Supplemental Online Materials (SOM) for

RICH Economic Games for Networked Relationships and Communities:

Development and Preliminary Validation in Yasawa, Fiji

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Ethnographic Background

Yasawa Island lies in the northwest corner of the Fiji Islands, at the northern end of the Yasawa group, 65 nautical miles from the town of Lautoka on Fiji's largest island, Viti Levu. Yasawa Island is 20 km long but rarely more than 2 km wide, with a maximum elevation of 400 m. The island is home to six indigenous Fijian villages averaging around 200 people; the smallest has less than 100 residents, the largest over 300. Sketches of Yasawa Island are given in Raven-Hart (1956) and Henrich and Henrich (2014). Photographs of Yasawa Island taken at the time of this study can be accessed at www.matthewgervais.net/photography.

Linguistically, Fiji has some 300 dialects or "communalects" (Geraghty 1983), which fall roughly into two language groups, Eastern and Western, split by the central highlands of Viti Levu (Pawley and Sayaba 1971; Schütz 1962). The communalects of Yasawa Island clearly belong to Western Fijian and are closely related to dialects from the Ba district of Northwestern Viti Levu (Triffit 2000).

The Yasawa Island language landscape is quite heterogeneous. There are slightly varying communalects among villages on Yasawa Island and increasingly divergent communalects as one travels away from Yasawa Island down the Yasawa island chain (Triffit 2000). The communalect of Waya, on the southern end of the Yasawa Group, may be the oldest and most distinct communalect in Fiji (Pawley and Sayaba In press). Yasawa, like indigenous Fiji generally, is prescriptively patrilocal, yet perhaps 10% ambilocal (Sahlins 1962), and exogamy sends many people to Yasawa Island from other islands in the Yasawas.

An increasing proportion of Yasawa residents come from beyond the Yasawa region as well, as cross-cousin marriage prescriptions relax and individuals attending school or seeking wage labor on Viti Levu return to villages with spouses from as far away as Lau in Eastern Fiji.

To facilitate future economic opportunities, some Yasawan primary schools forbid the use of village communalects in class and require Standard Fijian or English. For these reasons, Standard Fijian is effectively a lingua franca on Yasawa Island, as it is across Fiji (Pawley and Sayaba 1971), and it is heard daily in conversations at all social scales, from family meals to village meetings and church sermons. Only the oldest (those over 80) and youngest (those under five) Yasawa Island villagers speak exclusively in their village communalect, although all villagers routinely deploy theirs in particular contexts.

Village-level kinship is the primary mode of Fijian social organization (Sahlins 1962), and Yasawa is no exception. Each village is organized patrilineally and patrilocally, with extended households (*itokatoka*) composing clans (*mataqali*) that together constitute a *yavusa*, or territorial unit. A yavusa tends to have a single chief and is often, though not always, coextensive with a village. Within a village, clans are ranked by an historical division of labor, from the chiefly clan (*turaga*), and the "face of the chief" (*matanivanua*), down through priests (*bete*), kingmakers (*sau turaga*), warriors (*bati*), carpenters (*matai*), fishermen (*gonedau*), and other commoners (*tauvanua*).

Today, most villagers are generalists, and many historical roles are enacted only at ceremonies. Rank nonetheless pervades village life, dictating terms of address, comportment, obligations, and precedence in seating, eating, and receiving shares of distributed goods (Toren 1990). Within clans, descent, age, and sex determine rank in a strongly patriarchal fashion. Village meetings are run by chiefs or their proxies and are animated by elders and other influential men from all clans.

A chief holds the highest inherited rank within a well-defined traditional hierarchy. The office of the chief is greatly respected and is accorded public demonstrations of respect,

including spatial positioning, choice foods, serving order, honorific language, and elaborate funerary rites. The person holding the chiefly office is assumed to embody core Fijian ideals such as generosity, self-control, and respectfulness (Ravuvu 1983). However, an individual chief can lose the respect of the people, or an heir can fail to be installed as a chief, to the extent that he fails to embody these values. Chiefliness (*vakaturaga*), or village-oriented generosity and *noblesse oblige*, is a necessary condition for installation as a chief, with chiefly "blood" (*drau*) being insufficient.

A chief has little opportunity to dictate to villagers and depends on prestige and consent for his influence. Yet once officially installed, a chief acquires the sanction of ancestor spirits and a degree of sacredness (Ravuvu 1987). The traditional economic role of a chief was to possess ample resources and distribute them generously based on need, and male villagers in Yasawa still gather once a year to plant their chief's yam garden, from which all can draw in times of need.

A chief was traditionally viewed as possessing immense *mana*, a kind of force of efficacy that permeated his possessions and was dangerous to the touch. Many Yasawans currently lament the general loss of mana by all Fijians, and it does not appear to play much of a role in legitimating chiefly influence in modern-day Yasawa. That said, the traditional lineage-based power structure of a village is still respected in the villages of Yasawa, and few question the right and responsibility of an exemplary chief to influence village affairs. A village chief is supposed to serve the good of the village, and it can fall to him to adjudicate disputes within the village when other options fail (Sahlins 1962).

