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# Religious fragmentation, social identity and cooperation: Evidence from an artefactual field experiment in India*

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**Abstract**

We study the role of village-level religious fragmentation on intra- and inter-group cooperation in India. We report on data on two-player Prisoners Dilemma and Stag Hunt experiments played by 516 Hindu and Muslim participants in rural India. Our treatments are the identity of the two players and the degree of village-level religious heterogeneity. In religiously-heterogeneous villages, cooperation rates in the Prisoners Dilemma are higher when subjects play with another in-group member for both Hindus and Muslims, but to a much lesser extent in the Stag Hunt game. This suggests that positive in-group biases operate primarily on the willingness to achieve socially efficient outcomes, rather than through beliefs about the actions by one's counterpart. Interestingly, cooperation rates among people of the same religion are significantly lower in homogeneous villages than in fragmented villages in both games. This is likely because a sense of group identity is only meaningful in the presence of an out-group.

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# 1 Introduction

Economists have established over the last two decades a negative relationship between social fragmentation (typically defined as a function of the relative size of different social groups in the population) and economic performance, in particular public good provision (Easterly and Levine, 1999; Alesina et al., 1999, 2003; Alesina and La Ferrara, 2005; Banerjee et al., 2005). There are many possible reasons for this negative relationship: different social groups may prefer different types of public good (Poterba, 1998); restricting economic transactions to within a group may also be useful as it reduces informational asymmetries, and increases the scope for the punishment of transgressors (Greif, 1993; Miguel and Gugerty, 2005). Finally, individuals may prefer to share a public good with those of their own group and/or dislike sharing a public good with people from other social groups (Alesina and La Ferrara, 2005).

We study the effect of village-level religious fragmentation on intra- and inter-group cooperation. We are particularly interested in understanding the role religious identity plays in explaining behavior in our experiments. India is an ideal setting to study our research question, having a longstanding social structure characterized by fragmentation along religious lines, as well as a rigid caste system. Issues such as social exclusion and public good provision (or lack thereof) along religious lines are widely documented (de Hann, 1997; Sen 2000; Bardhan et al., 2010; Das et al., 2011).[1] We build upon existing household survey work on religious-based social exclusion in villages in West Bengal, India, and we focus our attention to the problem of religious discrimination among Muslim and Hindu communities in West Bengal.

When reviewing the literature on the effects of ethnic diversity on economic outcomes, Alesina and La Ferrara (2005) identify social identity theory as a means to provide micro-foundations to theoretical explanations for why fragmentation affects economic performance. Social identity theory argues individuals attach utility to group membership and to the well-being of fellow group members to the detriment of outsiders — see Akerlof and Kranton (2000) and Basu (2007) for theoretical analyses of how social identity can affect economic decisions. The missing piece to this body of literature is the identification of the underlying

[1] This problem even extends to the breakdown of trade across different social groups (Anderson, 2011).

causal mechanism underpinning this phenomenon. This paper presents data from an artefactual field experiment examining two channels through which social identity may operate and influence the relationship between social fragmentation and public good provision.

The first channel is preferences: social identity theory argues that membership of a social group means individuals display a higher concern for the welfare of fellow 'in-group' members than outsiders (Tajfel et al., 1971). Experimental evidence from the lab and field supports this inter-group discrimination hypothesis in dictator games (Bernhard et al., 2006; Chen and Li, 2009), distribution games (Klor and Shayo, 2010), and prisoners' dilemma games (Goette et al., 2006; Charness et al., 2007), using both artificial and real social groups. Therefore, individuals should be more likely to cooperate with in-group members, even if doing so incurs them an economic cost, and particularly so if total welfare within the group increases as a result. Conversely, individuals may be less likely to cooperate with outsiders. The net effect is therefore a decline in cooperation as the number of outsiders increases. To study the role of preferences, we resort to a classic social dilemma, the prisoners' dilemma. In this two-player game, cooperation is a strictly dominated strategy for individuals who care only about their own monetary payoff; but one player can unilaterally increase total welfare (at a personal cost) by cooperating.[2]

The second channel concerns beliefs: individuals may only be willing to cooperate on a common enterprise if they believe others are likely to do so as well. While transaction costs due incomplete contracts are a feature of many economies, they are a crucial issue in many developing countries, as in those economies either property rights are not institutionally assured, or access to legal recourse in case of a dispute may be limited and/or costly (see Posner, 1998 and references therein). In this context, the belief by an economic agent about her counterpart's willingness to abide by an informal agreement is essential for economic activity to take place. In this context, a sense of group identity could help cooperation to the extent that individuals believe fellow in-group members are more likely to cooperate than outsiders (Brewer, 1986; Yamagishi and Kiyonari, 2000). Social psychological evidence suggests these expectations are stronger within group boundaries than across group divides

[2]Conditional cooperation is also possible in the prisoners' dilemma, but players must exhibit other-regarding preferences for this to be the case in one-shot or finitely-repeated games.

(Tanis and Postmes, 2005; Yamagishi, Jin and Kiyonari, 1999). Experimental economics evidence from the lab also suggests this may be the case: Chen and Chen (2011) find that inducing a common group identity increases efficiency in the minimum-effort game using artificial identities. To study the role of beliefs, we implement the stag hunt game, in which two players must decide whether or not to cooperate. While defecting ensures a positive payoff, cooperating only pays off if the other player cooperates as well; otherwise the payoff from cooperation is zero. This means both players cooperating can also be an equilibrium of the game, provided players assign high enough probability to their counterpart doing so. Importantly, a player's own other-regarding preferences play no role in determining behavior in this game.

We study the effect of religious identity among Hindu and Muslim groups by varying the way our subjects are matched with each other. We implement in-group/in-group treatments where Muslim subjects play with fellow Muslim subjects and Hindu subjects play with fellow Hindu subjects; we also implement in-group/out-group treatments where Hindu subjects play with Muslim subjects. Finally, we have a control treatment where the identity of a subject's match is uncertain. To study the effect of fragmentation, we resort to a quasi-experimental approach. We take religious composition of villages as fixed, based on the village-level survey on religious fragmentation by Das et al. (2011). We select villages in two districts in West Bengal which conform to one of three categories: Muslim-dominated, where over 90% of the population is Muslim; Hindu-dominated, where over 90% of the population is Hindu; and fragmented, where the Muslim and Hindu communities are roughly equal.[3] Our experimental design combines identity treatments with village types to understand how social identity interacts with fragmentation.

We find clear evidence of in-group favoritism in fragmented villages in the prisoners' dilemma, in that cooperation rates are higher in in-group matches than in both unknown and out-group matches. However, we detect no such difference in the stag hunt game. This suggests that in-group biases manifest themselves more strongly via other-regarding

[3]Although the Indian census collects village-level data on religious composition, that information is classified and not available to researchers. We use data from Das et al.'s 2011 household survey in West Bengal on religious discrimination to select villages.

preferences than through beliefs. We find no evidence of out-group prejudice (defined as lower cooperation with an out-group member than with an unknown individual) in both the prisoners' dilemma and stag hunt games.

In both games, cooperation rates among individuals of the same religion are lower in homogeneous villages than fragmented villages, even when controlling for village characteristics such as size, unemployment and literacy rates, which could be be proxies for other types of social norms that can predict cooperation. Furthermore, we find cooperation rates amongst individuals of the same religion in homogeneous villages are no different to cooperation rates between two individuals of different religions in fragmented villages. We attribute this to the fact that diversity makes subjects' religious identity salient, therefore triggering positive in- group favoritism. In other words, diversity increases the rate of cooperation *within* groups, while not triggering lower cooperation rates *across* groups.

The rest of the paper is organized as follows. Section 2 gives a brief background to Hindu-Muslim relations which motivate our study. Section 3 describes the experimental design and procedures, Section 4 outlines the results and Section 5 discusses the results and concludes the paper.

# 2 Background to Hindu-Muslim Relations in India

Studying social identity is complex, especially given the difficulty in isolating the different identities which play a role in social and economic contexts. A key social institution which forges an individual's identity in India is religion. Recent Indian history has witnessed several episodes which have stoked traditionally tense relations between Hindus and Muslims. The partition on Bengal along Hindu-Muslim lines in 1905 and the second partition of Bengal into West Bengal and East Pakistan (now Bangladesh) in 1947, when the modern Indian state was formed are particularly relevant to our study. In both cases, the mass displacements of people led to numerous episodes of inter-religious violence (Akbar, 2003; Brass, 2003). Turner and Brown (1978) suggest that the insecure relationship between Hindus and Muslims may be because post-partition India is demographically Hindu-dominant and the fact that politically there has been a reversal of roles, as Muslims provided most of the ruling elite a

| | C | D |
|---|---|---|
| C | 60, 60 | 30, 70 |
| D | 70, 30 | 40, 40 |

PD Game

| | C | D |
|---|---|---|
| C | 80, 80 | 0, 40 |
| D | 40, 0 | 40, 40 |

SH Game

Table 1: Payoff matrices for the PD and SH games.

couple of centuries earlier. The underlying division between the two religious groups have often manifested itself in conflict and violence in regular intervals between 1950 and 2000 (Mitra and Ray, 2013). Such regular conflicts suggest that the religious differences are socially entrenched in India. Recently, religious riots have been recorded in 2002 in the state of Gujarat, as well as in 2010 in West Bengal, the state in which we conduct our study.[4]

According to the Census of India 2001, 81% of the total Indian population is Hindu and 13% is Muslim. In West Bengal, the state in which we conduct our study, five districts have significant Muslim population, two of which are Murshidabad and Burdawan, where we carry out our experiments. In West Bengal, 65% of the rural population is Hindu and 33% is Muslim; in urban areas, the proportions are 85% and 13%, respectively. The economic and social indicators are marginally worse for Muslims in India. In rural areas, there is a marginal difference in poverty ratios between Muslims and Hindus, but this difference is larger in urban areas (John and Mutaktar, 2005).[5]

# 3 Experimental Design, Procedures and Hypotheses

## 3.1 The Games

We report data from two games, each of which captures an important feature of social behavior: the Prisoners' Dilemma (PD) game and the Stag Hunt (SH) game. We now

[4]See New York Times, 2014 and Times of India, 2010, respectively.

