Rarer Actions: Giving and Taking in Third-Party Punishment Games

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In attempting to understand cooperation, economists have used the methods of experimental economics to focus on spheres of human behavior in which humans display altruism, reciprocity, or other social preferences through giving and through punishment. Recent work has begun to examine whether allowing allocations in the negative domain, that is, allowing subjects to take (or steal) other subjects' endowments, might affect participants' behavior. If participants' behavior is affected, then our understanding of experimental results generally, and social preferences specifically, should be affected too (List 2007, Bardsley 2008). In this paper we propose an experimental variation on the Dictator Game with third-party punishment (Fehr & Fischbacher 2004*b*). We examine, first, a basic Dictator Game with third-party punishment, after which we introduce a treatment allowing the dictator to take from the receiver, in the knowledge that the third party could punish them. The results conflict. Many dictators choose the most self-interested option, while, when taking is introduced as an option for the dictator, third parties punish the most self-interested option more than in the baseline.

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1 Introduction

Prospero, the protagonist in Shakespeare's *Tempest*, instructs us that "the rarer action is in virtue than in vengeance." For some time experimental economists have investigated people's behavior as they decide how to allocate endowments either to other subjects in experiments, or to some public good from which they might benefit, thus examining the virtues of giving, cooperation and cooperation-sustaining punishment (Camerer 2003, Henrich et al. 2006). But Prospero warns that vengeance is more common than virtue, though economists have only recently begun to take heed by examining vicious behavior (Kirchsteiger 1994, Saijo & Nakamura 1995, Abbink, Irlenbusch & Renner 2000, Abbink & Sadrieh 2009, Abbink & Herrmann 2009). This paper contributes to the literature by examining an experiment that allows taking, in the presence of potential punishment.

Why should we care about giving and taking, and not giving only? First, in everyday interactions an individual's actions are not truncated: she has the option to give and to take, to behave altruistically or nastily, to punish prosocially or antisocially (Fehr & Gächter 2002, Fehr & Fischbacher 2004*a*, Frey & Meier 2004, Cinyabuguma, Page & Putterman 2006, Bochet, Page & Putterman 2006, Herrmann, Thöni & Gächter 2008, Casari & Luini 2009). Second, if we consider range effects, then an individual might be predisposed to give something not because she actually wishes to behave altruistically, but because it is not the lowest amount possible - therefore signalled as the most self-interested - to give (Parducci & Weddell 1986). Constraining an individual's actions so that she must behave only in the positive, and therefore altruistic, domain is a contrivance, and we should allow individuals to employ actions that are not only altruistic (giving), or not altruistic (neither giving nor taking), but also entirely self-interested (taking). We may thus explore what Prospero thought the more common actions: vengeance, spitefulness, robbery, abuse.

But most researchers who have worked on the topic have used the dictator game to elicit preferences over giving and taking (Bardsley 2008, List 2007).[1] The problem with this method is that the dictator game is not so much a 'game' as it is a decision by one agent - the dictator. Games require beliefs and actions by more than one player. Consequently, it would be valuable to assess the changes in decisions by subjects in experiments where subjects need to predicate their decision on the beliefs they have about others. The third-party punishment game allows us to capture such effects by predicating the dictator's activities on the knowledge that a third party, with the power to reduce the dictator's payoffs and thus to 'punish' them, is involved in the game. Moreover, it allows us to investigate the role of costly punishment in maintaining social norms amid the option to take.

Experiments that provide an adequate environment to interrogate taking can expand our understanding of whether the incidence and extent of social preferences - altruism, reciprocity, inequity aversion - are as great as the accumulated international and cross-cultural evidence suggests (Camerer 2003, Hen-

[1] Bosman & van Winden (2002), Bosman, Sutter & van Winden (2005) and Bosman, Hennig-Schmidt & van Winden (2006) use a 'power to take' game. But, this game tends to restrict dictator behavior to the negative domain only and is consequently subject to the same criticism as experiments that only allow behavior in the positive domain: it falsely restricts subjects' actions to one kind of behavior.

rich et al. 2006, Herrmann, Thöni & Gächter 2008). Without research into the dynamics of taking, previous results might lead us to believe falsely that social preferences are more both more widespread and more salient than they are. Alternatively, if we do investigate taking behavior rigorously, then we may become aware of the operation of social preferences in previously unexplored domains of human behavior. We may see whether subjects take, whether subjects respond to the presence of taking, and, in the context of the games we investigate, whether the option to take changes punishment behavior that may sustain or undermine social norms.