Each village also has a locally elected representative of the national government (*turaga ni koro*) who liaises with the government, enforces national laws (albeit loosely), and organizes

some community work. The controversies surrounding the Fijian central government feel very distant in Yasawa, and several water development, road improvement, hall construction, and cyclone relief projects have recently been implemented by the government, though to varying standards.

Each village on Yasawa Island hosts two Christian denominations, Methodist and Assemblies of God, whose services give cadence to the week's activities. The churches variously organize feasts, fundraisers, Bible study sessions, prayer groups, and rotating farm collectives. The congregations tend to cleave according to traditionalist/modernist sentiments. The Methodist church is invariably the older building, located on the central village green, and bound up with the traditional village hierarchy and prestige goods such as whale's teeth (*tabua*). The Assemblies of God churches are often built on the fringes of villages and attract younger villagers and commoners through charismatic practices, entreaties to economic advancement, and proscriptions on kava drinking and smoking (see also Brison 2007; Ryle 2010; Tomlinson 2009). There are also three primary schools on the island, and almost all children attend school from around the age of five until 14. Students must leave the island to obtain secondary education, which is increasingly common, and tertiary education, which remains quite rare. Literacy is high and is reinforced by Bible study.

Subsistence on Yasawa is primarily root-crop horticulture and fishing with spear, line, and net; littoral gathering, vegetable crops, and fruit trees supplement the diet. Pigs, chickens, goats, and cows are also kept and eaten, especially at ceremonies. Sea turtles are a particularly valued ceremonial food, and caches of eggs are eaten raw when found. Economic activities are highly gendered, with men doing most of the fishing and farming, and women doing much of the gathering and all of the cooking. Around 25% of calories come from purchased goods such as

flour, sugar, and rice (R. Boyd and J. Henrich, personal communication), which are stocked and sold from small canteens run by a handful of families in each village. However, supplies of these goods are unreliable, rendering subsistence activities indispensable, though risky.

Cyclones (hurricanes) are common in Yasawa, with a significant tropical storm damaging crops and houses every several years. One village has relocated twice in the last 50 years owing to decimation by cyclones. The eye-wall of a Category 4 cyclone raked Yasawa Island in December 2012 and knocked down almost every traditional house on the island (which accounted for ~30% of dwellings), while destroying root crops for a year.

Each village gets its drinking water from several large (~10,000 gallon) concrete tanks that collect rain water from the tin roofs of the church or community hall as well as from many smaller tanks attached to private tin-roofed homes. Yasawa is among the driest locales in Fiji, behind the rain shadow of Viti Levu, and, by the end of the dry season (April–September), many tanks are dry and crops can wither. Several villages also drink water of uncertain quality from wells.

Extended households are the primary economic unit on Yasawa, organizing most fishing, farming, and resource pooling. Clans also pool resources for holiday feasts and organize labor for house building, net fishing, yam planting, and life course rituals. Village-level collective action occurs as well, for tasks such as cleaning the island road, planting the chief's yams, conducting seasonally large fish drives, enacting cultural performances for tourists, and raising funds for schools. Church congregations crosscut kinship and also organize rotating farm work and fundraisers while hosting rotating intervillage services.

Beyond the household, resource transfers occur primarily through two mechanisms (Sahlins 1962). First, ritual obligations among clans and villages—involving the exchange of

sacred objects, foodstuffs, woven mats, kerosene, and other valued goods—attend most life course rituals such as births, coming of age ceremonies, marriages, and funerals. Such exchanges are highly ritualized and strictly reciprocal, building social networks that can be tapped for cooperation and support (see Ravuvu 1987). Second, a system of ad hoc need-based requests (*kerekere*) operates among households, clans, and villages. Any social unit can kerekere any other for virtually anything—food, labor, money, land—on the condition that the initiator is in demonstrable need and that the potential donor has enough to share. Every recipient is obliged to share when they are themselves the target of a kerekere, yet a transfer requires no short-term reciprocity or account keeping, and often the flow of goods carries a net imbalance that follows persistent need. Being a generous provider is a sure path to prestige and influence, and generosity and compassion (components of "chiefliness") are integral to the "Fijian way of life" (*na bula vakaviti*).

