. Indeed, the inherent link between unverifiable beliefs and ritual actions enables religious ideologies to enhance intra-group cooperation and cohesiveness more effectively than their secular counterparts can.

Evolutionary researchers must begin to consider the role that religious ritual and belief have played in the evolution of human cooperation. Various researchers have posited that religion serves an adaptive function through its ability to promote intra-group cooperation (see Bulbulia, n.d. b; Sosis & Alcorta, 2003, n.d.). Recently there have been significant advances in understanding the durability of religious beliefs and their success in lateral as well as cross-generational transmission (Atran, 2002; Boyer, 2001; Sosis, 2003). Several features of religious beliefs, such as their intrinsic connection with rituals performed prior to theological training and their minimally counter-intuitive nature, appear invaluable for successful cultural transmission. There has been less empirical work, however, devoted to discerning the unique characteristics of religious ideologies, such as supernatural punishment, that enable them to promote cooperation among adherents. Cooperation can be directed toward mutually beneficial outcomes, as observed here, or destructive collective action, as attested to by countless historical incidents of religious and secular zealotry. If we ignore the influence of ideological commitments on

cooperation, we will have little understanding of the proximate motivations and selective pressures underlying these behaviors.

## NOTES

1. One hundred shekels equaled approximately \$25 at the time these experiments were conducted and constituted 13–17% of the monthly stipends received by kibbutz members in our sample kibbutzim.

2. We tested three different variations of this experimental game on student subjects and members of three kibbutzim not in our sample. The most familiar design we tested was a parameterization of the public goods game in which there are 100 shekels to be divided and each pair member may claim up to 50 shekels, that is, any amount between 0 and 50. The amounts that each player leaves in the envelope are summed together, multiplied by 1.5 and divided equally between the two players. Feedback from subjects indicated that they found this design difficult to understand. The main source of confusion for subjects in standard public goods games is the existence of two accounts (as opposed to only one common pool from which money is drawn in our design).

3. During structured interviews, many kibbutz members complained about the over-consumption of common-pool resources. Moreover, for those members who wished to see the kibbutz become more privatized, the misuse of common-pool resources was cited as the number one reason. Although production on the kibbutz takes the classic form of a public goods problem, our interviews suggest that it is less of a concern than over-consumption.

4. A translation of the instruction sheet is available from the authors upon request.

5. In the original Hebrew, the word *yishuv* was used, which can be translated as city, town or populated area in Israel.

6. In other papers (Ruffle & Sosis, n.d. a, b; Sosis & Ruffle, 2003) we have reported left- or double-censored Tobit regressions, rather than OLS regressions, to handle the cluster of observations at zero and one hundred (see Sosis & Ruffle, 2003 for an explanation). Here we chose to report OLS regression results for the ease with which coefficients can be interpreted. All of our results and qualitative findings are robust to Tobit specifications.

7. These data were obtained from an annual survey on privatization conducted by Shlomo Getz.

8. We also found no significant effects by experimenter, including whether the experimenter dressed religiously, and no evidence that the numerical examples used during the explanatory phase of the experiment had any impact on participants' decisions.

9. To obtain this, differentiate the estimated regression equation with respect to "predict," set the derivative equal to zero, and solve for "predict."

10. Rappaport (1999, pp. 119–123) distinguishes between acceptance and belief. He maintains that regardless of whether one believes in the moral values encoded in ritual performance, by participating in a ritual performance an individual signals his or her acceptance of the community's moral code, and can be held accountable if these rules are compromised.

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