[5]The marginal per capita expenditure index for Muslims (Hindu = 100) for across India is 96.3 and West Bengal is 87% (Rural) and 91% (Urban). According to the head count data on poverty (Census of India, 2001) in rural West Bengal 37% of Muslims and 29% of Hindus are counted as poor (West Bengal 32% are poor, while the India head count is 27%). The Hindu-Muslim literacy gap in rural West Bengal is 11% (Hindus 67% and Muslims 55.6%) and in urban West Bengal it is 18% (Hindus 84%, and Muslims 66%).

briefly describe each game as it was implemented in our experiments, and our approach in analyzing and interpreting behavior in each of the games.

The PD game is the quintessential social dilemma, in which private incentives run against the welfare of the group. It is one of the most widely studied games by scholars investigating the determinants of cooperation. While it is a dominant strategy to defect, both players achieve the joint payoff-maximizing outcome if they cooperate. The left payoff matrix in Table 1 reproduces the formulation of the PD game used in our experiment, where payoffs are denoted in Indian rupees (INR). There are two available strategies, C and D, which we will denote henceforth as 'cooperate' and 'defect'.[6]

The experimental economics literature on the PD game reports a non-trivial share of observations recording the (dominated) strategy of cooperation in one-shot or finitely repeated interactions (Dawes, 1980; Roth, 1988; Sally, 1995). Cooperation in one-shot or finitely-repeated PD games has been attributed to other-regarding preferences, such as efficiency preferences (Reuben and Riedl, 2013; Capraro et al. 2014), or impure altruism (Andreoni, 1990).[7] In our analysis of behavior in the PD game, rather than focusing on the proportion of Nash equilibrium strategy play, we focus on the proportion of individuals who chose to cooperate, taking it as a proxy for social preferences, and how that proportion changes as a function of village fragmentation, in-group/out-group matching and measures of social identity.

The SH game looks at a different aspect of cooperation: the role of beliefs.[8] Unlike

[6]This was not the nomenclature used in the experiment; we employ it in the paper for ease of exposition. See the Appendix for copies of the instructions and materials.

[7]Reuben and Riedl (2013) and Andreoni (1990) discuss the role of efficiency preferences and impure altruism in the linear public good game, which is an N-player, continuous version of the prisoners' dilemma if $b/N < c < b$, where $b$ is the marginal per capita return to the public good and $c$ is the cost of contribution. Kreps et al. (1992) show that cooperation can be attained by rational, self-interested players if there is incomplete information about player types. However, we can rule out such motivations in our case, since our experiment only entails one-shot interactions.

[8]The stag hunt game can also be interpreted as the long run payoffs of two players playing particular infinitely-repeated prisoners' dilemma games using grim trigger strategies (Skyrms, 2001). In the experimental implementation, because game payoffs are denoted in cash rather than utility, risk attitudes may matter, but it is unlikely that risk attitudes will systematically vary with village composition and/or social identity.

the PD game, cooperation among two self-interested players is a possible Nash equilibrium of the game. The payoff matrix on the right-hand side of Table 1 reproduces the SH game used in our experiment, where payoffs are in INR. If a player believes the probability his/her counterpart will cooperate is higher than 1/2, then it is a best-reply to cooperate; if in contrast the player believes the probability of the counterpart cooperating is lower than 1/2, then it is a best-reply to defect. These beliefs form the basis of two pure-strategy Nash equilibria: (C,C) and (D,D). A third mixed-strategy Nash equilibrium exists when both players believe the probability of cooperation is exactly 1/2.[9] The key aspect of this game is that the only determinant of players' optimal choice is their belief about their counterpart's action. Unlike the PD game, off-equilibrium behavior is not efficiency-increasing: cooperating when the other player does not cannot benefit one's counterpart. Furthermore, both equilibria are the only outcomes which minimize income inequality. When analyzing behavior in the SH game, we focus on the fraction of individuals who choose to cooperate, taking it as a proxy for beliefs about the likelihood the other player will also cooperate, and how those beliefs change as a function of village fragmentation and in-group/out-group matching.

## 3.2 Experimental Design

To study the effect of religious fragmentation on behavior in our two games, and our participants from three different types of villages, based on their religious composition: "Homogeneous - Muslim" and "Homogenous - Hindu" villages, where 90% or more of the village's population was of one religion, and "Fragmented" villages, where no more than 60% of the village's population was of one religion. Village-level data on religious composition is not publicly available data — the Indian Census data only provides religious composition data at the district level. To circumvent this problem, we selected our villages based on data from Das et al. (2011), who conducted a large-scale household survey on the effects of religious fragmentation in West Bengal villages.[10]

[9]Note that while our game retains the payoff structure which defines a stag hunt (i.e. $\pi_i(C,C) > \pi_i(D,C) \geq \pi_i(D,D) > \pi_i(C,D)$), in our case (C,C) is both the risk-dominant and payoff-dominant equilibrium.

[10]The village selection was further restricted by whether or not a given village would have an appropriate building for the running of sessions — we opted for villages that had a primary school. The villages that

In order for this quasi-experimental design to be valid, we require village composition to be exogenous. If people self-select into different villages on the basis of their religious breakdown, we would not be able to identify the causal mechanism between fragmentation and behavior. We are confident that our assumption about the exogeneity of villages' religious composition holds. In India, rural-rural migration is predominantly due to marriage, whereby women move to their husband's village; other motives include family reasons, employment and education (Bhattacharya, 2000). All of these motives are uncorrelated with a village's religious composition. About 70% of our participants reported having been born in the village and/or their father and grandfather being born in the village. Another potential concern with using a quasi-experimental design is that the participant sample systematically differs on the basis of the type of village (i.e. homogeneous vs. fragmented) we sampled. We are confident that this is not the case on the basis of data on observable characteristics we collected from participants, including gender, age, caste, profession, marital status, place of birth, land ownership and literacy — see Table 4 in the appendix for details.

In the fragmented villages, we conducted four different types of treatments, each of which refers to a matching protocol. The M-M treatment consisted of sessions in which all participants were Muslim. Likewise, the H-H treatment was such that the only participants were Hindu. The H-M treatment consisted of sessions in which half of the participants were Hindu and the other half were Muslim, and participants knew they were playing someone from another religion. Finally, the MIX treatment consisted of sessions with both Hindu and Muslim participants, but where the religious identity of their match was uncertain. We elaborate on how we accomplished this when we describe the experimental procedures below. Table 2 describes the experimental design.

## 3.3 Hypotheses

We are primarily interested in studying how fragmentation along religious lines affects cooperation.Even though each game measures a different motive for cooperation (i.e. preferences

fit our demographic criteria, had a primary school, and whose local authority would allow us to use it were the following: Alampur, Bhurkunda, Char Mathurapur, Chupi, Domohani, Ganfulia, Gokarno, Hasanpur, Jhikra, Kanakpara, Kirtipur, Pilsowa, Roshanpur, Shuhari, Sridharpur and Tungi.

| | | Treatment | | | |
|---|---|---|---|---|---|
| | | M-M | H-H | H-M | MIX |
| Village Type | Homogenous - Muslim | 94 | - | - | - |
| | Fragmented | 40 | 70 | 130 | 58 |
| | Homogenous - Hindu | - | 124 | - | - |

Note: numbers in cells indicate sample size.

Table 2: Experimental design

and beliefs), we will pool our hypotheses for both games into one hypothesis for ease of exposition. First, we fix village-level religious fragmentation, and we examine in-group/out-group differences in behavior. Second, we restrict interactions to be only among in-group members and we study the effect of village-level fragmentation by comparing fragmented villages to homogenous ones. We will now state our alternative hypotheses, given that our general null hypothesis is that behavior will not differ either by treatment or by village type.

Our first hypothesis follows from a well-established literature in social psychology and experimental behavioral economics, which establishes that individuals display favoritism towards members of their social group relative to an out-group (Tajfel et al., 1971). We compare treatments where the likelihood of cooperating with an in-group is 100% (H-H/M-M) to the case where that likelihood is 50% (MIX) or 0% (H-M).

**Hypothesis 1a:** *In fragmented villages, there will be higher frequencies of cooperation in H-H/M-M than in MIX.*

**Hypothesis 1b:** *In fragmented villages, there will be higher frequencies of cooperation in H-H/M-M than in H-M.*

The existence of in-group biases does not necessarily mean that there will be negative out-group biases, either theoretically (Allport, 1954; Brewer, 1999), or empirically (Morita and Servátka, 2013). In our experiment, the relevant treatments to establish this comparison are the H-M treatment, where the likelihood of playing with an out-group member is 100% and the MIX treatments where that likelihood is 50%. On that basis, we state our next hypothesis.

**Hypothesis 2:** *In fragmented villages, there will be higher frequencies of cooperation in MIX than in H-M.*

We now turn to the test of whether or not social identity can account for the effect of fragmentation. Brewer (1991) theorizes that in-group identification is a function of two competing needs. On the one hand, individuals have a need for inclusion: an isolated individual would seek to identify herself with a collective. On the other hand, people require a degree of distinctiveness: members of very large groups may search for alternative identities through which they can affirm their uniqueness. It follows that subjects' sense of religious identity should be less salient in villages where one religion dominates: individuals ought to identify with groups which provide them with a better sense of uniqueness. In contrast, in-group identification should be strongest in fragmented villages, since not only there is an out-group to provide a comparison, but also because both religious groups are equally numerous within the village. Therefore, we should find more evidence of in-group biases in fragmented villages than in homogeneous villages, and this in turn should lead to higher cooperation levels in the former than the latter.[11] This is our third and final hypothesis.