We present evidence from a third party punishment game with a taking treatment: the dictator can take up to the entire show-up fee of the receiver. Dictator behavior was mixed, with dictators both giving and taking. Taking behavior was punished by more third parties and more harshly in the taking treatment than the most self-interested behavior in the baseline treatment, suggesting a role for a third party as an enforcer of social norms. The remainder of the paper progresses as follows. In section 2, we explain the experimental design and the results from the experiment. In section 3 we discuss the results and assess them against current theories of social preferences. Some concluding comments are offered in section 4.

2 Experimental Design and Results

The experimental design synthesizes two separate designs: the design of dictator taking from Bardsley (2008) and List (2007) with the design of a third party punishment in the dictator game from Fehr & Fischbacher (2004*b*). The taking treatment is most similar to List's and Bardsley's treatments in which dictators are allowed to take from receivers. The taking treatment is most consistent with List's because dictators may take up to the entire show-up fee of the receiver, whereas Bardsley does not allow dictators to adopt such actions.[2]

2.1 Design

Subjects were recruited from the student body at the University of Cape Town during the second and third quarters of the 2010 academic year. A baseline and one treatment were conducted. Identical procedures and parallel instructions were used, based on the English language translation of instructions in Fehr & Fischbacher (2004*b*). Participants were randomly assigned to one of three groups, and each group was allocated to a separate room: Room A, B or C. All participants met at a central location at the beginning of the experiment to assuage any doubt about the existence of co-participants (Frohlich, Oppenheimer & Moore 2001). That is, the subjects saw that there were other subjects and that subjects were individually and randomly allocated to one of room A, B or C, but at no time could subjects communicate with one another. Subjects were only permitted to communicate with the experimenters. No subject participated in more than one treatment, so the results reflect between-subject variation only.

[2]During recruitment, prospective subjects were told that they could make no money during the experiment.

The baseline treatment was modeled on the third-party punishment in the dictator game (TP-DG) experiment (Fehr & Fischbacher 2004*b*, 66). Subjects played with points, not money. The exchange rate of points for money was 1 point equal to 1 South African Rand (ZAR) as a monetary unit (MU).[3] All subjects were allocated a show-up fee of 20MUs, or 20 points. A dictator in room A was given 80 points and she could allocate up to 40 points to her counterpart receiver - her randomly allocated partner in room B - in multiples of five. The 40-point maximum was selected, consistent with Fehr and Fischbacher, to highlight the 'distributional norm' of 50%. The third party in Room C was randomly partnered with subjects in Rooms A and B. The third party was given 40 points that she could use to reduce the dictator's payoffs at a rate of 1 to 3: each point she spent would reduce the dictator's payoff by 3 points. The third party could spend any number of points to reduce the dictator's payoff. We used the strategy method, asking the third party how many deduction points she would charge for each potential dictator transfer. The receiver was given no additional points. After each treatment, subjects were asked to fill out answers to a questionnaire consistent with Gächter, Herrmann & Thöni (2004) and Fehr & Fischbacher (2004*b*).

The treatment Take 20 is identical in every way to the baseline treatment, except that the set of actions for the dictator extends not only over [0, 40] points, but is extended to allow the dictator to take up to the entire show-up fee given to receivers. Dictators could take in multiples of five: 5, 10, 15 or 20 points. This implies that a dictator's action set is now [-20, 40] points. Though this differs from List's (2007) 'neutral' mid-point of zero, the intention was to provide a significant endowment to the dictator rather than to have symmetrical smaller endowments.

