

**Analyzing the Effects of Cultural Heterogeneity on  
Cooperative Behavior Using a Laboratory Experiment  
in India**

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## Abstract

This case adds to the discussion on the effectiveness of laboratory experiments in sociological research. Sociologists often question laboratory experiments' external validity and particularly criticize the neglect of context effects in experimental designs. Bringing context into social lab experiments is of prior importance for sociological research. Our case addresses this criticism and practically guides through the 10 steps necessary to successfully conduct a sociological lab experiment, using the example of a project on cooperative behavior undertaken in Mangalore, India. Our exemplary research focuses on cooperation in a culturally heterogeneous environment and the testing of specific hypotheses regarding the functionality of leadership. Inviting both Hindu and Muslim participants into the lab, we used religious affiliation as a salient marker of cultural dissimilarities. We measured cooperative behavior with the Public Goods Game (PGG) and found that cultural diversity does not affect cooperation per se, but reduces cooperation in the presence of a first-moving leader. In heterogeneous groups, poor leadership and uncertainty about followers' reciprocity hinder the effectiveness of leadership as an institutional device to resolve social dilemmas. We also discuss more general issues of experimental research in the social sciences, including the overrepresentation of positive findings in the published literature (publication bias) and the tailoring of narratives based on particular findings in the data (overfitting). To resolve these critical issues, we stress the value of cumulative knowledge obtainable through replication and comprehensive meta-studies which add considerable value to stand-alone experiments in sociology and the social sciences in general.

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## Learning Outcomes

By the end of this case, students should be able to

- Understand the practical steps to undertake a laboratory experiment
  - Be aware of the practical difficulties in operating a research project in a new cultural environment
  - Have knowledge on an exemplary solution to bring context into and thus increase external validity of sociological experiments
  - Understand the importance of the cumulative value of experimental research
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## Project Overview and Context

Our project investigates how cultural heterogeneity affects cooperative behavior in small groups. It qualifies as an exemplary case study for three reasons. First, the experiment—which we published in the *Journal of Socio-Economics* in 2014—was our first research project after

we had finished our PhD theses. We hence went through a process of intense learning particularly regarding questions of practical implementation. This allows us to point out practical lessons learnt especially for readers who are yet to undertake their first research project. Second, our project is typical for an experimental study in the sense that it provides an adequate level of comparable detail to the steps needed to implement a successful laboratory experiment. Third, our chosen topic is useful to both introduce and add to the discussion about the value and effectiveness of lab experiments for sociological research.

From private discussions in the context of our previous research and observations from firsthand experiences in developing countries, we were long interested in the social mechanisms connecting cultural heterogeneity, cooperative behavior, and economic prosperity. Most importantly, we were motivated to understand why many culturally heterogeneous countries in the “developing world” suffer from inter-group conflict and foregone economic growth.

This case study describes experimental methods in light of a contextualized implementation, the procedural difficulties of an experiment undertaken in a culturally diverse environment, and respective conclusions from an experimental study conducted in Mangalore, India.

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## Method

As opposed to analysis of observational data, the quality of causal inferences (internal validity) is generally higher in experiments due to participants’ randomized assignment to control and treatment conditions. This “manipulationist” approach to causal inference provides direct answers to “what-if-things-would-have-been-different” questions. Further and in stark contrast to survey data, experiments permit the collection of behavioral data rather than mere behavioral intentions.

On the contrary, the external validity of lab experiments has been called into question, particularly by sociologists. (Webster & Sell (2007) provide an excellent introduction to laboratory experiments in sociology). Critique centers around artificial decision situations and socially desirable behavior by participants under researchers’ close scrutiny. Laboratory experiments have also been accused of being blind to context effects. This is especially relevant for sociological research which—unlike most experimental research in economics and psychology—fully acknowledges the importance of context effects in a multi-level explanation of individual action. Furthermore, in a contribution attracting major scholarly attention, Henrich, Heine, and Norenzayan (2010) stress that most experimental studies are confined to Western student pools. Efforts to counter these limitations rely on experiments conducted at multiple

locations, including developing countries and small-scale societies. This research program, however, has also run into obstacles due to limited transferability of standardized decision situations into parallel laboratory set-ups. Such difficulties include differences in local recruiting, experimenter effects, the need to translate instructions, and—as purchasing power typically varies across locations—differences in monetary incentives (Roth, Prasnikar, Okuno-Fujiwara, & Zamir, 1991). Furthermore, such studies typically compare behavior elicited in parallel sessions at multiple locations, but do not consider the interaction between local participant pools (e.g., Brandts, Saijo, & Schramand, 2004).

