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**Abstract**

We study dictator allocations using a 2x2 experimental design that varies the level of anonymity and the choice set, allowing observation of audience effects in both give and take frames. Changes in the distribution of responses across treatment cells allow us to distinguish among alternative motives as elaborated in recent theory. We observe significant audience effects that vary by both frame and gender. The pattern of responses suggests that heterogeneous concerns for reputation and self-signaling across gender give rise to the contextual effects associated with the give and take frames that have previously been observed in the literature.

*Keywords*: Dictator game; anonymity; gender; framing.
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# Gender- and Frame-specific Audience Effects in Dictator Games

## 1. Introduction

Evidence of the propensity to give in dictator games is widespread and well known, but still incompletely understood.[1] Contributions that explain behavior entirely through distributional preferences, such as those by Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) have been challenged, both by protocols that allow for taking from the passive player and by theory and experiment that demonstrates the importance of audience effects. List (2007), Bardsley (2008), and Cappelen et al. (2013) all find giving is diminished in treatments in which both giving and taking are permitted, indicating that "dictator giving… is not explained by unselfishness towards others that exists independently of the experimental context" (Bardsley, 2008). Consistent with this conclusion, List (2007) argues that "a more appropriate theoretical framework must be advanced and subsequently tested in order for the meaning of giving to be more fully understood."

One candidate framework is Andreoni and Bernheim's (2009) model of audience effects. Similar in aim to more general theories that admit intrinsic, extrinsic, and image-related motivations (Benabou and Tirole, 2006), Andreoni and Bernheim (2009) focus specifically on dictator giving and argue that a preference for fairness must be augmented by a concern for reputation and self-image to account for experimental findings. Support for the theory is found in experimental results that vary the social distance between the dictator and recipient, and in some cases the experimental monitor (Andreoni and Bernheim, 2009; Dufwenberg and Muren, 2006, Hoffman et al. 1994, 1996; Koch and Normann, 2008), as well as in protocols where dictators sacrifice monetary returns to avoid participation and observation (Dana et al., 2006; Broberg et al., 2007).

[1] Camerer (2003) and Engel (2011) document the extent of giving. Engel reports that across more than 600 treatments about 64% of subjects give to the passive player. On average, 28% of the available surplus is transferred. Conditional on giving, equal division is the modal choice.

The examination of audience effects in dictator games has, to date, been limited to the give frame and in this study we present results from a two-by-two experimental design – varying both observability and the action space. Consistent with existing results, we hypothesize that taking imposes a cost – but one that varies with the level of observability. Thus, our analysis focuses primarily on treatments within either the give or take frame, and only secondarily on differences across frames. In this respect our protocols are most closely related to treatments of List (2007) who explores the structure of the 'moral cost function' within the take space. While varying the maximum amount that dictators can take, List observes coherence in the moral cost function on both the extensive and intensive margins; more dictators take and more is taken when the permitted amount is increased from 20% to 100% of the endowment. Our protocols explore the moral cost function from a complementary perspective, by varying costs associated with public observability, rather than the available benefits.[2]

## 2. Design

Two-player dictator games were conducted, between subjects, using a 2x2 factorial design varying the choice set and the observability of dictators' choices. Provisional endowments of \$20 (\$10) for Player A (Player B) were given to Player A in two envelopes containing \$1 bills (U.S). Each envelope was labeled by player type (A or B) and a common numeric identifier for the subject pair. In the give frame (G), Player A was instructed that they could transfer to Player B any amount from \$0 to their entire endowment of \$20 in one dollar increments, by transferring bills from the A envelope to the B envelope. In the take frame (T) the set of possible transfers is expanded to range from -\$10 to \$20, allowing transfers from B to A of amounts up to and including B's entire endowment.

