WHEN DOES IT MATTER THAT GOD IS WATCHING?: DIFFERENTIAL EFFECTS OF LARGE AND SMALL GODS ON CHEATING AS A FUNCTION OF MATERIAL INSECURITY IN YASAWA, FIJI

by

RITA ANNE MCNAMARA
B.A., Washington University in St. Louis, 2009

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS
in
THE FACULTY OF GRADUATE STUDIES
(Psychology)

THE UNIVERSITY OF BRITISH COLUMBIA
(Vancouver)

August 2012

© Rita Anne McNamara, 2012
Abstract

Previous work on religion’s potential to suppress behaviours that threaten sustained cooperation is extended to villagers in Yasawa, Fiji. Yasawans’ co-existing Christian (Bible God) and local, deified ancestor spirit (Kalou-vu) beliefs provide comparisons of different kinds of deities’ impact on prosocial behaviour in a small-scale society. If religion promotes prosociality through the threat of supernatural punishment (the ‘supernatural monitor’) in this context, then villagers should cheat less when they believe a deity is more punitive and more when they think the deity is more forgiving. Prosociality was measured in this study using a die rolling game to assess covert cheating in favour of self or in-group vs. out-group. Perceptions of the Bible God and Kalou-vu are as forgiving or punitive significantly predicted cheating as a function of material insecurity. Specifically, perceptions of a punishing Bible God predicted fewer coins to the self or in-group (thus less cheating) when material insecurity was low or at average levels, but more coins (more cheating) when material insecurity was high. Punishing Kalou-vu showed a similar effect that was showed more statistically significant relationships with probable cheating. These effects are more strongly driven by expected food insecurity for years (long-term) to come than by expected insecurity in the coming months (short-term). Additional analysis using perceptions of national secular authority as represented by police showed that a more punishing view of police predicted more cheating, though this effect dropped out of significance when police negativity was considered in separate analyses. This suggests that, unlike urban contexts, secular authority may have little psychological impact on sustaining cooperation in this relatively isolated social context. Further, the results of this study suggest the impact of perceptions about supernatural agents may depend upon both the kind of deity involved and the individual’s sense of resource availability. Implications for the evolution of religion and its place in the evolution of large-scale societies are discussed.
Preface

The data for the cheating game and material insecurity were collected as part of a wider project, entitled Virtues in Conflict, with Dr. Joseph Henrich as my collaborator on the Fiji site and Dr. Daniel Hruschka as the project Primary Investigator. I was involved with only the Fiji portion of this multi-site, cross-cultural project. I was responsible for ensuring Fijian research assistants correctly and completely translated and back-translated all study materials; counted money before handing out receipts after the die game and interviews; oversaw data entry; analyzed all of the Fiji data; and wrote the manuscript for an unpublished book chapter on the project. This data was collected under the approval of the UBC Behavioural Research Ethics Board with Certificate number H11-01180.

Data for the supernatural and secular negativity scores were collected as part of a separate study investigating the effects of religious priming on offers in a Dictator Game within the villages included in the current research. Dr. Ara Norenzyan and Dr. Joseph Henrich were my collaborators on this project. I was responsible for study design, developing study materials, overseeing Fijian research assistant translation and back-translation of all study materials; overseeing data collection for all phases of the study; recording Dictator Game offers before handing out receipts; all data analysis; and presenting the findings at the Psychology of Religion and Spirituality Pre-Conference at the 13th annual meeting of the Society for Personality and Social Psychology held in San Diego, CA, USA in January 2012. Portions of the analysis on die rolling data and religious, material insecurity, and covariate predictors were also presented at the 24th annual meeting of the Human Behavior and Evolution Society held in Albuquerque NM, USA in June 2012. This data was collected under the approval of the UBC Behavioural Research Ethics Board with Certificate number H11-01207.
# Table of Contents

Abstract ................................................................................................................................. ii
Preface ................................................................................................................................. iii
Table of Contents ................................................................................................................. iv
List of Tables ....................................................................................................................... vi
List of Figures ..................................................................................................................... vii
Acknowledgements ........................................................................................................... viii
1 Introduction ....................................................................................................................... 1
   1.1 Cooperation as Risk Management ........................................................................ 1
   1.2 Two Cooperative Solutions to Insecurity: Food Sharing and Economic Markets .................. 3
   1.3 Maintaining Cooperation at Various Levels of Societal Complexity .............................. 4
   1.4 Religious Prosociality and the Supernatural Monitor .................................................. 5
   1.5 Cultural Evolution of Religion as Cooperation Facilitator .......................................... 7
   1.6 Current Study Aims ................................................................................................... 9
2 Details of Fiji Field Site .................................................................................................. 12
   2.1 Site Overview ........................................................................................................... 13
   2.2 Face-to-Face Communities ....................................................................................... 13
   2.3 Subsistence: Economy, Market Access, and Material Insecurity ................................. 15
   2.4 Religious Belief ....................................................................................................... 17
3 Methodology ................................................................................................................... 19
   3.1 Variables ................................................................................................................ 19
      3.1.1 Outcome Variable: Covert Cheating ..................................................................... 19
      3.1.2 Primary Predictor Variable: Divine and Secular Negativity ................................. 20
      3.1.3 Moderator Variable: Material Insecurity ............................................................. 22
      3.1.4 Additional Covariates ....................................................................................... 22
   3.2 Overview of Research Methods ................................................................................. 22
      3.2.1 Participant Details ............................................................................................. 22
      3.2.2 Materials .......................................................................................................... 23
      3.2.3 Payment Distribution ........................................................................................ 24
      3.2.4 Procedures ........................................................................................................ 24
4 Results ............................................................................................................................. 27
   4.1 Cheating ................................................................................................................ 27
   4.2 Predicting Cheating ................................................................................................. 28
   4.3 Supernatural and Secular Negativity with Material Insecurity ...................................... 34
   4.4 Short vs. Long-Term Security .................................................................................. 37
5 Discussion ....................................................................................................................... 41
5.1 Why Cooperate ........................................................................................................ 43
5.2 Strengths and Limitations ..................................................................................... 44
5.3 Future Directions .................................................................................................... 46
5.4 Conclusion ............................................................................................................... 47

Bibliography .................................................................................................................. 48

Appendix A: Translations and Back-translations .......................................................... 56
A.1 Introductory Comments: Die Rolling Game ......................................................... 56
A.2 Information Letter .................................................................................................... 58
A.3 Script for Game Rules .............................................................................................. 60
A.1.1 Activity A: In-Out Treatment ............................................................................. 61
A.1.2 Activity B: Self-Out Treatment ......................................................................... 66
A.4 Material Insecurity Questions .................................................................................. 71
A.1.3 Food Insecurity ................................................................................................... 72
A.1.4 Financial Insecurity ............................................................................................. 72
A.5 Negativity Scores ..................................................................................................... 73

Appendix B: Site Background Information .................................................................... 76
B.1 Local Geography ....................................................................................................... 76
B.2 History and Language ............................................................................................. 76
B.3 Housing ................................................................................................................... 76
B.4 Local Resource Production ..................................................................................... 77
B.5 Political Organization ............................................................................................... 78
B.6 External Influence: Education, Healthcare, and Telecommunication .................... 78

Appendix C: Additional Methodological Details ............................................................ 80
C.1 Week 1 ................................................................................................................... 80
C.1.1 Neutral Prime ........................................................................................................ 80
C.1.2 Dictator Game ....................................................................................................... 80
C.1.3 Post-Game Interview ............................................................................................ 80
C.2 Week 2 ................................................................................................................... 81
C.2.1 Experimental Prime .............................................................................................. 81
C.2.2 Dictator Game ....................................................................................................... 81
C.2.3 Post-Game Interview ............................................................................................ 81

Appendix D: Regression Tables ...................................................................................... 82
List of Tables

Table 4.1 Zero-order Correlations among Variables.................................................................28
Table 4.2 Full Regression Predicting Coins by All Variables ......................................................29
Table D.1 Negativity by Short and Long-Term Insecurity Interactions........................................82
Table D.2 Divine Punishment and Short vs. Long-Term Food Insecurity ..................................83
Table D.3 Divine Punishment and Short vs. Long-Term Financial Insecurity ..............................84
Table D.4 Secular Authority by Short vs. Long-Term Food and Financial Insecurity .................85
List of Figures

Figure 2.1 Map of Yasawa Group in Fijian Archipelago................................................................. 14
Figure 3.1 Histograms of Negativity Measures and Bar Plots of Security Measures............. 21
Figure 3.2 Detail of Activity Materials: Experimenter arranging cups in activity room .......... 24
Figure 3.3 Research Assistant with Cups in Activity Room .......................................................... 25
Figure 3.4 Participant with Female Research Assistant Interviewer................................. 26
Figure 3.5 Window where money was counted and distributed.............................................. 26
Figure 4.1 Percent of sample giving offers to either self (yellow) or in-group (blue) compared to theoretically expected outcome based on the binomial distribution (grey). ......................... 27
Table 4.1 Zero-order Correlations among Variables................................................................. 28
Table 4.2 Full Regression Predicting Coins by All Variables. Odds ratios with p<0.1 are written in bold. .................................................................................................................................................. 29
Figure 4.2 Interaction Plot of Bible God Negativity Predicting Cheating at Low, Medium, and High Material Insecurity. Effects in logits to emphasize predicted direction of cheating......... 35
Figure 4.3 Interaction Plot of Kalou-vu Negativity Predicting Cheating at Low, Medium, and High Material Insecurity. Effects in logits to emphasize predicted direction of cheating .................. 36
Figure 4.4 Interaction Plot of Police Negativity Predicting Cheating at Low, Medium, and High Material Insecurity. Effects in logits to emphasize predicted direction of cheating .................. 37
Figure 4.5 Slopes of Bible God Negativity Predicting Cheating for the Self at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating...................... 38
Figure 4.6 Slopes of Kalou-vu Negativity Predicting Cheating for the Self at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating...................... 39
Figure 4.7 Slopes of Bible God Negativity Predicting Cheating for the In-Group at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating .......... 40
Figure 4.8 Slopes of Kalou-vu Negativity Predicting Cheating for the In-Group at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating .......... 40
Figure C.1 Likert Scale for Negativity Questions Showing Fijian Translations and Pictographic Scale Orientation Guides .............................................................................................................. 81
Acknowledgements

I owe my sincerest gratitude to the dedicated efforts of my fantastic crew of research assistants in Yasawa Fiji: Mela Tui, Paula Tekei, Litia Feoko, and Sitiveni Naileqe. I am also particularly indebted to the kind hospitality and participation of the people of Teci and Dalomo, Yasawa, Fiji. I of course could not have completed any of this research without the support of my research supervisors: Dr. Joseph Henrich, whom I thank for establishing this field site and sending me there; and Dr. Ara Norenzayan, whom I thank for providing me the seeds of a research question that warranted such an extraordinary population to sample. I thank Dr. Steve Heine for contributing to my thesis committee. I would like to thank Dr. Daniel Hruschka and all of the contributors to the Virtues in Conflict project for the clever, subtle measure of in-group and self preference and the theoretical lens of material insecurity to analyze it through. I owe another deep debt of gratitude to Dr. Jeremy Beisanz for his instruction above and beyond the Multiple Regression class to teach me how to use hierarchical logistic regression for this particular analysis. Finally, I owe all of my thanks to my family for supporting me in my esoteric obsessions and various attempts to get as far away from home as humanly possible.
1 Introduction

One of the most notable effects of religion the world over is its ability to bring people together. The cohesive aspects of religion can work to bring otherwise unrelated individuals together in massive displays of group effort towards a common goal. The resulting prosocial effects of religion translate to subtle individual behaviours around decisions to give resources away or abstain from breaking rules (Ahmed, 2008; Ahmed & Salas, 2011; Ahmed & Hammarstedt, 2011; McKay, Efferson, Whitehouse, & Fehr, 2011; Randolph-Seng, 2007; Shariff & Norenzayan, 2007). How this phenomenon developed over human evolution is not, however, entirely clear. In order to understand why religion might have evolved from means of understanding the natural world to a way of organizing group cooperation, one must look at the elements of cooperation as it expends costs and gives benefits to its practitioners. Primary among these benefits is the reduced risk of going without a needed resource – particularly when resources are scarce. The concomitant cost to this cooperation, however, is the risk of expending the effort to get such a resource but not being able to extract the benefit of its use. This risk is what lies at stake when cooperation fails, and can be a hefty deterrent to keeping cooperation going long-term (Axelrod, 1984; Hardin, 1968). Solutions to this cost of cooperation come in many forms across human societies, with religion as a prime example (Armstrong, 2006). The ways that religion works to support cooperation have been documented in complex, anonymous societies but are not as clear in the smaller societies more similar to ancestral societies. Thus, greater understanding of how religion evolved supporting cooperation in the ways seen today requires deeper investigation of religion’s social functions in smaller societies.

1.1 Cooperation as Risk Management

One of the major benefits to the remarkable level of extra-kin cooperation seen in humans is its ability to reduce individual risk. Humans have developed a number of different cultural solutions to cooperative risk management, including food-sharing networks in small, face-to-face communities (De Weerdt & Dercon, 2006; Fafchamps & Gubert, 2007; Sugiyama, 2004) and anonymous economic markets in large, complex societies (Guiso, Sapienza, & Zingales, 2006; Seabright, 2010). However, this hyper-sociality faces a fundamental coordination problem: individuals must be willing to cooperate with non-kin others in ways introduce a new risk of exploitation. In evolutionary terms, this problem is a huge hurdle to successful maintenance of the cooperation needed to sustain human sociality (Axelrod, 1984; Bowles & Gintis, 2004; Chudek & Henrich, 2011b; Chudek, Zhao, & Henrich, forthcoming; Fehr & Fischbacher, 2004; Friedman & Singh, 2004; Henrich & Henrich, 2006; Imhof, Fudenberg, & Nowak, 2005; O’Gorman, Henrich, & Van Vugt, 2008; Roes & Raymond, 2003; Tooby, Cosmides, & Price,
2006). The likelihood of being taken advantage of by a genetically unrelated competitor spells loss in the evolutionary struggle to maintain a genetic foothold in the next generation. Thus, the chance of failed cooperation produces an additional risk that must itself be managed, often through additional strategies employed to dissuade cheaters in order to maintain cooperation (Chudek & Henrich, 2011a; Hardin, 1968; J. Henrich, 2006; Herrmann, Thoni, & Gachter, 2008). Humans have developed an additional layer of cultural innovation across societies solving this cooperative dilemma, including reputation networks and methods of introducing disinterested third parties as external rule enforcers (Andrews, 2001; Chudek & Henrich, 2011b; Fehr & Fischbacher, 2004; Grosjean, 2010; Henrich et al., 2006; Nelissen & Zeelenberg, 2009).

With all of this effort expended towards maintaining such extensive cooperation, one may wonder what the basic psychological cues driving these phenomena are. One strong candidate is the perception of insecurity about one’s material resources – items like food, shelter, and basic physical protections against the harsh realities of the outside world. Feelings of greater individual insecurity should then motivate different cooperation investment strategies, seeking to enlist the aid of other humans in mitigating this insecurity (Fincher & Thornhill, 2011; Hruschka & Henrich, 2012; Kaplan & Gurven, 2005; Schaller & Murray, 2011). Having more than one person working towards gaining a resource, even one that is fairly rare or otherwise difficult to acquire, increases the odds of success. Thus, survival in an insecure world may require the combined efforts of several individuals. However, though the individual benefit is highest when enlisting the help of others to get a resource, this benefit is also highest when a successful acquisition is not shared. This presents the opportunity for failed cooperation – one member of a cooperative pair expends effort at a cost towards gaining the resource, but does not receive the benefit of using the resource when the other partner refuses to share.

Because cooperation can deteriorate without a stable solution to the risk of being exploited in the case of failed reciprocity, the reminder of an external entity that can punish cheaters may also mitigate the effect of potential cooperation failure (Fehr & Fischbacher, 2004; Harrell, 2010; Roes & Raymond, 2003; Shariff & Norenzayan, 2011). This reminder of an external enforcer may be a fundamental cultural innovation, useful in creating and sustaining a psychological space that allows for more extensive cooperation even in the face of highly unstable resources (Roes & Raymond, 2003; Shariff, Norenzayan, & Henrich, 2010). Further, this external enforcer may be the key to bridging the psychological gap between the face-to-face cooperation of small-scale societies and anonymous cooperation in large-scale societies (Norenzayan & Gervais, 2011; Norenzayan & Shariff, 2008). A greater understanding of how these predictability perceptions and enforcement reminders play out in a community with deep similarities to the
ancestral populations most likely to first develop this cultural tool can provide us with another key to understanding how humans have evolved into the immensely social species we are today.

1.2 Two Cooperative Solutions to Insecurity: Food Sharing and Economic Markets

Humans have developed a wide array of techniques for cooperatively acquiring and distributing resources across various levels of societal complexity. Food sharing networks within small-scale societies are among the oldest human solutions to cooperative risk management (Collings & Wenzel, 1998; De Weerdt & Dercon, 2006; Fafchamps & Gubert, 2007; Fafchamps & Lund, 2003; Nolin, 2012). Because food-sharing practices may be among the oldest forms of social insurance employed by human groups, much scholarship has focused on isolating facets of food production influencing levels of sharing within small-scale societies (Kaplan & Gurven, 2005; Marlowe, 2004). These studies find the predictability of the food resource as a key factor - larger items (such as big game prey) and items that are rarer because their availability is harder to predict are shared more often than small, regularly available items. This suggests that the extend to which people feel secure about the future availability of a given food resource will influence the amount of cooperation involved in distributing it. Other evidence suggesting food security has an influence on cooperative behaviour comes from economic game data collected across societies of varying complexity (see for example, Henrich et al., 2006; 2005; Marlowe, 2003; Marlowe, 2004; Wiessner, 2009; Gurven, 2004). On the other hand, the solution to managing resource insecurity in the modern world of large, complex societies is vastly different from the intimate food-sharing networks of humanity’s deepest ancestry. In these large, anonymous communities, economic markets provide the most important social source of resource security. The market provides security by bringing together anonymous strangers to exchange resources through an arbitrary instrument of currency. Thus, in most modern, large-scale societies, the psychological effect of food insecurity is largely mitigated by access to currency (Bowles, 1998; Henrich et al., 2010a; Seabright, 2010).

The difference between these two solutions to risk management seen at different levels of societal complexity hint at a deeper psychological separation between the divergent poles of human experience at different levels of societal complexity. This psychological difference has distinct implications for the distinct methods conscripted to maintain cooperation that are associated with these different degrees of social complexity.
1.3 Maintaining Cooperation at Various Levels of Societal Complexity

A necessary precondition to make both food sharing and economic markets work is that neither partner in a cooperative transaction can have an average loss that outweighs the benefit gained from the cooperative act. Therefore, in order to keep either food sharing networks or extended anonymous markets up and running, humans need a stable solution to the cooperation dilemma as mentioned above. Humans have developed a wide range of cultural devices solving this dilemma that often involve a set of rules and intuitions governing how to cooperate, who to cooperate with, and – most importantly – what happens to cheaters. These rule sets may be informal norms, formalized legal codes, or anything in between (Black, 1976; Beller, 2001; Chudek & Henrich, 2011a; Gigerenzer & Hug, 1992; Mikhail, 2007). Further, these rule sets often minimize cheating in one of two ways: within the social transaction via reputation, or outside of the social transaction via disinterested rule enforcers.

The reputation strategy allows for individuals to decide when and how to cooperate based upon known cheating history of a potential transaction partner. Reputation is a powerful tool to get cooperation started (Bowles & Gintis, 2004; Friedman & Singh, 2004; Leimar & Hammerstein, 2001), but is fundamentally limited by the availability of information about the transaction partner. As soon as the group size is large enough for members to be anonymous, a cheater can again take advantage of those naïve to his or her past behaviours. The cheater may then ride this current of anonymity through the group, extracting benefits without appropriate cost, thereby destroying the previous cooperative equilibrium.

Thus it is important to note the diametrically opposed psychological space necessary for anonymous cooperation as compared to the social dynamics inherent in reputation-based cooperation. Because one can no longer rely upon previous knowledge of the transaction partner’s reputation, one must out-source this knowledge to some external reinforcement. Ability to trust strangers is such a fundamental precondition to market-based anonymous cooperation that markets cannot get a foothold without it (Nunn, 2009; Nunn & Wantchekon, 2011). This requires the advent of a new strategy, allowing for those not involved in the initial cooperative act to intervene when cheating occurs. This third-party-punishment paradigm can fill in the gaps left by anonymity in a reputation network, allowing for punishment of even single-interaction cheating (Fehr & Fischbacher, 2004; Henrich, 2006; Nelissen & Zeelenberg, 2009).

This dynamic has been documented in the real world; the smallest societies – including those like the hunter-gatherers of the Kalahari – hold gossip and social exclusion (simply moving away from an offensive or stingy person) as their main weapons of cooperation enforcement.
(Marlowe, 2003; Wiessner, 2009). In contrast, societies with larger community sizes do indeed favour third-party punishment in maintaining fair resource distribution more than smaller communities that could rely upon reputation for the same end (Henrich et al., 2006; 2010a; Marlowe et al., 2008). In large-scale secular societies, rule of law and government often serve as the external enforcers stabilizing cooperation. Violators can be arrested, prosecuted, and punished by disinterested third parties who will ensure that the rules are followed without giving undue benefit to either party involved in the initial transaction.