**Hypothesis 3:** *There will be higher frequencies of cooperation in fragmented villages than in homogeneous villages in both H-H and M-M treatments.*

## 3.4 Participant Recruitment and Experimental Procedures

We employed a mixed-gender, mixed-religion team of local research assistants to recruit participants and conduct the sessions, so as to minimize any possible experimenter demand effect. A week ahead of a planned session, our research assistants travelled to the village where that session would take place. A set of neighborhoods were randomly selected, and within each neighborhood, recruitment was done on a door-by-door basis. On a given street, every two consecutive houses were skipped and the third house would be approached and those who agreed to participate would be signed up. Participants were reminded about the session the day before it took place. Participants did not know the purpose of the experiment:

[11] Naturally, cooperation rates could be driven by factors other than social identity salience. We will control for village-specific effects in our econometric analysis to separate the effect of identity on cooperation.

when approached, they were informed that the research team would be conducting decision-making sessions. We conducted one session per village.[12]

We made religious identity salient by making the names of participants common knowledge, and by allowing participants to visually identify their potential counterparts in the games participants played.[13] Upon arrival, participants were asked to remain outside the main school building and wait for their name to be called out. Upon hearing their name, each participant was taken to the main classroom, and told to sit at one of the ends of the classroom, facing the middle. It is reasonably easy to identify someone as a function of their name, since Muslim names are quite different from Hindu names. Calling in participants individually made their religious identities salient (and established the existence of an out-group) in an inconspicuous way.[14]

Participants were told they would be making a series of decisions with someone on the other side of the room, and they were told that they would always make each decision with a different person. This allowed participants to identify the religious identity of their potential counterparts, either through their choice of attire, or by recognizing participants across the room.[15] However, since there were typically 15 to 20 participants on either side of the room, it was impossible for participants to know who their counterpart was in each game, therefore preserving the anonymity of decisions – this was important since 83% of participants stated in the post-experimental questionnaire that they recognized most of the

[12]After the first session in the first village, it was clear that participants discussed the experiments among their social network. Due to a combination of the novelty factor and the generous incentive payments, the sessions themselves raised interest among villagers in the hours after the sessions ended, therefore contaminating the pool of potential participants in that village.

[13]This is a combination of two existing methods of making identity salient: Habyarimana et al. (2007) induce ethnic identity in experiments conducted in Uganda using photographs of participants, while Fershtman and Gneezy (2001) induce ethnic identity in experiments conducted in Israel using participants' names.

[14]Eliciting religious identity through names could have also elicited participants' caste identity as well. We control for this possibility in the econometric analysis of the data, and our results are robust.

[15]The experiments were unusual events in the villages, and many participants came to the sessions in formal attire. In rural Bengal, Hindu men wear "dhoti," a long white cloth draped around the waist, and Muslim men wear "lungi," a piece of checkered cloth also worn around the waist. Hindu women wear "saris," as well as "bindi" on their forehead, while Muslim women wear "salwar" and "kamiz" and no "bindi."

participants in the room.

In the H-H and M-M sessions, all subjects in the room shared the same religion, so the seating arrangement was irrelevant. In the H-M sessions, Hindu subjects were all seated in one end of the room, while Muslim subjects sat in the other end; finally, in the MIX sessions, Hindu and Muslim subjects sat on both ends of the room.

Sessions were split in three parts. In the first part, participants played three games: the Prisoners' Dilemma, the Stag-Hunt game and the Tullock contest (in that specific order). In the second part of the session, participants played a series of individual decision-making tasks.[16] In the third part, participants individually responded to a survey in a separate room, got feedback on the decisions made in the experiment, and received their corresponding payment. An experimenter standing in the middle of the room read the instructions aloud, using visual aids to explain the incentive structure of each game (see Appendix for the experimental materials). We did not employ written instructions since about a third of our subjects was unable to read or write. As such, we denoted payoffs in INR and used images of Indian notes and coins to represent payoffs.

A potential pitfall of running experiments in which subjects do multiple tasks is that there may be contamination of behavior across games, such as order effects, wealth effects, behavioral spillovers or hedging. Order effects are certainly possible in our experiment; while they would affect cooperation levels, the hypotheses of interest are on differences in behavior across villages and/or treatments, all of which were exposed to the same order of play. We minimized the scope for wealth, spillover and hedging effects in our experiment by (a) not informing subjects of the games they were about to play ahead of time; (b) not providing feedback between games; (c) implementing a turnpike matching scheme, whereby subject $i$ was never matched with the same person twice, and any of $i$'s matches would never play each other. Subjects were reminded of these features at the start of each game. To check that subjects may have hedged their decisions in the two games, we computed the Spearman correlation coefficient of behavior in the PD and SH games using the full sample, which equalled 0.06 ($p = 0.161$); the Fisher's exact test also did not reject the null hypothesis of

[16]The data from the Tullock contest, as well as the individual tasks is the focus of companion papers.

independence of behavior in the two games ($p = 0.186$).[17]

The first part of the session took approximately 60 minutes and sessions as a whole lasted on average 3 hours. Average payment for the PD game was INR 53.26 ($0.86), average payment for the SH game was INR 43.17 ($0.70) and average payment for the whole session was INR 598.70 ($9.65).[18]

# 4 Results

We start by examining behavior in the PD game, which will measure the extent to which religious identity affects individuals' preferences for efficiency. We then analyze the data from the SH game, which measures the extent to which identity affects beliefs about counterparts' cooperation intentions. We complete the analysis by combining our behavioral data with post-experimental survey data which includes measures of attitudes towards out-group members and socio-economic characteristics at both individual and village level. In our analysis, we use each individual's decision as an independent variable and we report two-sided tests throughout.

## 4.1 The PD Game

Figure 1 displays the fraction of cooperation decisions in the PD game in fragmented villages as a function of the identity of the decision-maker's counterpart. In order to make the appropriate comparisons, we divide the H-M treatment data into H-M - Muslim, corresponding to the Muslim participants' decisions, and H-M - Hindu, referring to the Hindu participants' decisions (likewise for MIX).

We start by examining the existence of in-group biases. As predicted, the average cooperation rates are higher when subjects play an in-group member than when they play an

[17] We found similar results when analyzing the Muslim and Hindu sub-samples. In the Muslim (Hindu) sample, the Spearman correlation coefficient on cooperation in the PD and SH games equalled 0.063, $p = 0.337$(0.059, $p = 0.316$); the Fisher's exact test on the null of independence yielded a p-value of 0.391 (0.379).

[18] The average daily wage for a rural worker in West Bengal in 2011 ranged from INR 105 ($1.74) for an unskilled female worker to INR 297.50 ($4.93) for a male well digger; in most agricultural occupations average daily wages were approximately INR 130 ($2.15), Government of India (2012).

out-group member. Cooperation rates by Muslim subjects are 34 percentage points higher when playing an in-group member (M-M, 0.95) than when playing an out-group member (H-M, 0.64), $p = 0.001$, Fisher's exact test (henceforth FET); cooperation rates by Hindu subjects are higher in H-H (0.80) than H-M (0.66) by 14 percentage points ($p = 0.023$, FET). Average cooperation in the in-group/in-group matches (H-H or M-M) is also higher than that

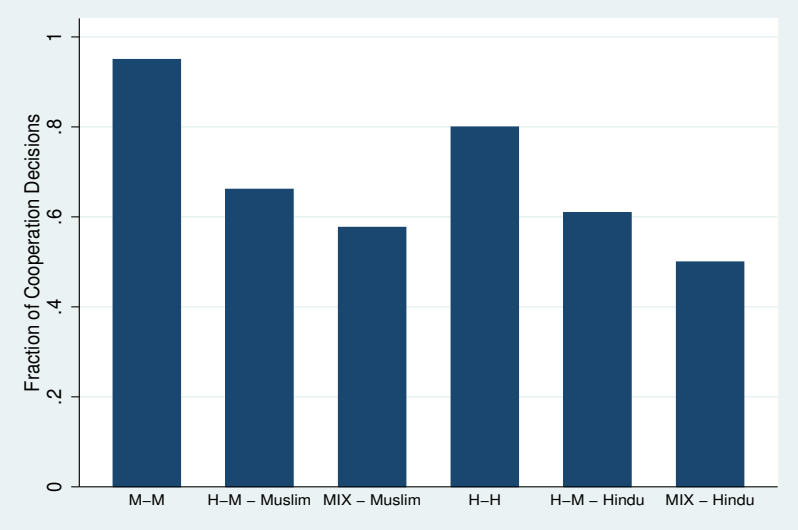


Figure 1: Fraction of cooperation decisions in the PD game – fragmented villages.

in the case where the identity of the counterpart is uncertain (MIX). The cooperation rate among Muslim participants is 37 percentage points lower in MIX than in M-M ($p < 0.001$, FET), while among Hindu participants the cooperation rate is 30 percentage points lower in MIX than in H-H ($p = 0.004$, FET).