With a model of self-interested money-maximising, the subgame perfect equilibrium for the third-party punishment game is for the dictator to give nothing, and for the third party not to punish. In the taking treatment, the subgame perfect equilibrium would require that the dictator take the entire amount that she could - 20 points - and require that the third party not punish any allocation. The various models of social preferences and social norms would instead stipulate that subjects, to some greater or lesser extent, have regard for others' payoffs or adhere to norms of fairness or equity. That is, rather than preferences that are only self-regarding and consider an agent's own material gain, the agent also considers the material gain of others. Such behavior is often called other-regarding behavior. Were subjects to behave other-regardingly, then they might give in the baseline, not take as much as they could (that is, not behave entirely selfishly) in the taking treatment, or punish others either for not giving in the baseline or for taking in the taking treatment (Fehr & Schmidt 1999, Fehr & Fischbacher 2004*b*, Levitt & List 2007, Bowles 2008, Carpenter & Matthews 2009).

2.2 Results

Table 1 and Table 2 and Figure 1 to Figure 4 summarize the individual data obtained from the third-party punishment games. The sample comprises 195

[3]At the time of the experiments, ZAR 1=USD 0.13. As an index, the show-up fee is approximately twice the urban wage for services and hospitality. Thus the dictator's endowment of 80 points is worth just less than one eight-hour day's work at this minimum wage.

individuals in total, with 34 dictators and 35 third parties in the baseline treatment and 31 dictators and 30 third parties in the Take 20 treatment forming an unbalanced experimental sample. We assess dictator giving and taking, then we proceed to examine third-party punishment.

We report descriptive statistics to show that the subjects' choices are affected by the option to take. Making the assumption of normality of the distributions of allocations that are required for most tests seems unfeasible given the distributions of the data (Friedman & Cassar 2005). Consequently, non-parametric tests are used to examine whether behavior differs in the treatments.[4] With respect to punishment, researchers have typically undertaken regression analysis of the Minimum Unfined Offer (MUO) because it may be more amenable to regression analysis and statistical inference (Marlowe et al. 2008, Henrich et al. 2010). We report the MUOs, but also discuss how using the MUO as a variable of observation is problematic for the sample.

Four main results demand attention: first, the largest proportion of dictators adopts the most self-interested behavior in both the baseline and in the treatment; second, dictators make significantly fewer positive allocations when taking is permitted; third, un-self-interested dictator behavior remains prevalent in both the baseline and the treatment; and, fourth, though punishment by third parties does not significantly differ in most cases, the most self-interested option is punished substantially more severely in the taking treatment than in the baseline.

2.2.1 Dictator Behavior

In the baseline treatment, approximately 65% of dictators made positive offers. In the Take 20 treatment, there was a dramatic decrease in the number of positive offers as only 29% of the dictators made positive offers. Where p_B is the proportion of dictators who give in the baseline and p_T is the proportion of dictators who give in the Take 20 treatment, it is necessary to evaluate whether $d_G \equiv p_B - p_T$ is significantly different from zero. The bootstrap confidence interval for d_G is $-0.5776 \leq d_G \leq -0.1254$.[5] The difference in the proportion of dictators who choose to give is significant at the 1% level.

The average dictator in the Baseline made a low allocation relative to the literature on either dictator games or third-party punishment games.[6] Dictators' allocations in the baseline treatment were 10.85% of their endowment, and the

[4]Bernhard, Fischbacher & Fehr (2006) undertake ordered probit regressions to evaluate punishment, but their treatments involved the same experimental structure with variations in ethnic composition as the treatment and not changes in the range of allocations, therefore we cannot perform the same analysis.

[5]Following Bardsley (2008, 127, FN4), for whom the methodological constraints were similar, when proportions approach zero, the Z-test for equality of proportion and the chi-squared tests are insufficient. We use the bootstrap method, consistent with Efron (1979) and Efron & Tibshirani (1986). For the baseline, a number of draws equal to the sample size was taken, with replacement, and repeated 10 000 times. This was repeated for the Take 20 treatment. The two-sided confidence intervals were calculated with the percentile method, from which we obtained the p-values (Cameron & Trivedi 2005, Good 2006, Cameron & Trivedi 2009).