1.4 Religious Prosociality and the Supernatural Monitor

There is an apparent psychological gulf between the intimate knowledge sustaining reputation networks and the dispassionate oversight provided by secular law. Secular law may fall short here for a number of reasons. First, some evidence suggests that secular institutions must be reliable and consistent before they can produce meaningful deterrents to uncooperative behaviour (Fernández, 2010; Fisman & Miguel, 2007; Norris & Inglehart, 2004). Further, a strong force driving the development of culture itself may have been intense intergroup competition early in human history (Bernhard, Fischbacher, & Fehr, 2006; Choi & Bowles, 2007; García & van den Bergh, 2011; Turchin, 2011). This effect of parochial altruism in spurring on group-level selection of different cultural forms may have presented an active barrier, rather than a lack of incentive, to risking cooperation with out-group members. Secular control is able to override many forms of parochial interest, but this has not always been the case (Grosjean, 2010; Norris & Inglehart, 2004). Historically, the kinds of secular controls seen in modern, Western society – those that fundamentally separate life into domains of sacred and profane – may themselves be an outgrowth of the cooperation-building effects of Christianity (Asad, 2001; 2003; Taylor, 2007). Thus it seems that, historically, religion played a key role in bridging the gap between cooperation with the immediate in-group and willingness to trust strangers (Tan & Vogel, 2008; Wright, 2009). Religious systems advocating a moralizing God may serve as another external enforcer presiding over anonymous interactions that bridge this gap (Roes & Raymond, 2003; Shariff et al., 2010).

The belief that an unseen, supernatural watcher is monitoring behaviour to sanction anti-social actions may lead to more cooperation and less cheating against all others – not just self and kin (Norenzayan & Gervais, 2011; Norenzayan & Shariff, 2008; Shariff et al., 2010). Reminders of the big, moralizing monotheistic God have been documented to reduce cheating and increase generosity among people living in large-scale societies (Ahmed & Salas, 2011; Ahmed & Hammarstedt, 2011; Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007; 2011; Sosis & Ruffle, 2004). In fact, many societies without reliable external enforcement through
government instead put their trust in religion to do the same job (Norris & Inglehart, 2004). Conversely, when secular institutions (like government) are reliable enough to deter rampant cheating, the need for religion as an external enforcer goes down. In this case, societies become less religious while God becomes less of a punisher and more of a warm-and-fuzzy source of personal fulfillment (Laurin et al., in press; A. Shariff & Norenzayan, 2011; Zuckerman, 2008). The cues to religious affiliation may serve as signals denoting trustworthiness and provide the social lubrication needed to initiate cooperation among strangers. Further, signals of non-affiliation, including avowed atheism, may cue distrust and hinder cooperation from religious believers (Gervais & Norenzayan, 2010; Norenzayan & Gervais, 2011).

The cooperation boost conferred by religion in experimental and quasi-experimental studies (Ahmed & Salas, 2011; Shariff & Norenzayan, 2007; Sosis & Ruffle, 2004) using economic game paradigms opens this phenomenon to consideration within the wider context of other, non-religious economic game situations as well. In many of these non-religious game scenarios, rates of cooperation tend to generally increase when participants think others will be aware of their actions in the game (Eckel & Grossman, 1996; Franzen & Pointner, 2012; Gervais & Norenzayan, 2012; Haley & Fessler, 2005). Of particular note, this includes a boost in cooperative behaviour when players think they are being watched - as with a camera or some other recording device (Bateson, Nettle, & Roberts, 2006; Haley & Fessler, 2005; Rigdon, et al., 2009). This dovetails nicely the finding that small-scale societies with a belief in an Abrahamic God gave significantly more money in Dictator Games and Ultimatum Games which serve as experimental situations with no outside source of punishment (Henrich et al., 2010a). However, when an internal check on the level of cooperation was built into the experimental situation as presented within the Third Party Punisher Game, this belief in an Abrahamic God no longer

1 The Dictator Game is played between two players: a Dictator and a Recipient. The Dictator is given a sum of money to distribute between him or herself and the Recipient. The Recipient has no direct influence over this decision and can only take what the Dictator offers.

2 The Ultimatum Game is very similar to the Dictator Game, but differs in that the Recipient can decide to reject an offer. If the Recipient rejects, then both players go home with nothing. This results in the potential for spite; a purely rational Recipient should accept any offer above zero but will lose in terms of pure self-interest if any other offer is rejected. The knowledge of potential rejection can therefore boost the amount of money the Dictator offers to a roughly equal pay-out for both players.

3 The Third Party Punisher Game has three players: a Dictator who is given an allocation of money to distribute, a Recipient who gets whatever the Dictator decides to give, and a Third Party Punisher who is given a sum of money equalling half of what the Dictator starts with. The Punisher can respond to the Dictator’s offer by paying money out of his or her allocation in order to take money away from the Dictator. This punishment is likely to occur if the Punisher thinks the Dictator’s offer is unfair. The Recipient has no say in what happens and will only take home the amount of money given by the Dictator.
significantly predicted cooperation. Instead, these cross-cultural third-party punishment results show evidence that the size of the surrounding community has a marked influence on peoples’ willingness to interfere with transactions that they are not directly involved in. Hence, when there was no reason to believe one would be held accountable for one’s actions, God served as a predictor of cooperation. This points to the punishment for moral transgression associated with especially monotheistic deities as the primary motivator for this increase in cooperation.

1.5 Cultural Evolution of Religion as Cooperation Facilitator

These findings linking religion to prosocial behaviour in large, complex societies offer glimpses into the dynamics behind religious prosociality, but they give no indication of its origins. Previous studies comparing religious and secular groups show religious groups have, on average, greater longevity (Sosis & Alcorta, 2003). This suggests there may be some adaptive advantage to religious belief and practice. Looking deeper into potential causes of this higher survival rate, some correlational evidence shows religious groups in Israeli Kibbutzim give significantly more monetary resources to fellow kibbutz members than similar members of non-religious kibbutzim (Ahmed & Salas, 2011; Sosis & Ruffle, 2004). The vast majority of these findings come from monotheists (Sosis & Ruffle, 2004) and who are often North Americans (Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2007; Sosis & Alcorta, 2003). This is highly problematic when findings are assumed to apply universally, as even basic cognitive processes can differ worldwide. In fact, it seems Westerners – particularly North American undergraduates – may often be sufficiently different from the rest of humanity as to make them a poor focal point for full understanding of the entire range of human experience (Henrich, Heine, & Norenzayan, 2010b).

Based on extant studies, two camps focusing on belief in an all-seeing, morally concerned deity as the catalyst behind religion’s prosocial effects have emerged.⁴ They differ on the group

⁴ At least three additional theoretical foxholes exist around the origins of religion, but do not directly relate to the core theoretical stance that the current study addresses. Among these, researchers who focus on signalling and social cohesion (Ruffle & Sosis, 2010; Sosis, 2005a; 2005b; Sosis & Alcorta, 2003; Sosis & Ruffle, 2004) as the main source of social benefit from religion also see this as an individual-level genetic adaptation. While the signalling effects of religious displays undoubtedly promote in-group cooperation, it is unclear why any of these effects would extend beyond the in-group. Thus, an additional mechanism is needed to understand why religion might help people overcome the potential for only parochial applications of altruism. A second additional theoretical stance places religion as a by-product of individually adaptive psychological mechanisms like the ability to infer the mental states of others (Barrett, 2000; 2008; 2011; Barrett & Lanman, 2008; Bloom, 2007; 2012; Boyer, 2001; 2003; Pinker, 2005). These theorists acknowledge the downstream benefits religion may confer only as side effects. It is also clear that some aspects of human cognition likely developed long before religion and were exapted by later social forces. However, most do not endorse religion as a direct adaptation, and consequently make no clear claims about patterns of giving. Yet another camp (Haidt, 2012; D. S. Wilson, 2003; E. O. Wilson, 2012, Wright, 2009) see religion also as a group-level adaptation, but from a genetic rather than cultural
dynamics creating a need for a cooperation booster in the first place. For the first camp (Bering, McLeod, & Shackelford, 2005; Johnson & Bering, 2006), this benefit is strictly individual and genetically inherited. According to this line of theory, the active ingredient in religion from all societies across history is the belief in omniscient deities with personal interest in human moral affairs. Over time, individuals with these beliefs fared better than their unbelieving competitors, passing on more of their belief-enhancing genes – making this belief an individual, *genetic* adaptation to social life to avoid getting a bad reputation. The other camp (Atran & Henrich, 2010; Atran & Norenzayan, 2004; Norenzayan & Shariff, 2008) contends the unique psychological challenges facing cooperation in large-scale societies with frequent anonymous interaction requires a *cultural* adaptation. As outlined above, the psychological space created by anonymous cooperation creates a need for ways of maintaining cooperation that often cannot be fully met through reputation networks in smaller, face-to-face communities. In this case, the cultural adaptation is the development of belief in a moralizing and punitive God. Therefore, only beliefs that grew up across millennia of civilization-level cultural development – like those found in monotheism – will produce morally concerned gods.

Note also that the theoretical debate above depends upon the idea, “God is watching,” as the key cognitive ingredient to producing generosity out of religious reminders (Norenzayan & Shariff, 2008). While preliminary studies among North Americans support this (Gervais & Norenzayan, 2012; Shariff & Norenzayan, 2007), it not clear that also applies to people living in small, face-to-face communities. In these social groups, individuals spend most of their lives with almost no privacy. In these smaller groups, the effect of constant potential observation itself can boost cooperation without the need for any additional threat of oversight. For example, economic games played among the hunter-gatherers living in the Kalahari showed some of the lowest offers compared to people in larger societies, with the highest offers in larger camps (Henrich et al., 2005; Marlowe, 2003; Wiessner, 2009). Because these groups are renowned as some of the most egalitarian societies on the planet, this result is striking. The far rarer opportunity to keep resources to one’s exclusive use may have promoted stinginess in the games themselves (Marlowe, 2003). However, the players in these societies are still hard-pressed to find a way to use their new resources in a way that does not involve sharing. After the games, money was often used to buy food and other consumable items for that were still widely and extensively shared within camps (Wiessner, 2009). Therefore, the constant effect of

---

group selective model. This genetic group selection claim remains difficult to support empirically, while the cultural base for group selection has received greater support.
real, known individuals watching over one’s cooperation record may itself be enough to sustain cooperation without the need for an additional unseen observer.

The impact religion has on social life also changes as a result of perceived material insecurity. Broad, cross-national surveys have shown that religious adherence decreases when threats from famine, pestilence, violence, and environmental changes are reduced by effective rule of law and reliable economic systems (Gray & Wegner, 2010; Norris & Inglehart, 2004; Zuckerman, 2007; 2008). Conversely, an insecure environment can boost adherence to local norms and religious affiliations (Fincher & Thornhill, 2011). Perceptions of randomness in the world (Kay, Moscovitch, & Laurin, 2010b; Laurin, Kay, & Moscovitch, 2008), reminders of one’s own mortality (Jonas & Fischer, 2006; Norenzayan, 2006), and lack of personal control (Kay et al., 2010a; Kay et al., 2010c) all have been shown to increase personal adherence to belief in powerful supernatural agents. A world where resources are hard to find presents a particular kind of unpredictability. One of the most reliable ways to level out peaks and valleys in resource availability is through working together with others. However, the increased risk of getting caught without enough to meet one’s needs makes recovering the cost of failed cooperation much harder when resources are already unreliable. Religious belief – particularly in powerful supernatural agents – can provide solace in the face of an insecure world. Thus, unsuccessful cooperation becomes even more dangerous when the world is already insecure. Though it is clear that religion can become a more important source of psychological solace in the face of an insecure world, it is not clear whether believers will also promote cooperation with out-group members. Some evidence suggests that religious belief can reduce out-group derogation even under perceived threat (Norenzayan et al., 2009). However, this may be completely dependent upon the content of religious teachings and beliefs; prejudice may be heightened when a group is directly devalued by religious teachings, lessened when teachings promote tolerance towards a specific group, or indifferent if there is no specific valence towards a particular group (Hunsberger, 2005). It is then reasonable to expect that if religion can provide a sense of security, then out-groups should be cooperated with more, even when material resources are themselves insecure.

1.6 Current Study Aims

The current study will investigate whether belief in different kinds of gods differentially impacts prosocial behaviour in a game offering the chance to covertly cheat in favour of the self or in-group. Further, this study will examine whether effect of religion on cheating in turn depends
upon how secure or insecure individuals feel about their material resources. The current study extends this literature on religious prosociality to a group of villagers living in Yasawa, Fiji.\textsuperscript{5}

Critical research questions this study will address include:

Does cheating decrease as perceptions of a punitive, moralizing, highly agentic God increase? This would replicate and extend similar findings in North America (Shariff & Norenzayan, 2011). Supernatural monitoring found working similarly in both ends of societal complexity would indicate that a mere familiarity with extensive anonymous cooperation is not a prerequisite for these religious prosocial benefits. If this familiarity with anonymous cooperation is not necessary for supernatural monitoring effects to occur, then this leaves open the possibility that supernatural monitoring can act as bridge between cooperation with known others and anonymous cooperation among strangers.

Does a punitive but less powerful local deity have a similar effect? If this is the case, then belief in this lower-level supernatural being may serve as a middle step between the socially disinterested gods of hunter-gatherers and the hyper-involved, all-powerful being of Monotheism. Yasawans have dual belief in both Christian and local ancestor deities. This provides the opportunity to investigate the effects of either kind of supernatural monitor.

Does this effect show-up in cheating to benefit the in-group as well as for the self? One of the primary means of scaffolding cooperation up from more ancestral forms of kin-based affiliation is to expand the range of potential cooperation partners. An decrease in observed cheating that favours the self or in-group to the detriment of the out-group would indicate this kind of expanded range of cooperation. If this is seen within the context of supernatural monitoring, it would also support the hypothesis that an unseen third-party arbitrator can help overcome parochial altruism.

Does perception of resource security change the shape of the relationship between cheating and perceptions of supernatural punishment? Resources perceived as scarce may help motivate people to seek help from others, while at the same time this insecurity may encourage people to hold tighter to the in-group (Fincher & Thornhill, 2011; Hruschka & Henrich, 2012; Hruschka et al., 2012). If supernatural monitoring is more important for social cohesion than simply following rules, then different degrees of material insecurity should show a change in alliances supported by this supernatural cooperation boost. Supernatural monitoring may

\textsuperscript{5} The specific advantages to asking the following questions among these people will be expounded upon in more detail in chapter 2.
enhance the willingness to follow abstract rules when insecurity is low and the need to hold tight to the in-group is consequently low as well. However, when the stakes are set to favour the in-group in the context of high insecurity, then supernatural monitoring may flip to support the value placed upon the in-group.

Does the effect of security depend on the kind of resource – food or financial? Financial resources only matter if one is involved in a market economy. Distance from access to this organized, anonymous system of extended cooperation should decrease the effect of financial insecurity. However, as this market distance increases, insecure basic needs like food become more important. The small villages of Yasawa, with their greater distance from the economic system (as compared to most North Americans), provide the opportunity to decouple these resources to see any potential independent effects.

Does secular authority in a context where the state has little direct influence also serve as a buffer against cheating? As mentioned above, secular authorities can provide a monitoring effect to maintain cooperation without the need to refer to an unseen, supernatural observer. However, secular authority may to only prove effective if its impact is reliable and readily visible. If this secular authority decreases cheating in Yasawa, where the influence of secular authorities is as distant as the market, then the potential stabilizing effect of secular control may be stronger than previously hypothesized.
2 Details of Fiji Field Site

As mentioned in the Introduction, the development of religious entities as external rule enforcers may be a human cultural innovation that bridged the gap between reputation-based cooperation and anonymous market transactions. To accurately look at the effect of supernatural monitors, one must look at the kind of society most likely to be subject to the social pressures these enforcers are designed to address. Further, to study the evolution of such supernatural norm enforcement, one must seek a society similar to ancestral groups with the most ancient examples of such beliefs.

The above requirements create a problem for experiments conducted among people living in large, complex societies like those found in North America and Europe. First and foremost, people living in these societies are unlikely to ever experience life outside of the resource safety net of the market economy – if these people have money then they have food. Further, typical university samples present a particularly restricted range in this regard; even ‘starving’ undergraduates are unlikely to ever truly not know where their next meal is coming from. Thus, any variation in material insecurity found in these samples will be restricted solely to financial concerns, and then perhaps only extending a fraction of the whole range found across all varieties of human experience. Further, the university samples common in previous studies investigating links between religion and cooperation often represent a limited range of supernatural beings to compare across. The majority of these studies focus on the effect of monotheistic religious belief already heavily intertwined with the historical development of these large-scale societies.

The people of Yasawa, Fiji offer a strong test case to address this problem. The earliest evidence for religious beliefs espousing supernatural involvement in human social affairs does not arise in the historical record until after the advent of sedentary, horticultural societies. The earlier gods of many hunter-gatherer groups are often only credited with non-social environmental influence (Boyer, 2001; Wright, 2009). Yasawans currently live in groups sharing many similarities with the first societies to reference socially involved gods. These similarities include a subsistence-oriented lifestyle in which cooperation is essential to survival; traditional supernatural beliefs; and a highly structured social hierarchy organized on kinship lines around a clan system that culminates power in a hereditary chief. Because of these features, Yasawans provide a comparison point towards understanding the kinds of social pressures associated with the earliest development of morally interested deities. Further, the Yasawans hold concurrent belief in both the monotheistic “Bible God” of Christianity and locally concerned, less powerful
deified ancestor spirits, or *Kalou-vu* (literally “root god” but more accurately “ancestor god”). This extension outside of the North American university student samples of previous social psychological research on religious prosociality was necessary in order to gain access to a wider range of human experience than is often found in universities. This extension provides access to the psychology accompanying life in a highly integrated, face-to-face community, the psychology that comes along with a dearth of market resources, and the duality of religious belief endemic to native Fijian culture. Additional detail about the site beyond the scope of this chapter can be found in Appendix B.

### 2.1 Site Overview

Data for this research was gathered from a field site encompassing two small villages: Teci and Dalomo. Teci and Dalomo lie on the eastern side of Yasawa Island, the northern-most island in the Yasawa Group that stretches out along the Western edge of the Fijian archipelago (see Figure 2.1). These villages are linked together into one *yavusa*, or “chiefdom,” via kinship structures that form the basis of the traditional Fijian political system.

### 2.2 Face-to-Face Communities

The social structures of communities within Yasawa, Fiji are among the primary attractions for the psychological study of cooperation. As noted above, the villages of Teci and Dalomo are united through kinship forming a single political unit called a *yavusa*. Here, approximately 60 households (28 in Dalomo and 32 in Teci) live in near constant close contact with members of extended kin groups. This creates ideal conditions for cooperation through reputation – everyone knows everything about everyone else, as well as detailed information about each villager’s family history extending back several generations. This makes for a drastically different psychological space for cooperation when compared to the complex, anonymous societies typical of North American student samples. These small networks of known others allow for personal experience with potential cooperation partners to guide decisions about when, where, and to what extent one should trust another to engage in a cooperative transaction. Accordingly, cooperation among villagers is common and extensive. Village men get together once a week to perform tasks that maintain the village as a whole (trimming weeds, etc.). Men also work together to plant the chief’s crops and to perform public works like building a pathway for the local school. Women work together weaving mats and cooking meals for communal gatherings. The village sponsor monthly *soli*, or “offerings,” allowing villagers to share a large meal with all members of the village. Members of the same clan work together
helping each other plant crops, build houses, care for children, and share food. Inter-marriage and consequential cooperation across Yasawa island villages is also common.

**Figure 2.1 Map of Yasawa Group in Fijian Archipelago.**

Within this kin-based social organization, the classificatory sibling is among the most important links outside of the immediate family. A classificatory sibling is a child of one’s parents’ siblings and is differentially defined based upon the sex of the parent and the parent’s sibling. Children of one’s parent’s same-sex sibling (mother’s sister; father’s brother) are classified the same ways as full biological siblings. In fact, these cousins are treated with the even more formality and respect than full siblings – importantly, they and are strictly off limits sexually. Conversely, children of a parent’s opposite-sex siblings (father’s sister, mother’s brother) – despite being
equally genetically related as other cousins – are called “cross-cousins.” Cross cousins are generally the best people to be friends with; they are considered the best people to joke around with, ask for help, and are ideal marriage partners. This marriage through linking cross-cousins is part of what fuels marriages and cooperation across villages within Yasawa Island even outside of the Tec/Dalomo yavusa.

In accord with this intensive familial and within-island cooperation, Yasawans see norm violations against particular others more favourably as the distance from the kin-group increases. Villagers may not express negative emotions against outsiders and are generally friendly and hospitable to everyone. However, they also find it readily permissible to steal from high-end tourist resorts owned by non-Fijians. In fact, the permissibility of acts like theft clearly falls along a gradient where stealing from the most distant outsiders is markedly less wrong than stealing from a family member.

2.3 Subsistence: Economy, Market Access, and Material Insecurity

The sporadic availability of items only accessible through the marketplace creates yet another aspect of Yasawan life that makes these villages an interesting case for the study of cooperation and religion. Yasawans are obliged to rely upon local food production due to their distance from the main island of Viti Levu and the frequent rough sailing conditions around Yasawa Island. Though a variety of non-local products are often available, island-wide shortages of non-local staples are a basic fact of Yasawan life. Thus, unlike life in a society where access to the economic marketplace is common, Yasawans must rely upon their own food production to provide for the material resources they need in daily life. As a result, perceived security of food resources becomes much smaller than that found among the typical North American university sample. People in Yasawa are instead compelled to rely upon local ecological conditions, traditional food production techniques, and the help of kith and kin to make it by day-to-day.

The nearest major trade center is Lautoka, located on the main island of Viti Levu roughly 60 km across the sometimes turbulent seas of the Bligh Water. This market is mainly accessed by boat. Due to frequent high winds, Tec and Dalomo are often only directly accessible via

---

6 In the wet summer months, hurricanes can damage crops and wipe out whole gardens. In the dry winter seasons, fires can threaten to destroy crops as well.