To adequately address these issues and generate the specific behavioral data needed to answer our research question, we had to choose a rather unconventional setting: We decided to get two culturally distinct groups into the same laboratory. In this context, we looked for a location in which we could conduct a high-stake experiment in a single language (English in our case). Also, we needed a place where cultural heterogeneity could be detected by unique and salient identifiers. The obvious candidate was India and the identifier religious affiliation.

We considered the Public Goods Game (PGG) as the optimal test bed for studying the willingness to cooperate under different conditions of cultural heterogeneity.

The standard linear PGG, first introduced by the economists Mark Isaac and James Walker in 1988, represents a dilemma situation where individual incentives and social interest diverge. Each of a given number of players decides on how much of their endowment to contribute to a public good. All contributions are summed and multiplied by a factor greater than one but smaller than the number of players so that contributing fully is socially optimal but not individually attractive. Hence, the game represents an experimental test of cooperation behavior between group members.

A compendium of results from social experiments published by Colin Camerer (2003), a leading figure in behavioral economics, reports that most PGG studies find cooperation rates of roughly 50%. Fischbacher, Gächter, and Fehr (2001), for example, explain this display of pro-social behavior by conditional cooperation, which describes the individual willingness to give up personal benefits if others do likewise. Furthermore, researchers observed that participants tend to give a little less than what they believe the others will contribute on average (self-serving bias).

In our experiment, we first consider contribution behavior conditional on others' religious affiliation (heterogeneity treatment). We signaled religious affiliation through a "game name" each participant had to choose from a list of typical Hindu or Muslim names upon entering the

lab (see Step 4 below). Second, we additionally observe contribution behavior facing a leadership situation (leadership treatment). We designed leadership according to the principle of “leading by example”, considering an exemplary first-mover, whose contribution behavior was disclosed to the other group members.

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### Practical Implementation

In general, conducting a laboratory experiment requires several consecutive steps allowing considerable time each, especially when undertaken in a location with little academic infrastructure and no pre-existing participant pools. The following 10 steps will explain an exemplary procedure in detail.

#### Step 1: Develop the Idea

The first and most crucial step is to formulate your research questions as precisely as possible. This necessarily includes the formation of unambiguous hypotheses.

In our case, we worked with three main hypotheses:

*1. Heterogeneity reduces the level of cooperation.*

We derived this hypothesis from the macroeconomic literature (e.g., Alesina, Baqir, & Easterly, 1999) which stresses weak inter-group cooperation as a negative effect of (cultural) heterogeneity.

*2. Leadership increases the level of cooperation.*

Building on prior experimental findings (e.g., Moxnes & van der Heijden, 2003), we considered two mechanisms to bring about the positive effect of leading by example: First, the leader anticipates followers' behavior and strategically contributes more to trigger positive reciprocity. Second, the followers reciprocate the observed large investment of the leader.

*3. There is a negative interaction between leadership and heterogeneity with respect to the level of cooperation.*

There was little substance in either the experimental or empirical literature we could directly use to substantiate this hypothesis. Nor could we derive it directly arguing along a fostered theory. Nevertheless, we argued along the lines of belief formation and reciprocal behavior: If heterogeneity increases disbelief about others' reciprocity, second-movers in heterogeneous groups should be less prone to expect other followers to reciprocate the leader's investment (first-order beliefs). This disbelief may stem from the assumed irrelevance of a leader's signal for followers of another religion. Moreover, it seems

reasonable to expect that each follower believes that other followers have similar thoughts about the relevance and effectivity of a leader's signals (second-order beliefs). As a result, the influence of leader contributions on follower beliefs should vary between homogeneous and heterogeneous groups.

No matter how sound the rationalization of your hypotheses may be, you must ask yourself the question: Is the expected outcome of a laboratory experiment the best way to test your hypotheses and hence to provide an answer to your research question? Only if you can answer this question positively, you should continue to sketch your experimental set-up. Along with a solid explanation of your motivation for your project, a list of well-developed hypotheses, and empirical methods to test them, such a sketch should include the specifics of the practical details of the experiment:

- Number of participants needed (independent observations);
- Specific requirements of your research (location, participant characteristics, and local facilities);
- Financial resources required (depending on the former two points).