[6]In Camerer (2003), the average dictator allocates approximately 20% of the dictator's endowment. South African dictator allocations have ranged from 15%-26% of their endowments (Burns 2004, Van der Merwe & Burns 2008, Ashraf, Bohnet & Piankov 2006). In Fehr & Fischbacher's (2004*b*, 69) third party punishment games, dictators allocated an average of 24.5% of their total endowment.

average positive allocation was 16.76% of the dictator's endowment. In the Take 20 treatment, the average offer was negative, and, though the incidence of giving is lower, the average allocation is higher as the average positive offer increases to 25.69% of the dictator's endowment.

Contrasting the median and modal offers, we see, first, that the median allocation for the baseline is 10 (12.5% of the total), whereas in the Take 20 treatment the median allocation is -10 (50% of the total amount possible to take). We see, second, that the modal allocations are 0 in the baseline and -20 in the Take 20 treatment. These foreshadow the result that a large proportion of dictators behaved as self-interestedly as they could.

Figure 1 and Figure 2 provide further insight for the distribution of allocations. In Figure 1, the mode appears at zero, though several dictators make positive allocations up to a maximum of 35 points. In Figure 2, we observe a mode at the allocation -20 (32% of dictators made this allocation), with an additional 23% allocating -10, and 6.5% of subjects allocating 0. Unlike in List (2007), when introducing the ability to take, this sample does not display two modes at the most self-interested allocation (-20) and neither taking nor giving (an allocation of zero). This result may be a consequence of the construction of the treatment: its mid-point remains a positive amount, rather than at zero as was the case with in List's construction.

Were it the case that a range effect obtained, we would expect that the maximum positive offer should decrease in lock-step with the decrease in the minimum bound. This is not the case. In fact, the maximum observed allocation is higher in the treatment (40 MUs) than in the baseline (35 MUs). We could ignore this as an outlier, but allocations of 20, 25 and 30 remain. These would be inconsistent with the allocations being a range effect only.

2.2.2 Third Party Behavior

The aggregate third party behavior is depicted in Table 2, with some incidence of punishment shown in Figure 3 and average punishment shown in Figure 4. First, the most relevant difference in punishment behavior is that there are fewer third parties who never punish in the Take 20 treatment than there are in the baseline. Second, there are more third parties who punish all allocations in the taking treatment (16%) than there are in the baseline treatment (4%). Third, as shown in Figure 3, though punishment in the baseline third-party punishment game follows the customary trend of decreasing as the allocation increased, this is not the case in the taking treatments where some punishment of high allocations also occurs. Fourth, as shown in Figure 4, though the average number of deduction points allocated to punishment is lower in this sample than in others internationally, the pattern of high spending at low allocations and lower spending at high allocations is maintained, which reflects the evidence.[7] Finally, the punishment of the most self-interested behavior is more severe in the taking treatment than in the baseline.

In the Take 20 treatment, the level of punishment is highest (8.73 deduction points) at an allocation of -20 points, and decreases to 4.3 deduction points at a zero allocation. The punishment differs distinctly from the outcome for the baseline treatment, where punishment decreases at higher positive allocations.

[7]See Fehr & Fischbacher (2004*b*) and Bernhard, Fischbacher & Fehr (2006).

The amount of punishment is low given the literature.[8] The level of punishment is 14.28% for zero allocations in the baseline, and 10.75% for zero allocations and 21.83% for -20 allocations in the Take 20 treatment. Thus the only level of punishment that is remotely similar to Fehr & Fischbacher (2004*b*) is that of the highest punishment in the sample: punishment of those who take 20 points.

Similar to the analysis of giving by the dictators, we assess whether there is a significant difference between the proportion of punishers in the baseline and in the taking treatment. Bootstrap tests were run for the proportion that punishes overall, and the proportion of individuals that chooses to punish at each dictator allocation. For each of these, therefore, there is a proportion, p_B, of third parties that chooses to punish in the baseline and there is a proportion, p_T, that chooses to punish in the Take 20 treatment. Evaluating whether the difference $d_i \equiv p_B - p_T$ is significantly different from zero requires inferring a bootstrap confidence interval. The values for each of these bootstrap tests is presented in Table 3. The only significant difference in proportions occurs at a dictator allocation of 40, so subjects in the Take 20 treatment were more likely to punish a dictator allocation of 40 than subjects in the baseline.