7 Any additional food staples beyond what is locally available, including flour, sugar, and canned meats, must be purchased from the markets. Even yaqona, the traditional drink vital to many traditional village religious and social rituals, is most often purchased non-locally from market sources.
outboard motor boat or by land. Village boat access consists of small outboard motor boats captained by one of several village men. The nearest area where larger vessels currently offer services is located several hours’ walk/ approx. thirty-minute outboard motor boat ride south in the larger village of Nabukeru. Here a larger passenger boat runs locals back and forth across the Bligh Water at intervals of varying predictability. However, this boat frequently breaks and may stop service to villages without much warning. A third option is the twice-daily tourist boat which runs up and down the resorts located along the Yasawa and nearby Mamanuca islands to Nadi, another city on the main island. However, the tourist boats only arrive once daily for the northern-most stops, which do not run as far north as Yasawa island itself. Travel times between Teci and Dalomo to Lautoka range from three to 24 hours, depending on means of transit and water conditions. Other Yasawa island villages are accessibly by outboard motor boat or via the dirt road along the spine of the volcanic hills in the interior. One may travel along this road using one of the two trucks in the island – each associated with other villages (neither Teci nor Dalomo has a truck of its own), on horseback, or on foot. One small airstrip offers small aircraft access between the main island and a larger village, Bukama, north of Teci and Dalomo. This village is approximately 4 hours’ walk or a one-hour boat ride north of Teci and Dalomo. Air travel is possible from a nearly resort, but even paid use of the plane is prohibited to all but tourists except in the rare cases or extreme emergencies. In addition to the main island markets in Lautoka, each village has its own small canteen selling a smaller selection of market goods at prices reflecting the extra effort to transport the goods to the island. Of course, these canteens are themselves subject to the frequency of shipments from the main island and often run out of even common items. These canteens are rarely able to stay in business more than a few years at a time. At least one resort near the villages has a small grocery store with items for sale to locals, but prices are marked up to reflect tourist-fuelled inflation.

In addition to the distance and difficulty in accessing markets, Yasawans’ access to currency is itself dependent upon local resource production. The small economy of Teci and Dalomo is driven largely by sale of locally collected or produced goods and interactions with the tourist industry. Fauna collected areas around the village and plant production in excess of what the family needs to survive is sold either in the main markets of Lautoka or to the resorts. While the resorts appear to have some sort of quota for local workers, many villagers are fired for stealing from the resort shortly after starting work. As a result, far more villagers have had some experience working at a resort than are currently employed there.
2.4 Religious Belief

The most crucial aspect of Yasawan life for the study of religious prosociality is their coexisting belief in of monotheistic Christian “Bible God” (Kalou ni vola, literally “god of the book”) and local, less powerful ancestor spirits called Kalou-vu (ancestor gods). Yasawans generally are quite religious. Village religious life revolves around Protestant Christian practice through membership in one of two groups: the Wesleyan Methodist church (the most common denomination across Fiji) and the Assemblies of God (a relatively small but growing contingent within the villages). Villagers practice Christianity with varying degrees of adherence, from attending multiple services a week to only attending on special occasions. In this Christian cosmology, the Bible God is an omnipotent, omniscient agent working to keep the powers of Satan and devils at bay. The Bible God is the ultimate source of all authority in the universe, though not terribly interested in daily life in the village. The Bible God does encourage people everywhere to work together and be generous, but may not directly punish individual minor infractions. However, major infractions – including violations against leaders of the church – are thought to be heavily punished by the Bible God and may impact the violator’s descendants for generations to come.

Alongside this formalized Christian belief, traditional beliefs in ancestor deities called Kalou-vu (“root/ancestor-gods”), local spirits (tevoro “devils”), and witchcraft (sovu yaqona “pouring kava”) are still common. Importantly, these local deities are in charge of local affairs exclusively; they have no power outside of the local area around the village and may or may not even be able to see what happens beyond the village (Henrich 2007). Stories of spirit possession told by village elders describe how the Kalou-vu or tevoro can possess villagers to warn of infractions against traditional rules. Punishment for misconduct includes illness, shark

---

8 Unsurprisingly, Yasawans sometimes reference the Bible God and Jesus interchangeably, but they do seem to hold slightly distinct concepts of the two.

9 Yasawa was among the last areas of Fiji to convert to Christianity. Many villagers refer to a particularly bloody incident before Yasawa was Christianized involving villagers attacking a contingent of visiting Catholic missionaries. They now blame the misfortunes of many households on this event while crediting the success of others to their ancestors’ attempts to protect the missionaries.

10 “Pouring kava” is a description of the practice thought to evoke the Kalou-vu for the purposes of conducting sorcery.

11 The Kalou-vu are more powerful than the tevoro, and have traditionally had a more positive connotation. Influence from Christian missionaries (particularly among the Assemblies of God) seems to be gradually demoting local spirits from Kalou-vu to pesky, mischievous tevoro.

12 Such breeches of conduct include yelling in the village (especially after dark) and women bathing naked (again, especially after dark), among others.
attack, injuries, death of child and other misfortunes. While Kalou-vu and tevorō are often associated with such punishments, the Christian God is often expressed as more benevolent but perhaps less involved in daily village affairs (Henrich, 2007; McNamara, Norenzayan, & Henrich, 2012). In either case, the scope of supernatural concern for villagers’ behaviour rarely extends beyond internal village affairs. The Methodists are generally more flexible and accepting of the traditional beliefs alongside Christianity, while the Assemblies of God parishioners generally take a firmer stance against anything but Christian practice. The yaqona drinking traditions are highly associated with the traditional religious beliefs, and the drinking sessions are times when the old stories are recounted and handed on to new generations.¹³

Men are generally the keepers of this traditional spirit knowledge; however, it is generally the women who report being possessed. Though the villagers can use Kalou-vu and tevorō to label the same local spirits, this research only uses Kalou-vu to refer to these spirits.

Finally, the social structure of the villages also contributes to Yasawa’s appeal to questions about the evolution of religion. Often, studies aimed at the evolutionary roots of social behaviours look to hunter-gatherer groups as analogs of our deepest ancestry. As mentioned above, the historical record of religious development shows hunter-gatherer groups referencing supernatural beings that are largely responsible only for regulating the environment with minimal direct involvement in human affairs. However, the sedentary societies like the villages in Yasawa, Fiji are among the first to reference deities interested in human relations as well as natural phenomena. Therefore, though hunter-gatherer groups may typically provide analogs to the most ancient of our ancestors, the kinds of societal problems that observant supernatural beings help solve do not necessarily appear in hunter-gatherer life (Armstrong, 1993; Boyer, 2001; Wright, 2009).

¹³ As a part of their hard-liner stance against non-Christian practice, Assemblies of God parishioners are never supposed to indulge in yaqona, though some still do.
3 Methodology

3.1 Variables

3.1.1 Outcome Variable: Covert Cheating

This study seeks to predict prosocial behaviour from perceptions of supernatural and secular negativity as they relate to material security. This study measured prosocial behaviour through an opportunity to subtly cheat. This cheating measure was derived from a die rolling game that offered the opportunity to covertly bend the rules in favour of the self or in-group. The game consisted of two conditions: in one condition, participants chose between distributing coins to the self or an anonymous out-group member; in the second condition, participants chose between an anonymous in-group member or an anonymous out-group member. All participants played both conditions in counter-balanced order. For each condition, participants were directed to distribute 30 coins, each worth 20 cents in local currency for a total of $6 Fijian dollars, or approximately half of one day’s wage, into cups. One cup was for the self/in-group and the other was for the out-group. Participants were asked to use a six-sided die, with three black sides and three white sides, to determine which cup to place money in. The rules of the game stipulated that participants should first decide how they would distribute the money – depending upon whether the die came up black or white – before rolling the die. If the die roll came up as the other color, they were to place the coin in the cup they did not initially choose. For example, a participant might decide to place a coin in the in-group cup if the die roll is black. After making this decision, the participant would roll the die. If following the rules, the participant should place the coin in the out-group cup if the die roll was white.

Game behaviour was made completely private by asking participants to play the game in a private room where they made their decisions mentally (without stating anything out loud). The pre-roll decision was not stated out loud nor was it in any way made public. Further, participants were situated in the game room such that the experimenter who explained the rules could see when the participant finished but not what the participant was doing during the game. Each participant carried around the cups so that none of the researchers would know about any potential cheating until participants received their pay-out at the end of the study. A researcher who could not see the participants counted the final coin allotments, and no names were recorded on any of the research materials.

The method used for this site followed the basic protocol for all seven sites associated with the Virtues in Conflict project (Hruschka et al., 2012). The in-group was defined as: “a person within your yavusa” while the out-group was “a person from another island.” The other island stranger
was chosen as out-group because, despite the fact that the most important politico-social organization unit within the island is the yavusa, villagers still have frequent contact with many cross-village/ yavusa marriages. This interconnection results in potential impressions about within-island other villagers that are less distinct than other out-groups included in the rest of the project.

3.1.2 Primary Predictor Variable: Divine and Secular Negativity

The primary predictor variables are Bible God negativity and Kalou-vu negativity. These variables were measured one week before the die game as part of a separate study (see Appendix C), so the effect of merely measuring them should have had little to no direct impact on the cheating behaviours measured in the outcome variable. Participants were asked to rate how much fourteen adjectives (7 positive: forgiving, comforting, loving, compassionate, kind, gentle, peaceful; 7 negative: punishing, harsh, terrifying, angry, fearsome, vengeful, jealous = 14 items total) applied to each supernatural agent – Bible God and Kalou-vu. The negativity rating scale ranges from 1 (completely agree) to 7 (completely disagree). The positive items and negative items were averaged, and then the positive average was subtracted from the negative. Thus, a larger negativity score indicates belief in a more forgiving deity. This scale has been used for the Christian God in similar studies among North Americans (A. Shariff & Norenzayan, 2011). However, this study was the first time this scale was used in the Yasawas; Cronbach’s alphas for both Bible God negativity (α = 0.81) and Kalou-vu negativity (α = 0.87) indicate internal reliability in these measures. These ratings were made on a modified 1-7 likert scale that can be seen in Appendix C.

An additional secular control – police negativity – was also collected. Police have minimal impact on daily life in Yasawa, with the closest police station is on Naviti island, located further south in the Yasawa Group – and only recently opened in 2011 (Whippy, 2011). Villagers do, however, come into contact with police when they travel in to the city of Lautoka. Thus, police are a meaningful concept to the villagers included in this study but do not have an important place in their daily lives. This additional measure was included to assess the possibility that external secular controls can provide prosocial benefits similar to those found following religious reminders. This effect of secular prosociality has been shown in student samples, and is thought to be dependent upon the reliability secular institutions have in maintaining social order (Shariff & Norenzayan, 2007). Similar to both Bible God and Kalou-vu negativity, police negativity measures for this study indicated acceptable levels of internal reliability (α = 0.75). Histograms of these variables can be seen in Figure 3.1.
Figure 3.1 Histograms of Negativity Measures and Bar Plots of Security Measures

- Bible God Negativity Scores
- Kalou-vu Negativity Scores
- Police Negativity Scores

- Material Insecurity
- Food Insecurity
- Financial Insecurity
3.1.3 Moderator Variable: Material Insecurity

The moderator variable in this analysis is material security. This was measured both as the perceived security of food resources and of financial (monetary) resources. Both food and financial security were measured as part of a follow-up interview immediately after the cheating task in a series of four yes/no questions. Food insecurity was measured by asking participants: “Do you worry that in the next [x amount of time] your household will have a time when it is not able to buy or produce enough food to eat?” The amount of time varied from one month, six months, one year, and five years. The food insecurity score for each person was then calculated as the number of times each participant said yes to these four questions; a score of 4 is the most insecure, while a 0 is the least insecure. The Cronbach’s alpha for this measure was also indicative of internal reliability (\(\alpha = 0.85\)). Financial insecurity was measured the same way with the series of questions: “Do you worry that your household will have to pay for a big event (such as a wedding, funeral, festival, or illness in the family whether planned or not) in the next [x amount of time] that your household will not be able to pay for alone?” The Cronbach’s alpha for this measure indicates acceptable internal reliability as well (\(\alpha = 0.81\)). After combining all eight questions into a single measurement of material insecurity, the Cronbach’s alpha for the combined scale indicates that the measure remains internally reliable (\(\alpha = 0.87\)). Histograms of these variables can be seen in Figure 3.1.

3.1.4 Additional Covariates

Three additional, less theoretically interesting variables are included to control for their potential confounding effects: age, sex, and years of formal education. Age is measured as years since birth and ranges from 17 to 71, with an average age of 40.4 and a median age of 44. A total of 16 men and 14 women participated. Years of formal education are measured as the number of years spent in the Fijian national school system and ranges from 5 to 16 years with an average of 8.97 years and a median of 8.5 years of education.

3.2 Overview of Research Methods

3.2.1 Participant Details

Participants for the full activity and interview study came from the village of Dalomo. The villagers were familiar with the potential personal monetary benefits associated with these studies from previous economic games studies (J. Henrich et al., 2006; 2010a; McNamara et al., 2012). Though the Yavusa consists of two villages, only Dalomo villagers participated in the

\[\text{\textsuperscript{14}}\text{ Data from the 17-year-old participant was collected with parents' consent.}\]
die rolling game. Previous studies using economic games show different patterns of giving between these two villages (McNamara et al., 2012). Because the researchers have their base in Teci, Teci villagers have had much more extensive contact with the researchers than the Dalomo villagers (though research has been conducted in both villages for more than eight years). These factors make restricting the game to Dalomo controls for numerous uninteresting potential confounds and makes it more likely to find consistent, true relationships among the variables.

The study included 30 adults from Dalomo. Participants were randomly selected using individual ID numbers generated as part of the general field site data management. Data for the supernatural negativity scores was collected one week before the die game over two days. Data for the die game and subsequent material security interviews was collected over 4 days, with 8 participants each day. For the die game, a research assistant invited the next day’s randomly selected potential participants in the evening before each session. If too few invitees showed up the next morning, that research assistant invited more people to participate in order that their ID number had been randomly selected.

3.2.2 Materials

All project materials were translated into the Standard Fijian dialect by native Fijian research assistants, fluent in both Standard Fijian and English, recruited from the University of the South Pacific in Suva, the Fijian capital city located on the south eastern corner of the main island. These translated documents were then back-translated into English by another research assistant who had not seen the original English documents. The Fijian translation was then adjusted to make the meaning derived through the second English translation as close as possible to the original documents. These documents are provided in Appendix A.

Two dice – one primary, one back up – were constructed using white paper stickers and permanent markers, each with three black sides and three white sides. The dice were tested before the study began to ensure they were fair. Next, paper cups were labeled with “you” or “person from another island” for the self vs. out-group condition and “yavusa” or “person from another island” for the in-group vs. out-group condition. These cups being arranged by the experimenter in preparation for the first participants can be seen in Figure 3.2. Allocations were made using thirty 20¢ coins in Fijian currency for each of the two rounds of the die rolling game.
3.2.3 Payment Distribution

In-group recipients were defined as, “a randomly selected member of their yavusa.” After the final day of data collection, another random list of ID numbers corresponding to people who had not participated in the study was generated. Research assistants delivered in-group allocations in order according to this random ID list. The out-group was defined as, “a randomly selected person from another island.” Research assistants delivered these pay-outs to random people from the main island after completion of the field season. This delay in pay-out delivery made the most practical sense because of the high expense of travel off of the island.

3.2.4 Procedures

The study was conducted at the family house of the Dalomo village turaga ni koro (head man). Participants were invited to participate in a different economic decision study the week prior to the die rolling game (see Appendix C for further detail about this separate study). After making their Dictator Game money allocation decision for the other study, participants were asked to rate the perceived negativity of the Bible God, Kalou-vu as a specific local spirit or in general, and the police. For the die rolling game and insecurity interview, the participants were asked to sit on a tarp arranged in the front of the hosts' house at the beginning of each session. There, the researchers completed the introduction and consent process for the study, including asking the participants to sign consent forms. Those who were unable to sign were allowed to mark with an "X." Participants were distributed index cards with numbers 1-32 in groups of 8 (1-8 day
1, 9-16 day 2, etc.),\textsuperscript{15} which determined the order of participation. They were asked to wait on the tarp until they finished the study and to avoid speaking about the study with anyone until the full data collection had been completed. One villager was asked to monitor the sitting area to keep conversation about the study to a minimum; he was also the final participant.

**Figure 3.3 Research Assistant with Cups in Activity Room**

The dice game took place in the hosts' kitchen area, as shown in Figure 3.3. A small table and two plastic chairs were set up to allow the research assistant to see when the participant finished but not what he or she was doing. The research assistant for this phase was female; she explained the instructions for the task, then left the participant to finish the first die rolling activity in private. After the first activity was completed, the research assistant returned to explain the second phase, then again left the participant alone to finish the task.

\textsuperscript{15} An additional 2 participants completed the die rolling game for the Virtues in Conflict project but not the negativity questions for the current study. Therefore, these two were dropped from the present analysis.
After completing the dice game, participants were directed to the main living area of the hosts' house, where a second female research assistant (shown in Figure 3.4) asked the material insecurity questions along with additional interview materials collected for separate analyses. Finally, participants were directed to a second house (shown in Figure 3.5) where one of the researchers distributed earnings and made out receipts. Participants were free to leave after signing their receipts and collecting their earnings.

A third and final interview was presented to participants after they moved to a small table outside by a third research assistant (this one a male).
4 Results

4.1 Cheating

Before analyzing rule breaking in light of perceptions of divine retribution and material worries, it first must be established that cheating occurred. For the self-allocations, the range extends from 12 to 30 of 30 coins, with a mean allocation of 18.9 and a most common allocation of 20. The range of allocations given to the in-group extends from 10 to 30 of 30 coins, with a mean offer of 17.9 and a most common allocation of 16 coins. Given that these offers were based on rolling a black or white side, the theoretical distribution most appropriate to assess likely levels of cheating is the binomial distribution. Figure 4.1 depicts the percent of sample offering each possible number of coins (self in yellow, in-group in blue) compared to the theoretical percent probability of getting that offer based upon the binomial distribution (in grey). This figure shows that there were distinct discrepancies from this distribution in the higher offers range.

**Figure 4.1 Percent of sample giving offers to either self (yellow) or in-group (blue) compared to theoretically expected outcome based on the binomial distribution (grey).**

[Graph showing the distribution of offers]

Table 4.1 shows the zero-order correlations among variables. First, this table shows that in-group and self offers are the most strongly related variables in the dataset; those who gave more coins to themselves also gave more to the in-group ($r=0.71$, $p=0.00001$). Table 4.1 also shows that the only significant correlation among the predictors is between food insecurity (FI) and financial insecurity (EI), ($r=0.54$, $p=0.002$). This correlation between FI and EI makes combining them into a single measure of material insecurity reasonable, but the fact that they are not perfectly correlated also suggests that they may be operating in different ways. This possibility will be investigated further later in this chapter.
Table 4.1 Zero-order Correlations among Variables.

<table>
<thead>
<tr>
<th></th>
<th>In-Group Coins</th>
<th>Self Coins</th>
<th>Bible God</th>
<th>Kalou-Vu</th>
<th>Police</th>
<th>Food Insecurity</th>
<th>Financial Insecurity</th>
<th>Age</th>
<th>Sex</th>
<th>Edu</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Group Coins</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Coins</td>
<td>-</td>
<td>0.71***</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bible God</td>
<td>-0.21</td>
<td>0.02</td>
<td>-0.1</td>
<td>0.17</td>
<td>0.29</td>
<td>0.23</td>
<td>0.17</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kalou-Vu</td>
<td>-0.32'</td>
<td>-0.27</td>
<td>0.36</td>
<td>-</td>
<td>0.23</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Police</td>
<td>-0.07</td>
<td>-0.17</td>
<td>0.29</td>
<td>0.02</td>
<td>0.08</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Insecurity</td>
<td>-0.23</td>
<td>-0.1</td>
<td>0.29</td>
<td>0.02</td>
<td>0.08</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Insecurity</td>
<td>0.21</td>
<td>0.07</td>
<td>0.17</td>
<td>-0.13</td>
<td>-0.16</td>
<td>0.54**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.29</td>
<td>-0.24</td>
<td>-0.01</td>
<td>0.42</td>
<td>0.22</td>
<td>0.19</td>
<td>0.06</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>-0.02</td>
<td>0.14</td>
<td>-0.02</td>
<td>0.26</td>
<td>0.19</td>
<td>-0.21</td>
<td>-0.16</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Edu</td>
<td>-0.21</td>
<td>-0.18</td>
<td>0.05</td>
<td>-0.14</td>
<td>0.1</td>
<td>0.14</td>
<td>-0.05</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>32</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>32</td>
<td>31</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

' p<0.1, * p<0.05, ** p<0.01, *** p<0.001

4.2 Predicting Cheating

To assess the individual impact of each variable, the first model in this analysis includes all of the variables listed in chapter 3, section 1. Due to the nested nature of the data – 30 die rolls per participant per condition with predictor variables measured across participants – the probability of cheating, as defined as deviations from the expected binomial distribution, were analyzed using hierarchical logistic regression (Bailey & Alimadhi, 2007). The moderator effect of food insecurity is captured as an interaction term in the following equations (e.g. negativity score*food insecurity). Negativity scores, age, and education are held constant at their mean values. Condition is held at in-group and sex is held at female as the reference groups of these nominal variables. Because zero corresponds to the lowest level of insecurity and is a meaningful reference point for the insecurity measures, these variables are held constant at 0.