While small canteens are present in each village, other local sources of income vary across villages. A number of villagers from one village and a small number of villagers from other villages work at the one resort on Yasawa Island, a highly insulated five-star operation near the largest village. Another village has a lucrative deal with a cruise ship company, owing to a popular limestone cave nearby. A third village had, at the time of this study, a relatively sophisticated sea cucumber–harvesting operation utilizing scuba gear subsidized by Chinese middlemen in Lautoka. Two villages have little economic alternative to selling fish and other produce to the resort. Most villagers must leave the island to find reliable income, and some villagers receive remittances from relatives working in Fijian towns or cities abroad. Most adult men, and many women, have spent some time working in resorts in the Yasawa group or in odd

jobs on the mainland. Copra is no longer pursued as an economic resource on Yasawa, as small-scale household operations have been excluded by larger-scale operations elsewhere in Fiji.

Transport on the island is primarily by foot or horse. There are several trucks for hire, although the trucks are often in disrepair and the rutted dirt road that runs the length of the island is often impassable in the rainy season (November–March). Infrastructure is absent outside of the resort, and electricity comes almost exclusively from privately owned diesel generators that run for only a few hours some nights of the week. Most villages also have a nursing station with solar power, a refrigerator, and basic medical supplies, although the stationed nurse is often visiting the mainland. A cell phone tower was installed by a private company on the high point of the island in 2010, and cell phones are now widely owned, though infrequently charged, while the Internet remains accessible only to temporary residents (e.g., nurses, pastors, anthropologists) who bring computers and wireless modems from the mainland.

There are outboard motorboats in all villages and they are the primary means of inter-island travel, with indigenous boatbuilding skills having been lost. However, fuel is unreliably available, and larger cargo ships run only intermittently as far north as Yasawa Island, making transport to and from the island unpredictable. A high-speed tourist shuttle that runs daily up the Yasawa group to several dozen backpacker hostels stops short of Yasawa Island, and it is prohibitively expensive for most villagers to use. When used, one must arrange to be picked up by an outboard boat at the southern tip of the island south of Yasawa and then travel for an additional hour north. A small private plane operated out of the resort is also available, but is likewise prohibitively expensive. Trips to or from the mainland can be as quick as four hours, but more often take 15.

Methods

Sample

The sample for the present study came from one village on Yasawa Island. Seventy-two adult males resided in the village at some point during the study period (September 2011–June 2012) and participated in complete demographic and physical measures interviews. Of these 72 men, 58 were present to participate in an interpersonal attitude ratings task (February–April)—an inclusion criterion for the games—and were included in six months of time allocation sampling. Fifty-four of these men were present at the start of the Allocation Game (May) and were included as Targets. Fifty of these 54 remained available and participated as Deciders in all three games. One Target was unable to participate as a Decider due to vision loss and possible cognitive impairment, while another elected not to participate as a decider while remaining a Target. One Target was available for the Allocation Game but was then unavailable for the other two (hence the N=51 in the AcG), while the fourth took a job as a ship captain shortly after the start of the AcG. The 54 men included as Targets were representative of the starting 72 on all measured variables (e.g., demographics, reputation, attitudes toward), except that they had on average one less year of education.

The men in this sample have life-long relationships with cross-cutting bases that include biological relatedness, diverse kinship norms, inherited and achieved status asymmetries, differentiated economic interdependencies, several church congregations, and individual variation in market integration. Appropriately measured and included as covariates, these variables can be pitted against one another as predictors of relational behavior. While a number of such covariates were gathered as part of this study, I do not report them here.

Protocol

I administered these games with the assistance of an indigenous Fijian research assistant from elsewhere in Fiji who had been working in Yasawan villages with me for over a year. We displayed target photos in a 54-cell array composed of three 3 x 6-cell Paylak CTNB107 storage boxes with lid hinges notched for easy removal and replacement. This allowed us to transport the apparatus from house to house in a backpack with the photos already in their randomly assigned cells. It also allowed us to have the coins pre-distributed in the Target cells before the start of the Taking Game. We used one of the box lids to hold the model grid during demonstrations and another to display the reduction tokens in the CRG. The photos in each cell were headshots taken during the physical measures interview months before, standardized for scale and size (1.8" x 1.8") and laminated. Each cell was large enough to hold all the relevant coins in each game. In the Taking game, the external cup into which Deciders could place their take was larger than the array cells so as to accommodate the max take of 424 FJ$0.05 coins. For both the TkG and CRG, in which the Decider's photo was in a separate cup, a white card marked with an "X" held the randomly assigned place of the decider's photo in the array and was pointed out.

We conducted interviews in Standard Fijian supplemented by conversational Yasawan. I first wrote all protocols in English. They were then translated into Standard Fijian by one English–Fijian bilingual research assistant (RA), then back-translated by another English–Fijian bilingual RA. I discussed any discrepancies with both RAs together and finalized the Fijian text. All Fijian translations are available on request.

I selected the words to describe key elements of the games—*wasea* (divide, distribute) in the AcG, *taura* (take) and *maroroya* (keep) in the TkG, and *vakalailaitaka* (shrink) or *musu* (break, reduce) in the CRG—after extensive discussion with my research assistants and

consultation of several dictionaries (Capell 1991 [1968]; Gatty 2009). The goal was to use words that did not bias decisions toward particular distributive or normative patterns.