With punishment we can also examine what is known as the 'minimum unfined offer' (MUO) (Marlowe et al. 2008, Barr et al. 2009, Henrich et al. 2010). The MUO is the lowest offer for which an individual no longer punishes (Henrich et al. 2010, 1483). In the baseline treatment, if a subject punishes offers of 0 and 5 points, but not 10 points or higher, then that subject's MUO is 10 points. A subject's MUO is a measure of that subject's willingness to punish low offers. The MUOs are presented in Figure 5.

In the current sample, however, there are several problems with using the MUO. Customarily, one uses the MUO if there is a sufficient proportion of the sample that has an MUO above which there is no fining. For example, it may be expected that a subject will punish low offers, then at some MUO choose to stop punishing. Contrastingly, a subject could punish low offers, stop punishing, then punish high offers. Alternatively, a subject could punish no low offers (thus having the lowest possible MUO), but punish high offers: that is, she punishes 'generosity'. Finally, a subject could punish all offers, in which case she does not have an MUO. In the current sample of third parties, 6% punish all dictator allocations and do not have MUOs. A further 37% of third parties have MUOs above which they choose to punish. Consequently, to analyze MUOs in the customary manner would require dropping approximately 43% of the sample of third parties and assuming that the data is randomly rather than systematically missing. Consequently we do not believe it is justified to analyze MUOs.

3 Discussion

When it comes to dictator behavior, two results are consistent with List (2007) and Bardsley (2008). First, many of the dictators in the sample make the purely self-interested choice: they give nothing in the baseline, or take 20 points in the Take 20 treatment. Giving is not the behavior of the majority of subjects. Second, and obversely, some fraction of each subject pool also made allocations that were not purely self-interested. If a subject took, she may not have taken every-

[8] In Fehr & Fischbacher (2004*b*, 68) third parties used approximately 28% of their endowment to punish an allocation of zero.

thing; or she may have allocated zero in the taking treatment; or she may have given some of her endowment away. This mixed evidence is therefore consistent with a model in which some agents are purely self-interested and others are not. Social preferences may, therefore, explain some subjects' behavior, whereas preferences based on self-interest may explain the behavior of others. Alternatively, a model based on incorporating social norms, culture and identity may also explain the results, though the social norms to which individuals adhere would be heterogeneous (Akerlof & Kranton 2000, Akerlof & Kranton 2005).

With taking we can begin to examine the extent of what List calls the 'moral' cost function derived from Levitt & List (2007, 156). Levitt and List argue that actions result in utility through two channels: the wealth gained and the moral costs incurred as a consequence of an action. The moral costs incurred are a function of the amounts involved in the game, the set of social norms against a behavior, and the degree of scrutiny. Similar to List (2007, 488-489), there appears to be a different type of moral cost to taking than to giving nothing because of the prevalence of taking.

When interpreting the differences in average positive offers, it seems as though the introduction of taking as an option makes 'unfair' positive or negative offers more salient for some subjects. Dictators who had their choices framed by the potential to take may have given more than their counterparts in the baseline experiment who did not have their choices framed by the potential to take. This is not consistent with theories of social preferences in which the simple addition of four actions allowing taking alters the behavior of subjects concerned with fairness, reciprocity or conditional cooperation.

Considering punishment, the results are somewhat more difficult to interpret and it is difficult to say whether they are consistent with other evidence. First, the behavior of third parties in the baseline is consistent with other evidence from third-party punishment games: punishment has a relatively high incidence at low allocations, but decreases steadily at higher allocations. One anomaly, though, is that the incidence of punishment is lower at an allocation of 0 than it is at an allocation of 5, which suggests a strategic motive to avoid punishing at this allocation. Alternatively, third parties may want individuals to behave 'honestly' in the sense that if a dictator is self-interested, then a third party may prefer for them to allocate zero than to allocate a negligible 5 points. Finally, third parties may have wanted to appear as though they were willing to punish certain some self-interested allocations, but that they expected the zero allocation to be more common and wanted not to have to punish at that allocation.