- Probability of coin in cup = \( b_0 + b_1 \text{ Material Insecurity (MI)} + b_2 \text{ Bible God negativity score (BG)} + b_3 \text{ BG * MI} + b_4 \text{ Kalou-vu negativity score (KV)} + b_5 \text{ KV * MI} + b_6 \text{ Police negativity score (P)} + b_7 \text{ P * MI} + b_8 \text{ Condition (Self)} + b_9 \text{ Age} + b_{10} \text{ Sex} + b_{11} \text{ Education} + (1 \mid \text{Participant}) \)

The results of this regression are shown in Table 4.2. The full model with material insecurity shows significant interactions with Kalou-vu (Odds Ratio=0.89, \( z=-2.83, p=0.005 \)) and Police (Odds Ratio=1.08, \( z=1.99, p=0.05 \)) but not Bible God (Odds Ratio=0.91, \( z=-0.91, p=0.36 \)).
Table 4.2 Full Regression Predicting Coins by All Variables. Odds ratios with p<0.1 are written in bold.

<table>
<thead>
<tr>
<th></th>
<th>Full MI</th>
<th>Full FI</th>
<th>Full EI</th>
<th>BG by MI</th>
<th>BG by FI</th>
<th>BG by EI</th>
<th>KV by MI</th>
<th>KV by FI</th>
<th>KV by EI</th>
<th>P by MI</th>
<th>P by FI</th>
<th>P by EI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG Odds Ratio</td>
<td>2.17</td>
<td><strong>4.69</strong></td>
<td><strong>4.79</strong></td>
<td>3.96</td>
<td><strong>9.01</strong></td>
<td>2.51</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.73</td>
<td>0.68</td>
<td>0.67</td>
<td>0.82</td>
<td>0.92</td>
<td>0.62</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>1.06</td>
<td>2.27</td>
<td>2.34</td>
<td>1.67</td>
<td>2.4</td>
<td>1.47</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.29</td>
<td>0.02</td>
<td>0.09</td>
<td>0.03</td>
<td>0.14</td>
<td>1.57</td>
<td>1.44</td>
<td>1.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KV Odds Ratio</td>
<td><strong>1.82</strong></td>
<td><strong>1.59</strong></td>
<td>0.81</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td><strong>0.27</strong></td>
<td><strong>0.18</strong></td>
<td>0.33</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.28</td>
<td>0.16</td>
<td>0.32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.67</td>
<td>1.98</td>
<td>0.33</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>2.14</td>
<td>2.95</td>
<td>-0.65</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.09</td>
<td>0.05</td>
<td>0.74</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.03</td>
<td>0.003</td>
<td>0.51</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>P Odds Ratio</td>
<td><strong>0.62</strong></td>
<td><strong>0.65</strong></td>
<td>1.52</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.79</td>
<td><strong>0.74</strong></td>
<td>1.22</td>
</tr>
<tr>
<td>SE</td>
<td>0.22</td>
<td>0.12</td>
<td>0.27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.24</td>
<td>0.16</td>
<td>0.27</td>
</tr>
<tr>
<td>z</td>
<td>-2.28</td>
<td>-3.58</td>
<td>1.55</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.99</td>
<td>-1.85</td>
<td>0.72</td>
</tr>
<tr>
<td>p</td>
<td>0.02</td>
<td>0.003</td>
<td>0.12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.32</td>
<td>0.06</td>
<td>0.47</td>
</tr>
<tr>
<td>MI Odds Ratio</td>
<td><strong>0.93</strong></td>
<td>-</td>
<td>-</td>
<td>0.96</td>
<td>-</td>
<td>-</td>
<td>1.02</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.06</td>
<td>0.07</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.06</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>-1.28</td>
<td>-0.61</td>
<td>0.36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.06</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.2</td>
<td>0.55</td>
<td>0.72</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.95</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI Odds Ratio</td>
<td>-</td>
<td><strong>0.78</strong></td>
<td>-</td>
<td>-</td>
<td><strong>0.73</strong></td>
<td>-</td>
<td>0.93</td>
<td>-</td>
<td>-</td>
<td>0.94</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.1</td>
<td>0.14</td>
<td>0.09</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>-2.47</td>
<td>-2.23</td>
<td>-0.79</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.64</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.01</td>
<td>0.03</td>
<td>0.43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.95</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI Odds Ratio</td>
<td>-</td>
<td>-</td>
<td>1.09</td>
<td>-</td>
<td>1.09</td>
<td>-</td>
<td>1.13</td>
<td>-</td>
<td>-</td>
<td>1.19</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.11</td>
<td>0.1</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.13</td>
<td>-</td>
<td>-</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>0.85</td>
<td>0.86</td>
<td>1.21</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.13</td>
<td>-</td>
<td>-</td>
<td>1.56</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.4</td>
<td>0.39</td>
<td>0.23</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.23</td>
<td>-</td>
<td>-</td>
<td>0.12</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
### Self Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>Full MI</th>
<th>Full FI</th>
<th>Full EI</th>
<th>BG by MI</th>
<th>BG by FI</th>
<th>BG by EI</th>
<th>KV by MI</th>
<th>KV by FI</th>
<th>KV by EI</th>
<th>P by MI</th>
<th>P by FI</th>
<th>P by EI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>z</td>
<td>1.56</td>
<td>1.55</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
</tr>
<tr>
<td>p</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
</tr>
</tbody>
</table>

### Age Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>Self</th>
<th>Age</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds</td>
<td>1.17</td>
<td>0.99</td>
<td>0.99</td>
<td>0.01</td>
<td>0.37</td>
<td>0.71</td>
<td>1.17</td>
<td>0.25</td>
<td>0.62</td>
<td>0.54</td>
<td>0.94</td>
<td>0.05</td>
<td>-1.31</td>
<td>0.19</td>
</tr>
<tr>
<td>Ratio</td>
<td>1.17</td>
<td>0.99</td>
<td>0.99</td>
<td>0.01</td>
<td>0.37</td>
<td>0.71</td>
<td>1.17</td>
<td>0.25</td>
<td>0.62</td>
<td>0.54</td>
<td>0.94</td>
<td>0.05</td>
<td>-1.31</td>
<td>0.19</td>
</tr>
<tr>
<td>SE</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>-0.38</td>
<td>0.26</td>
<td>0.12</td>
<td>0.25</td>
<td>0.36</td>
<td>0.27</td>
<td>0.06</td>
<td>0.06</td>
<td>-0.78</td>
<td>0.43</td>
</tr>
<tr>
<td>z</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>1.56</td>
<td>-1.8</td>
<td>-1.95</td>
<td>0.12</td>
<td>0.27</td>
<td>0.36</td>
<td>0.27</td>
<td>0.06</td>
<td>0.06</td>
<td>-1.02</td>
<td>0.8</td>
</tr>
<tr>
<td>p</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>0.27</td>
<td>0.36</td>
<td>0.27</td>
<td>0.06</td>
<td>0.06</td>
<td>-1.29</td>
<td>0.31</td>
</tr>
</tbody>
</table>

### Men Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>Full MI</th>
<th>Full FI</th>
<th>Full EI</th>
<th>BG by MI</th>
<th>BG by FI</th>
<th>BG by EI</th>
<th>KV by MI</th>
<th>KV by FI</th>
<th>KV by EI</th>
<th>P by MI</th>
<th>P by FI</th>
<th>P by EI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
</tr>
<tr>
<td>z</td>
<td>0.62</td>
<td>0.85</td>
<td>1.85</td>
<td>1.11</td>
<td>0.91</td>
<td>1.32</td>
<td>0.6</td>
<td>0.53</td>
<td>1</td>
<td>1.17</td>
<td>1.14</td>
<td>1.33</td>
</tr>
<tr>
<td>p</td>
<td>0.54</td>
<td>0.4</td>
<td>0.06</td>
<td>0.27</td>
<td>0.36</td>
<td>0.19</td>
<td>0.55</td>
<td>0.59</td>
<td>0.31</td>
<td>0.31</td>
<td>0.47</td>
<td>0.22</td>
</tr>
</tbody>
</table>

### Edu. Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>Full MI</th>
<th>Full FI</th>
<th>Full EI</th>
<th>BG by MI</th>
<th>BG by FI</th>
<th>BG by EI</th>
<th>KV by MI</th>
<th>KV by FI</th>
<th>KV by EI</th>
<th>P by MI</th>
<th>P by FI</th>
<th>P by EI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>0.94</td>
<td>1</td>
<td>0.91</td>
<td>0.96</td>
<td>1.02</td>
<td>0.94</td>
<td>0.93</td>
<td>0.95</td>
<td>0.93</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>z</td>
<td>-1.31</td>
<td>0.02</td>
<td>-1.73</td>
<td>-0.78</td>
<td>0.26</td>
<td>-1.02</td>
<td>-1.29</td>
<td>-0.99</td>
<td>-1.17</td>
<td>-0.73</td>
<td>-0.67</td>
<td>-0.76</td>
</tr>
<tr>
<td>p</td>
<td>0.19</td>
<td>0.99</td>
<td>0.08</td>
<td>0.43</td>
<td>0.8</td>
<td>0.31</td>
<td>0.2</td>
<td>0.32</td>
<td>0.24</td>
<td>0.47</td>
<td>0.5</td>
<td>0.45</td>
</tr>
</tbody>
</table>

### BG*MI Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>BG*MI</th>
<th></th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds</td>
<td>0.91</td>
<td>-</td>
<td>-</td>
<td>0.81</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ratio</td>
<td>0.91</td>
<td>-</td>
<td>-</td>
<td>0.81</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.91</td>
<td>-</td>
<td>-</td>
<td>0.81</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>-0.91</td>
<td>-</td>
<td>-</td>
<td>-1.83</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.36</td>
<td>-</td>
<td>-</td>
<td>0.07</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### KV*MI Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>KV*MI</th>
<th></th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds</td>
<td>0.89</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.92</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ratio</td>
<td>0.89</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.92</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>0.89</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.89</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>-0.91</td>
<td>-</td>
<td>-</td>
<td>-1.83</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1.92</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.36</td>
<td>-</td>
<td>-</td>
<td>0.07</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### P*MI Odds Ratio

<table>
<thead>
<tr>
<th></th>
<th>P*MI</th>
<th></th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th></th>
<th>SE</th>
<th>z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ratio</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SE</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>z</td>
<td>1.99</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.99</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.05</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.04</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Full MI</td>
<td>Full FI</td>
<td>Full EI</td>
<td>BG by MI</td>
<td>BG by FI</td>
<td>BG by EI</td>
<td>KV by MI</td>
<td>KV by FI</td>
<td>KV by EI</td>
<td>P by MI</td>
<td>P by FI</td>
<td>P by EI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BG*FI Odds Ratio</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.66</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.2</td>
<td>0.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>-2.11</td>
<td>-2.48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.04</td>
<td>0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KV*FI Odds Ratio</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.83</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.86</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.05</td>
<td></td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>-4.12</td>
<td></td>
<td>-2.99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.00004</td>
<td></td>
<td>0.003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P*FI Odds Ratio</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.05</td>
<td></td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>3.52</td>
<td></td>
<td>1.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.00004</td>
<td></td>
<td>0.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BG*EI Odds Ratio</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.67</td>
<td>-</td>
<td>-</td>
<td>0.75</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.18</td>
<td></td>
<td>0.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>-2.26</td>
<td></td>
<td>-1.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.02</td>
<td></td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KV*EI Odds Ratio</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.02</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.94</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.09</td>
<td></td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>0.25</td>
<td></td>
<td>-0.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.8</td>
<td></td>
<td>0.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P*EI Odds Ratio</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.87</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.08</td>
<td></td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>-1.86</td>
<td></td>
<td>-1.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.06</td>
<td></td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cons. Odds Ratio</strong></td>
<td>2.39</td>
<td>3.36</td>
<td>0.99</td>
<td>2</td>
<td>4.44</td>
<td>1.12</td>
<td>1.33</td>
<td>1.87</td>
<td>0.97</td>
<td>1.4</td>
<td>1.75</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.41</td>
<td>0.36</td>
<td>0.37</td>
<td>0.48</td>
<td>0.51</td>
<td>0.38</td>
<td>0.36</td>
<td>0.32</td>
<td>0.34</td>
<td>0.45</td>
<td>0.38</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>2.11</td>
<td>3.34</td>
<td>-0.01</td>
<td>1.44</td>
<td>2.93</td>
<td>0.29</td>
<td>0.78</td>
<td>1.94</td>
<td>-0.08</td>
<td>0.74</td>
<td>1.47</td>
<td>-0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>0.04</td>
<td>0.0009</td>
<td>0.99</td>
<td>0.15</td>
<td>0.003</td>
<td>0.78</td>
<td>0.44</td>
<td>0.05</td>
<td>0.93</td>
<td>0.46</td>
<td>0.14</td>
<td>0.59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
These interactions indicate that, as participants report experiencing more material insecurity across different time frames, the nature of the relationship cheating has with both Kalou-vu negativity and police negativity will change. For each one unit increase in the perceived punitive nature of Kalou-vu, there will be a 0.89 unit change in the probability of getting a coin in the self or in-group cup vs. the out-group cup. Because this odds ratio is smaller than one, this indicates that the probability of getting a coin for the self or in-group actually decreases as the Kalou-vu are seen as more punishing, and that this relationship will attenuate and eventually flip as levels of material insecurity increase. There is no significant difference between allocations to the in-group or self (Odds Ratio=1.17, z=1.56, p=0.12). Further, while none of the demographic control variables show a significant impact on predicting coins given to the self or in-group (age Odds Ratio=1, z=0.37, p=0.71; sex Odds Ratio=1.17, z=0.62, p=0.54; education Odds Ratio=0.94, z=-1.31, p=0.19). However, both Kalou-vu negativity (Odds Ratio=1.82, z=2.14, p=0.03) and Police negativity (Odds Ratio=0.62, z=-2.28, p=0.02) make significant independent contributions to predicting coin distribution, while Bible God negativity scores do not (Odds Ratio=2.17, z=1.06, p=0.29). Controlling for all other predictors and holding material insecurity constant at its lowest level, perceptions of a more punishing Kalou-vu predict a lower probability of cheating overall, while perceptions of police as more punishing predict a higher probability of cheating.

Decomposing this composite measure of insecurity into its food and financial components produces two additional full models:

- Probability of coin in cup = $b_0 + b_1 \text{Food Insecurity (FI)} + b_2 \text{Bible God negativity score (BG)} + b_3 \text{BG} * \text{FI} + b_4 \text{Kalou-vu negativity score (KV)} + b_5 \text{KV} * \text{FI} + b_6 \text{Police negativity score (P)} + b_7 \text{P} * \text{FI} + b_8 \text{Condition (Self)} + b_9 \text{Age} + b_{10} \text{Sex} + b_{11} \text{Education} + (1 \mid \text{Participant})$

- Probability of coin in cup = $b_0 + b_1 \text{Financial Insecurity (EI)} + b_2 \text{Bible God negativity score (BG)} + b_3 \text{BG} * \text{EI} + b_4 \text{Kalou-vu negativity score (KV)} + b_5 \text{KV} * \text{EI} + b_6 \text{Police negativity score (P)} + b_7 \text{P} * \text{EI} + b_8 \text{Condition (Self)} + b_9 \text{Age} + b_{10} \text{Sex} + b_{11} \text{Education} + (1 \mid \text{Participant})$

Analysis of these two facets of insecurity reveals distinct patterns in their interactions with the supernatural and secular negativity predictors' relationship to the number of coins given in either condition.

Food insecurity shows significant interactions with all three negativity score variables (BG*FI Odds Ratio=0.66, z=-2.11, p=0.04; KV*FI Odds Ratio=0.83, z=-4.12, p=0.00004; P*FI Odds
Ratio = 1.18, \( z = 3.52, \ p = 0.0004 \). Again, this indicates that the relationships between predicted probabilities of cheating for all negativity scores will change as material insecurity increases. For Bible God and Kalou-vu, the probability of cheating will shift from lower probability of cheating when either the Bible God or Kalou-vu are seen as more punishing, then flip to the opposite trend as material insecurity increases. Again, the pattern is reversed for police, such that punishing police initially predict more cheating, then gradually less as material insecurity increases. The demographic control variables again do not show any statistically significant relationships with cheating (age Odds Ratio = 0.99, \( z = -0.38, \ p = 0.71 \); sex Odds Ratio = 1.18, \( z = 0.85, \ p = 0.4 \); education Odds Ratio = 1, \( z = 0.02, \ p = 0.99 \), and offers to the self again do not significantly differ from offers to the in-group (Odds Ratio = 1.17, \( z = 1.56, \ p = 0.12 \)). Controlling for all of these additional predictors, food insecurity now shows all three negativity score variables to be significantly related to cheating for both the in-group and self (BG Odds Ratio = 4.69, \( z = 2.27, \ p = 0.02 \); KV Odds Ratio = 1.59, \( z = 2.14, \ p = 0.003 \); P Odds Ratio = 0.65, \( z = -3.58, \ p = 0.0003 \)). Here, both more negative perceptions of the Bible God and Kalou-vu predict lower probability of cheating, while negatively perceived police predict a higher probability of cheating.

Financial insecurity, on the other hand, shows interactions only with Bible God negativity (Odds Ratio = 0.67, \( z = -2.26, \ p = 0.02 \)) and police negativity (Odds Ratio = 0.87, \( z = -1.86, \ p = 0.06 \) [marginal]), with Bible God negativity alone among the negativity variables arising as a significant independent predictor at the lowest levels of financial insecurity (Odds Ratio = 4.79, \( z = 2.34, \ p = 0.02 \)). This again indicates that a punishing Bible God predicts less cheating when material insecurity is low, then will reverse direction as material insecurity increases. Additionally, only the full equation with financial insecurity shows marginally significant effects for the control variables; men now may have a higher probability of cheating than women (Odds Ratio = 1.66, \( z = 1.85, \ p = 0.06 \)) and those with a higher education may have a lower probability of cheating (Odds Ratio = 0.91, \( z = -1.73, \ p = 0.08 \)). However, age still does not show a significant relationship with cheating, just as cheating in the self and in-group conditions continues to remain statistically indistinct. While a moderating effect can be seen in both food and financial insecurity components of material insecurity, the effects of food insecurity on the negativity scores remains far more clearly related to the probability of cheating with the food insecurity component.

One concern raised by adding this many predictors such a small data set is that the models over fit the data. This may produce estimates of effect sizes that do not accurately reflect all of the true relationships present. To deal with this possibility, the rest of the analysis in this chapter will focus on each negativity score measure, retaining others negativity scores held at their
mean but without controlling for the interactions with material insecurity among the others negativity score measures. For example, analysis of the Bible God negativity effects will include Kalou-vu and police negativity held constant at their mean, but will only include the interaction between material insecurity and Bible God negativity. This procedure was selected to see what relationships each negativity score measure may have with cheating without loosing too much predictive power to the variation shared among the material insecurity by negativity variables interactions. Though food insecurity and financial insecurity may be interacting with the negativity scores slightly differently, the patterns of prediction are in the same direction for all negativity scores. Therefore, they will continue to be combined as material insecurity (see Appendix D for more detail on analysis of food and material insecurity considered separately).

Further, the potential confounding effects of age, sex, and education will continue to be controlled for by holding them constant at their mean (and holding females as the reference group for gender). Similarly, offers to the self and in-group will be clumped together because, as can be seen in Table 3.2, the dummy variable for condition (holding constant with in-group as the reference group) show does not show significant difference between the two for any of the models.

4.3 Supernatural and Secular Negativity with Material Insecurity

The interactions between negativity measures and material insecurity were decomposed into low (0, the lowest possible rating in the material insecurity questionnaire) medium (4) and high (8) by re-centering the material insecurity distribution to hold constant at the low, medium, or high values by using the Aiken and West approach (Aiken & West, 1991; West, Aiken, & Krull, 1996). All of the following analyses hold age and education constant at their average with sex held at female and condition held at in-group. The resulting equations are:

- Probability of coin in cup = $b_0 + b_1$ Bible God negativity score (BG) + $b_2$ Material Insecurity (MI) + $b_3$ BG * MI + $b_4$ Condition (Self) + $b_5$ Age + $b_6$ Sex + $b_7$ Education + (1 | Participant)

- Probability of coin in cup = $b_0 + b_1$ Kalou-vu negativity score (KV) + $b_2$ Material Insecurity (MI) + $b_3$ KV * MI + $b_4$ Condition (Self) + $b_5$ Age + $b_6$ Sex + $b_7$ Education + (1 | Participant)

- Probability of coin in cup = $b_0 + b_1$ Police negativity score (P) + $b_2$ Material Insecurity (MI) + $b_3$ P * MI + $b_4$ Condition (Self) + $b_5$ Age + $b_6$ Sex + $b_7$ Education + (1 | Participant)
The first critical element of the analysis reveals a general replication of the relationship between perceptions of divine punishment and cheating in North America (A. Shariff & Norenzayan, 2011), and is depicted in Figure 4.2.

**Figure 4.2 Interaction Plot of Bible God Negativity Predicting Cheating at Low, Medium, and High Material Insecurity.** Effects in logits to emphasize predicted direction of cheating.

The interaction between material insecurity and Bible God negativity again shows an odds ratio smaller than one (0.82, \( z = -1.87, p = 0.06 \)), which indicates that a more punitive Bible God predicts lower probability of cheating when material insecurity is low. Since this interaction does not quite reach significance, the pattern may not fully reverse as material insecurity increases. At the lowest level of material insecurity, increasing ratings of the Bible God as punishing predicts a decrease in the probability of cheating, and does reach statistical significance (Odds Ratio=4.6, \( z = 1.97, p = 0.05 \)). The size of this odds ratio indicates that the probability of cheating increases quickly as the Bible God is seen as more forgiving. At the medium levels of material insecurity, Bible God negativity predicts more cheating than at low insecurity, but overall cheating still decreases as the Bible God is seen as more negative; however, this relationship just misses reaching statistical significance (Odds Ratio=2.06, \( z = 1.94, p = 0.053 \)). However, the probability of having cheated is not well predicted by perceptions of the Bible God at the highest
level of material insecurity (Odds Ratio=0.93, \( z = -0.35, p=0.73 \)), as is indicated by the odds ratio that is close to 1. Accordingly, this trend is not significantly different from what would be expected by chance.