The Fijian base *wase* (trans., wasea) is used generally to discuss dividing something into parts—such as a book by chapters, or a room by a wall—and also specifically the division of a resource across recipients, such as in ceremonial distributions of food or valued goods. However, unless additionally modified it implies no particular division, as into equal parts or according to need or status. In Fijian, taura is used generally with reference to taking or receiving something into one's hands or possession, for example after division of a resource (complementing wase). It is also used metaphorically to speak of grasping the meaning of a statement. It is not, however, generally used with reference to receiving a requested resource, minimizing the mapping of this instruction onto need-based requesting, or kerekere. Maroroya is used to speak of keeping something as one's possession, with connotations of cherishing, protecting, and being hesitant to relinquish. However, it does not imply selfishness or greed. Vakalailaitaka is a compound Fijian word composed of a base—*lailai*—meaning "small," and two modifiers: *vaka*-, which means "in the manner of" or "possessing the property of," and –*taka*, which means "to bring about" or "make happen." Thus, meaning "to reduce" or "to make smaller," vakalailaitaka is used generally with reference to any property or quantity.

The Fijian base musu, which we used to clarify the object of vakalailaitaka in the course of describing the CRG, means generally to break or cut crosswise (as in a piece of wood), but recently has come to be used specifically in reference to reducing a quantity of money, as in a price or a wage. Like wase for distribution, musu (and the transitive *musuka*) does not imply a magnitude of reduction unless appropriately modified.

We performed recruitment and obtained informed consent separately for each game, and randomized participant order within each game. While participants made decisions, we moved away and sat with our backs to the participant. While I recorded decisions, my RA asked the debriefing questions. We informed participants that they would receive their earnings at the end of the study. At the time of final payment, after all the games, we also performed a memory check, asking participants to describe the three games they had played. All participants were able to describe the games and mentioned the keywords wasea (distribute) for the Allocation Game, taura (take) for the Taking Game, and musu (break, reduce) for the Costly Reduction Game.

Training Examples

In explaining each game, we provided each participant with a series of example decisions using the model grid. For the Allocation game, we first showed them a single cell containing first one, then two, then three, then 20 coins, and we explained the payoffs that each allocation would generate. Next, they were shown alternative distributions of all 20 coins: four coins in five cells; five coins in four cells; one, two, three, four, five, and five coins across six cells; one coin in 10 cells, and two coins in five cells; and 10 coins in one cell, nine coins in one cell, and one coin in another cell, with payoffs explained.

For the Taking Game, we first used a single cell to explain the payoffs if participants took none, one, two, three, four, or eight coins from one target. Then, we explained the payoffs were they to take one coin from each of six targets (they each earn $.35, Ego earns $.30, everyone else earns $.40), one coin from each of seven targets ($.35, $.35, $.40, respectively), one coin from each of eight targets ($.35, $.40, $.40, respectively), one coin from each of nine targets ($.35, $.45, $.40 respectively), and one coin from every target ($2.65 for self, $.35 for everyone else). We then explained payoffs were they to take different amounts from different targets: one, two,

three, four, five, six, seven, and eight coins from eight different targets (earning Ego $1.80), four from 10 targets and eight from 10 targets (earning Ego $6.00), two from 10 targets, four from 10 targets, six from 10 targets, and eight from 10 targets (earning Ego $10.00), and taking all coins from all 53 targets, earning Ego $21.20.

For the Costly Reduction Game, we explained that if a man was going to earn $20 from the previous tasks, and Ego left one red coin on his photo, he would instead earn $18; if he were going to earn $7, he would instead earn $5; and if he were going to earn $3, he would instead earn $1. We then demonstrated additional examples using the model grid: Buying one coin could reduce another target by $2 and leave Ego $4.50; buying two red coins could reduce two targets by $2 each and leave Ego $4; two coins could also reduce one target by $4 and leave Ego $4; three red coins would cost $1.50, reduce one target by $6, and leave Ego $3.50; five red coins would cost $2.50, reduce one target by $10, and leave Ego $2.50; and 10 red coins would cost $5, reduce one target by $20, and leave Ego no money in this task. We also demonstrated leaving different numbers of red coins on different targets: one coin to reduce one target by $2, two to reduce a second target by $4, three to reduce a third target by $6, and four to reduce a fourth target by $8, using 10 red coins and costing a total of $5, leaving none for Ego. We also described the different ways that a set number of coins could be used: Were they to buy seven red coins, costing $3.50 and leaving themselves $1.50, they could reduce seven targets by $2 each, or two targets by $4 and three targets by $2, or one target by $8 and one by $6, or one target by $14—any combination, their decision (*mo lewa ga*).