In the taking treatment, the behavior of third parties is inconsistent with previous evidence: though third parties in the Take 20 treatment punish negative allocations severely, third parties also seem to have a much higher average punishment level than in the baseline. It is unclear whether the results showing the differences in punishment levels in Figure 4 indicate true antisocial punishment, that is, an objection to the behavior of those who 'cooperate' by punishing them, or an objection to inequality (Fehr & Schmidt 1999, Falk & Fischbacher 2006, Fehr & Schmidt 2010), or spite towards those who had the option to take (Levine 1998), or some state-based preference (Frohlich, Oppenheimer & Moore 2001, Bowles 2008).

Though the evidence may be ambiguous for the theories discussed above, we can conclude that the results are inconsistent with other theories. Bolton &

Ockenfels's (2000) theory predicts no punishment, most especially because the third party already has a 'fair share' of one third. Moreover, pure reciprocity theories, for example Rabin (1993), would predict reciprocal punishment by B of A if B could punish, but such a theory does not include the possibility for C to punish A when C was not affected directly by A's actions. The evidence from these experiments does not support either of these theories.

To investigate inequity aversion, Barr et al. (2009) provide a useful one-parameter model as an elucidation of Fehr & Schmidt (1999). Based on the model, Barr et al. (2009) predict subgame perfect responses for punishment and allocations in the TP-DG. They say, 'offers weakly greater than $\frac{1}{2}$ should never be fined in the third-party punishment game' (Barr et al. 2009, 15). Their full sample had an incidence of 6% for punishment for amounts greater than 50%. The problem, though, is that they do not detail levels of punishment in the range of 25-50%, or what could be thought of as 50% or greater of the distribution norm (40 points). Considering that their logic for offers greater than 50% could be applied to offers of exactly 50%, we see that their one-parameter version of the utility function may not hold when the option to take is introduced. Taking should not affect the predictions in their model because allowing subjects to take simply includes possibilities in the negative domain. Barr et al.'s (2009) model implies, with the positive endowments given, that some subjects should make positive allocations and others will punish, but these distributions should not be sensitive to an expansion of the dictator's action set to the negative domain of allocations. Nevertheless, when the action set was expanded to include taking, many more subjects (40%) punished an allocation of 50% than in the baseline (11.43%). The bootstrap confidence intervals show that this is the one allocation where the baseline and taking treatment did not coincide. These results contravene the predictions that Barr et al. made because the subjects' behavior has been affected by the option to take. The evidence therefore conflicts with some constructions of inequity aversion, but may be consistent with the general idea of inequity if it includes possibilities for subjects to punish those whose action sets include options to take.

4 Conclusion

The results from the experiments indicate several similarities to preceding research investigating third party punishment and dictator games. Consistent with the literature, dictator behavior was mixed: many dictators made positive offers, and many dictators also behaved entirely self-interestedly by either giving nothing in the baseline or taking the most that they could in the taking treatment. The results therefore provide tentative support for the existence of individuals who adhere to different behavioral rules where a significant proportion of subjects behave entirely self-interestedly while others behave other-regardingly (Camerer 2003, List 2007, Bardsley 2008). Punishment in the baseline followed accepted patterns (Fehr & Fischbacher 2004*b*, Bernhard, Fischbacher & Fehr 2006, Marlowe et al. 2008). Punishment in the taking treatment, however, showed a slightly different pattern: there was a significant incidence of punishment across all allocations, higher incidence of punishment and greater average punishment of the most self-interested allocations, and higher incidence of punishment and higher average punishment of the least self-interested offers.

The results therefore show that a theory based only on material self-interest does not adequately describe the behavior of the individuals in the sample, but neither does a model of behavior based only on inequality aversion. A mixed model may offer a more plausible representation of the behavior of subjects in this sample. The results offer additional evidence that experimental economists may have constructed experiments in such a way that the virtuous actions have appeared more common than the vicious.

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Table 1: Aggregate Dictator Behavior

Treatment (n)	Proportion of Positive Offers	Mean Offer	Median Offer	Modal Offer	Average Positive Offer
Baseline (34)	.65	8.68	10	0	13.41
Take 20 (31)	.29	-4.19	-10	-20	20.55

Offers are in points, not percentages.
The average positive offer ignores zero and negative offers.