**Observation 1:** *Cooperation rates in the PD game are higher when Hindu or Muslim participants play with an in-group member than when they play with an out-group member or with an unknown group member.*

We now compare cooperation rates between the H-M and MIX treatment. While the rates of cooperation are nominally higher in H-M than MIX for both religious groups, in neither case are these differences statistically significant (Muslim: $p = 0.477$; Hindu: $p = 0.383$, FET). Finally, we compare behavior across the two religious identities: while we observe higher cooperation rates among Muslims than Hindus when they are playing an

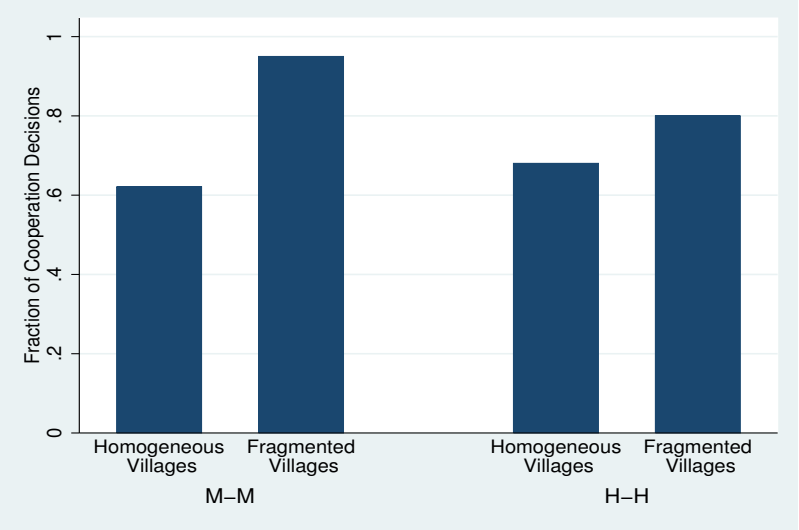


Figure 2: Fraction of cooperation decisions in the PD game – homogeneous vs. fragmented villages.

in-group subject ($p = 0.047$, Fisher's exact test), we observe no differences in cooperation rates between the two religious group in either the H-M ($p = 0.586$, FET) or MIX ($p = 0.605$, FET) treatments.

**Observation 2:** *Cooperation rates in the PD game are the same when Hindu or Muslim participants play either with an out-group member or with a player whose identity is uncertain.*

We now turn to the effect of village-level fragmentation on behavior within in-group members. Recall that we hypothesized that group identities should be more salient in fragmented villages, which in turn should mean higher cooperation rates in fragmented villages. Figure 2 displays the fraction of cooperation decisions in the PD game among in-group/in-group matches, comparing fragmented villages to homogeneous villages.[19] Among Muslim subjects, there is a significantly higher rate of cooperation in fragmented villages (0.95) than in homogeneous villages (0.62, $p < 0.001$, FET). Among Hindu subjects, there is a smaller difference in cooperation rates between fragmented (0.80) and homogeneous (0.66) villages, which is only marginally significant ($p = 0.099$, FET).

[19]Recall that we could not collect data on H-M or MIX treatments in homogeneous villages, since there were very few or no members of the minority group in those villages.

**Observation 3:** *Cooperation rates in the PD game are higher in fragmented villages than homogeneous villages, both among Muslim and Hindu participants.*

We now briefly examine differences in cooperation levels across religious groups. We see no difference in cooperation rates among Muslims or Hindus from homogeneous villages when they play a fellow in-group member ($0.68 = 0.62, p = 0.390$, FET). In fragmented villages (see Figure 1) we also do not observe any differences in the fraction of cooperation across religious lines when subjects play an out-group member ($0.66 = 0.61, p = 0.586$, FET), or when they play an unknown group member ($0.58 = 0.50, p = 0.605$, FET). The only differences in behavior across the two religious types are restricted to in-group/in-group matches in fragmented villages ($0.95 = 0.80, p = 0.047$, FET). This suggest Muslims exhibit higher in-group favoritism than Hindus, which is noteworthy given they are the minority group in the state.

**Observation 4:** *Muslim subjects exhibit a higher degree of in-group favoritism in the PD game than Hindu subjects.*

We conclude our analysis of the PD game by asking: ultimately, what is the effect of fragmentation? On the one hand, fragmentation enhances in-group favoritism, albeit at the possible expense of cooperation with out-group. To determine which effect dominates, we compare behavior in H-M in fragmented villages to H-H/M-M data in homogeneous villages. In the case of Hindu subjects, recall that the fraction of cooperation choices was equal to 0.61 in H-M, and equal to 0.68 in H-H in homogeneous villages ($p = 0.336$, FET). In the case of Muslim subjects, the fraction of cooperation choices was equal to 0.66 in H-M, and equal to 0.62 in M-M in homogeneous villages ($p = 0.620$, FET). Having established earlier that in-group cooperation is higher in fragmented villages than in homogeneous villages, we conclude that in-group favoritism is the main driving force in shaping behavior.

**Observation 5:** *In the PD game, cooperation rates with in-group members in homogeneous villages are not different to cooperation rates with out-group members in fragmented villages.*

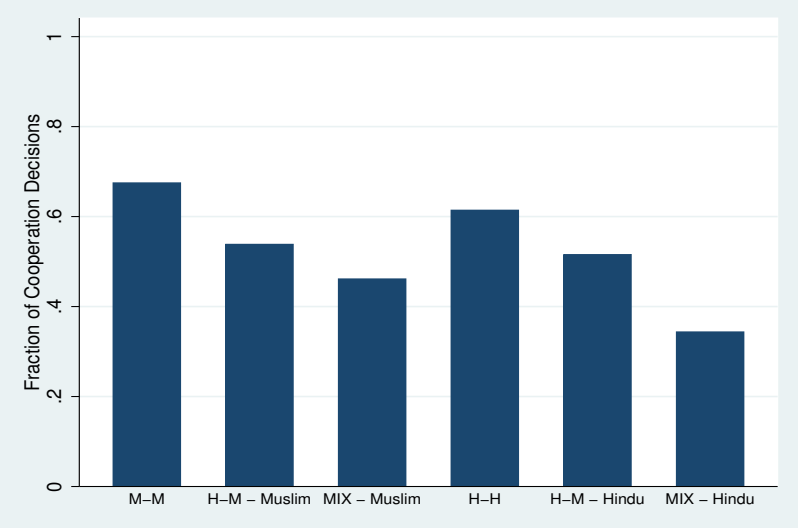


Figure 3: Fraction of cooperation decisions in the SH game – fragmented villages.

## 4.2 The SH Game

We now repeat the above analysis for the SH game. Figure 3 displays the fraction of cooperation decisions in the SH game in fragmented villages as a function of the identity of the counterpart, conditional on the religious identity of the decision-maker. The qualitative pattern is similar to that of the PD game in that, conditional on the religious identity of the decision-maker, cooperation decisions are nominally higher in in-group/in-group matches. However, we do not find a significant difference between H-M and either M-M ($p = 0.223$, FET) or H-H ($p = 0.296$, FET). We do observe a statistically higher cooperation rate between H-H and MIX ($p = 0.018$, FET), but not when we compare M-M to MIX ($p = 0.132$, FET). We also do not find any significant difference between H-M and MIX for either the Muslim sample ($p = 0.645$, FET) or the Hindu sample ($p = 0.132$, FET).

One could argue that the lack of significance is due to the small sample size, since we are breaking up the data along religious groups. To check for this, we pool Muslim and Hindu samples and compared the cooperation rates in the pooled H-H and M-M sessions to the pooled H-M sessions. We did not find a significant difference ($p = 0.115$, FET). However, when comparing pooled H-H and M-M sessions to pooled MIX sessions, we do find a significant difference ($p = 0.003$, FET).

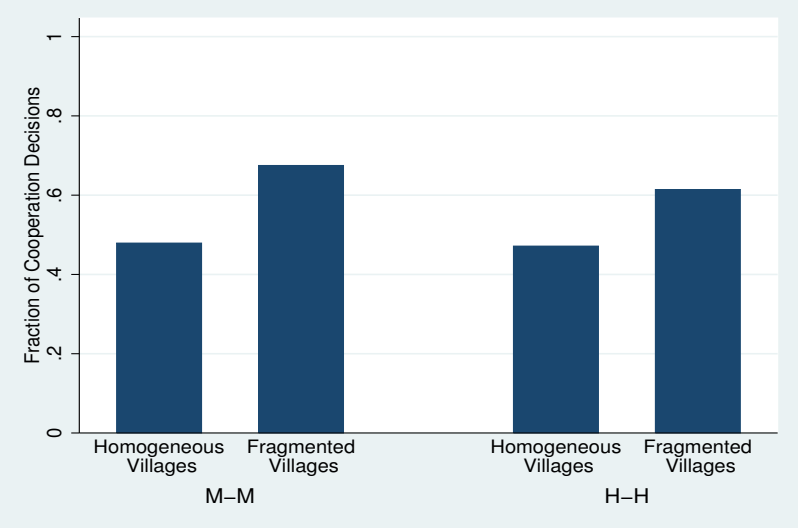


Figure 4: Fraction of cooperation decisions in the SH game – homogeneous vs. fragmented villages.

**Observation 6:** *Cooperation rates in the SH game are higher among Hindus when they play with an in-group member than when they play with a player whose identity is uncertain. We find no significant differences in behavior in the SH game among Muslims.*

We now turn to the effect of village fragmentation on behavior in the SH game, conditional on subjects playing with an in-group member. Figure 4 shows the fraction of cooperation decisions in M-M and H-H, conditional on village type. Like in the PD game, we observe significantly higher cooperation rates in fragmented villages than in homogeneous ones. In the Muslim sample, cooperation is 20 percentage points higher in fragmented villages ($p = 0.040$, FET), while in the Hindu sample that difference is equal to 14 percentage points ($p = 0.072$, FET). This leads to our next observation.

**Observation 7:** *Cooperation rates with in-group members in the SH game are higher in fragmented villages than in homogeneous villages, both among Muslim and Hindu participants.*

There are no significant differences in cooperation levels between Muslim and Hindu subjects in any condition.[20]

[20]Fragmented villages, H-M - Muslim = H-M - Hindu: $p = 0.861$; H-H = M-M: $p = 0.545$; MIX - Muslim

**Observation 8:** *Conditional on village type and treatment, there are no differences in cooperation rates in the SH game between Muslim and Hindu participants.*

We conclude this part of the analysis by asking the same question as in the PD game: are frequencies of cooperation in the SH game higher in homogeneous villages than in fragmented villages? The answer is, like the PD game, no: the frequency of cooperation by Muslim subjects when playing an in-group match in a homogeneous village is 0.48, while the frequency of cooperation by Muslim subjects when playing with a Hindu counterpart in a fragmented village is 0.53 ($p = 0.522$, FET). Likewise, the cooperation frequency by Hindu subjects when playing the SH game in homogeneous villages is 0.47, while their cooperation frequency when playing Muslim subjects in fragmented villages is 0.52 ($p = 0.644$, FET). In short, fragmented villages have higher cooperation rates when players belong to the same religious group, and no worse cooperation rates when players are from different groups. Diversity is again beneficial.