Variation in the observability of Player A's behavior is created by implementing both an anonymity preserving double-blind protocol (A), and a public protocol in which each dictator's decision is observed by all others in the experimental lab (O). In both observable and anonymous conditions, each Player A dropped their B envelope into a

[2] List (2007) also explores the moral cost function by varying the "deservingness" of the passive player through earned endowments (see also Cherry et al. (2002)). Cappelen et al. (2013) extend research on this topic in the take frame.

sealed box individually after allocation decisions were made. In the observable condition, all envelopes were first collected by the monitor. Each Player A was then called individually to the front of the room, where the amount in Player B's envelope was counted by the experimental monitor and made public by entering the dollar value into a spreadsheet projected at the front of the room. All monies were returned to the B envelope and Player A then dropped the envelope into the sealed box before returning to their seat and rejoining the audience. As in List (2007), Player A and Player B "did not have any contact before, during, or after the session." The audience effects we examine are therefore associated with the observation of dictator decisions by the experimental monitor and the other A players. Three distinct monitors were used, all with extensive previous experience in the conduct of laboratory experiments.

Experimental sessions were conducted at the University of Alaska Anchorage Experimental Economics Laboratory with graduate and undergraduate students. The lab infrastructure includes shielded workstations so that actions were not observed while subjects were tasked with determining the final contents of the envelopes. A total of 228 dictator decisions were observed with the allocation across treatments as noted in Table 1. Treatments are indicated by the combination of letters associated with each factor: GA, TA, GO, and TO. Sessions were conducted between June, 2012 and April, 2013. An additional protocol implemented during these sessions is unrelated to the questions addressed in this paper. The order of implementation of the dictator protocol was counterbalanced with the other protocol across sessions.

**3. Results**

Continuous and dichotomous descriptors of the data are used to examine the salience of the audience on the dictators' decisions. The continuous descriptor is the final payoff to the dictator, the content of envelope A (*aenve*). Indicators of giving (taking) are coded one if *aenve* is less than (greater than) Player A's endowment ($20) and zero otherwise.

Table 1 presents the main results for the payoff variable for both the entire sample (Panel A) and disaggregated by gender (Panel B). Within treatments, the mean value of *aenve* ranges from 16.44 (GO), to 21.59 (TA). A Kruskal-Wallis test rejects the hypothesis that

*aenve* is drawn from the same population across the four treatments (p = 0.0001). Conditional on giving, however, the pattern is quite similar, with the mean of *aenve* equal to 14.47, very close to what would be predicted by the 50-50 norm. The Kruskal-Wallis tests fails to reject the null of no difference across treatments for this measure (p = 0.398).

Table 2 presents the proportion of the sample in each subset of the action space (give, take, and no change) by treatment. Testing for differences in the proportion of givers across all treatments the Kruskal-Wallis test rejects homogeneity (p = 0.0241). Further examination of the differences yields a first result on the impact of observability on behavior.

Result 1: *Observability induces giving in the give frame but has no effect on giving in the take frame.*

Giving increases from 49% to 68% of the sample across the GA and GO treatments, a statistically significant effect (p = 0.0265).[3] In the TA and TO treatments the share giving remains relatively stable, respectively 41 and 44 percent, and the increase is statistically insignificant (p = 0.3513). The difference in the stability of giving across give and take frames is noteworthy, and in combination with results reported below, is consistent with the idea that context helps to frame behavioral norms. Despite the null result on giving in the take frame, we do find an impact of observability as noted in Result 2.

Result 2: *Observability reduces taking.*

Taking is reduced from 48% in TA to 34% in TO (p = 0.0542). In combination with the relative stability of giving the result implies additional mass in the distribution at the original endowment. As shown in Table 2 the proportion of those who take no action and leave with their endowment doubles from 10.6% (TA) to 21.3% (TO) a statistically significant increase in proportions (p = 0.0490).

Probit models support the unconditional inferences on aggregate changes while controlling for additional influences. Table 3 reports estimated average marginal effects for giving (Model 1) and taking (Model 2) for models that fully interact gender with the

[3] Results are from a Chi-squared test of proportions (one-tailed).

treatment indicators, controlling also for monitor effects.[4] Table 4 consolidates the estimates and presents the predicted probabilities of giving and taking by frame, observability, and gender.