Table 2: Aggregate Third Party Behavior

	Baseline	Take 20	Overall
Never Punish	.29	.17	.23
Punish Only Allocations Beneath 50% of Potential†	.20	.04	.18
Punish Only Allocations Above 50% of Potential†	.04	.04	.04
Punish at Zero Allocation†	.56	.56	.56
Punishers who punish allocations below zero†	-	.96	-
Punishers who always punish†	.04	.16	.10
Overall n	35	30	65

† As a proportion of those who punished.

Table 3: Third Party Bootstrap Tests

Overall	$-.0843 \leq d_O \leq 0.3174$
Allocate 40	$0.0745 \leq d_{A40} \leq 0.4910^{\dagger}$
Allocate 35	$-0.0770 \leq d_{A35} \leq 0.3975$
Allocate 30	$-0.08 \leq d_{A30} \leq 0.4106$
Allocate 25	$-0.2295 \leq d_{A25} \leq 0.2623$
Allocate 20	$-0.3159 \leq d_{A20} \leq 0.1721$
Allocate 15	$-0.3462 \leq d_{A15} \leq 0.1381$
Allocate 10	$-0.2585 \leq d_{A10} \leq 0.2365$
Allocate 5	$-0.2558 \leq d_{A5} \leq 0.2306$
Allocate 0	$-0.1411 \leq d_{A0} \leq 0.345351$

† Significant at the 99% level of confidence.