*Kalou-vu* negativity, shown in figure 4.3, has a stronger reversal for probability of cheating, as is indicated by the statistically significant interaction (Odds Ratio=0.91, \( z = -2.42, p=0.02 \)). The interaction shows the perception of punishing *Kalou-vu* predicts less cheating when material insecurity is low and more cheating when material insecurity is high. Analysis of material insecurity held at its lowest level show less probability of cheating when *Kalou-vu* are perceived as punishers, though this relationship only reaches marginal statistical significance (Odds Ratio=1.58, \( z = 1.72, p=0.09 \)). This relationship is not significant at middle levels of material insecurity (Odds Ratio=1.1, \( z = 0.72, p=0.47 \)). However, perceptions of punitive *Kalou-vu* significantly predict a *higher* probability of cheating when material insecurity is high (Odds Ratio=0.77, \( z = -2.67, p=0.008 \)). Further, this greater probability of cheating when *Kalou-vu* are perceived as punitive at high material insecurity is the only trend to reach full statistical significance, which indicates it is unlikely to have arisen by chance.

**Figure 4.3 Interaction Plot of Kalou-vu Negativity Predicting Cheating at Low, Medium, and High Material Insecurity.** Effects in logits to emphasize predicted direction of cheating.
Police negativity, depicted in 4.4, has no significant interaction with material insecurity (Odds Ratio=1.03, $z=0.73$, $p=0.46$). Furthermore, no significant effects for police negativity on predicted cheating are found at any level of material insecurity (low: Odds Ratio=0.77, $z=-1.19$, $p=0.06$; medium: Odds Ratio=0.86, $z=-1.22$, $p=0.22$; high: Odds Ratio=0.97, $z=-0.17$, $p=0.87$). Though these trends do not reach significance, it is interesting to note that the direction of these predictions is opposite to both Bible God and Kalou-vu negativity. Dropping the interaction term and treating material insecurity as a covariate also fails to show any direct effect of police negativity (Odds Ratio=0.88, $z=-1.08$, $p=0.28$).

**Figure 4.4 Interaction Plot of Police Negativity Predicting Cheating at Low, Medium, and High Material Insecurity.** Effects in logits to emphasize predicted direction of cheating.

4.4 Short vs. Long-Term Security

As noted in chapter three, the insecurity measures collected for this research include time spans ranging from one month to five years. It is possible that short and long-term material insecurity have a different effect on these trends. Because no significant effects were found among the demographic control variables, they were dropped from the following analysis. Further, because the only most statistically significant interactions – as shown in table 4.2 – were for Bible God
and Kalou-vu as moderated by food insecurity, this section will only focus on food insecurity. Greater detail about analysis of short and long-term financial insecurity can be found in Appendix D. Finally, offers to self and in-group were considered separately to reveal any potential differences between patters of cheating for either the self or in-group. Decomposing these insecurity measures into short-term and long-term components reveals that these time spans interact with religious belief and cheating in distinct ways. Finally, these relationships are presented here as slopes instead of odds ratios to emphasize the change in direction of prediction when interactions are present.

Short-term food insecurity does not significantly moderate Bible God negativity’s predictive impact on cheating for the self ($b=-0.39$, $z=-1.2$, $p=0.23$). However, long-term food insecurity does marginally significantly moderate this relationship ($b=-0.8$, $z=-1.88$, $p=0.06$). As shown in Figure 4.5, long-term food insecurity provides a stronger impact on Bible God negativity effect size in predicting potential cheating.

**Figure 4.5 Slopes of Bible God Negativity Predicting Cheating for the Self at Different Levels of Food Insecurity.** Effects in logits to emphasize predicted direction of cheating.

Similarly, Kalou-vu negativity is more strongly related to cheating for the self at long-term, rather than short-term, food insecurity. Short-term food insecurity has only a marginally significant interaction with Kalou-vu negativity ($b=-0.2$, $z=-1.81$, $p=0.07$). On the other hand, long-term food insecurity does significantly moderate Kalou-vu negativity’s effect on cheating for the self ($b=-0.28$, $z=-3.12$, $p=0.002$), and is shown in Figure 4.6.
Figure 4.6 Slopes of Kalou-vu Negativity Predicting Cheating for the Self at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating.

Long-term food insecurity appears to drive the entire relationship between Bible God negativity and cheating for the in-group. As shown in Figure 4.7, there is no significant interaction between Bible God negativity and short-term food insecurity in predicting cheating for the self ($b=-0.11$, $z=-0.33$, $p=0.73$). However, the marginally significant moderation effect of long-term food insecurity with Bible God negativity ($b=-0.73$, $z=-1.68$, $p=0.09$) shows a similar effect of Bible God negativity on pro-in-group cheating compared to food insecurity across all time scales.

As can be seen Figure 4.8, only Kalou-vu negativity shows a significant interaction with both short ($b=-0.11$, $z=-0.33$, $p=0.73$) and long-term food insecurity ($b=-0.11$, $z=-0.33$, $p=0.73$). Nonetheless, long-term food insecurity still shows a more significant relationship between Kalou-vu negativity and cheating for the in-group.
Figure 4.7 Slopes of Bible God Negativity Predicting Cheating for the In-Group at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating.

Figure 4.8 Slopes of Kalou-vu Negativity Predicting Cheating for the In-Group at Different Levels of Food Insecurity. Effects in logits to emphasize predicted direction of cheating.
5 Discussion

The current study shows evidence that perceived punitive supernatural beings predict lower amounts of covert cheating in the context of a small, rural Fijian village. This effect was found for both the powerful Bible God and local, less powerful *Kalou-vu* ancestor gods. This replicates similar patterns identified in North American students (Shariff & Norenzayan, 2011).

This study adds an additional layer of complexity by showing stronger statistical significance between these supernatural negativity measures and cheating when they are considered as a function of resource security. When the villagers included in the present study perceive their material resources to be secure, they show an effect of punitive deities predicting a lower probability of cheating that is similar to that found among North Americans. However, when these villagers report being unsure of whether their families will have enough food or money in the coming months and years, supernatural punishment gradually predicts more cheating to the point of fully reversing the direction of the relationship. At the highest levels of material insecurity, more negative perceptions of the *Kalou-vu* in particular actually predict more cheating for both self and in-group.

These general patterns hold for both the Bible God and *Kalou-vu*, but the strength of the associations each deity has with cheating varies with the beneficiary of potential cheating. First, the most statistically significant relationships between cheating and supernatural negativity were for the locally concerned yet less powerful *Kalou-vu*. This may well be due to the fact that the study took place within the villages where the *Kalou-vu* have a more meaningful impact on daily village affairs than the more distant, universally-concerned Bible God. At the same time, the point estimates for the size of the *Kalou-vu* effects are smaller than the effects of Bible God negativity, which may relate to the general indifference the *Kalou-vu* have towards more abstract rules that do not specifically relate to village life. This may also reflect the fact that *Kalou-vu* care primarily about how villagers interact with each other inside the social norm structure of the village itself.

While the Bible God’s negativity effects related to cheating are estimated to be less significantly different from what might be expected by chance, the effects of Bible God negativity are actually the largest of any of the negativity measures. Further, the perception of the Bible God as more punitive seems to have the most significant predictive influence on cheating for the self rather than the in-group. This may be a reflection of the highly personalized God indicative of many Protestant teachings. An omnipotent and omniscient Bible God that cares primarily about humans acting as individuals, rather than in relation to specific groups, should have a greater
impact on behaviours relating to the self. This may also provide basic support for the idea that such a universal deity can help scaffold cooperation up beyond known others. If the effect such a God has more impact on self-relevant behaviours than in-group relevant behaviours, then this action can be directed to others outside of the immediate vicinity to other, unknown individuals. Conversely, if the punishment levied by the all-powerful deity was only directed at violations against an in-group, then believers would never have a reason to coopt this perceived divine protection against exploitation to engage in a trust-based cooperative interaction with a stranger.

Though food insecurity was found to significantly moderate the predictive power of a punitive supernatural agent on both self and in-group offers, there was a much smaller moderating effect of financial insecurity for any of these predictions. This may not be surprising, given the relative difficulty the villagers included in this research have in engaging with the market economy. Even when these villagers do have monetary resources at hand, their access to currency depends largely upon their local production of food-based resources that they can then sell in order to purchase other non-local goods. Thus, suggests that the psychological impact of resource availability may at least partially depend on the kind of resource at stake. Though money may be harder to come by overall, it has less of a psychological impact because survival is more directly tied to food resources. This may also indicate that the potential stabilizing effects a market economy can confer on resource availability has not had the chance to filter down into the psychology of this community.

Further, decomposing the security measures into both short and long-term worries also shows long-term worries about food security appear to have the biggest impact on changing the relationship between perceived likelihood of divine punishment and cheating. Concerns about not having food in the coming months (short-term) and years (long-term) all showed the same pattern of results as was found across all time-scales. However, the effect was much larger and more clearly related to cheating when people anticipated problems with food acquisition for years (rather than months) to come. Thus, it is not just that the kind of resource may matter, but the extent to which this insecurity is expected to be chronic problem may matter as well. An individual may be able to withstand the stress of an insecure future for short periods of time before he or she feels compelled to seek solace in order conferred by unseen supernatural forces. For example, one can weather a short-term crisis by relying on stored resources or calling in credits gathered by helping others in times of plenty. However, these stores are necessarily limited. However, once the insecurity felt exceeds what one can handle alone, as can happen when survival basics are expected to be unreliably available for long periods of
time, then the impact felt by turning to supernatural sources of order can have greater effect (Pargament, Ano, & Wachholtz, 2005).

Finally, the present research found evidence for punishing police reducing cheating when all negativity measures and all demographic controls were included in the analysis. With the small dataset at hand, this is likely to have overfit the data, so analyses were conducted with each negativity measure separately. Without the effect of supernatural negativity being controlled for, police negativity failed to any significant effect for either food or financial insecurity. This relatively smaller effect compared to the supernatural negativity measures makes some sense with the minimal impact national-level authority provided by police has in the daily affairs of these villagers. Secular authority should only work as a buffer against uncooperative behaviour if that authority is experienced as a regular and reliable source of third-party influence on potential social interactions. Had this study been conducted in the city where the police have a more meaningful impact, this secular influence may have shown a stronger predictive influence on cheating. Further, had this study included local human authorities like the village chief or elders, then an effect of secular control predicting less cheating may also have been detected. Finally, there is an extent to which police for these villagers are similar to minor deities in some cultures – unconcerned and far away. However, they differ in that they are known to be totally human, and therefore unable to see infractions even if they did care about them. Thus, the hypothesis that secular control can help to deter cheating, but the effects of secular influence may matter less when secular influence is only distantly felt remains a viable explanation.

### 5.1 Why Cooperate

The most striking finding of the present study is the strong reversal effect of supernatural punishment on cheating at high levels of food insecurity. Previous scholars have noted that groups tend to rely more heavily upon kin and close social ties when personal insecurity through pathogen exposure (Fincher & Thornhill, 2011; Schaller & Murray, 2010; 2011), climactic variation (Van de Vliert, 2011), and food insecurity (Hruschka et al., 2012; Hruschka & Henrich, 2012; Kaplan & Gurven, 2005). Thus, differential investment (via resource sharing, including food resources) in people at varying distances across one’s social network should expand and contract along with feelings of resource predictability. In order to cooperate with strangers, a giver may already need to believe that his or her resources are relatively secure. People should only be willing to give resources to strangers when they can be reasonably assured that the resource will be available again, because the likelihood of reciprocation from a stranger is comparatively smaller than from a kinsman. Conversely, the cut-off of resource security that would prevent generosity even towards family should be very low. Because investing in those
very socially close – kin and intimate in-group members (including mates) – is beneficial genetically even when the individual gene carrier may not gain anything, the cost that would outweigh this benefit should be much higher than the cost deterring a similar offer to a stranger.

Therefore, when people are most worried about whether or not they will have enough resources in the future, the impetus is to invest as heavily as possible in local connections. Thus, any behaviour that does not favour the self or in-group in the context of such high concern about resource security may be deemed counter-normative, and perhaps even morally wrong. Particularly given the local-centric concern of the Kalou-vu and the relatively stronger statistical support for their impact on in-group cheating, this may indicate that squandering resources on an unknown other may be perceived as subject to supernatural reprimand.

Some anecdotal evidence from interviews conducted for a different economic game study among these villagers (McNamara et al., 2012; see Appendix C) suggests this might be the case. In this study, villagers were asked to give money to an anonymous stranger from another island in a Dictator Game. After making their decisions, participants were asked what they thought the study was about. Many of these participants expressed concern about giving money away to a complete stranger, claiming that the stranger may waste the money when the participant knew that he or she would put it to good use. Despite these concerns, many participants knew that the good ‘Christian’ thing to do was to be generous and share the money. Some participants even thanked God for the opportunity to participate in the Dictator Game in order to take all of the money. Thus, even though the value on sharing is known, when resources are scarce, some villagers consider it worse to squander the opportunity to acquire another resource for local consumption.

5.2 Strengths and Limitations

The very characteristics that make this research interesting in the context of existing literature also produce some notable limitations. Primary among these limitations is the small sample size. The current study included participation from literally every available adult within Dalomo village at the time data was collected. Despite this high percentage of participation, the sample still only consists of 30 individuals. On top of this small sample size, the data were collected in a setting that by necessity was less tightly controlled than the typical psychological laboratory used in previous research. This additional layer of noise makes any true relationships in the data harder to detect. This presents a problem for power in the analysis; it is quite likely that the effects found here are real, but the true magnitude they have is hard to discern with this small, noisy dataset.
Another complicating factor in this study is the limited literacy among the villagers sampled. Though many Yasawans do have some formal education and though some are quite literate, many of the people included in this analysis were unfamiliar with written language. As such, this presented specific challenges in conducting research on topics that often rely on written assessment tools. A particular challenge came from asking participants to rate various statements using a likert scale. The scale used for the negativity questions (which can be seen in Appendix C) was translated in to Standard Fijian, included a graphic display in addition to numerals, and was clearly explained to the participant by the research assistant before beginning each rating. Further, if participants seemed to show any confusion during the ratings, the scale was explained again. Despite these difficulties, most participants used the full range of the scale across the three agents (Bible God, Kalou-vu, and police) being rated. One other way of getting around the difficulty of using a likert-based rating scale is to bypass the ranking and just make the questions answerable as yes or no. This is how the material insecurity questions were handled. The drawback to this simpler format is the loss of resolution in the data. The limitation to yes/no in these eight questions (four about food insecurity and four about financial insecurity) makes it harder to differentiate people who are at more moderate levels of insecurity. However, given the small sample size, this additional detail in the data may not have made a huge impact on the final analysis.

Finally, this research did not directly manipulate perceptions of various agents or material insecurity, so the exact causal relationships among these variables are not clear in this data. For example, chronic insecurity about resources leads one to see supernatural agents as more effective punishers, or the pre-existing idea that gods are powerful may lead people to avoid taking the initiative to make changes in their lives that would lead to lower resource insecurity. The latter has some support in studies among North Americans (Laurin et al., 2012), but has yet to be fully fleshed out among the Yasawans sampled.

Even with these limitations, the primary strength this research has in contributing to the existing literature on the impact of religious belief on prosocial behaviour is the extension to a population representing a far greater range of material insecurity and supernatural belief than is found in much of the previous research on the subject. This grants greater insight into the potential social dynamics at play in the earlier cultural evolutionary history of these belief systems. This in turn can tell us more about what kinds of social pressures these belief systems may help alleviate and how these beliefs may impact the development of ever widening circles of potential cooperation partners.
5.3 Future Directions

Given all of the effort humans devote to maintaining cooperation towards gaining more stable resources, what might lead to a sense of resource insecurity in the first place? One strong candidate is the sense that resource availability is predictable or not. Perceptions of resource predictability may provide the drive to invest in these cooperative acts: if it is hard to predict when the next resource item will be available, one should feel more insecure about it. Feelings of greater individual insecurity should then motivate different cooperation investment strategies to help balance out this underlying unpredictability.

As would be expected from a system built upon reputation, the food-sharing networks within small-scale societies capitalize on the structure of social networks. Recent evidence from the Hadza hunter-gatherer groups suggests that giving across social networks may be an early human adaptation supporting cooperation (Apicella, Marlowe, Fowler, & Christakis, 2012). Thus, a future extension to the current research might test these predictions linking predictability to resource sharing within the established social networks already documented in previous research within these villages. In smaller, nomadic hunter-gatherer groups, people may choose to a) stop cooperating with a known cheater and b) move away from that person and into another group if necessary (Marlowe, 2003). Such mobility is not typically available to sedentary forager/horticulturalists like the Yasawans; the possibility to avoid conflict with others by moving away becomes far more costly. As such, people in these situations should be motivated to develop different cultural tools maintaining cooperation over sustained interaction. If resource predictability motivates sharing with people at different degrees of separation across a social network, then a less predictable resource should be shared more with closer social connections while sharing with more distant social connections may only happen with a relatively more predictable resource.

An additional future direction that can be taken from the current research is in determining what kinds of mental states believers attribute to different kinds of deities. Given that the prosocial benefits of supernatural punishment depend upon the perceptions that a) a supernatural being is watching and b) that supernatural agent will punish anyone who violates a given rule, this effect should completely depend upon individuals’ abilities to infer these mental states. Much theorizing on the psychological roots of religious belief posits that mind perception is the basis of belief (Guthrie, 1995). Recent research among North Americans shows that “Theory of Mind,” or the capacity to infer other’s mental states, is related to belief in the Christian God (Norenzayan, Gervais, & Trzesniewski, in press). Further study on what kinds of attributions people make to all-powerful entities vs. only locally effective beings (that are still more powerful
than humans) vs. non-agentic supernatural forces like karma may tell us more about how the perception of potential divine retribution impacts decisions to cooperate or defect in various social situations.

5.4 Conclusion

Humans rely on cooperation for nearly all aspects of life, which makes it necessary to understand how this cooperation is maintained in order to understand what it means to be human. Across many societies, a large portion of what helps maintain this cooperation is religion. The current study provides access to a wider range of resource insecurity at a lower level of social complexity than much of the previous psychological research on religious prosociality. This extension opens new perspectives into how these social dynamics interact with religion, predicting various propensities towards cheating for the self and in-group. Additionally, this research extends beyond monotheism to kinds of religious beliefs more like that of our ancestors at the earliest times when religion began to interact with social functioning. By using research techniques drawing from ethnography and social psychology, this research can begin to unveil previously unseen aspects of this highly complex phenomenon. This in turn allows for deeper understanding of what social pressures religion helps to alleviate. This may lead to more knowledge about how various contexts may bring out the cooperative side of religious behaviour, which in turn can help people develop more positive relationships the world over. Such understanding is vital to successful social navigation in a world full of individuals, with ever more complex cultural and religious backgrounds, mixing in every aspect of daily life.
Bibliography


Gervais, W., & Norenzayan, A. (2012). Do you believe in atheists? Distrust is central to anti-atheist prejudice (pp. 1–53).


Appendix A: Translations and Back-translations

Originals are written in regular text. Standard (Bauan) Fijian translations are written in bold. Back-translations to English are written in italics. Experimenter comments not directed at participants are underlined.

A.1 Introductory Comments: Die Rolling Game

Thank you all for taking the time to come today. My name is [...]. I am a researcher. Today’s games may take 2 hours, so if you think you will not be able to stay that long let us know now. Before we begin I want to say a few things about what we are doing here today and explain the rules that you should follow. We will be playing some games with money. Whatever money you receive in the games will be yours to keep and take home. Joe will be supplying the money. But you should understand that this is not Joe’s own money. It is money given to me by a university to use for research. These games are part of a scientific research project involving many researchers like me and people from many different societies. This research will eventually be part of a book. Vinaka vakalevu kece na vakayagataka na nomuni gauna mo ni yaco mai nikua. Na yacau o [...]. Oau na dau ni vakadidike. Nikua na qito e rawa ni taura tiko e 2 na auwa, kevaka o nanuma ni ko sega ni rawa ni tiko ena balavu ni gauna oqo qai vakaraitaka ga mai vei keitou qo. Ni se bera ga ni tekivu au na via tukuna ga e vica na ka me baleta na ka eda na cakava ni kua kei na lawa mona muria. Eda na qito taka tiko eso na qito vata kei na lavo. Na levu ga ni lavo o rawata ena qito sa na nomu, maroroya ka kauta sara yani l vale. O Joe na solia nai lavo. E dodonu mo ki la ni oqo e sega ni lavo nei Joe. Oqo nai lavo ka solia mai na Univesiti me vakayagataki ena vakadidike. Na qito oqo e tiki tiko ni dua na vakadidike ka ra vakaitaki kina eso tale na dau ni vakadidike vakai au kei na tamata mai na veimataqali vanua. Na vakadidike qo ena tiki tiko ni dua nai vo la.