Postgame Interviews

The specific questions we asked after each game were the following:

Allocation Game:

1) How did you decide to distribute the money as you did?
2) Why did you distribute the money to some men?
3) Why did you not want to give money to some other men?
4) Do you think others will make the same kinds of decisions as you?
5) How *should* [*e dodonu me*] someone distribute money in this task?
6) Did this task remind you of any of your life experiences? (or Fijian life? or village events?)

Taking Game:

1) How did you decide to distribute the money as you did?
2) Why did you take money from some of the men?
3) Why did you not take money from some of the men?
4) Do you think others will make the same choices as you?
5) What *should* [e dodonu me] someone do in this game?
6) Did this task remind you of anything you have experienced in your life? (or aspects of Fijian life? Or village events?)

Costly Reduction Game:

1) How did you decide to distribute (or not distribute) the red coins as you did?
2) Why did you place red coins on the men you did?
3) Why did you place different numbers of red coins on different men?
4) Do you think others will make the same choices you did?
5) What *should* [e dodonu me] someone do in this game?

6) Does this game remind you of anything you have experienced in life? (or aspects of Fijian life? Or village events?)

Results

Experiential Analogues of the Games for Participants

Allocation Game

Twenty-six (51%) said the AcG reminded them of helping (*vukei*) others, including distributing (wasea) fish or money to those in need (*leqa*), looking after others (*veinanumi*), or having love (*lomani*) or compassion (*loloma*) for others. Five (9.8%) mentioned times of money trouble (*leqa vakailavo*), while four (7.8%) mentioned decision making with money. Three (5.9%) mentioned paying fees for schooling or travel, while two (3.9%) mentioned tithing. Five (9.8%) mentioned competition (*veisisivi*) or gambling.

Taking Game

Twenty-two participants (44%) said the TkG reminded them of helping others, showing love, joint production (*solesolevaki*), or taking care of others (*veikauwaitaki*). Two (4%) mentioned caring for elders, while four (8%) mentioned being responsible (*vakayalomatua*), or not being greedy (*kocova*). Eight (16%) mentioned facing financial difficulties, while one mentioned seeking help from others (*kere veivuke*). One mentioned cross-cousins (*tavale*) taking money from each other, while four (8%) mentioned duties to relatives (*vakaveiwekani*).

Costly Reduction Game

The CRG elicited a wider diversity of answers than the other two games. Eight (16%) mentioned sharing in some sense, but half of these (8% overall) mentioned difficult or heavy (*vakabibi*) decisions, not sharing, or unequal distributions. Only four (8%) mentioned helping those in need,

while three (6%) mentioned looking out for relatives. Five (10%) mentioned solving household problems (*ni bula ni vuvale*). Only one mentioned working together. Six (12%) mentioned experiencing financial hardship, while five (10%) mentioned being asked for money (*kere ilavo*) or losing money in business. One mentioned theft ("taking without knowledge"), one competition (*veiqati*), and one a test or trial (*veivakatovolei*). One compared the game to the "many ways" Fijians can be made equal (*vakatautauvata*).

Coding Decision Rationales

Deciders gave a range of reasons for their allocation decisions. I compiled the open-ended responses to the first three questions for each game (relating to reasons for decisions) and used them to inductively generate coding categories. Recurring distinctions included aspects of self or target (e.g., need or character), relationship (e.g., quality, kinship), attitudes (e.g., love, respect), and generalized considerations (e.g., equality, fairness). Final categories, coded separately for both action and inaction (e.g., taking and not taking), included Ego need, Target need, Target character, Relationship quality, Kinship, Interpersonal feelings, Abstract values/rules, and two other categories: "My decision/desire" if that was the only reason mentioned, and "Other," for a handful of idiosyncratic, uninterpretable, or uninformative answers (e.g., "Because I took money from them."). Coding took the form of binary presence or absence of each code for each respondent, and allowed for the possibility of multiple codes per question per participant.

I coded responses with reference to both the Fijian responses and English translations made by a bilingual Fijian RA. I trained an American anthropology undergraduate as a second coder through iterated coding of exemplars, and she coded all English translations. We then compared results and built consensus, using the agreed on coding as the final data. I calculated

interrater reliability for each game as the total number of "present" codes on which both raters agreed divided by the total number of "present" codes by either rater alone. Initial coding agreement between myself and the RA across the three games were 88.1% (AcG), 76.7% (TkG), and 72.2% (CRG).

Game Decisions

Allocation Game Decisions

On average, deciders allocated money to 19% of the possible targets. For comparison, 20 coins maximally distributed across 53 targets could have gone to 38% of them, while 17.5 coins (allowing for the mean keep of $2.49, or 2.5 coins kept) could have gone to 33% of possible targets.

Decisions across Games

The total amount Deciders kept for themselves in the AcG was significantly correlated both with the total amount they took from others in the TkG (r = .45, p <. 001) and the total amount they kept in the CRG (r = .36, p < .01). However, the total amount Deciders took from others in the TkG was not related to the total amount they kept in the CRG (r = .11, p >. 40). Spearman's rank correlation produced qualitatively similar results.