### **Step 2: Write a Proposal for Funding**

Conducting a laboratory experiment requires resources, not only your time. The following list contains the largest blocks of costs:

- Rent for adequate facilities such as a computer lab or a classroom;
- Payouts for participants which depend on the number of participants, the way your experiment is designed, and the desired level of incentivization (low vs high stakes);
- Office material, including computer maintenance, pencils and paper, and calculators;
- Compensation for research assistants;
- Travel costs.

There are numerous ways to cover the costs of an experiment. Most research facilities have dedicated funds and/or the possibility to apply for external resources such as special scholarships.

As we were members of the Department of Sociology and Economics, we qualified to apply for funds provided directly through the Munich Experimental Laboratory for Economic and Social Sciences (MELESSA) at the University of Munich, Germany. The application process included a comprehensive written proposal and a discussion in the respective research seminar. In our case, the funds provided by MELESSA covered our costs for participant payouts, office

material, and the hiring of research assistants. To cover travel costs, we applied and received a scholarship from the Bavarian Indian Centre (BayInd) which, among other things, promotes research exchange between our home state of Bavaria and the Indian state of Karnataka.

### **Step 3: Organize an Adequate Location**

Undertaking a research project in an environment where social experiments are uncommon may be a challenge. A major obstacle is to find a guest institution that is willing to host you. As our research institutions did not have direct links to any universities in Karnataka (to which we were bound due to both the favorable conditions regarding cultural heterogeneity and restrictions of our scholarship), we needed to find an appropriate university to provide us with some research infrastructure. It makes sense to develop and maintain a very close working relationship with the senior academic staff of the guest institution to ensure local support of the operations. We successfully contacted the St. Aloysius College in Mangalore which constituted our preferred choice as their institution could provide a large pool of potential participants from the local Hindu and Muslim communities. The college kindly offered us a room to conduct the experiment as well as assistance with recruiting operations. However, we learned that being on an unusual research mission attracts considerable attention. Lengthy meetings with members of the faculty and administration were scheduled before the actual operational discussions, let alone the operations themselves could be started. Also, we had to learn that an all-encompassing stakeholder management is crucial for the success of a research project. It is necessary to inform all bodies directly involved, such as potentially participating students, faculty staff, and facility management. Also, not directly involved actors such as local authorities and affected credit institutions may have to be informed. We could have saved a lot of time if we had informed the local banks, the police, and potentially the local media as we were continuously creating suspicions and even minor police investigations due to numerous requests for withdrawals of high numbers of small bills at several bank branches (for participant payout) and local media reports discussing our inter-religious research design.

### **Step 4: Design the Experimental Procedure**

Although both the sketch of the experimental set-up and a funding proposal may only describe the rough shape of the actual experiment, a lot of effort needs to be spent on the details of the experimental description. This includes the exact wording of the written instructions for the participants and the detailed description of operational procedures. A definite need is a strict protocol that tells you exactly what you have to say and do during the experiment. To ensure comparability of sessions, it is absolutely important to leave no room for variation between the sessions. Training of the procedures and strict adherence is vital.

In our project, a smoothly running process was especially important as our participant-onboarding process was essential to categorize participants into their experimental roles. Bringing context into the lab is challenging, particularly if you do not want to inform participants about your research goal. Upon arrival, participants had to choose an anonymizing “game name” from a list of six typical Hindu (Mantra, Thulasi, and Trishul) and Muslim names (Haj, Namaz, and Zakkat). Apart from their indication of religious affiliation, these names provide no indication of class or caste. Any mistakes or procedural differences would have been fatal for the respective experimental session. Fortunately, without being instructed to do so, all participants chose their game name according to their religious affiliation which we were able to cross-check through their student ID cards.

#### **Step 5: Recruit the Participants**

For a laboratory experiment, the selection process of participants is crucial. The level of difficulty to obtain an adequate sample of participants may differ strongly across projects. Many universities have access to extensive databases (containing not only student participants), as well as well-defined processes of random sample selection.