**Observation 9:** *In the SH game, cooperation rates within religious groups in homogeneous villages are no different to cooperation rates across religious groups in fragmented villages.*

## 4.3 Individual Heterogeneity and Strength of Affiliation

We now extend our analysis of behavior by introducing individual-level and village-level heterogeneity as potential drivers of behavior, using data from our post-experimental survey. In addition to socio-demographic information, we also collected several measures which proxy a sense of affiliation to different social groups. These included national-level identity, village-level identity, and religious identity. We also collected a number of measures of individual attitudes towards out-group members, where out-groups are defined along caste or religious lines. These included questions on attitudes towards inter-religious marriage, or how participants would feel if their neighbor would profess another religion or is of a different caste.[21] We also measured attitudes towards religious integration in school, and

= MIX - Hindu: $p = 0.425$. Homogeneous villages, H-H = M-M: $p = 1.000$, all comparisons, FET.

[21] Muslims and Hindus typically reside in different areas of a given village, as do Hindus of different castes.

perceptions of religious diversity in their village. For details on the questionnaire, please see the Appendix.

Interestingly, our measures of in-group affiliation were remarkably consistent across our sample: over 90% of participants identified themselves along national and religious lines, and less than 5% identified themselves with their village (despite almost 70% of our participants stating being born in their village). Ideally, we would have wanted to have two distinct measures of affiliation, one regarding the in-group, and the other regarding the out-group, since the existence of an in-group bias does not imply a negative out-group bias (Brewer, 1991). The lack of heterogeneity in in-group attitudes does not allow us to measure econometrically their effect on behavior, so we are left with measures of out-group bias. We did, however, get some variation on our measures of out-group attitudes, which allows us to analyze how they correlate with behavior when subjects are matched with an out-group player. We estimated the Logit model outlined in equation (1):

$$Pr(C_i^g = 1|X) = \exp(\beta X)/[1 + \exp(\beta X)] \tag{1}$$

where our dependent variable, $C_i^g$, is the decision by player $i$ to cooperate in game $g$. In the PD and SH game, this variable equals one if participant $i$ chose C and zero otherwise, while X is the vector of independent variables and $\beta$ is a vector of parameters to be estimated.

We consider two specifications of this model. The restricted version of our econometric model replicates the analysis done so far, and $X$ only includes treatment dummies *M-M*, *H-H* and *H-M* (*MIX* is the omitted category), plus the variable *Muslim*, which equals one if subject $i$ is Muslim, and its interaction with *H-M*.

In the unrestricted version of our econometric model, $X$ also encompasses a number of different variables from our post-experimental survey, which we now describe. Our first variable, $DisOG_i$ measures attitudes towards those of a different religion; it equals one if participant $i$ stated disliking members of another religion (either Hindu or Muslim) and 0 otherwise. We interact it with the *H-M* treatment dummy to measure the effect of out-group attitudes on behavior towards the out-group.

Subjects also reported if they belonged to one of the following categories: SC (Scheduled Classes, sometime denoted in contemporary literature as 'Dalits'), ST (Scheduled

Tribes) and OBC (Other Backward Classes). These social groups encompass historically disadvantaged people, who have recognition in the Indian Constitution and benefit from widespread affirmative action policies and assured political representation. These groups, particularly OBCs, exist across religious lines (Sachar Committee Report, 2006).[22] Based on this information, we constructed the variable $PropMyCaste_i$, which is the proportion of subjects on the other side of the room that share the same caste group as subject $i$. When constructing this variable, we restricted ourselves to the side of the room opposite the decision-maker, since this is the set of possible matches for a given subject. We interacted $PropMyCaste_i$ with a dummy, $Adv$, which equals one if a subject does not belong to SC, ST, or OBC. This part of the analysis serves as a robustness check on the existence of in-group biases along dimensions other than religion; here we exploit uncontrolled caste heterogeneity within sessions. Subjects in our experiment would have been able to identify the 'social class' of their counterparts in the room by their name (announced outside the room) and potentially by their physical appearance. We also control for the possibility that subjects may know each other and therefore may cooperate with each other, irrespective of the treatment, with a view to extract maximum earnings from the experimenter. We inquired in our post-experimental survey about how many people a subject knew in the room. Most subjects stated knowing most other participants. We generated the dummy variable $KnowAll_i$, which equals 1 if subject $i$ stated knowing all or almost all other subjects in the room.

We also include variables that capture village-level heterogeneity. These variables are intended to proxy other social norms that may also explain differences in cooperation levels across different types of villages. The variable $DistanceHC$ measures the distance to the village's nearest health center; it is a proxy of how isolated the village is. We conjecture that

[22]The India Census has collected data on OBCs among Muslim in response to the Mandal Commission Report in 1980 that recommended the inclusion of scheduled classes (SCs) and other backward classes (OBCs) from the Muslim communities in Government of Indias affirmative action programs. The 1901 Census of India classified the Muslims in India in three categories: the Ashrafs, Muslims who could trace their lineage to foreign countries and converts from higher Hindu castes; the Ajlafs, Muslims who were converts from lower castes but whose occupation was considered to be "clean"; and Arzal, who had converted from the lowest ranks of the caste hierarchy. Broadly, the Ajlafs get categorized as OBCs and the Arzal get categorized as SCs. OBC- and SC-Muslims are eligible for the affirmative actions of the State and Central Governments.

people who live in isolated communities rely more on informal social networks for risk sharing, and therefore, the effect of identity should be stronger in such communities. Using data from the 2011 India Census, we construct the variable *VillPop* which is the village's population. We control for village size in our econometric estimation, as religiously-homogeneous villages in India tend to be smaller than heterogeneous ones. This means village size could potentially be driving our result on the effect of fragmentation. Two effects could be at play. On the one hand, cooperation levels should be lower in larger villages; on the other hand, larger villages could conceivably develop norms of inter-religious tolerance and acceptance due to higher economic activity, thus potentially leading to more cooperation.[23] We also take 2011 India Census data on village illiteracy rates (*Vill Ilit*) and village unemployment rate (*VillUnemp*). These variables should capture the economic circumstances of villages, particularly wealth. It is plausible to presume that the financial stakes are higher in poorer villages; it is also possible that subjects in economically depressed villages are less likely to cooperate, since public good provision in those villages may be lower. Finally, $Male_i$ is a gender dummy and $Age_i$ is the reported age of subject $i$.

Regression (1) replicates our analysis of behavior in the PD game, and broadly confirms our findings. Cooperation rates are significantly higher in *M-M* and *H-H* than both our control condition, *MIX* (*M-M*: $z = 12.74, p < 0.001$; *H-H*: $z = 3.67, p < 0.001$) and *H-M* (*M-M*=*H-M*+*H-M*×*Muslim*: $\chi^2(1) = 51.30, p < 0.001$; *H-H*=*H-M*: $\chi^2(1) = 4.52, p = 0.034$). We find a significant difference between homogeneous villages and fragmented villages among the Muslim sample (*M-M*×*HomogVil*= 0, $z = -9.25, p < 0.001$), but not in the Hindu sample (*H-H*×*HomogVil*= 0, $z = -1.43, p = 0.152$).

Regression (2) extends our analysis to include village-level characteristics, individual attitudes, as well as responsiveness to characteristics such as caste and caste diversity within the session. The treatment effects remain broadly consistent with the restricted model. We find a small, positive and significant coefficient on *DistanceHC*: subjects villages which are isolated are more likely to cooperate. We find a negative and significant coefficient on *VillIlit* and *VillUnemp*: the higher a village's illiteracy rate or a village's unemployment rate, the

[23]See Isaac et al., 1994 and Weber, 2001 for evidence of group size on cooperation in public good games and minimum effort games, respectively.

| | (PD) | | | | (SH) | | | |
|---|---|---|---|---|---|---|---|---|
| DV: $C_i$ | (1) | | (2) | | (3) | | (4) | |
| *M-M* | 2.59*** | (0.20) | 3.37*** | (0.52) | 0.95 | (0.58) | -0.66 | (0.42) |
| *M-M*×*HomogVil* | -2.45*** | (0.26) | -3.35*** | (0.42) | -0.81** | (0.39) | 0.43 | (0.37) |
| *H-H* | 1.41*** | (0.38) | 0.85*** | (0.24) | 1.05** | (0.51) | 1.11*** | (0.26) |
| *H-H*×*HomogVil* | -0.62 | (0.44) | -1.14*** | (0.36) | -0.57** | (0.27) | -0.88*** | (0.27) |
| *H-M* | 0.48 | (0.34) | 0.52 | (0.42) | 0.66 | (0.58) | 1.19*** | (0.28) |
| *H-M*×*Muslim* | -0.17 | (0.58) | -0.83 | (0.58) | -0.29 | (0.25) | -0.86** | (0.36) |
| *Muslim* | 0.39 | (0.38) | 0.97*** | (0.35) | 0.38** | (0.15) | 0.43* | (0.24) |
| *DistanceHC* | - | | 0.05*** | (0.02) | - | | 0.04** | (0.02) |
| *VillPop* | - | | -2×10$^{-5}$ | (2×10$^{-5}$) | - | | -2×10$^{-6}$ | (2×10$^{-5}$) |
| *VillIlit* | - | | -8.33** | (3.54) | - | | 7.51*** | (2.12) |
| *VillUnemp* | - | | -5.55*** | (2.09) | - | | -3.05* | (1.75) |
| $DisOG_i$ | - | | 0.32* | (0.16) | - | | 0.31 | (0.24) |
| $DisOG_i$×*Muslim* | - | | -0.59 | (0.49) | - | | 0.33 | (0.41) |
| $DisOG_i$×*H-M* | - | | -0.21 | (0.63) | - | | -1.01*** | (0.38) |
| $DisOG_i$×*H-M*×*Muslim* | - | | 1.32 | (1.02) | - | | 0.58 | (0.60) |
| $PropMyCaste_i$ | - | | -0.25 | (1.00) | - | | 0.79** | (0.42) |
| $PropMyCaste_i$×*Adv* | - | | -1.03 | (0.98) | - | | -0.58 | (0.42) |
| $KnowAll_i$ | - | | 0.14 | (0.42) | - | | -0.12 | (0.28) |
| $Male_i$ | - | | 0.25 | (0.29) | - | | -0.35 | (0.23) |
| $Age_i$ | - | | 0.01 | (0.01) | - | | -0.01 | (0.01) |
| *Constant* | -0.04 | (0.18) | 6.27*** | (1.36) | -0.59 | (0.51) | -1.72 | (1.64) |
| $N$ | 514 | | 513 | | 516 | | 515 | |
| Pseudo-$R^2$ | 0.05 | | 0.10 | | 0.02 | | 0.07 | |

Village-level clustered standard errors in parentheses. ***, **, *: significance at 1%, 5% and 10% level.