Thank you all for taking your time in arriving today. My name is [...]. I am a researcher. Today’s game could be lasted for 2 hours, if you think you can’t stay for the whole period, you can inform us now. Before we start, we would like to say a few things about what we are doing here and the rules that you should follow. We will be doing some activities with money. Whatever money you receives in this game activities will be yours to keep and take home. Joe will be supplying the money. You should know that this is not Joe’s money. The University provided Joe with the money for the project. This game is part of the research project of which involves many researchers like us and people from different societies. This research will eventually be part of a book.
Before we proceed any further, let me stress something that is very important. Many of you were invited here without understanding very much about what we are planning to do today. If at any time you find that this is something that you do not wish to participate in for any reason, you are free to leave regardless of whether we have started the games or not. **Ni se bera ga ni tekivu yani, au na via vakaraitaka e dua na ka bibi. E levu vei kemuni e yaco mai nikua e sega ni kila vinaka na ka keitou via cakava nikua. Kevaka e dua beka na gauna ko kunea ni oqo edua na ka ko sega beka ni via vakaitavi kina, e tu vei iko na galala mo lako veitalia ga e sa tekivu oti na qito se sega. Before we start, I would like to say something very important. A lot of you came today without knowing what we want to do. If at any time you find that this is not what you want to participate in, you are free to go regardless of whether we have started the games or not.**

[Distribute and read information letter]

If you agree to participate in the study, please sign or mark an X at the bottom of the information sheet. **Kevaka o sa vakadonua mo vakaitavi ena vuli, kerea mo na saini se makataka na X ena boto ni vola tukutuku. If you agree to participate in the study, please sign or mark X at the bottom of the information sheet.**

We will be asking each of you to come into these rooms and to play a number of games. Before we begin the games, I am going to pass out $3 to each of you to compensate you for coming today. **[Distribute money].** This money is yours to keep. In addition, you may receive money during the games, depending on the results of the games you will play. **Keitou na qai tukuna vei dua vei kemuni me lako mai ena loma ni rumu me mai qitora e vica na qito.Bera ga ni da tekivu qito au na pasitaka yani $3 vei kemuni yadua me vakavinavinaka ni nomu yaco mai nikua. Na I lavo qo e nomu maroroya. Na kenaikuri,iko na rawata na ilavo ena gauna ni qito, vatau ga ena ka rawata ena nomu qito. We will be asking each of you to come into these rooms and to play a number of games. Before we begin the games, I will be passing $3 to every one of you to thank you for coming today. This money is yours to keep. In addition, you will be receiving money during the games depending on the results of the game you play.**

We are also going to give you an envelope with a number in it. Please keep track of this envelope with the number. No one will know your result from the games, because the person who records payments will never see you. So the number is the only thing that will make sure you can take away your payment. It will be important to show this number to ensure your payment at the end of the games. **[Let each participant draw one envelope.]** **Keitou na qai solia talega vei iko na waqa ni vola ka tu eloma na naba. Kerea me qarauni na waqanivola**
ka tiko kina na naba. Sega ni dua ena kila na vei ka o rawata mai na qito, baleta na tamata e vakaivolataka tiko na veisiaumi ena sega ni raici iko. Na naba duauda ga ena vakavuna na nomu taura na kemu isau. E ka bibi mo vakaraitaka na naba qo ka na rawa ni ko na veisiaumi ni oti na qito. We are also going to give you an envelope with a number inside.

Please keep track of this envelope with the number. No one will knows your result of the game because the person recording the payment will not be seeing you. The number is the only thing to make sure you can take away your payment. It is important to show this number to enable you to get paid after the game.

While you wait and after you leave the game, please do not talk or ask questions about the games. Once you are alone with the game administrator, you will be able to ask questions about the game. Ni ko wawa tiko se oti na nomu qito, kerea mo kakua ni vosa se taroga edua na taro me baleta na qito. Gauna ga o sa tiko duauda kina kei koya na e lewa na qito, sa qai rawa mo taroga na taro me baleta na qito. While waiting or after playing the game, please do not talk or ask any question about the game. Once you are alone with the game administrator, you will be able to ask questions about the game.

Now we will escort each of you one-by-one into a room for the first part of the study. Ena gauna qo keitou na kauti kemuni yadudua ena loma ni rumu me tekvu na matai ni vakadidike.

Now, we will be individually taking you inside the room for the first part of our research.

A.2 Information Letter

Dear Potential Participant: Kivei kemuni na via vakaitavi: Dear Potential Participant:

Dr. Joseph Henrich at the University of British Columbia is conducting a study of how people make decisions to do things for themselves and for others. Dr Joseph Henrich e na University of British Columbia e cakava tiko e dua na vakadidike, e bucini vakacava na vakatulewa ni tamata me cakava kina e so na ka me baleti ira ga kei ira na tani. Dr. Joseph Henrich at the University of British Columbia is conducting a study of how people make decisions to do things for themselves and for others.

Your participation will involve participating in a game and responding to an interview about decisions whether or not to help people. You will participate in the game and interviews individually. We will not ask for your name, address, or any other personal identity information. 200 or more people are being invited to participate in the study in a number of different countries. Your involvement should take 2 hour. All participants must be 18 years or older. Nomu vakaitavi ena wili kina na nomu vakaitavi ena qito kei na nomu sauma na
Your participation will involve participating in a game and responding to interview concerning decisions whether or not to help people. You will participate in the game and interview alone. We will not be asking your name, your address or any other personal identity information. 200 or more people are being invited to participate in the study in a number of different countries. Your involvement should take 2 hour. All participants must be 18 years or older.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there is no penalty. You can also skip questions as you wish. The results of the research study may be published, but your name and other uniquely identifying information will never be published or associated with your answers in any way. Nomu vakaitavi ena vakadidike oqo e ka ni veivuke. Kevaka ko ni digitaka moni kakua ni vakaitavi se mo ni vakasuka ena vadidike ena dua na gauna sa rawa, e sega na kena l toto. E rawa ni ko kua ni sauma na taro ke ko ni vinakata. Na sau ni taro ni vakadidikena tabaki vaka i vola, ia na yacamuni kei na so tale na i tukutuku ena sega ni tabaki vaka i vola se salamuria kei na nomuni sau ni taro. Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there is no penalty. You can also not answer the questions if you like. The answer to the questions in this research will be published in a book, but your answers will not in any way show your personal identity.

You will receive $3 for participating in the study, with a possibility of gaining $6 in the game. On average, each individual leaves with about $6. Ona taura e $3 na nomu vakaitavi ena vakadidike, ka rawa sara ni orawata e $6 ena dua na gauna ni qito. Vacaca, na tamata yadudua ena kauta lesu voleka na $6. You will receive $3 for participating in the study, with a possibility of gaining $5 in the game. On average, each individual leaves with about $6.

If you have any questions concerning the research study, please contact Joseph Henrich. Kevaka edua na nomu taro me baleta na vakadidike qo, kerekere qai veitaratara kei Joseph Henrich. If you have any questions concerning the research study, please contact Joseph Henrich.

Sincerely,
Joseph Henrich

University of British Columbia

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Kevaka e tiko na nomuni vakatataro me baleta na nomu dodonu e na nomu vakaitavi tiko e na vakadidike qo, se ko vakakila ni ko rivariva bi taka na nomu I vakaitavi, ko rawa ni na veitaratara kei na liuliu ni Human Subjects Institutional Review Board, e na ASU Office of Research Integrity and Assurance ena na naba ni talevoni (480) 965-6788. If you have any questions about your rights in participating on this research, or if feel you've been at risk about your participation, you can contact the Chair for Human Subjects Institutional Review Board, in the ASU Office of Research Integrity and Assurance on the number (480)965-6788.

Sign here or mark with an X if you agree to be part of the study. Mo saini ike se vola e dua na X kevaka ko sa vakadonuya mo vakaitavi e na vakadidike qo. Sign here or mark an X if you agree to participate in this research.

Signature or X_________________________________Date____________________

Initial here or mark with an X if you will allow us to photograph you during the study. Matanivola ni matai ni yacamu kei matanivola ni karua ni yacamu eke se vola e dua na X kevaka ko sa solia vei keitou na galala me keitou tabaki iko ena vakadidike qo. First letter of your first name and first letter of your second name here or mark an X if you have agree that we would take your photo during this research.

Initial or X ________________________

A.3 Script for Game Rules

We are about to begin the instructions for the activity. It is important that you listen as carefully as possible, because only people who understand the activity will actually be able to play. Eda sa na vakarau ni tekivu yani ena vakamacalataki ni ka mo cakava. Ena kabibi mo na vakarorogo sara vakavinaka, baleta ko ira ga era kila vinaka na ka oqo ena vakaitavi. We are about to begin with the instructions of what to do. It is important that you listen carefully because only those who know the rules will be taking part.
A.1.1 Activity A: In-Out Treatment

[Read if this is the first activity]

Now you have two cups in front of you: one belongs to a person from your Yavusa and the other belongs to a person from another island, as illustrated on the cups. You will be asked to roll a die 30 times and each die roll will tell you how to assign one 20 cent coin; each time you roll the die, you will put 20 cents in one of the two cups in front of you. After you finish today’s activities, we will deliver these two cups of money to a person randomly selected from your Yavusa and another person randomly selected from another island. You will not be informed about who will receive the money and the persons who receive the money will not know about you. Ena gauna qo e tu vei iko erua na bilo e matamu: edua e nona na tamata mai na nomu Yavusa kei na kena I karua e nona edua na tamata mai na dua tani tale na yanuyanu, ka vakaraitaki koto e na bilo. Ena kerei vei iko mo vaqiqica na daisi vaka 30 kei na dua na nomu vakaqiqica na daisi ena vakaraitaka ke ko solia I vei na na 20 na sede; ena dua na nomu vakaqiqica na daisi; ona biuta e 20 na sede vei dua veirau na bilo e tu e matamu eliu. Ni sa oti na nomuni vakaitavi, keitou na kauta na rua na bilo ilavo ki vei koya na tamata e digitaki mai na nomu Yavusa kei dua tale na tamata e digitaki mai na dua tale na yanuyanu. Ena sega ni tukuni vei iko ocei ena taura nai lavo kei na tamata e taura nai lavo ena sega ni kila na ka me baleti iko. Now you have two cups in front of you, one of the cups belongs to a person from your Yavusa and the other cup belongs to a person from the other island, as illustrated on the cups. You will be asked to roll the dice 30 times and every each of the dice you throw, you will be let known who to give the 20 cents to; each time you roll the dice, you will put a 20 cents into one of the cups in front of you. After you participate today, we will distribute the two cups containing money to the person chosen from your Yavusa and the other cup chosen from the other island. You will not be told who received the money and the person receiving the money will not be told anything about you.

[Read if this is the second activity]

Please put the two cups that you used in the previous activity on the tray. Now we will play the activity a little bit differently. Now you have 2 cups in front of you. One is for a person from your Yavusa, and the other is for a person from another island, which is a different person than the person in the previous activity. You will be asked to roll a die 30 times and each die roll will tell you how to assign one 20 cent coin; each time you roll the die, you will put 20 cents in one of the two cups in front of you. After you finish today’s activities, we will deliver these two cups of money to a person randomly selected from your Yavusa and another person randomly selected
from another island. You will not be informed about who will receive the money and the persons who receive the money will not know about you. **Kerea mo biuta na rua na bilo ko sa vakayagataka oti ena kwa sa oti ena tere. Nikua daru na cakava tale ia e duidui ga vakalailai. Gauna qo e tu e matamu erua na bilo. Edua mai vua edua na tamata mai na nomu Yavusa, kei na dua tale na tamata mai na dua tani tale na yanuyanu, ka dua tani tale na tamata mai vei koya na tamata e sa qai vakaitavi oti qo. Ena kerei vei iko mo vaqiqica tale na daisi vaka 30 ena dua na nomu vakaqiqica kina na daisi ena tukuna vei iko e vei ko na solia kina na 20 na sede; dua na gauna o vakaqiqica kina na daisi, o na biuta na 20 na sede kina dua vei rau na bilo e tu e matamu. Ni sa oti na nomu vakaitavi, keitou na kauta na rua na bilo ilavo ki vei koya na tamata e digitaki mai na nomu Yavusa kei dua tale na tamata e digitaki mai na dua tale na yanuyanu. Ena sega ni tukuni vei iko ocei e soli vua nai lavo kei koya na tamata e taura nai lavo ena sega ni kila me baleti iko.**

Please put the cups that you used in the previous activity in the tray. Now, we will be playing again but a little bit differently this time. Now you have two cups in front of you. One is for a person from your Yavusa and the other is for a person from another island, which is different person from the person participated in the previous activity. You will be asked to roll the dice 30 times and every each of the dice you throw, you will be let known who to give the 20 cents to; each time you roll the dice, you have to put a 20 cents into one of two cups in front of you. After you participate today, we will distribute the two cups containing money to a person chosen from your Yavusa and another person chosen from another island. You will not be told who is receiving the money and the person receiving the money about you.

[Read always]

You should follow these three steps to allocate each 20 cents using the die: **Mo na vakamuria e tolu na vakatagedegede me rawa ni kunea kina na 20 na sede ena nomu vakayagataka na daisi:** You will have to follow these three steps to allocate each 20 cent while using the dice:

Step 1: Please choose one of these two cups in your mind. **Vakatagedegede 1: Kerea mo digia e rua na bilo ka tu qori ena nomu vakasama.** Step 1: Please choose one of these two cups in your mind.

Step 2: Roll the die once. **Vakatagedegede 2: Vakaqiqica na daisi vakadua.** Step 2: Roll the dice once.

Step 3: The die has 6 sides: 3 sides black and 3 sides white. If the die lands with a black side facing up, you will put one of the 20 cent coins in the cup you chose in your mind in Step 1. If
the die does not land with the black face up, you will put one of the 20 cent coins in the cup that you did not choose in Step 1. **Vakatagedegede 3: E ono kece na yasa ni daisi: e 3 e loaloa ka tolu e vulavula. Kevaka e tau na daisi ena yasana loaloa ka vuki cake, oiko mo biuta na 20 na sede kina bilo o digia ena nomu vakamananu ena vakatagedegede 1: Kevaka e sega ni tau, vuki cake na daisi e na yasana loaloa, o na biuta na 20 na sede kina bilo o sega ni digitaka ena Vakatagedegede 1. Step 3: The dice has 6 sides: 3 sides black and 3 sides white. If the dice lands with the black side facing up, you will put 20 cents into the cup that you’ve chosen in your mind in Step 1. If the dice does not landed with the black side facing up, then you will have to put 20 cents into the cup that you did not choose in Step 1.**

Repeat these three steps for each of the 20 cent coins until there is no more money left. **Cakava tale na 3 na vakatagedegede vakadua na vei ya 20 na sede me yacova ni sa sega ni dua nai ilavo e vo. Repeat these three steps for each of the 20 cents coins until there is no more money left.**

Here are some examples for single rolls: **Oqo e so na kena vakaraitaki ni vakaqiqi daisi taudua: Here are some examples for single rolls:**

For example, suppose that you chose the cup for the person from your Yavusa in Step 1. Then you roll the die once. If the die lands with a black side up, you will place one of the 20 cent coins in cup for the person from your Yavusa. If the die does not land with a black side up, you will place one of the 20 cent coins in the cup for the person from another island. **Vakacava kevaka o digia na bilo nei koya na tamata mai na nomu Yavusa ena Vakatagedegede 1. Ka o vakaqiqica na daisi vakadua. Kevaka na daisi e tau na yasana loaloa icake, ko na biuta edua na 20 na sede kina bilo nei koya na tamata mai na nomu Yavusa. Kevaka na daisi e sega ni tau na yasana loaloa cake, ko na biuta na 20 na sede kina bilo nei koya na tamata mai na dua tani tale na yanuyanu. For example, suppose you chose the cup of the person chosen from your Yavusa in Step 1. Then you roll the dice once. If the dice lands with a black side up, you will place 20 cents in the cup of the person from your Yavusa. If the dice does not land with a black side up, you will place 20 cents in the cup of the person from another island.**

Here is another example. Suppose that you chose the cup of the person from another island in Step 1. Then you roll the die once. If the die lands with the black side up, you will place 20 cents in the cup of the person from the other island cup. If the die does not land with the black side up, you will place 20 cents in the cup of the person from your Yavusa. **Oqo edua tale na kenai vakaraitaki. Vacava kevaka o digia na bilo nei koya na tamata main a dua tani tale na yanuyanu ena Vakatagedegede 1. Ka o qai vakaqiqica na daisi vakadua. Kevaka na daisi...**
e tau na yasana loaloa, ko na biuta e 20 na sede kina bilo nei koya na tamata mai na dua tale na yanuyanu. Kevaka na daisi esega ni tau na yasana loaloa cake, ko na biuta e 20 na sede vei koya na tamata mai na nomu Yavusa. Here is another example. Suppose that you chose the cup of the person from another island in Step 1. Then you roll the dice once. If the dice lands with the black side up, you will place 20 cents in the cup of the person from another island. If the dice does not land with the black side up, you will place 20 cents in the cup of the person from your Yavusa.

Now I am going to ask you some questions to see if you understand the activity: Gauna qo au na tarogi iko eso na taro meu raica kina ni ko sa kila vinaka na I tavi qo: Now I am going ask you series of questions to see if you’ve properly understood the activity:

[RA’s check the answers given to make sure they are correct.]

Suppose that you chose the cup of the person from your Yavusa in Step 1. When you roll the die it lands with the black side up. Which cup should you place the 20 cents in? [Correct  

Suppose that you chose the cup of the person from another island in Step 1. When you roll the die it lands with the black side up. Which cup should you place the 20 cents in? [Correct  
Answer: the cup of the person from another island.] Vakacava kevaka o digia na bilo nei koya na tamata mai na dua tani tale na yanuyanu ena Vakatagedegede 1. Qai o vakaqiqica na daisi ka tau na yasana loaloa cake. Na bilo cava e dodonu mo biuta kina na 20 na sede iloma? Suppose that you chose the cup of the person from another island in Step 1. When you roll the dice it lands with the black side up. Which cup should you place the 20 cents in?

Suppose that you chose the cup of the person from another island in Step 1. When you roll the die it does not land with the black side up. Which cup should you place the 20 cents in?  
[Correct Answer: the cup of the person from my [your] Yavusa] Vakacava kevaka o digia na bilo nei koya na tamata mai na dua tani tale na yanuyanu ena Vakakatagedegede 1. Ena gauna o vakaqiqica kina na daisi qai sega ni tau na yasana loaloa cake. Na bilo cava e dodonu mo biuta kina na 20 na sede e loma? Suppose you chose the cup of the person from
another island in Step 1. When you roll the die it does not land with the black side up. Which cup should you place the 20 cents in?

Suppose that you chose the cup of the person from your Yavusa in Step 1. When you roll the die it does not land with the black side up. Which cup should you place the 20 cents in?

[Correct Answer: the cup of the person from the other island] Vakacava kevaka o digia na bilo nei koya na tamata mai na nomu Yavusa ena Vakakatagedegede 1. Ena gauna o vakaqiqica kina na daisi qai sega ni tau na yasana loaloa cake. Na bilo cava e dodonu mo biuta kina na 20 na sede e loma? Suppose that you chose the cup of the person from your Yavusa in Step 1. When you roll the die, it does not land with the black side up. Which cup should you place the 20 cents in?

How many times will you roll the die in this activity? [30 times] E vica kece na gauna e dodonu mo vakaqiqica kina na daisi ena vakaitavi qo? How many times will you roll the dice in this activity?

Will the money allocated by you be delivered to the person from your Yavusa and to the person from the other island? [Yes] Nai lavo ena soli qo vei iko ena vakau li, ki vei koya na tamata main a nomu Yavusa kei koya mai na dua tale na yanuyanu? The money allocated to you, will it be delivered to the person from your Yavusa and to the person theron another island?

[RA: if the person has answered all the questions correctly proceed; if not return to the examples or re-ask the questions they got wrong]

You have answered all the questions correctly. Do you have any questions? ...You are about to start the activity. O sa sauma kece kece na taro vakadodonu. E dua beka na nomuni vakatataro?... O sa vakarau tekvu ena I vakaitavi qo. You have answered all the questions correctly. Do you have any other questions?......You are about to start the activity.

Here are the two cups, one for the person from your Yavusa and the other for the person from the other island. Here are 30 coins worth 20 cents each. You will roll a die 30 times to decide which cups to place each 20 cent coin in. While I am outside, please follow the instructions we just talked about. Let me know when you are finished rolling and putting money in the cups.

Oqo o rau na bilo, e dua vei koya na tamata mai na nomu Yavusa kei na dua tale vua na tamata mai na so na yanuyanu. Oqo e 30 na koidi ka tau ya 20 na sede dua. O na vakaqiqica na daisi vaka 30 na gauna mo vakasamataka na bilo cava mo biuta kina na 20 na sede e loma. Ena gauna au tiko kina I tuba, kerekere mo qai vakamuria na lawa daru
se qai veitalanoataka oti. Qai tukuna mai vei au na gauna sa oti kina na nomu vakaqiqica ka biuta nai lavo ena loma ni biolo. Here are the two cups, one for the person from your Yavusa and the other for the person from the other island. Here are 30 coins worth 20 cents each. You will roll the dice 30 times and decide which cup should you place each of the 20 cents in. While I am outside, please, follow the instructions that we’ve just talk about. Let me know when you are finished with the rolling and placing of money in the cups.

[After participant is finished with the activity, ask subjects to take the cups and put them on a tray in the room after each activity.]