In our project, we had the particular situation of offering a high-stake experiment, meaning that the participants’ expected monetary returns were substantial compared with their outside earning options (opportunity costs). Although high stakes are often important to increase internal validity—diffusing the suspicion that decisions may not be taken seriously enough—they may have ambiguous effects on recruiting. High stakes may help to attract large numbers of participants, but may cause unintended side effects. For example, if we had not been cautious enough to track the real names of participants, several candidates would have taken part in the experiment repeatedly. This would certainly have been destructive for the adequacy of the results. Also, the communication process is important. First, we only allowed male participants into the experiment to shut-off potential gender effects. Second, we had to diffuse several misunderstandings which developed due to the fact that we recruited only Hindu and Muslim but no Christian students. The latter make up a sizeable proportion of the St. Aloysius student population. Being unable to communicate this fact in a public way without giving away information that would have jeopardized the results of the experiment, we needed to spend a considerable amount of time for face-to-face discussions. Following sound research ethics, potential mistakes in the recruiting process that may put the randomness of subject selection into question should lead to an exclusion of certain sessions (as much as this may hurt) which needs to be documented in any publishable reports about the project. Fortunately, we did not experience any substantial issues during the recruiting process.

**Step 6: Execute the Experiment**

Never underestimate the necessity of coaching during an experiment. This should be anticipated, considering the particular situation the experiment is taking place. To minimize disturbances and loss of observations, it is important to strictly keep to the standardized processes and timetable. In most cases, it is necessary to perform a pretest to identify potential weaknesses and adjust the protocol accordingly. Also, keeping the experimental set-up as simple as possible helps for a smooth execution.

Among other things, we experienced more difficulties in participants' understanding than initially anticipated. This led us to significantly increase the in-session explanation part to ensure that all participants would understand the experimental instructions.

Another vital part of the experimental procedure is the anonymity of payouts. For our project, this meant that we needed an additional person, who was not engaged in the operations of the actual experiment, to conduct the payments in private.

**Step 7: Collect and Process the Data**

For experimental studies conducted in an advanced lab environment—that is, in a room with inter-connected computers—the collection and processing of data is automated and hence does not require manual scrutiny.

However, due to the limited availability of computer facilities at our host institution, we conducted the experiment in a paper-and-pencil version. This required the transcription of data into electronic format for analysis through statistical programs, whereas hard copies of decisions and payment receipts need to be retained safely to be able to provide an adequate data-log for potential reviews.

In our project, we entered the information contained in the paper form for each participant immediately after the respective experimental sessions first into MS Excel and later loaded the data into the program Stata where the analysis was conducted. We took paper copies of the actual decisions back to our home institutions and stored them appropriately.

**Step 8: Debrief Participants and Academic Partners and Report on Funds Used**

The level of detail regarding the debriefing of participants highly depends on the content of the project. On the one hand, a detailed and carefully crafted debrief may be useful to limit negative effects connected to speculation about the research purpose. In our case, a timely debrief of participants may have helped to avoid the spreading of rumor. On the other hand, debriefing experimental subjects can contribute to “cross-talk,” informing future participants

about the aim of the study and thus pose a threat to the validity of behavioral data collected toward the end of the project. In our project, we thus decided against a detailed debrief of participants.

In any case, a short note, possibly even further in-person meetings are necessary to debrief the host institution about the final status of the experiment. Also, reports have to be filed to account for the financial resources used. In our case, the host institution was not as interested in the debriefing about the experiment as it was in the introductory sessions. Nevertheless, we provided a comprehensive written statement containing a description of finalized procedures to the relevant stakeholders. Next, we wrote encompassing financial reports to all institutions providing funding including details of spending and operations as well as our particular experiences and preliminary results.

### **Step 9: Analyze the Data**

In its most straightforward form, this step includes a comprehensive, descriptive analysis of the data showing obvious effects and findings. Also, it includes the specifics of the results from hypotheses testing. In our project, all but very few descriptive analyses were conducted back at our home universities. Testing the hypotheses to identify significant differences in the observed behavior between experimental conditions, we applied two-sided Wilcoxon rank-sum tests and reported  $\alpha$ -errors as common in experimental research.

Regarding our first hypothesis, we found that heterogeneous groups—groups that contained at least one Hindu and at least one Muslim participant—do not contribute less than their counterparts in homogeneous groups. For us, this was especially astonishing as participants from heterogeneous groups believed that their fellow group members would contribute less (as we had expected). However, they did not let their beliefs deteriorate their cooperation as the rationale of conditional cooperation would request.