Table 3: Logit estimates of the determinants of cooperation in the PD and SH games.

lower the likelihood cooperation. In contrast, the coefficient on *VillPop* is extremely small and not significant. Irrespective of village size, the socio-economic status of a village is strongly correlated with cooperation.

Our measure of out-group attitudes has limited predictive power: we find a small and marginally significant coefficient on $DisOG_i$, and no significant coefficients on any of its interactions. With regards to caste effects, we find a negative, but non-significant coefficient on both $PropMyCaste_i$ and its interaction with the dummy for advantaged caste members, *Adv*. In other words, caste homogeneity appears not to influence behavior in the PD game.

Regression (3) performs the same analysis as regression (1), this time on behavior in the SH game. Much like our earlier analysis, there is a much less pronounced difference in treatments conducted in fragmented villages: the only significant difference in behavior is that between *H-H* and *MIX*: the coefficient on the *H-H* dummy is positive and significant ($H\text{-}H = 0 : z = 2.05, p = 0.040$). Like our earlier analysis, we find a significant effect of village fragmentation on in-group/in-group matches ($M\text{-}M \times HomogVil = 0$: $z = -2.08, p = 0.038$; $H\text{-}H \times HomogVil = 0$: $z = -2.13, p = 0.033$).

Regression (4) extends the analysis of SH behavior in the same way as regression (2) did for behavior in the PD game. Again, the treatment effects remain consistent with regression (3). We replicate the effects in the PD game analysis in that there is a positive and significant coefficient on *DistHC*, a negative and significant coefficient on *VillUnemp*, as well as a very small and non-significant coefficient on *VillPop* – we can therefore rule out, insofar as our sample is concerned, that village size is driving our results. Surprisingly, we find a positive and significant coefficient on *VillUnemp*.

While the coefficient on *DisOG* is not significant, its interaction with *H-M* is negative and significant, though not its interaction with the Muslim dummy variable: subjects who express disliking their religious out- group are less likely to cooperate when matched with an out-group, irrespective of their actual religion. Finally, with regards to caste, we find a positive and significant coefficient on $PropMyCaste_i$, though not on $PropMyCaste_i \times Adv$. The bigger the proportion of people in the other side of the room (i.e. the set of potential matches) of the same caste as the decision-maker, the higher the likelihood of cooperation, irrespective of the decision-maker belonging to the advantages castes or not. This reinforces

our findings that the mechanism through which identity operates in preferences is different to that in beliefs.

**Observation 10:** *In both the PD and SH game, the likelihood of a subject cooperating decreases with village unemployment. There is no effect of village size on behavior in either game. Caste breakdown in a session is only correlated with behavior in the SH game.*

# 5 Conclusion

Social identity theory has been identified as a potential cause for the negative correlation between the degree of social fragmentation and economic performance, particularly the provision of public goods (Alesina and La Ferrara, 2000; 2005). The argument is that individuals derive benefit from membership of social groups and display favoritism towards members of their group at the potential detriment of outsiders. As societies become more fragmented, discrimination along group lines means less cooperation with a larger number of outsiders, leading to lower economic performance.

However, there is still a lack of micro-level data which establishes the extent to which social identity drives this correlation, and what are the underlying mechanisms through which it operates. Our paper fills this gap by reporting data from an artefactual field experiment in which we test the effect of religious fragmentation on behavior in a region of the world where religion is an integral part of society and inter-religious conflict is well documented. We sample our participants from villages whose populations are predominantly of one religion, as well as villages whose populations are roughly equally split between the two religions.

We study two simple two-player games in order to understand two important, and conceptually distinct mechanisms driving behavior in strategic interactions. We study the prisoners' dilemma, through which we can infer the effect of preferences over the size of surplus; and the stag hunt game, which captures the role of beliefs about the opposing player's behavior. By varying the religious identity of the opposing player, as well as the type of village, we understand how social identity can affect either individual preferences for surplus, or individuals' beliefs about the actions of their counterpart.

Our first main result is that in both prisoners' dilemma and stag hunt games, cooperation rates in homogeneous villages among individuals of the same religion are no different than cooperation rates in our control treatment where the identity of matches is uncertain. We attribute this to a sense of group identity only being triggered in fragmented villages. In other words, a sense of identity is meaningful only when an out-group exists. Without it, that particular category ceases to be meaningful. Our result resonates with laboratory evidence with artificial identities (Eckel and Grossman, 2005); it is also consistent with field evidence on in-group biases in judicial decisions. Shayo and Zussman (2011) find strong evidence of ethnic (i.e. Arab or Jewish) in-group biases in sentencing decisions in Israeli small claims courts. These biases are strongly correlated with the incidence of terrorist events in geographical proximity of the court. The authors argue that the incidence of terrorism is a catalyst for the saliency of the judges' ethnic identity.

Introducing religious fragmentation leads to higher levels of cooperation than our control condition when subjects play someone of the same religion – more so in the prisoners' dilemma than in the stag hunt game. This suggests that group identity triggers greater concerns over the welfare of in-group members, rather than triggering the belief that an in-group member is more likely to be a cooperator — a finding consistent with dictator game evidence from different ethnic groups in postwar Bosnia (Whitt and Wilson, 2007). This vindicates the modeling approach by Chen and Li (2009) and Chen and Chen (2011), who model the effect of social identity through other-regarding preferences, and apply them to distribution and coordination games, respectively. We find that Muslim subjects exhibit higher in-group favoritism than Hindus. This may be because Muslims are a significant minority in India, which reinforces the importance of their religious identity. This is consistent with evidence from trust experiments ran in India and Bangladesh with Muslim and Hindu subjects (Gupta et al., 2013), as well as from earlier survey evidence in India (Tripathi and Srivastava, 1981).

Interestingly, in our data, the existence of positive favoritism towards one's group does not mean prejudice towards out-group members — cooperation rates when subjects play with out-group members are not lower than those in the control treatment in either game. This leads to the intriguing finding of our experiment: religiously-diverse villages exhibit higher cooperation rates. In other words, despite finding strong evidence for social

identity-driven behavior, our data (particularly our final result) suggest that social identity *per se* may not be the root cause for the negative relationship between fragmentation and public good provision. At the very least, our data shows that religious homogeneity does not lead to the highest cooperation levels in our simple $2 \times 2$ games.

It is possible that the explanation for the negative relationship between fragmentation and economic performance lies in institutions. These include the ability of social groups not only to monitor compliance more effectively, but also to punish non-compliant individuals more effectively (Greif, 1993). In small communities, mechanisms like ostracism are likely to be easier to enforce. Miguel and Gugerty (2005) find that schools in ethnically-fragmented communities in Kenya have significantly lower local funding that schools in homogeneous areas. They attribute this to effective social sanctioning of free-riders in the latter case. Central to this argument is a repeated-game argument, in which sanctions work not only as a punishment for past and present actions, but also as a deterrent to bad behavior in the future.

This is not to say that the harsher punishment of norm violators is not consistent with a sense of identity. It is certainly possible that the social sanctions towards free-riders by Kenyan parents were driven by a strong sense of community belonging — in itself a powerful identity. Goette et al. (2006) show that Swiss army personnel are willing to punish defectors in a prisoners' dilemma game with third-party punishment, particularly so when the victim of defection is a fellow platoon member. Social identity preferences likely work through institutions, amplifying the effect of social sanctions by reducing the utility cost of punishing someone, as well as increasing the cost of being punished by one's peers. The net effect should be that cooperation is more appealing in the long run. This is consistent with the fact that in smaller communities, ostracism and exclusion are common punishment mechanisms. Understanding how identity interacts with such institutions is a promising future line of inquiry.

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# A Appendix — For Online Publication

## A.1 Subject Characteristics

In this section, we outline the basic characteristics of our sample. In particular, we wish to understand whether the participant subsample from homogeneous villages differs in a systematic way than the subsample from fragmented villages. To this effect, we compare the two types of villages, pooling the two types of homogeneous villages on a number of characteristics, including caste, marital status, place of birth (both the subjects and their next-of-kin), land ownership, profession, and literacy level.

Table 4 displays the proportion of subjects in each type of village that belong to each of 37 categories. We do not find large discrepancies on any category, although some of the differences are statistically significant using Fisher's exact test. The two differences that are worthy of note are the proportion of advantaged caste subjects, which is ten percentage points higher in Homogeneous villages, while OBC subjects are more prevalent by eight percentage points in Fragmented villages. We also sampled more subjects who either finished or were enrolled in tertiary education in Homogeneous villages. Nevertheless, we reiterate that we do not find systematic differences across multiple categories; even those categories where we there are significant differences, these are not sufficiently large to warrant concern.