The baseline in the probit models is the give treatment, under anonymity, for females (GAF), and the estimated 76% rate of giving is significantly greater than for males in the give, anonymous condition (GAM = 30%). There is no significant difference, however, between giving in the anonymous and observable conditions for females (GAF – GOF = 0.097, p = 0.465). In the take frame women significantly reduce their taking when observed from 50% (TAF) to 23% (TOF) (p = 0.027).

For men in the give frame observability has a significant effect with the rate of giving increasing from 30% (GAM) to 71% (GOM). The rate of giving in the observable condition (71%) is also indistinguishable, statistically, from that of women (GOM-GOF= 0.050, p = 0.715). In the take treatments, male subjects are much less sensitive to the audience. Taking does decline under observation, from 53% to 44%, but the difference is not statistically significant (p = 0.512).

Further insights on the nature and robustness of the gender effects can be gained from examining the distribution of final payoffs, by gender and frame. Figure 1 presents the actual distributions of the dictators' payoffs, and Kolmogorov-Smirnov tests support significant audience effects for men in the give frame (p = 0.031) and women in the take frame (p = 0.067), but not for men while taking (p = 0.797) or women while giving (p = 0.196). Results on gender effects are summarized as Result 3.

Result 3: *Audience effects are gender specific and interact with the framing of the decision. In the give frame women are consistently generous, while men increase giving substantially in response to an audience. In the take frame, it is women's behavior that exhibits significant variability. Women take at rates similar to men under anonymity. In the presence of an audience they dramatically reduce their taking, while men are relatively unaffected.*

## 4. Discussion and Conclusion

[4] Marginal effects for each observation were calculated and then averaged as discussed in Cameron and Trivedi (2005).

We examine both enduring and novel questions about dictators' allocations by examining the role of audience effects in both give and take space. The design allows us to distinguish distributional preferences from signaling motivations for giving, providing further insights on the contextual dependence of norms highlighted by the original contributions of List (2007) and Bardsley (2008) in similar settings, and more broadly by Levitt and List (2007). Our results provide additional support for the notion that the frame supplies important signals of acceptable norms of behavior, although in our subject pool the effect is gender specific. The finding of increased generosity under observation in both frames is consistent with that of Hoffman et al. (1996) in the give frame.[5] In the take frame, increased generosity under observability is reflected in the more frequent choice of the status quo option, which can be interpreted as a kind action in this setting.

The heterogeneous gender effects in the take frame are novel, but what we find in the give frame is consistent with what can be gleaned from previous studies. Eckel and Grossman (1998) implement a double blind protocol and find that women are significantly more generous than men, while Bolton and Katok (1995) find smaller and insignificant effects when the audience consists of the experimental monitor (see also Croson and Gneezy (2009) for discussion). Thus, one further contribution of the current study is to examine the robustness of these conclusions, avoiding possible confounds associated with different subject pools and procedures across research labs, and allowing us to observe that additional giving by men drives the aggregate audience effect in the give frame.

Consistency in the distribution of responses across observability conditions – for women in the give frame and men in the take frame – is an unexpected result. The theory of audience effects helps us interpret the observed distributions by suggesting the relative presence or absence of alternative motives.[6] For women, relative stability of results in the

[5] The results contrast with those of Dufwenberg and Muren (2006) who find increased selfishness for dictators under observation. Dufwenberg and Muren (2006) attribute their result to impression management of economics students in front of classmates and thus also consistent with the importance of signaling.

[6] This discussion describes tendencies that are apparent in the response distributions. Within each treatment, conditional on gender, there is obviously significant variability in responses, and we cannot rule out that individual choices may reflect altruistic behavior. Explaining individual behavior in detail is beyond the scope of this paper. However, there is evidence in related settings that both personality traits (Visser and Roelofs, 2011) and hormone levels (Zak et al., 2009) can help explain the heterogeneity we observe.

give frame suggests that self-signaling motives play a role in allocations that are absent for men. Self-signaling concerns, however, are malleable and in the take frame behavior is more readily explained by either self-interest or reputational concerns. Changes in men's distributions are well explained by assuming self-interested behavior. The lone exception is the give frame where an audience is sufficient to generate a concern for reputation.