A.1.2 Activity B: Self-Out Treatment

[Read if this is the first activity]

Now you have two cups in front of you: one belongs to you and the other belongs to a person from another island, as illustrated on the cups. You will be asked to roll a die 30 times and each die roll will tell you how to assign one 20 cent coin; each time you roll the die, you will put 20 cents in one of the two cups in front of you. After you finish today’s activities, you can keep the money in your cup and we will deliver the other cup of money to a person randomly selected from another island. You will not be informed about who would receive the money and the person who receives the money will not know about you. Ena gauna qo e tu vei iko erua na biolo e matamu: edua e nomu, ka dua e nona edua na tamata mai na dua tani tale na yanuyanu, me vaka sa vakaraitaki toka e na biolo. Ena tukuni vei iko mo vaqiqica na daisi vaka 30 na gauna kei na dua na nomu vakaqiqica na daisi ena tukuna vei iko kena soli ki vei edua na 20 na sede; ena dua na nomu vakaqiqica na daisi; ona biuta e 20 na sede vei dua veirau na biolo e tu e matamu. Ni sa oti na nomu vakaitavi, o rawa ni maroroya nai lavo ena nomu biolo ka keitou na kauta na karua na biolo ilavo ki vei koya na tamata e digitaki mai na dua tani tale na yanuyanu. Ena sega ni tukuni vei iko ocei ena taura nai lavo kei na tamata e taura nai lavo ena sega ni kilan na ka me baleti iko. Now you have two cups in front of you: one belongs to you and the other belongs to a person from another island, as illustrated on the cups. You will be asked to roll the dice 30 times and each roll of the dice will tell you who to give the 20 cents to: each time you roll the die, you will place the 20 cents in one of the two cups in front of you. After you finished today’s activities, you can keep the money in your cup and we will deliver the other cup of money to a person randomly selected from another island. You will not be informed about who would receive the money and the person who received the money won’t know anything about you.
[Read if this is the second activity]

Please put the two cups that you used in the previous activity in the tray. Now we will play the activity a little bit differently. Now you have two cups in front of you, one is your cup and the other is for a person from another island, which is a different person than the person in the previous activity. *Kerea mo biuta na rua na bilo ko sa vakayagataka ena I tavi sa oti ena tere. Gauna qo keidaru na vakaitavi tale ia oqo sa na duidui vakalailai. Gauna qo e tu e matamu erua na bilo. dua e nomu bilo kei na kena I karua nei koya edua na tamata mai na dua tale na yanuyanu, ka dua tani na tamata mai vua na tamata e vakaitavi sa oti.* Please place the two cups that you've used in the previous task in the tray. Now we will do it again but a bit differently. Now you have two cups in front of you, one is your cup and the other is for a person from another island, which is a different person from the previous activity.

You will be asked to roll a die 30 times and each die roll will tell you how to assign one 20 cent coin; each time you roll the die, you will put 20 cents in one of the two cups in front of you. After you finish today's activities, you can keep the money in your cup and we will deliver the other cup of money to a person randomly selected from another island. You will not be informed about who would receive the money and the person who receives the money will not know about you.

*Ena tukuni vei iko mo vaqiqica na daisi vaka 30 e na dua na nomu vakaqiqica na daisi ena tukuna vei iko kivei cei ko na solia kina edua na 20 na sede; ena vei gauna o vakaqiqica kina na daisi, ko na biuta 20 na sede kina dua vei rau na bilo e tu e matamu. Ni sa oti na nomu vakaitavi, keitou na kauta na rua na bilo ilavo ki vei koya na tamata e digitaki mai na dua tale na yanuyanu. Ena sega ni tukuni vei iko ocei e soli vua na lavo kei koya na tamata e taura na lavo ena sega ni kila me baleti iko.* You will be asked to roll the dice 30 times and each dice roll will tell you who to give 20 cents to; each time you roll the dice, you will put 20 cents in one of the two cups in front of you. After you finished today's activities, you can keep the money in your cup and we will deliver the other cup of money to the person selected from another island. You will not be told of who receive the money and the person receiving money will not know about you.

[Read always]

You should follow these three steps to allocate each 20 cents using the die: *Mo na vakamuria e tolu na vakatagedegede me rawa ni kunea kina na 20 na sede ena nomu vakayagataka na daisi:* You will have to follow these three steps to allocate each 20 cent while using the dice:
Step 1: Please choose one of these two cups in your mind. Vakatagedegede 1: Kerea mo digia e rua na bilo ka tu qori ena nomu vakasama. Step 1: Please choose one of these two cups in your mind.

Step 2: Roll the die once. Vakatagedegede 2: Vakaqiqica na daisi vakadua. Step 2: Roll the dice once.

Step 3: The die has 6 sides: 3 sides black and 3 sides white. If the die lands with a black side facing up, you will put one of the 20 cent coins in the cup you chose in your mind in Step 1. If the die does not land with the black face up, you will put one of the 20 cent coins in the cup that you did not choose in Step 1. Vakatagedegede 3: E ono kece na yasa ni daisi: e 3 e loaloa ka tolu e vulavula. Kevaka e tau na daisi ena yasana loaloa ka vuki cake, oiko mo biuta na 20 na sede kina bilo o digia ena nomu vakanananu ena vakatagedegede 1: Kevaka e sega ni tau, vuki cake na daisi e na yasana loaloa, o na biuta e 20 na sede kina bilo o sega ni digitaka ena Vakatagedegede 1. Step 3: The dice has 6 sides: 3 sides black and 3 sides white. If the dice lands with the black side facing up, you will put 20 cents into the cup that you’ve chosen in your mind in Step 1. If the dice does not landed with the black side facing up, then you will have to put 20 cents into the cup that you did not choose in Step 1.

Repeat these three steps for each of the 20 cent coins until there is no more money left. Cakava tale na 3 na vakatagedegede vakadua na vei ya 20 na sede me yacova ni sa sega ni dua nai ilavo e vo. Repeat these three steps for each of the 20 cents coins until there is no more money left.

Here are some examples for single rolls: Qo o so na kena vakaraitaki ni vakaqiqi daisi taudua: Here are some examples for single rolls:

For example, suppose you chose your cup in Step 1. Then you roll the die once. If the die lands with a black side up, you will place one 20 cent coin in your cup. If the die does not land with a black side up, you will place one 20 cent coin in the cup of the person from the other island. Kenai vakaraitaki, vacava o digitaka edua na bilo ena vakatagedegede 1. Qai vakaqiqica na daisi vakadua. Kevaka na tau na daisi ena yasana loaloa cake, ko na biuta e dua na 20 na sede ena nomu bilo. Kevaka na nomu daisi e sega ni tau na yasana loaloa cake, ko na biuta e dua na 20 na sede koidi ena bilo vei koya na tamata mai na dua tani tale na yanuyanu. For example, suppose you chose a cup in Step 1. Then you roll the dice once. If the die lands with the black side up, you will place 20 cents in your cup. If the dice does not land
with the black side up, you will place one 20 cents coin in the cup of the person from another island.

Here is another example. For example, suppose you chose the cup of the person from the other island in Step 1. Then you roll the die once. If the die lands with the black side up, you will place one 20 cent coin in the cup of the person from the other island. If the die does not land with the black side up, you will place one 20 cent coin in your cup. Oqo e dua tale na kenai vakaraitaki. Kenai vakaraitaki, kevaka ko digitaka na bilo nei koya na tamata mai na so tale na yanuyanu ena vakatagedegede 1. Qai ko vakaqiqica na daisi vakadua. Kevaka e tau na yasana loaloa icake, ko na biuta edua na 20 na sede koidi ena bilo nei koya na tamata mai na so tale na yanuyanu. Kevaka na daisi e sega ni tau nay asana loaloa icake, ko na biuta edua na 20 na sede ena nomu bilo. Here is another example. For example, suppose you chose the cup of the person from another island in Step 1. Then you roll the die once. If it lands black side up, you will put 20 cents on the cup of the person from some other island. If the die doesn’t land black side up, you will put the 20 cents in your cup.

[RA's check the answers given to make sure they are correct]

Now I am going to ask you some questions to see if you understand the activity: Gauna qo au na tarogi iko eso na taro meu raica ni ko sa kila nai tavi qo: Now I am going to ask you some questions to see if you have understand this activity:

Suppose that you chose your cup in Step 1. When you roll the die it lands with the black side up. Which cup should you place the 20 cent coin in? [Correct Answer: my cup [your] cup] Vakacava ke o digitaka edua na nomu bilo ena vakatagedegede 1. Ena nomu vakaqiqica na daisi ka tau na yasana loaloa cake. Na bilo cava ko na biuta kina na 20 na sede iloma? Suppose if you chose your cup in Step 1. When you roll the dice it lands with the black side up. In which cup should you place the 20 cents in?

Suppose that you chose the cup of the person from the other island in Step 1. When you roll the die it lands with the black side up. Which cup should you place the 20 cents in? [Correct Answer: the cup of the person from another island] Vakacava ke o digitaka na bilo nei koya na tamata mai na dua tani tale na yanuyanu ena vakatagedegede 1. Ena nomu vakaqiqica na daisi ka tau na yasana loaloa cake. Na bilo cava ko na biuta kina na 20 na sede iloma? Suppose that you chose the cup of the person from another island in Step 1. When you roll the dice it lands with the black side up. In which cup should you place the 20 cents in?
Suppose that you chose the cup of the person from another island in Step 1. When you roll the die it does not land with the black side up. Which cup should you place the 20 cents in?

[Correct Answer: my cup [your] cup.]

Suppose that you chose the cup of the person from another island in Step 1. When you roll the die it does not land with the black side up. In which cup should you place the 20 cents?

Suppose that you chose your cup in Step 1. When you roll the die it does not land with the black side up. Which cup should you place the 20 cents in?

[Correct Answer: the cup of the person from another island]

Suppose that you chose your cup in Step 1. When you roll the die it does not land with the black side up. In which cup should you place the 20 cents in?

How many times will you roll the die in this activity? [30 times] How many times will you roll the die in this activity?

Will the money allocated by you be given to you and delivered to the person from the other island? [Yes] Will the money allocated by you be given back to you and be delivered to the person from another island?

[RA: if the person has answered all the questions correctly proceed; if not return to the examples or re-ask the questions they got wrong]

You have answered all the questions correctly. Do you have any questions? …You are about to start the activity. O sa sauma donu kece na taro. E dua li beka na nomu taro?….. Ko sa vakarau tekivu vakaitavi. You have answered all the questions correctly. Do you have questions?…..You are about to start with the activity.

Here are the two cups, one for you and the other for the person from the other island. Here are 30 coins. You will roll a die 30 times to decide which cup to place each coin in. While I am outside, please follow the instructions we just talked about. Let me know when you are finished rolling and putting money in the cups. Oqo o rua na bilo, e dua vei ikokau ki vua na tamata mai na so tale na yanuyanu. Oqo e 30 na koidi. Ko na vakaqiqica na daisi vaka 30 na gauna mo vakatulewakata na bilo cava mo na biubiuta kina na vei koidi iloma. Ena
gauna au sa tiko kina I tuba, kerekere mo qai vakamuria na lawa daru se qai veitalanoataka oti. Qai tukena mai vei au na gauna sa oti kina na nomu vakaqiqica ka biuta nai lavo ena loma ni bilo. Here are the two cups, one for you and the other for the person from some other island. Here are 30 coins. You will roll the dice 30 times to decide which cup to place each coin in. While I am outside, please follow the instructions we’ve just talk about. Tell me when you’ve finished with rolling and putting money in the cups.

[After each participant is finished with the activity, ask subjects to take the cups and put them on a tray in the room after each activity.]

After finishing the second activity:

Now, please go to the next room where you will wait for someone to ask you some questions. Please take this tray of cups with you. After you have answered these questions, you will go to another room to receive your payment for the activity. Gauna qo, kerekere mo lako kina karua ni rumu ko na waraka edua me tarogi eso na taro. Kerekere qai kauta na tere bilo qo vata kei iko. Ni oti na nomu sauma na vei taro, ko na lako kina dua tale na rumu mo laki taura mai kina na isau ni vakaitavi. This time, please go to the second room where you will wait for someone to ask some questions. Please take this tray of cups with you. After you have finished answering the questions, you will go to another room to receive your payment for the activity.

[The player is then guided to the waiting location separate from those who have played.]

[Once a player has played the activity, each player is given a one-on-one interview.]

A.4 Material Insecurity Questions

Now I will ask you a number of questions about things that you might worry about. Please answer yes or no. If you don’t know for certain, then please provide your best guess, but let the researcher know that you guessed. Ena gauna qo au na tarogi iko eso na taro me baleta eso na ka odau leqatakata tu. Kerea mo sauma mai ena lo se sega. Kevaka osega saraga ni kila, qai kerea mo na qai qesi ga mai, mo qai vakaraitaka ga mai vei koya e veitori tiko ni ko gesitaka tiko. At this time I am going to ask you about some things that you are worried about. Please answer in yes or no. If you really don’t know, then please just guess, so you should let the person incharge that you guess the answer.

[RA: if the “b” question about being a “guess” don’t make sense in this context, these can be ignored (not asked)]
A.1.3 Food Insecurity

Do you worry that in the next month your household will have a time when it is not able to buy or produce enough food to eat? O bau leqataka tu ena vula mai oqo na nomu matavuvala ena sotava na gauna sa na sega ni rawa ni volivoli se rawata mai na kakana me laukana? Are you worried about next month that your family will meet the time that you cannot buy or able to get food to be eaten?

Do you worry that in the next six months your household will have a time when it is not able to buy or produce enough food to eat? O bau leqataka tu ena vula ono mai oqo na nomu matavuvala ena sotava na gauna sa na sega ni rawa ni volivoli se rawata mai na kakana me laukana? Io se Sega? Are you worried about the next six months that your family will meet the time that you cannot buy or able to get food to be eaten?

Do you worry that in the next year your household will have a time when it is not able to buy or produce enough food to eat? O bau leqataka tu ena yabaki mai oqo na nomu matavuvala ena sotava na gauna sa na sega ni rawa ni volivoli se rawata mai na kakana me laukana? Are you worried about next year that your family will meet the time that you cannot buy or able to get food to be eaten?

Do you worry that in the next five years your household will have a time when it is not able to buy or produce enough food to eat? O bau leqataka tu ena lima na yabaki mai oqo na nomu matavuvala ena sotava na gauna sa na sega ni rawa ni volivoli se rawata mai na kakana me laukana? Are you worried about next five years that your family will meet the time that you cannot buy or able to get food to be eaten?

A.1.4 Financial Insecurity

Do you worry that your household will have to pay for a big event (such as a wedding, funeral, festival, or illness in the family whether planned or not) in the next month that your household will not be able to pay for alone? O bau leqataka na nomu matavuvala ena vakarau cakava edua na soqo levu ka na saumi vakailavo (me vaka na vakamau, so mate, soqo ni marau, se dua e tauvimate ena loma ni vuvale okoya e tuvatuva kataka kei koya e sega) ena vula mai oqo ka na nomu matavuvala ena sega ni rawa ni sauma duada? Are you worried that your family is about to do a big event and will require a lot of money (like weddings, funeral, happy gatherings, or if someone in the family is sick or there is someone in the family is about to be given traditional/modern gifts [newly weds] and those that are not) in the next month and your family wont be able to pay by themselves?
Do you worry that your household will have to pay for a big event (such as a wedding, funeral, festival, or illness in the family) in the next six months that your household will not be able to pay for alone? 

O bau leqataka na nomu matavuvale ena vakarau cakava edua na soqo levu ka na saumi vakailavo (me vaka na vakamau, so mate, soqo ni marau, se dua e tauvimate ena loma ni vuvale) ena vula ono mai oqo ka na nomu matavuvale ena sega ni rawa ni sauma duadua? Are you worried that your family is about to do a big event and will require a lot of money (like weddings, funeral, happy gatherings, or if someone in the family is sick) in the next six months and your family won’t be able to pay by themselves?

Do you worry that your household will have to pay for a big event (such as a wedding, funeral, festival, or illness in the family) in the next year that your household will not be able to pay for alone? 

O bau leqataka na nomu matavuvale ena vakarau cakava edua na soqo levu ka na saumi vakailavo (me vaka na vakamau, so mate, soqo ni marau, se dua e tauvimate ena loma ni vuvale) ena yabaki mai oqo ka na nomu matavuvale ena sega ni rawa ni sauma duadua? Are you worried that your family is about to do a big event and will require a lot of money (like weddings, funeral, happy gatherings, or if someone in the family is sick) next year and your family won’t be able to pay by themselves?

Do you worry that your household will have to pay for a big event (such as a wedding, funeral, festival, or illness in the family) in the next five years that your household will not be able to pay for alone? 

O bau leqataka na nomu matavuvale ena vakarau cakava edua na soqo levu ka na saumi vakailavo (me vaka na vakamau, so mate, soqo ni marau, se dua e tauvimate ena loma ni vuvale) ena lima na yabaki mai oqo ka na nomu matavuvale ena sega ni rawa ni sauma duadua? Are you worried that your family is about to do a big event and will require a lot of money (like weddings, funeral, happy gatherings, or if someone in the family is sick) next five years and your family won’t be able to pay by themselves?

If you said that you worried about paying for a big event, what kinds of events were you thinking of? 

Kevaka o tukuna ni ko leqataka tiko mo sauma eso na soqo lelevu, na mataqali soqo vakacava o nanuma tiko? If you said that you are worried to pay some of the big event, what particular event are you thinking about?

A.5 Negativity Scores

Now we will ask you to tell us how much the following qualities describe the some human and supernatural things we have been asking you questions about. Here is a scale that we would like you to use to tell us how much these apply. This end of the scale [RA points to 1] means
completely agree that this trait is a good description of that being or person, while this end [RA points to 7] means that you completely disagree that this word is a good description of that being or person. The middle [RA points to 4] means that you neither agree nor disagree with this word as a good description. Keitou na via tarogi iko kevaka iko rawa ni tukuna na levu ni tovo e vakamacalataka me baleta na tamata kei na veika vaka. Oqo e dua na laini ko rawa ni dusimaka me vakaraitaka na bibi ni vosa. Ena I cavacava ni laini oqo e kenai balebale ni sa taucoko na nomu vakaio ni dusidusi oqo sa I vakaraitaki vinaka ni dua na ka bula se tamata, ia ena I cavacava oqo e kenai balebale ni taucoko na nomu sega ni vakaio ni dusidusi oqo e vakamacalataka vakavinaka ni dua na ka bula se tamata. Na lomadonu ni laini e kena I balebale ni ko rawa ni vakaio se vakasega ni vosa oqo e rauta vinaka na i vakamacala. Now we will ask you to tell us how much the following qualities describe the some human and supernatural things we have been asking you questions about. Here is a scale that we would like you to use to tell us how much these apply. This end of the scale means completely agree that this trait is a good description of that being or person, while this end means that you completely disagree that this word is a good description of that being or person. The middle means you neither agree or disagree with this word as a good description.

Using the scale I just showed you, please point to the number for how much you agree with the following statements: “[Person or being] is [Compassionate].” Mai na vakayagataki ni laini au sa qai vakaraitaka vei iko, au kerea mo dusia vei au na naba me vakaraitaka na nomu vakaio ena yatuvosa ka koto era: “[Tamata se ka bula] e[Yalololoma]].” Using the scale I just showed you, please point to the number for how much you agree with the following statements: “[Person or being] is [Compassionate].”

<table>
<thead>
<tr>
<th>Quality</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kind</td>
<td>Dau loloma</td>
</tr>
<tr>
<td>Punishing</td>
<td>Veitotogitaki</td>
</tr>
<tr>
<td>Forgiving</td>
<td>Veivosoti</td>
</tr>
<tr>
<td>Gentle</td>
<td>Yalomalua</td>
</tr>
<tr>
<td>Peaceful</td>
<td>Vakacegu</td>
</tr>
<tr>
<td>Angry</td>
<td>Cudru</td>
</tr>
<tr>
<td>Loving</td>
<td>Veilomani</td>
</tr>
<tr>
<td>English</td>
<td>Bantu</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Fearsome</td>
<td>Vakarerevaki</td>
</tr>
<tr>
<td>Terrifying</td>
<td>Vakadomobula</td>
</tr>
<tr>
<td>Harsh</td>
<td>vakaukauwa</td>
</tr>
<tr>
<td>Comforting</td>
<td>Vakaceguya</td>
</tr>
<tr>
<td>Vengeful</td>
<td>dauveisausaumitaki</td>
</tr>
<tr>
<td>Jealous</td>
<td>Vuvu</td>
</tr>
<tr>
<td>Compassionate</td>
<td>Yalololoma</td>
</tr>
</tbody>
</table>
Appendix B: Site Background Information

B.1. Local Geography

The two villages involved in this field site are located on Yasawa Island, the northern-most island of the Yasawa island chain. This volcanic chain is located on the Western edge of the Fijian archipelago (See Figure 2.1). Historical periods of deforestation from human habitation, along with this relatively dry climate as compared to Eastern Fiji, contribute to making island’s interior volcanic hills semi-arid scrubland. Though the interior of the island is dry, the outer edges near the coast and areas near interior streams can be lush. The island’s shallow volcanic ledges are rimmed with diverse coral reefs.

B.2. History and Language

Yasawa island has been inhabited throughout most of the past couple thousand years, though its arid landscape contributed to various periods of decline. The ancestors of the current inhabitants seem to have come from other groups of people located on the south western edge of the main island, with whom they share linguistic similarities distinct from the Standard (Bauan) Fijian derived from dialects originating in the East (Bentley, 2000; Clark, 2009; Cochrane & Neff, 2006; Pawley & Sayaba, 2003). The history of somewhat sporadic inhabitation within the island continues to the present day, as both villages seem to be in a historically low population phase as compared to the previous eight years of contact they have had with researchers associated with this site.

The villagers speak a distinct local dialect that is discernable even from other villages on the island, and nearly unintelligible for speakers of standard Fijian (the Fijian Lingua Franca). Along with Standard Fijian, Fiji also holds English as one of its official languages. English is taught along with Standard Fijian in schools. Despite this, few villagers speak much English.

B.3. Housing

The villages are located just feet from the beaches along the central, eastern edge of the island. Housing consists of small structures, called bure, ranging from one to several rooms, with curtains as the main method of room demarcation. These houses are made of either traditional materials including reeds and dried palm leaves, or from cinder blocks and corrugated metal. Most houses also have a separate kitchen hut for the fire pit where meals are prepared and served. Running water comes through pipes from the local stream but is subject to the tides for water pressure. The villages each have a recently install gasoline-powered electricity generator (provided by the military government) that can be turn for special occasions when fuel is
available; otherwise there is no electricity (in Teci, the researchers have a tradition reed-thatch bure, equipped with solar panels for computers and other research equipment).