## A.2 Methodological Note

Before reproducing the experimental materials, a methodological note is warranted. A large proportion of our participant sample was unable to read and/or write to a satisfactory level of proficiency. Around a third of our sample was completely unable to read or write and a further 17% only had basic primary education. As such, we had to describe the different games in a different way than that used in typical laboratory experiments. We took a number of design decisions, which we describe and justify in turn.

We opted not to present any payoff matrix to participants. Based on early pilots, we felt that a payoff matrix (even in simple $2 \times 2$ games) would be too confusing and abstract to many participants. Instead, we presented the game to participants using a simple, but

| Variable | Fragmented Villages | Homogeneous Villages | p-value |
|---|---|---|---|
| Male | 0.45 | 0.49 | 0.374 |
| Age | 35.24 (12.26) | 33.52 (13.05) | 0.127 |
| SC | 0.18 | 0.20 | 0.821 |
| ST | 0.00 | 0.02 | 0.168 |
| OBC | 0.16 | 0.08 | 0.003 |
| Advantaged Castes | 0.60 | 0.70 | 0.020 |
| Single | 0.18 | 0.24 | 0.098 |
| Married | 0.77 | 0.71 | 0.188 |
| Widowed | 0.04 | 0.04 | 0.823 |
| Divorced | 0.01 | 0.01 | 0.640 |
| Separated | 0.00 | 0.01 | 0.425 |
| No Family Status | 0.00 | 0.00 | 1.000 |
| Born Here | 0.69 | 0.71 | 0.699 |
| Spouse Born Here | 0.42 | 0.43 | 0.787 |
| Father Born Here | 0.65 | 0.69 | 0.346 |
| Landless Contracted Labourer | 0.01 | 0.03 | 0.179 |
| Landless Farmer | 0.12 | 0.15 | 0.294 |
| Landless Non-contracted Labourer | 0.11 | 0.05 | 0.011 |
| Landed Less 0.5 H | 0.06 | 0.05 | 0.711 |
| Landed Less 1H | 0.08 | 0.06 | 0.500 |
| Landed More 1H | 0.03 | 0.04 | 0.804 |
| Seamstress | 0.09 | 0.09 | 0.877 |
| Student | 0.08 | 0.15 | 0.024 |
| Office Worker | 0.02 | 0.02 | 0.739 |
| Unemployed | 0.03 | 0.06 | 0.048 |
| Housewife | 0.26 | 0.18 | 0.034 |
| Attendant | 0.03 | 0.01 | 0.080 |
| Tutor House | 0.01 | 0.01 | 1.000 |
| Healthworker | 0.00 | 0.00 | 1.000 |
| Govt Rep | 0.03 | 0.01 | 0.080 |
| Quack | 0.01 | 0.00 | 0.510 |
| Tobacco Worker | 0.03 | 0.10 | <0.001 |
| Other | 0.01 | 0.01 | 1.000 |
| Retired | 0.00 | 0.01 | 0.076 |
| Illiterate | 0.20 | 0.19 | 0.911 |
| Sign Name | 0.13 | 0.11 | 0.498 |
| Primary Education | 0.15 | 0.14 | 0.802 |
| Secondary Education | 0.41 | 0.39 | 0.716 |
| Tertiary Education | 0.10 | 0.17 | 0.026 |

Standard deviations in paretheses.

p-values refer to 2-sided Fisher's exact tests except for "Age", where they refer to 2-sided t-test.

Table 4: Subject characteristics as a function of village type.

familiar framing. We then enumerated the actions available to participants, and we described each contingency in the game in turn using visual aids. To circumvent the illiteracy problem, payoffs were described using rupee notes and coins, since all participants were familiar with currency.

We framed the Prisoners' Dilemma game as a two-player voluntary contribution game in which any contribution to a common pool is multiplied by 1.5 and divided equally among both players. We felt this was the most natural way to explain the game. We framed the Stag Hunt game in the vein of Rousseau's original fable which originated the game itself. We used fish, since fishing is a more common activity in West Bengal than hunting and therefore the analogy would be more meaningful.

We piloted these framings in a study with a group of participants in the Birbhum district who had the same socio-economic background as our main subject pool. The feedback we obtained from post-session interviews suggested that our choice of framing led to participants understanding the incentive structure of each game without leading to experimenter demand effects. It is possible that our choice of framing could have led participants to interpret games in unintended ways, but we feel that participant confusion would be a worse outcome. Furthermore, since we are interested in differences in cooperation levels across village-types, rather than cooperation levels per se, we think this issue is of limited importance.

## A.3 Instructions

The following instructions are the English translations from Bengali. Experimenters read them aloud to participants as a fixed script. The team of experimenters used large A1-sized sheets mounted in the middle of the room to assist them in explaining every contingency of each game. The text in bold inside square brackets indicates an action by the experimenter, and was not part of the script. We include the example sheets along with the main text for ease of exposition. We also include the decision forms in separate sub-sections.

### A.3.1 Preamble

Welcome to our session. In this session, we will ask you to make series of decisions.

This session is part of a large study sponsored by a university. The purpose of this study is to understand how people make decisions in a typical Indian village. The objective is to better understand how to improve the welfare of villagers in India.

The decisions you will make are not a test of your knowledge. There is no right or wrong way to decide. What we want to know is how you decide when faced with slightly different problems. These problems give you the chance of earning a significant amount of money, so please think carefully before making your decisions.

Please do not talk either to the people sitting next to you or the people across the room about the task. If you have any questions about the experiment, or if something does not make sense, please raise your hand, and one of my colleagues will take your question.

The money you earn will depend on what you choose, on what other people in the room choose and sometimes depending on chance.

We will first explain to you carefully the nature of each decision, and how your payment is determined in each decision. This will involve some examples. Please pay attention to the rules. If you have any question or if the rules are difficult to understand, please ask. It is very important to us that you understand how each decision works.

You will make your decisions on a piece of paper, which we will provide. Please make sure you fill all the necessary decisions, since these will be what determines your payment for the session.

The pieces of paper you will receive will have a number. This number is unique to you. We will pay you based on your number. Please do not write your name on the piece of paper. That way, no one will ever be able to link the decisions you make in this session to you.

Your payment for each task will be determined at the end of the session. You will then be paid in cash. While you are collecting your cash we will also do a brief questionnaire with each of you individually.

### A.3.2 PD Game Instructions

In this task you will be paired with someone across the room. You will only be paired with that person for this decision; you will never be paired with that person again in this session. In this task, we will give you 40 rupees. The person with whom you are paired will also receive 40 rupees. You can either keep the 40 rupees or put them in a joint account with the other person. The person with whom you are paired has to make the same choice as you. We will put an additional 20 rupees for each 40 rupees you or the other person puts in the joint account. You will receive half of what is in the joint account, regardless of how much you put in.

- If you put 40 rupees in the joint account and the other person also puts 40 rupees in the joint account, you will receive 60 rupees and the other person will also receive 60 rupees.

- If you put 40 rupees in the joint account and the other person puts nothing, you will receive 30 rupees and the other person will receive 70 rupees.

- If you put nothing in the joint account and the other person puts 40 rupees, you will receive 70 rupees and the other person will receive 30 rupees.

- If you and the other person put nothing in the joint account, you will receive 40 rupees and the other person will also receive 40 rupees.

Both you and the other person must choose at the same time. This means you will not know what the other person has chosen while making your own choice.
Lets go through a couple of examples, using my colleague [X] and [Y] as "pretend" players.

**Example 1:**
The sheet on the wall shows the first example we would like to go through with you.
Suppose [X] decides to put his 40 rupees in the joint account, and [Y] does the same. That means the total put by both people is 80 rupees. We will add another 40 rupees to the total, which becomes 120 rupees.

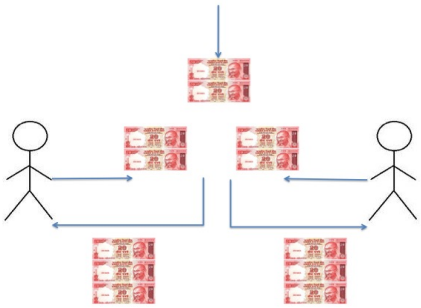

Figure 5: Accompanying A1-size sheet to Example 1.

We then split the total equally between the two people. So,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 60 rupees and [Y] gets 60 rupees.

**Example 2:**

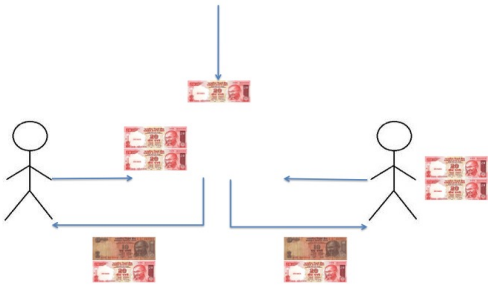

Figure 6: Accompanying A1-size sheet to Example 2.

The sheet on the wall shows the second example we would like to go through with you. Suppose [X] decides to put his 40 rupees in the joint account, but [Y] does not do the same. That means the total put by both people is 40 rupees. We will add another 20 rupees to the total, which becomes 60 rupees.

We then split the total equally between the two people. So,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 30 rupees and [Y] gets 70 rupees: 30 from the joint account, plus the 40 rupees she kept.

**Example 3:**

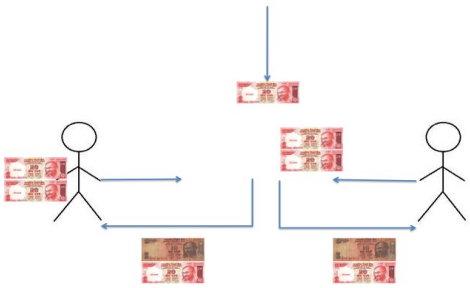

Figure 7: Accompanying A1-size sheet to Example 3.