Across the three games, decider earnings varied widely. The mean aggregate earnings from keeping in the AcG, taking in the TkG, and not spending in the CRG was FJD $12.31 ± $10.56. The maximum earned was $40.70. The minimum earned was $0 ($N$ = 4), in which case each decider kept nothing (AcG), took nothing (TkG), and spent everything (CRG).

Figure S1: Histograms of the FJ$ Deciders kept in the AcG, took in the TkG, and spent on reductions in the CRG.

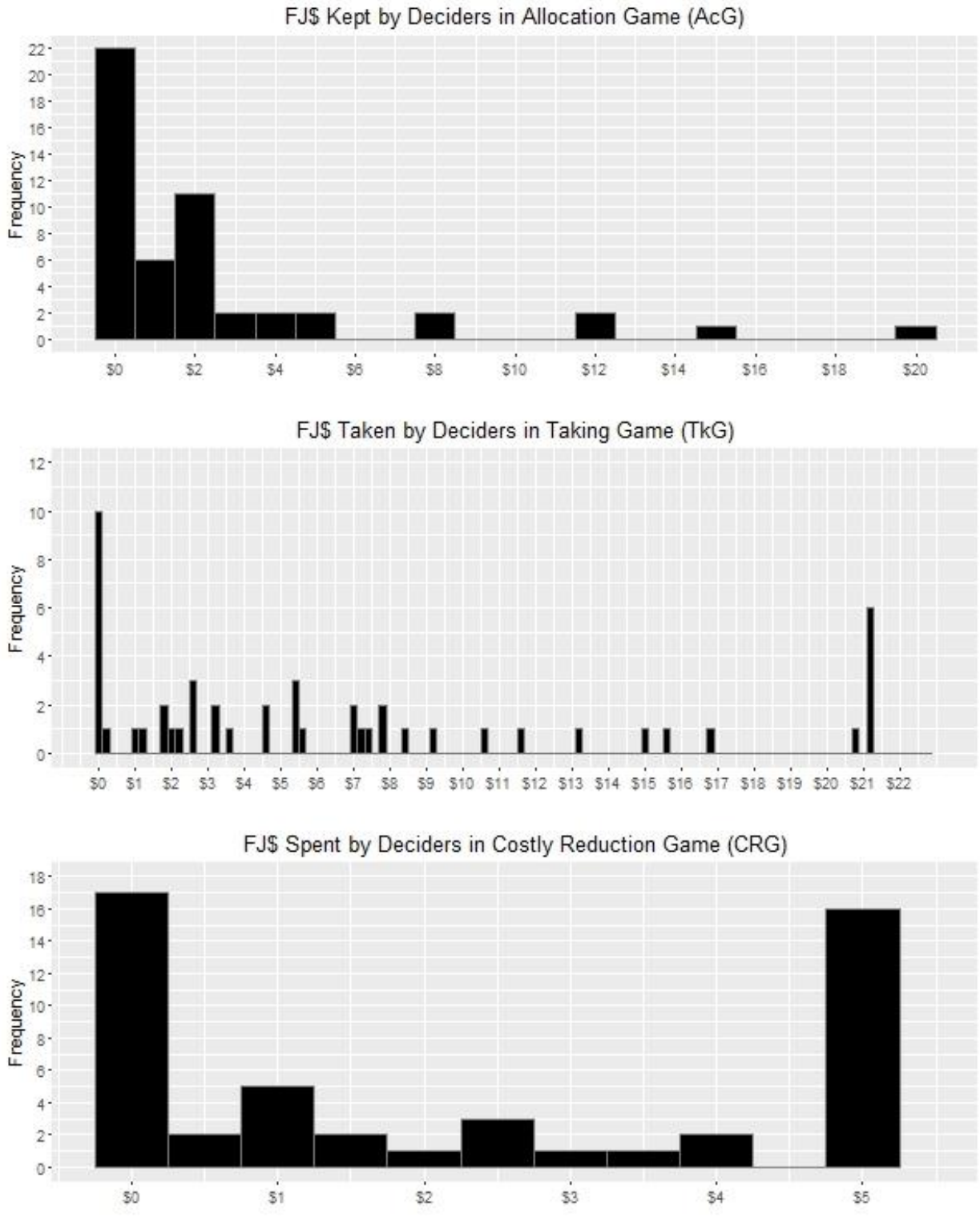
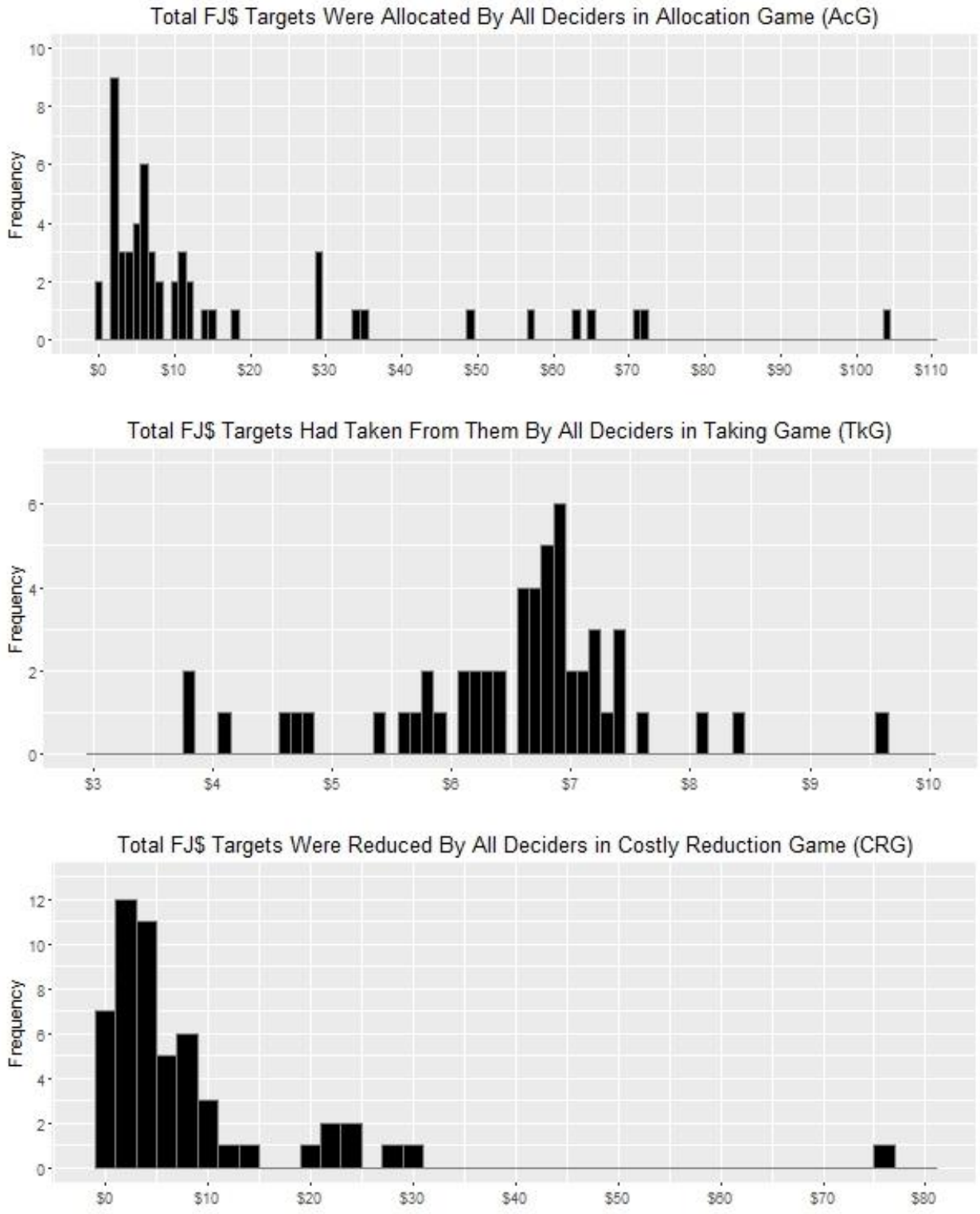