Table 1: Player A Payoffs Descriptive Statistics, by Treatment and Gender

| Panel A | Aggregate | | | Conditional on Giving | | | Conditional on Taking | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | *n* | Mean | S. D. | *n* | Mean | S.D. | *N* | Mean | S.D. |
| GA | 51 | 16.94 | 4.31 | 25 | 13.76 | 4.24 | - | - | - |
| TA | 66 | 21.59 | 6.20 | 27 | 15.19 | 2.29 | 32 | 27.34 | 2.40 |
| GO | 50 | 16.44 | 3.91 | 34 | 14.76 | 3.69 | - | - | - |
| TO | 61 | 19.77 | 6.65 | 27 | 14.04 | 1.44 | 21 | 27.00 | 2.76 |
| Total | 228 | 18.93 | 5.88 | 113 | 14.47 | 3.73 | 53 | 27.21 | 2.53 |

| Panel B | Aggregate: Female | | | Aggregate: Male | | |
|---|---|---|---|---|---|---|
| Treatment | *n* | Mean | S. D. | *n* | Mean | S.D. |
| GA | 21 | 15.57 | 3.92 | 29 | 17.83 | 4.25 |
| TA | 32 | 22.63 | 5.91 | 32 | 20.56 | 6.54 |
| GO | 26 | 17.19 | 2.62 | 20 | 15.50 | 5.26 |
| TO | 31 | 18.71 | 6.11 | 28 | 21.04 | 7.31 |
| Total | 110 | 18.89 | 5.61 | 109 | 19.03 | 6.33 |

Mean values are player A payoffs in U.S. Dollars. Panel A presents values for the entire sample and Panel B presents values by gender.

Table 2: Share of Givers and Takers, by Treatment and Gender

| | All | | | Female | | | Male | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Give | Take | S.Quo | Give | Take | S.Quo | Give | Take | S.Quo |
| GA | 0.49 | - | 0.51 | 0.76 | | 0.24 | 0.31 | | 0.69 |
| TA | 0.41 | 0.48 | 0.11 | 0.31 | 0.50 | 0.19 | 0.50 | 0.47 | 0.03 |
| GO | 0.68 | - | 0.32 | 0.65 | | 0.35 | 0.70 | | 0.30 |
| TO | 0.44 | 0.34 | 0.21 | 0.48 | 0.21 | 0.31 | 0.39 | 0.50 | 0.11 |

G: give, T: take, A: anonymous, O: observed.

Table 3: Probability of giving and taking, average marginal effects

| Variable | Model 1<br>pr(give) =0.758 | Model 2<br>pr(take) =0.501 |
|---|---|---|
| *take* | -0.444 | |
| | 0.001 | |
| *observed* | -0.104 | -0.274 |
| | 0.463 | 0.019 |
| *takeXobs* | 0.279 | |
| | 0.125 | |
| *gender* | -0.448 | -0.069 |
| | 0.001 | 0.554 |
| *obsXgender* | 0.500 | 0.384 |
| | 0.009 | 0.020 |
| *takeXgender* | 0.652 | |
| | 0.000 | |
| *takeXobsXgender* | -0.816 | |
| | 0.001 | |
| *mon 1* | 0.146 | -0.173 |
| | 0.055 | 0.080 |
| *mon 2* | 0.002 | 0.069 |
| | 0.983 | 0.530 |
| N | 219 | 123 |
| Ll | -138.51 | -77.59 |
| chi2 | 26.54 | 12.39 |
| AIC | 297.02 | 167.18 |