The sheet on the wall shows the third example we would like to go through with you.
Suppose [X] decides not to put his 40 rupees in the joint account, while [Y] decides to put his 40 rupees in the joint account. That means the total put by both people is 40 rupees. We will add another 20 rupees to the total, which becomes 60 rupees.
We then split the total equally between the two people. So,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**
[Y] gets 30 rupees and [X] gets 70 rupees: 30 from the joint account, plus the 40 rupees he kept.

**Example 4:**

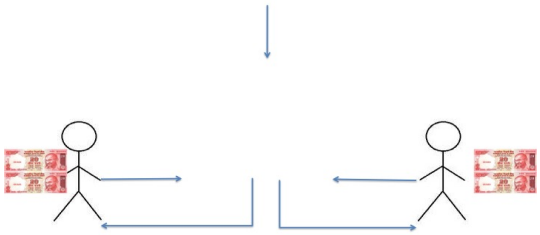

Figure 8: Accompanying A1-size sheet to Example 4.

The sheet on the wall shows the fourth example we would like to go through with you.

Suppose [X] decides keep his 40 rupees in the joint account, and [Y] does the same. That means the total put by both people in the joint account is 0 rupees. Since nobody put any money in the joint account, we add nothing to the joint account. Therefore,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 40 rupees and [Y] also gets 40 rupees.

ANY QUESTIONS? **(wait for a few seconds)**

In your decision sheet, please choose now how much money you want to put in the joint account.

**[Experimenters should now hand the decision sheet to the subject]**

### A.3.3 PD Game Decision Form

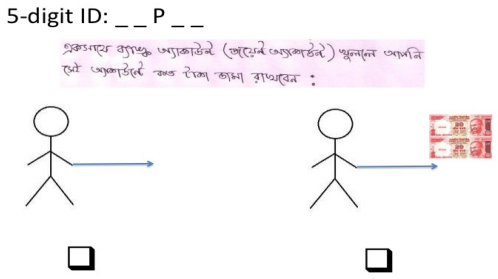


Figure 9: Decision form for the PD game. Bengali script over the decision form states: "If you open a (joint) bank account, then how much will you contribute to account:"

### A.3.4 SH Game Instructions

In this task you will be paired with someone across the room. You will only be paired with that person for this game; you will never be paired with that person again in this session. In this task you and person with whom you are matched will have to make a decision. Your payment for this task will depend on what you choose and what the other person chooses. You and the other person have to hunt a fish. You may choose to hunt a small fish or a large fish. The large fish is difficult to hunt. In order to hunt it, you need the other person

to hunt it with you at the same time. The small fish is easy to hunt. You can hunt it by yourself.

- If you decide to hunt the small fish, you will earn 40 rupees, no matter what the other person chooses.
- If you decide to hunt the large fish and the other person also decides to hunt the large fish, you will earn 80 rupees and the other person also earns 80 rupees.
- If you decide to hunt the large fish and the other person decides to hunt the small fish, you will earn 0 rupees and the other person earns 40 rupees.

Both you and the other person must choose which fish to hunt at the same time. This means you will not know what the other person has chosen while making your own choice.

Lets go through a few examples using my colleagues.

**Example 1:**

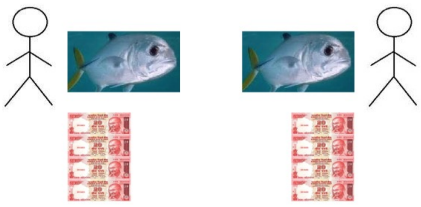

Figure 10: Accompanying A1-size sheet to Example 1.

The sheet on the wall shows the first example we would like to go through with you. Suppose [X] hunts the small fish and [Y] hunts the small fish. In that case,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 40 rupees and [Y] gets 40 rupees.

**Example 2:**

The sheet on the wall shows the second example we would like to go through with you.

Figure 11: Accompanying A1-size sheet to Example 2.

Suppose [X] hunts the small fish and [Y] hunts the large fish. In that case,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 40 rupees and [Y] gets 0 rupees.

**Example 3:**

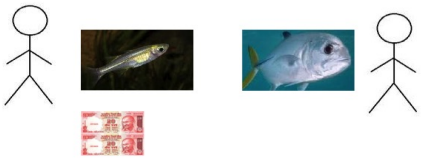

Figure 12: Accompanying A1-size sheet to Example 3.

The sheet on the wall shows the third example we would like to go through with you.

Suppose [X] hunts the large fish and [Y] hunts the small fish. In that case,

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 0 rupees and [Y] gets 40 rupees.

**Example 4:**

The sheet on the wall shows the fourth example we would like to go through with you.

Suppose [X] hunts the large fish and [Y] hunts the large fish. In that case,

Figure 13: Accompanying A1-size sheet to Example 4.

**[TRY TO ELICIT ANSWER FROM A PARTICIPANT!]**

[X] gets 80 rupees and [Y] gets 80 rupees.

ANY QUESTIONS? **(wait for a few seconds)**

In your decision sheet, please choose the fish (small or large) you want to catch.

**[Experimenters should now hand the decision sheet to the subjects]**

### A.3.5 SH Game Decision Form

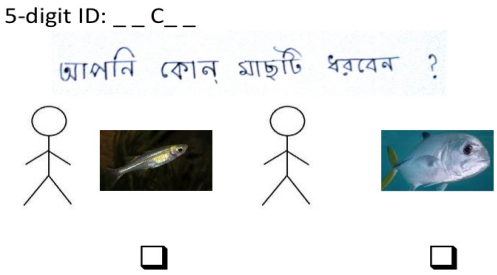


Figure 14: Decision form for the SH game.Bengali script over the decision form states: "Which fish would you like to catch?"

## A.4 Post-experimental Questionnaire

After all participants completed the final task and the experimenter team collected all decision materials, participants were called individually to a separate room where they were asked a number of survey questions, prior to knowing the outcome of each game and receiving their payoff. In this section of the Appendix, we outline each question in Table 5, along with summary statistics.

| Question Text | Category/Domain |
|---|---|
| Age | $[16, 80]$ |
| Religion | {Hindu, Muslim, Christian, Sikh, Buddhist, Parsi, Other} |
| Caste | {SC, ST, OBC, Normal, Other} |
| Marital Status | {Single, Married, Widowed, Divorced, Husband Left, Other} |
| Born in Village? | {Yes, No, Don't Know} |
| If not, how long have you lived here? | |
| Spouse Born in Village? | {Yes, No, Don't Know} |
| If not, how long has (s)he lived here? | |
| Father Born in Village? | {Yes, No, Don't Know} |
| If not, how long has he lived here? | |
| Grandfather Born in Village? | {Yes, No, Don't Know} |
| If not, how long has he lived here? | |
| Education Level | {Illiterate, Sign Name, Dropped out at grade $x$, Completed grade $x$, Currently sitting grade $x$ } |
| Profession | {Landless contract laborer, Landless farmer, Landless non-contract laborer, Attendant, Small-property farmer ($< 0.5$ Ha), Medium-property farmer ($< 1$ Ha), |

| | |
|---|---|
| | Big-property farmer > 1 Ha), Quarry worker, Student, Office worker, Unemployed, Housewife, Tutor House, Health Worker, Gov't employment program, Village quack, Village tobacco factory, Other} |
| Does your village have a pond? | {Yes, No, Don't Know} |
| Who owns it? | {Gov't, NGO, Village} |
| Do you use it? | {Yes, No, Don't Know} |
| Has it been appropriated/expropriated? | {Yes, No, Don't Know} |
| If yes, by whom? | {Higher caste, Land-owning villagers, Rich families, Political party, Panchayat, Other} |
| Does your village have a tubewell? | {Yes, No, Don't Know} |
| Who owns it? | {Gov't, NGO, Village, Private individual, Don't Know} |
| Do you use it? | {Yes, No} |
| Has it been appropriated/expropriated? | {Yes, No, Don't Know} |
| If yes, by whom? | {Higher caste, Land-owning villagers, Rich families, Political party, Panchayat, Other} |
| How far is the Block Health Center? | |
| If you fall ill, where do you go? | {Dispensary, Primary Health Center, Block Health Center, District Hospital, Nursing Home, Private Doctor, Village Quack, Other} |
| Name 3 public goods your village lacked for the last 3 years | {Water, Education, Health, Transport, Road, Drainage, No Problems, Don't Know, Others } |

| | |
|---|---|
| Name 3 important public goods | {Water, Education, Health, Transport, Road, Drainage, No Problems, Don't Know, Others} |
| Do you think of yourself as an Indian? | {Yes, No, Indifferent, Don't know, I belong to this village/district} |
| Do you think of yourself as a Hindu/Muslim? | {Yes, No, Indifferent, Don't know} |
| Do you believe you belong to this village? | {Yes, No, Indifferent, Don't know} |
| If a close relative married a non-hindu/ non-muslim, how would you feel? | {Good, Bad, Indifferent, Not Bad, Don't know} |
| If your neighbor belongs to a different religion, how would you feel? | {I like, I don't like, It's normal, Do not dislike, Indifferent, We do not mix, Don't know} |
| (Hindus only) If your neighbor belongs to a different caste, how would you feel? | {I like, I don't like, It's normal, Do not dislike, Indifferent, We do not mix, Don't know} |
| Would you like children from other religions in your child's school? | {Few, < half, Half, > Half, Almost everyone, I don't like children from other religions in school, Better everyone studies together, Don't know} |
| In your village, how many are of your religion? | {Few, < Half, Half, > Half, Almost everyone, Don't know} |
| In today's session, was there any person from your religion or other religion whom you personally knew? | {Few, < Half, Half, > Half, Almost everyone, Don't know} |

Table 5: Post-experimental questions