Figure S2: Histograms of the total FJ$ Targets received in the AcG, had taken from them in the TkG, and were reduced in the CRG.



Target Outcomes

Allocation Game

The number of allocations a Target received, and the maximum size of a received allocation, were highly correlated ($r = 0.72$, $p < .0001$).

Taking Game

A Target's number of takers, and the number of large takes they suffered (i.e., of >4 coins, or >50%), were highly correlated ($r = .69$, $p <. 0001$).

Costly Reduction Game

The number of Deciders reducing a Target, and the number of reductions a Target received of two tokens or more, were highly correlated ($r = .83$, $p <. 0001$).

Target Outcomes across Games

The total amount Targets were allocated in the AcG was strongly negatively correlated with the total amount they were taken from in the TkG ($r = -.79$, $p <. 0001$), but only marginally negatively correlated with the total amount they were reduced in the CRG ($r = -.23$, $p <. 09$). The total amount Targets were taken from in the TkG was strongly correlated with the amount they were reduced in the CRG ($r = .52$, $p = .0001$). Spearman's rank correlation produced qualitatively similar results.

Across the three games, target outcomes varied widely. The mean aggregate earned from being allocated to in the AcG, not taken from in the TkG, and not reduced in the CRG was FJD $21.73 ± $29.00. The maximum earned was $118.15. The minimum earned was −$63.60, in which case the target was reduced more than he was allocated (AcG) and left (TkG). Eight targets were reduced more than they were allocated and left; four of these finished with negative earnings after aggregating their own decisions to keep, take, or not reduce others.