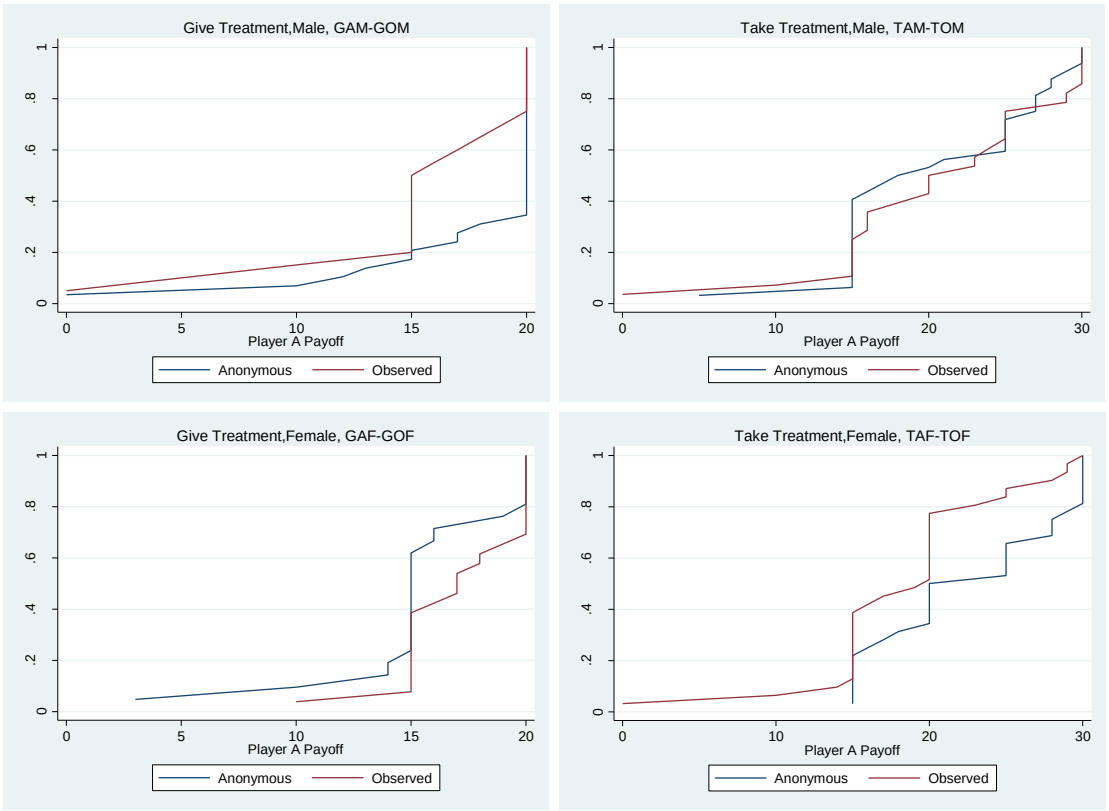
Model 1 is estimated for both give and take frames jointly, with p-values reported below the average marginal effects. *take* is an indicator equal to 1(0) for the take (give) treatment, *obs* an indicator equal to 1(0) for the observable (anonymous) treatment, and gender equal to 1(0) for men (women). The predicted probability for the baseline group in each model is presented at the top of each column. For example, for model 1, 0.758 is the probability of giving for a female in the give-anonymous treatment (GAF), and the reduction in giving for males is indicated by the -0.448 value of the gender variable, yielding a predicted probability for GAM of approximately 0.310. Table 4 consolidates the predicted probabilities for all treatment-gender interactions for both models. Small differences in values arise from the incorporation of monitor effects in Table 4.

Table 4: Predicted probabilities of giving and taking

| TRT | Prob(give) | Prob(take) |
|---|---|---|
| GAF | 0.758 | - |
| GAM | 0.302 | - |
| GOF | 0.661 | - |
| GOM | 0.711 | - |
| TAF | 0.305 | 0.501 |
| TAM | 0.518 | 0.427 |
| TOF | 0.486 | 0.232 |
| TOM | 0.368 | 0.543 |

G: give, T: take, A: anonymous, O: observed, F: female, M: male. Probability of giving and taking for each subgroup is calculated from the average marginal treatment effects reported in Table 3.

Figure 1: Distribution plots of dictator payoff by gender and frame, varying observability



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