Concerning the second hypothesis, the introduction of leading by example, which has been shown to reliably increase cooperation in other experiments, did not show any positive effect on participants' contributions in neither homogeneous nor heterogeneous groups.

Only our third hypothesis, expecting heterogeneous groups faring worse under leadership, was not rejected.

### **Step 10: Write and Publish a Paper**

Parallel to the analysis, usually after discussing preliminary results within one's relevant academic peer group, the final output of the research is starting to get shape.

As two of our three preliminary hypotheses had to be rejected, we had to go a lot deeper than initially anticipated, in finding a way to explain our experimental observations.

The lack of an effect from heterogeneity on individual contributions (although stated beliefs of others' contributions were lower) could be explained through psychological concepts suggesting that insecurity about others' behavior promotes the use of generally accepted coordination rules (e.g., Van Dijk, Wilke, Wilke, & Metman, 1999). Unlike in homogeneous groups, where the variation of individual contributions was large, subjects in mixed groups heavily relied on a simple coordination rule in choosing their contribution, that is, contributing 50% of their endowment. This suggests that individuals tend to resort to focal choices to cope with the increased uncertainty associated with culturally heterogeneity.

Our finding on the failure of leadership—which runs counter to prior experimental evidence—could be explained by a distinction between good (large first-mover contribution) and bad leadership (small or no first-mover contribution) as well as through second-movers' beliefs on other followers' response to a leader's contribution.

All in all, we could find a sound, internally valid rationalization for all relevant findings. Still, we changed to an exploratory strategy clearly deviating from the orthodox strategy of testing (and rejecting) only pre-defined hypotheses derived from our theorizing process prior to the data generation. Our approach of fitting a plausible narrative to our findings seems to be common in social science research and is often necessary to get results published. We reflect on this issue in the concluding section.

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## Discussion

In their discussion of the fruitfulness of laboratory methods in sociology, Michelle Jackson and David Cox (2013)—just like many researchers before them—make the crucial point that experimental results can only be considered well-established facts after they have been successfully replicated. We fully endorse this request both in the light of our own research journey and in the context of the structural constraints of scientific publishing:

- Interesting and statistically significant results are more likely to get published in prestigious journals and thus find their way more easily into course curricula and other published articles. Findings which counter the existing empirical literature (including null-results), on the contrary, often appear less credible or less exciting to reviewers and hence tend to be rejected at higher rates.
- Manuscripts submitted for publication are typically expected to not only report effects

established in the experiment but also explain them. If results are not covered by the original hypotheses, researchers must come up with plausible rationalizations. Such ad hoc explanations bear the risk of overfitting, that is, the tailoring of narratives based on particular patterns in the specific dataset at hand.

Students and practitioners of social science should thus be aware of publication bias and must not put too much confidence in just a few prominently published experimental studies on a certain topic, but search the broader literature to gain a more thorough picture of a supposedly well-established result. Our surprising result on the ineffectiveness of leadership, for example, constituted an obstacle to getting published right away. Furthermore, studies like ours—which reject one or more of their original hypotheses—must be critically examined whether the ad hoc explanations of surprising results are plausible and, most importantly, generalizable.

To conclude, successful and meaningful experimental research in sociology and the social sciences more generally requires joint efforts of ongoing replication. Ideally, each fundamental result should be cross-validated in additional studies using the same as well as alternative experimental settings. Comprehensive meta-studies can then provide a bigger picture of certain fields of experimental research. Experimental research is thus a collective endeavor resting on the idea of a cumulative discovery of knowledge.

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### Exercises and Discussion Questions

1. List all preconditions necessary to successfully conduct a laboratory experiment outside your own institution.
2. Think of other ways to bring social context into the artificial environment of the laboratory. Although this may be challenging, such designs offer valuable insights at the forefront of experimental sociology.
3. Design an experiment—and think through all 10 steps of its practical implementation—which directly tests for our explanation (individuals resort to coordination rules under increased uncertainty).
4. Discuss the effect of overfitting (tailoring of narratives based on particular findings in the data) on the scientific quality of publications in general and in the field of laboratory experiments in particular.

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### Further Reading

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