Additional Discussion

The Three Cs: Contagion, Collusion, Contamination

While field studies with economic games typically congregate participants and finish in one or two days (see Henrich et al. 2004), I ran these games over several weeks in private homes. This may have exposed the protocol to contagion and collusion through discussion among participants. I considered this an acceptable risk for several reasons. Rather than a random sample, I sought as complete a sample of the males in one village as possible, and their availability varied widely by day and time. RICH game instructions, decisions, post-game interviews, and payoff calculations are also more time consuming than dyadic games. I further wanted to facilitate privacy for participants making sensitive decisions toward other community members. I made a rule of the games that participants were not to discuss them; as far as my four-member research team could tell, villagers abided by this rule. Running the games "under the radar" in participants' homes may have reduced curiosity and common knowledge about participation, mitigating discussion and organized collusion. I also did not inform participants of how many games there would be or of when exactly they would be completed (*sensu* Henrich et al. 2010). Of note, pairwise collusion in RICH games, and the relational rapport it requires, should leave a signal in the dyadic data set. At a coarser level, I found no correlation between the order in which participants played each RICH game and their behavior therein.

Although there is no evidence of order effects in my analysis, it remains possible that the protocol suffered from contamination from one game to the next because of the within-subjects design and fixed game order (AcG before TkG before CRG). That these were the first economic games run in this village makes contamination from earlier games unlikely. I chose a within-subjects design because of interest in measuring and comparing altruism, selfishness, and spite

within individuals and relationships. I ran the games in fixed order because I was intent to maximize my sample for each game and was unsure how long they would take to complete within a bounded field season. Future work might vary the order of the games to assess experience effects from one to the next.

CRG and TPG Comparability

The CRG is, of course, imperfectly comparable to the TPG. One potential source of heightened buy-in to the CRG—on top of greater ecological validity—could be my use of a punishment multiplier of four, in contrast to the more standard ratio of 1:3 in the TPG (Ensminger and Henrich 2014; Fehr and Fischbacher 2004). In other words, in this implementation of the CRG, reducing others was relatively cheap. The primary reason that I chose a multiplier of four rather than three was a practical consideration. Rather than using abstract monetary units (MUs) or percentages, I implemented the CRG using real coins, and wanted a simple conversion from the Decider's stakes (FJ$0.50 units) to reduction units (FJ$–2.00). I also wanted to keep the reduction stakes around $20.00, a day's wage; a 1:4 multiplier with $0.50 Fijian coins was the most tractable way to do this. I know of no systematic studies of the effect of a punishment multiplier on punishment behavior in a third-party punishment game. However, related work on punishment in public goods games has shown that with greater punishment effectiveness (i.e., a larger multiplier), participants do punish more, but that this increase asymptotes at a multiplier of three and possibly reverses thereafter (Nikiforakis and Norman 2008). In other words, we should not expect multipliers of three and four to produce significantly different rates of punishment.

It could be that the rates of reduction in the CRG reflect the confluence of second- and third-party punishment and approximate the conjunction of rejection rates for low UG offers and punishment of low TPG offers. Participations gave rationales for reductions related to both

second-party (e.g., relationship quality) and third-party punishment (e.g., some cases of target character). However, to approach a rate of 66% from UG and TGP rates of punishing, different individuals in the population would have to engage in these two behaviors. Yet Yasawan UG and TPG data do not allow this inference since deciders did not play both games (Henrich and Henrich 2014).

One drawback of this initial implementation of RICH games is that a small number of participants finished with negative earnings. This may have been foreseeable, but it followed from surprisingly high rates of reduction in the CRG. To maintain goodwill and preserve confidentiality, I chose to compromise the integrity of the design by paying these participants positive amounts, and proportionally reimbursing those who had put these participants in the red. One obvious way to avoid this situation would be to make reductions in the CRG come out of a separate pot that would otherwise go to the participant, analogous to the Taking Game design; any of a Target's pot not reduced by a Decider would go to that Target as positive earnings.

Unlike the TkG, a CRG version of this design would entail making reducing a Target costly to a Decider, not directly beneficial. A risk in such a design might be that low rates of reduction would lead to high earnings by Targets, proportionate to the pot size and Decider N—potentially many days or weeks of wages, an expensive protocol and potentially disruptive earnings for participants with low market integration. I avoided such disruption in the TkG by having a small exploitable pot for each Target (FJ$0.40) that potentially summed to a day's wages only across Deciders. A similar design could be used in the CRG. An alternative implementation could have a day's wages to each Target vulnerable to taking or reducing by each Decider, but actual payoffs determined by randomly or algorithmically selecting only one

Decider's take or reduction. A drawback of this would be added complexity in explaining and understanding the game.

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