B.4. Local Resource Production

As a result of the inconstant supply of external food resources, a large portion of the Yaswan diet comes from horticultural cultivation of small family-based garden plots along the arid interior of the island, which are for within-household consumption. The starchy plants forming the majority of the villagers’ caloric intake include various root crops, especially cassava and yams, as well as the breadfruit they collect from locally tended trees. The lush areas around the coast and island streams support cultivation of various fruits, including papaya, mango, lemon, and several species of banana. As with many tropical islands, coconut trees can be found in abundance all along this rim of vegetation and are an ingredient in nearly every Yasawan meal. The real bounty of the island, however, comes from the diverse coral reefs rimming the coast. Villagers use three main fishing techniques: spear diving, nets, and line fishing. In particular, the spear diving techniques are almost exclusively used among men, and are dangerous. Additionally, women and children collect several species of shellfish and seaweed along the volcanic rocks in the intertidal zone between the reefs and beaches. For important occasions, some villagers also keep domestic animals including chickens, sheep, goats, and pigs. There are some horses, which are used for transportation.

Home production not consumed within the household is the primary means Yasawans have to access currency. Bêche-de-mer and lobster continue to be high-ticket items. In addition to seafood, the villagers also collect seashells for sale to tourists. Plant production of root and fruit crops also forms a high percentage of local incomes, as do collection of land fauna such as land crabs. Though the majority of fish and crop-based income is attributed to men, women are largely in charge of processing food for consumption. Products of women’s labour include coconut-derived oils for sale to tourists as well as large woven mats made from dried pandanus tree leaves. These woven mats are essential parts of the traditional Fijian wedding ceremony, are only woven by women, and are in constant demand among women in the larger towns who have often lost the cultural knowledge of how to make these mats. Some villagers also purchase extra items at the markets and re-sell them to other villagers as a means of personal income. Other sources of income include work at one of the local resorts. An average of two villagers are employed at a resort at any given time.
B.5. Political Organization

The political organization linking the villages of Teci and Dalomo derives from traditional Fijian kinship structures. The two villages together form one yavusa, the largest kinship unit in the Fijian system, which is ruled over by a single chief, or turaga ni Yavusa. Within the yavusa, several clans, or mataqali form the next level of association. These mataqali can be further broken down into itokatoka or extended households, which unite various nuclear families and are generally led by the eldest male of the itokatoka. The senior male of the highest-ranked itokatoka will in turn lead the mataqali. The leaders of the mataqali form a council of elders, which work along with the chief to make decisions within the Yavusa. A village headman, or turaga ni koro, is elected to handle affairs with non-traditional governmental bodies, though he has less power than the chief or the elders, except under exceptional circumstances. The leaders within the Christian churches may also have a large impact on political decisions, though the current church hierarchy seems to have little direct impact on village affairs in Teci or Dalomo at this time (For more on political organizations in Fiji, see Henrich & Henrich, 2010; Torren, 1990). Because of its stance as the largest unit of political organization on Yasawa Island, the yavusa was chosen as the unit of analysis for the in-group for this project.


Beyond provision of public services relating to basic education and health care, governmental impact on daily life in the villages is minimal. Teci is home to the primary school servicing the two villages and covers grades 1-8. To pursue an education beyond primary school (which has been rare until recently), students must move further south in Yasawa group or to Viti Levu. At present, all children attend primary school as long as teachers are available. However, advancement beyond primary school is largely contingent upon the funding available from their parents and family connections for a place to live while attending high school. Teachers are disbursed throughout Fiji by a central governmental authority, so most teachers originally came from other parts of the country. Teci also has a nurse’s station, staffed by the central government, though the nurse has only occasionally been in residence over the last decade.

Recent extensions of the Fijian telecom infrastructure have made cellular phone network access available within the villages. Basic cell phones are now among the most common electronics owned by the villagers. Service has improved so much as to allow daily use of dial-up speed Internet over the network, though no one (aside from the researchers) has a computer. While telecom access has been present in the villages for two years, the increase in cellular network strength this is a recent development starting in June of 2011. More frequently, villagers
occasionally use battery-powered radios (some of the other most common electronics) to listen to music and news broadcast from the main island.
Appendix C: Additional Methodological Details

The supernatural and secular negativity scores were calculated from data collected for a separate religious priming study conducted over two weeks. Though the village of Dalomo was the only one to participate in the die game study, both Teci and Dalomo participated in the prior religious priming study. This study ended one week prior to the beginning of the study including the die game measure of cheating. The basic procedural details of the religious priming study are outlined below.

C.1 Week 1

The religious priming study from which negativity scores were calculated ran over two weeks. The first week was the neutral phase. This design was used to allow for individual participants to serve as their own control, rather than adding the need for an additional group of participants in a neutral priming condition. This within-participant baseline was collected in an effort to compensate for the necessarily small samples sizes available.

C.1.1 Neutral Prime

The neutral prime consisted of an explicit reminder of the non-religious and non-social (thus neutral) topic of yams. A female Fijian research assistant asked participants a series of interview-style questions about yams.

C.1.2 Dictator Game

Following the interview, participants moved to a separate part of the house where the experiment was being conducted. Here, a male Fijian research assistant explained the Dictator Game. Participants were told that they were being asked to make a decision about how to distribute $10 FJD – worth approximately one day’s wage – in $1 Fijian coins. The recipient of the game was an anonymous stranger from the other side of the main island. This recipient was selected as a strong test of the theory that religious reminders help boost cooperation beyond just helping those seen as a member of an in-group. Following these instructions, the research assistant left the room so that the participant could make his or her decision in private.

C.1.3 Post-Game Interview

Following the end of the Dictator Game in week 1, participants were asked a short series of questions about their comprehension of the study. These questions included memory for the
interview questions, memory for the money decision task, and what they thought the money decision portion of the study was about.

C.2 Week 2

C.2.1 Experimental Prime

The interview changed from within to between subjects. In week 2, one third of the sample answered questions about the Bible God, one-third answered questions about the Kalou-vu, and one third answered questions about the police. The Kalou-vu questions focused on a specific local deity called Limakai (“hand stick”) because of its close associations with the villages and its frequent reference in previous interview data. While most participants reported having some knowledge of Limakai, a few did not. Those who said they did not know what Limakai was were instead asked to answer about the Kalou-vu in general.

C.2.2 Dictator Game

The Dictator Game format was identical in week 1 and 2.

C.2.3 Post-Game Interview

The post-game interview in week 2 added the supernatural and secular negativity scale (see chapter 3 section 1.2). The male Fijian research assistant who conducted the post-game interview carefully explained the scale to participants, then asked them to point to the appropriate number to rate each adjective for each agent (Bible God, Kalou-vu, police) being rated. Similarly to the interview prime questions, if participants did not know what Limakai was, they answered about Kalou-vu in general. Subsequent priming interview and Dictator Game comprehension questions were the same as week 1.

Figure C.1 Likert Scale for Negativity Questions Showing Fijian Translations and Pictographic Scale Orientation Guides

![Taucoko, Vakawasoma, Vagauna, Ko vakaio, Vagauna, Vakawasoma, Taucoko, nomu, vakaio, nomu, vakaio, nomu, se sega, nomu, vakasega, nomu, vakasega, nomu, vakasega]
### Appendix D: Regression Tables

#### Table A.1  Negativity by Short and Long-Term Insecurity Interactions

Coefficients are expressed in logits to facilitate interpretation of interaction effect size. BG= Bible God, KV= Kalou-vu, P= Police, FI= Food Insecurity, EI= Financial Insecurity, S= Short-term, L= Long-term.

<table>
<thead>
<tr>
<th></th>
<th>BG*FIS</th>
<th>BG*FIL</th>
<th>BG*EIS</th>
<th>BG*EIL</th>
<th>KV*FIS</th>
<th>KV*FIL</th>
<th>KV*EIS</th>
<th>KV*EIL</th>
<th>P*FIS</th>
<th>P*FIL</th>
<th>P*EIS</th>
<th>P*EIL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient</td>
<td>-0.39</td>
<td>-0.8'</td>
<td>-0.51</td>
<td>-0.53*</td>
<td>-0.2'</td>
<td>-0.28**</td>
<td>-0.11</td>
<td>-0.18</td>
<td>0.19</td>
<td>0.16</td>
<td>0.11</td>
<td>-0.12</td>
</tr>
<tr>
<td>SE</td>
<td>0.32</td>
<td>0.43'</td>
<td>0.46</td>
<td>0.25*</td>
<td>0.11'</td>
<td>0.09**</td>
<td>0.25</td>
<td>0.13</td>
<td>0.12</td>
<td>0.11</td>
<td>0.16</td>
<td>0.12</td>
</tr>
<tr>
<td>z</td>
<td>-1.2</td>
<td>-1.88</td>
<td>-1.11</td>
<td>-2.11</td>
<td>-1.81</td>
<td>-3.12</td>
<td>-0.44</td>
<td>-1.48</td>
<td>1.55</td>
<td>1.54</td>
<td>0.67</td>
<td>-1.04</td>
</tr>
<tr>
<td>p</td>
<td>0.23</td>
<td>0.06</td>
<td>0.27</td>
<td>0.04</td>
<td>0.07</td>
<td>0.002</td>
<td>0.66</td>
<td>0.14</td>
<td>0.12</td>
<td>0.12</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>In-Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient</td>
<td>-0.11</td>
<td>-0.74'</td>
<td>0.03</td>
<td>-0.23</td>
<td>-0.25*</td>
<td>-0.3***</td>
<td>-0.15</td>
<td>-0.13</td>
<td>0.21'</td>
<td>0.16</td>
<td>-0.14</td>
<td>-0.18</td>
</tr>
<tr>
<td>SE</td>
<td>0.33</td>
<td>0.44'</td>
<td>0.48</td>
<td>0.27</td>
<td>0.11*</td>
<td>0.09***</td>
<td>0.25</td>
<td>0.13</td>
<td>0.12'</td>
<td>0.11</td>
<td>0.16</td>
<td>0.12</td>
</tr>
<tr>
<td>z</td>
<td>-0.34</td>
<td>-1.68</td>
<td>0.06</td>
<td>-0.84</td>
<td>-2.3</td>
<td>-3.35</td>
<td>-0.62</td>
<td>-0.99</td>
<td>1.78</td>
<td>1.49</td>
<td>-0.88</td>
<td>0.97</td>
</tr>
<tr>
<td>p</td>
<td>0.73</td>
<td>0.09</td>
<td>0.95</td>
<td>0.40</td>
<td>0.02</td>
<td>0.001</td>
<td>0.54</td>
<td>0.32</td>
<td>0.08</td>
<td>0.14</td>
<td>0.38</td>
<td>0.33</td>
</tr>
</tbody>
</table>

' p<0.1, *p<0.05, **p<0.01, ***p<0.005
Table B.2  Divine Punishment and Short vs. Long-Term Food Insecurity

Coefficients are expressed as odds ratios to facilitate interpretation as probabilities of coins given to self or in-group. BG= Bible God, KV= Kalou-vu, FI= Food Insecurity, short= Short-term insecurity, long= Long-term insecurity.

<table>
<thead>
<tr>
<th></th>
<th>FI_short Low</th>
<th>FI_short Med</th>
<th>FI_short High</th>
<th>FI_long Low</th>
<th>FI_long Med</th>
<th>FI_long High</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG Odds Ratio</td>
<td>1.67</td>
<td>1.13</td>
<td>0.76</td>
<td>4.31'</td>
<td>1.93</td>
<td>0.86</td>
</tr>
<tr>
<td>SE</td>
<td>0.53</td>
<td>0.25</td>
<td>0.23</td>
<td>0.84'</td>
<td>0.43</td>
<td>0.18</td>
</tr>
<tr>
<td>z</td>
<td>0.96</td>
<td>0.48</td>
<td>-1.13</td>
<td>1.74</td>
<td>1.53</td>
<td>-0.8</td>
</tr>
<tr>
<td>p</td>
<td>0.37</td>
<td>0.63</td>
<td>0.26</td>
<td>0.08</td>
<td>0.13</td>
<td>0.42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FI_short Low</th>
<th>FI_short Med</th>
<th>FI_short High</th>
<th>FI_long Low</th>
<th>FI_long Med</th>
<th>FI_long High</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV Odds Ratio</td>
<td>1.21</td>
<td>1</td>
<td>0.82*</td>
<td>1.42*</td>
<td>1.07</td>
<td>0.81**</td>
</tr>
<tr>
<td>SE</td>
<td>0.18</td>
<td>0.09</td>
<td>0.09*</td>
<td>0.16*</td>
<td>0.09</td>
<td>0.07**</td>
</tr>
<tr>
<td>z</td>
<td>1.07</td>
<td>-0.04</td>
<td>-2.24</td>
<td>2.13</td>
<td>0.77</td>
<td>-2.88</td>
</tr>
<tr>
<td>p</td>
<td>0.29</td>
<td>0.97</td>
<td>0.03</td>
<td>0.03</td>
<td>0.44</td>
<td>0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FI_short Low</th>
<th>FI_short Med</th>
<th>FI_short High</th>
<th>FI_long Low</th>
<th>FI_long Med</th>
<th>FI_long High</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG Odds Ratio</td>
<td>1.26</td>
<td>1.13</td>
<td>1</td>
<td>4.35'</td>
<td>2.08'</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>0.54</td>
<td>0.25</td>
<td>0.24</td>
<td>0.86'</td>
<td>0.44'</td>
<td>0.19</td>
</tr>
<tr>
<td>z</td>
<td>0.43</td>
<td>0.46</td>
<td>0.02</td>
<td>1.72</td>
<td>1.67</td>
<td>-0.02</td>
</tr>
<tr>
<td>p</td>
<td>0.67</td>
<td>0.64</td>
<td>0.99</td>
<td>0.09</td>
<td>0.09</td>
<td>0.99</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FI_short Low</th>
<th>FI_short Med</th>
<th>FI_short High</th>
<th>FI_long Low</th>
<th>FI_long Med</th>
<th>FI_long High</th>
</tr>
</thead>
<tbody>
<tr>
<td>KV Odds Ratio</td>
<td>1.28</td>
<td>1</td>
<td>0.78**</td>
<td>1.42*</td>
<td>1.05</td>
<td>0.78***</td>
</tr>
<tr>
<td>SE</td>
<td>0.18</td>
<td>0.09</td>
<td>0.09**</td>
<td>0.16*</td>
<td>0.09</td>
<td>0.07***</td>
</tr>
<tr>
<td>z</td>
<td>1.4</td>
<td>0.02</td>
<td>-2.72</td>
<td>2.17</td>
<td>0.59</td>
<td>-3.33</td>
</tr>
<tr>
<td>p</td>
<td>0.16</td>
<td>0.98</td>
<td>0.007</td>
<td>0.03</td>
<td>0.55</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

*p<0.1, *p<0.05, **p<0.01, ***p<0.005
**Table C.3 Divine Punishment and Short vs. Long-Term Financial Insecurity**

Coefficients are expressed as odds ratios to facilitate interpretation as probabilities of coins given to self or in-group. BG= Bible God, KV= Kalou-vu, EI= Financial Insecurity.

<table>
<thead>
<tr>
<th>Self</th>
<th>EI_short Low</th>
<th>EI_short Med</th>
<th>EI_short High</th>
<th>EI_long Low</th>
<th>EI_long Med</th>
<th>EI_long High</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG Odds Ratio</td>
<td>2.23</td>
<td>0.29</td>
<td>1.34</td>
<td>2.2'</td>
<td>1.3</td>
<td>0.76</td>
</tr>
<tr>
<td>SE</td>
<td>0.87</td>
<td>0.43</td>
<td>0.19</td>
<td>0.47'</td>
<td>0.25</td>
<td>0.19</td>
</tr>
<tr>
<td>z</td>
<td>0.92</td>
<td>0.67</td>
<td>-1.15</td>
<td>0.7</td>
<td>1.04</td>
<td>-1.45</td>
</tr>
<tr>
<td>p</td>
<td>0.36</td>
<td>0.5</td>
<td>0.25</td>
<td>0.09</td>
<td>0.3</td>
<td>0.15</td>
</tr>
</tbody>
</table>

| KV Odds Ratio | 1.09 | 0.99 | 0.88 | 1.23 | 1.02 | 0.85* |
| SE | 0.47 | 0.24 | 0.08 | 0.23 | 0.12 | 0.08* |
| z | 0.2 | -0.06 | -1.52 | 0.9 | 0.17 | -2.02 |
| p | 0.84 | 0.95 | 0.13 | 0.37 | 0.86 | 0.04 |

<table>
<thead>
<tr>
<th>In-Group</th>
<th>EI_short Low</th>
<th>EI_short Med</th>
<th>EI_short High</th>
<th>EI_long Low</th>
<th>EI_long Med</th>
<th>EI_long High</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG Odds Ratio</td>
<td>0.9</td>
<td>0.93</td>
<td>0.96</td>
<td>1.43</td>
<td>1.13</td>
<td>0.91</td>
</tr>
<tr>
<td>SE</td>
<td>0.91</td>
<td>0.45</td>
<td>0.2</td>
<td>0.5</td>
<td>0.27</td>
<td>0.2</td>
</tr>
<tr>
<td>z</td>
<td>-0.11</td>
<td>-0.15</td>
<td>-0.2</td>
<td>0.72</td>
<td>0.5</td>
<td>-0.46</td>
</tr>
<tr>
<td>p</td>
<td>0.91</td>
<td>0.88</td>
<td>0.84</td>
<td>0.47</td>
<td>0.62</td>
<td>0.65</td>
</tr>
</tbody>
</table>

| KV Odds Ratio | 1.16 | 1.0002 | 0.86' | 1.08 | 0.95 | 0.84* |
| SE | 0.47 | 0.23 | 0.08' | 0.23 | 0.12 | 0.08* |
| z | 0.32 | 0.001 | -1.87 | 0.34 | -0.38 | -2.04 |
| p | 0.75 | 1 | 0.06 | 0.73 | 0.71 | 0.04 |

' p<0.1, *p<0.05, **p<0.01, ***p<0.005
Table D.1  Secular Authority by Short vs. Long-Term Food and Financial Insecurity

Coefficients are expressed as odds ratios to facilitate interpretation as probabilities of coins given to self or in-group. P= Police, FI= Food Insecurity, EI= Financial Insecurity.

<table>
<thead>
<tr>
<th></th>
<th>FL_short</th>
<th>FL_short</th>
<th>FL_short</th>
<th>FL_long</th>
<th>FL_long</th>
<th>FL_long</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Med</td>
<td>High</td>
<td>Low</td>
<td>Med</td>
<td>High</td>
</tr>
<tr>
<td>Self</td>
<td>0.75'</td>
<td>0.91</td>
<td>1.09</td>
<td>0.74'</td>
<td>0.87</td>
<td>1.03</td>
</tr>
<tr>
<td>P Odds Ratio</td>
<td>0.16'</td>
<td>0.11</td>
<td>0.16</td>
<td>0.16'</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>SE</td>
<td>-1.82</td>
<td>-0.94</td>
<td>0.55</td>
<td>-1.89</td>
<td>-1.28</td>
<td>0.2</td>
</tr>
<tr>
<td>z</td>
<td>0.07</td>
<td>0.35</td>
<td>0.58</td>
<td>0.06</td>
<td>0.2</td>
<td>0.84</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FL_short</th>
<th>FL_short</th>
<th>FL_short</th>
<th>FL_long</th>
<th>FL_long</th>
<th>FL_long</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Med</td>
<td>High</td>
<td>Low</td>
<td>Med</td>
<td>High</td>
</tr>
<tr>
<td>In-Group</td>
<td>0.78</td>
<td>0.97</td>
<td>1.2</td>
<td>0.79</td>
<td>0.92</td>
<td>1.09</td>
</tr>
<tr>
<td>P Odds Ratio</td>
<td>0.16</td>
<td>0.1</td>
<td>0.16</td>
<td>0.16</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>SE</td>
<td>-1.56</td>
<td>-0.29</td>
<td>1.14</td>
<td>-1.49</td>
<td>-0.73</td>
<td>0.58</td>
</tr>
<tr>
<td>z</td>
<td>0.12</td>
<td>0.77</td>
<td>0.26</td>
<td>0.14</td>
<td>0.47</td>
<td>0.56</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>EL_short</th>
<th>EL_short</th>
<th>EL_short</th>
<th>EL_long</th>
<th>EL_long</th>
<th>EL_long</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Med</td>
<td>High</td>
<td>Low</td>
<td>Med</td>
<td>High</td>
</tr>
<tr>
<td>Self</td>
<td>0.76</td>
<td>0.84</td>
<td>0.94</td>
<td>1.04</td>
<td>0.92</td>
<td>0.81</td>
</tr>
<tr>
<td>P Odds Ratio</td>
<td>0.29</td>
<td>0.16</td>
<td>0.12</td>
<td>0.18</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>SE</td>
<td>-0.96</td>
<td>-1.1</td>
<td>-0.55</td>
<td>0.22</td>
<td>-0.75</td>
<td>-1.49</td>
</tr>
<tr>
<td>z</td>
<td>0.34</td>
<td>0.27</td>
<td>0.58</td>
<td>0.83</td>
<td>0.45</td>
<td>0.14</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>EL_short</th>
<th>EL_short</th>
<th>EL_short</th>
<th>EL_long</th>
<th>EL_long</th>
<th>EL_long</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Med</td>
<td>High</td>
<td>Low</td>
<td>Med</td>
<td>High</td>
</tr>
<tr>
<td>In-Group</td>
<td>1.24</td>
<td>1.08</td>
<td>0.94</td>
<td>1.2</td>
<td>1</td>
<td>0.83</td>
</tr>
<tr>
<td>P Odds Ratio</td>
<td>0.3</td>
<td>0.16</td>
<td>0.12</td>
<td>0.18</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>SE</td>
<td>0.73</td>
<td>0.48</td>
<td>-0.55</td>
<td>0.97</td>
<td>-0.02</td>
<td>-1.34</td>
</tr>
<tr>
<td>z</td>
<td>0.46</td>
<td>0.63</td>
<td>0.38</td>
<td>0.33</td>
<td>0.97</td>
<td>0.18</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.1, *p<0.05, **p<0.01, ***p<0.005