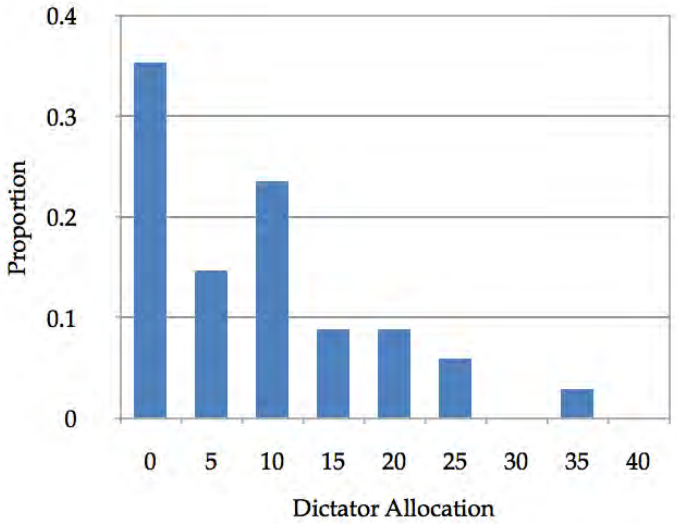

Fig 1: Baseline Treatment

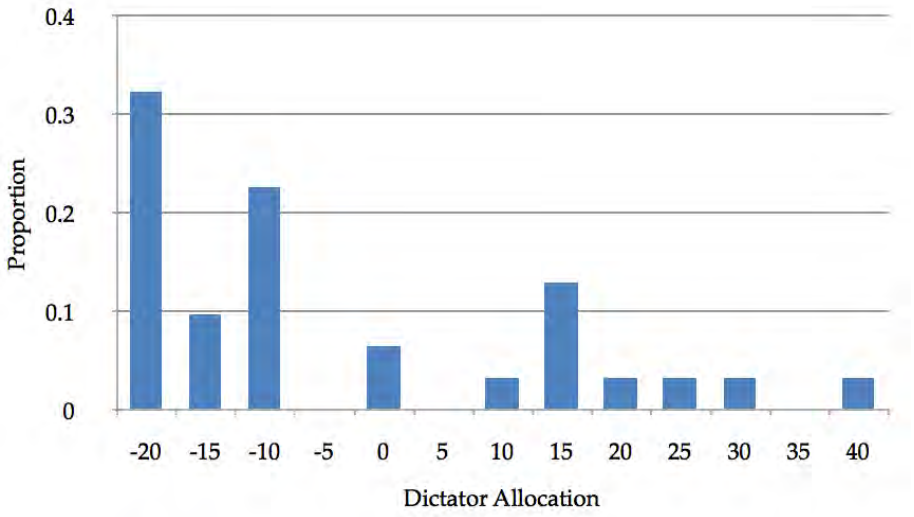

Fig 2: Take 20 Treatment

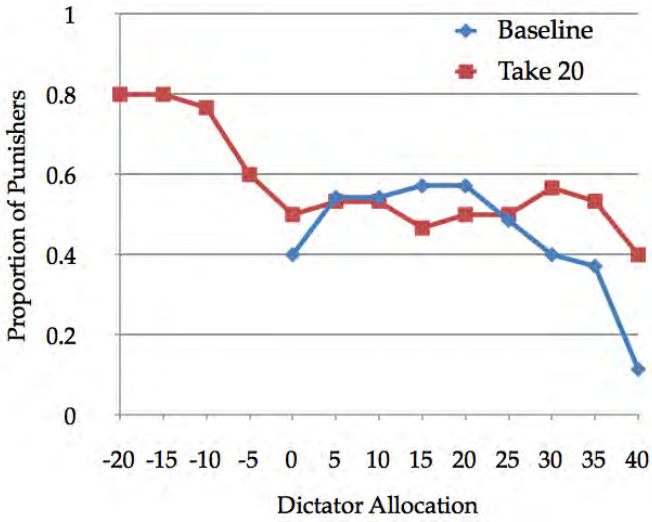

Fig 3: Proportion of Punishers

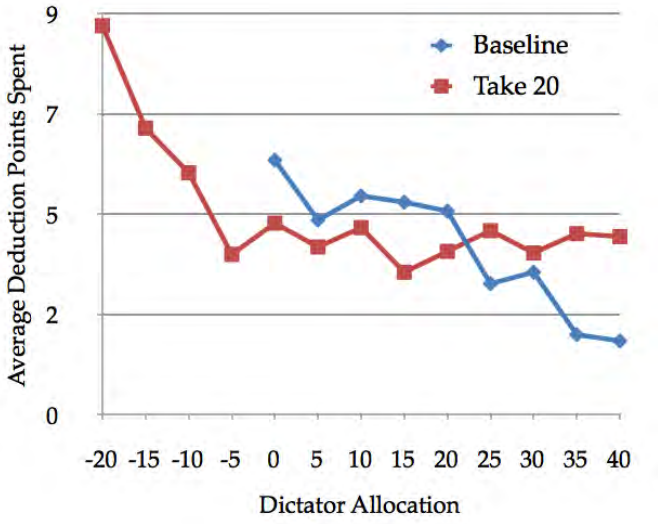

Fig 4: Actual Punishment

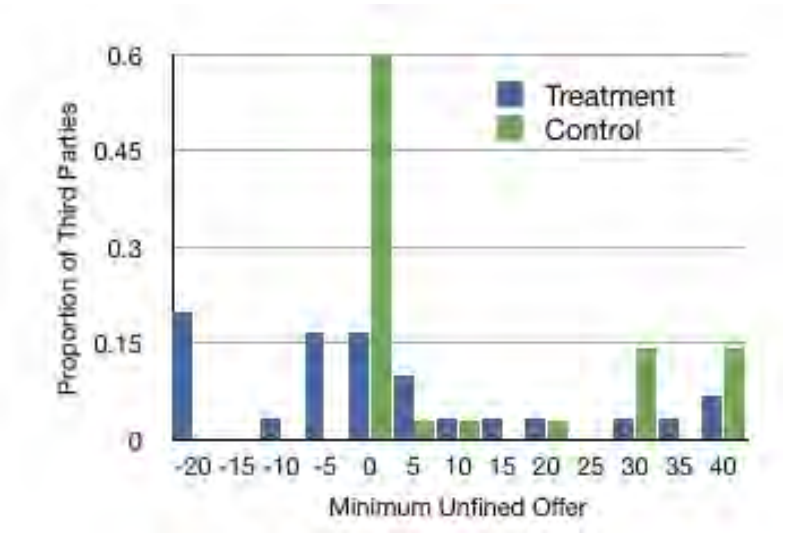

Fig 5: Minimum Unfined Offers