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Altruism and Anonymity: A Behavioral Analysis

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Abstract

The effect of anonymity on altruism was examined in a social discounting task with hypothetical rewards. Social discounting – the rate at which increases in social distance decrease value to the participant – was compared across three groups. Participants in the Anonymous group were told that recipients would not know who they were. Participants in the Observed group were asked to imagine that each of their choices was being observed by the recipient. Participants in the Standard group were given no special instructions with respect to anonymity or identity. Social discounting was measured at each of 7 social distances ranging from first closest friend or relative to the 100th closest. Social discount rates for all three groups were well described by hyperbolic functions. Participants in the Observed group were willing to forgo more money for the benefit of others (were more altruistic) than were those in the other two groups. Although participants in the Anonymous group, with no prospect of reciprocation, were willing to forgo less money for the sake of others than were those in the Observed group, they did express willingness to forgo significant amounts. This is some evidence that individual altruistic acts cannot be explained wholly by the possibility of reciprocation.

Keywords

altruism; anonymity; delay discounting; hypothetical rewards; social discounting; social distance

1. Introduction

1.1 Altruism and Anonymity

Behavior is said to be altruistic when it benefits others at a cost to the individual engaging in that behavior. In the laboratory, altruism is often studied in the context of game theory – e.g., prisoner's dilemma games, ultimatum games, or dictator games (see Camerer, 2010 for a review). In dictator games, for example, participants are given a sum of money that they may divide between themselves and a recipient. Each participant may give the entire amount, any part of it, or nothing at all to the recipient. Numerous studies have found an

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effect of anonymity on generosity in such games (Bolton, Katok, & Zwick, 1998; Bolton & Zwick, 1995; Charness & Gneezy, 2008; Dufwenberg, & Muren, 2006; Frey & Bohnet, 1995; Frohlich, Oppenheimer, & Moore, 2001; Hoffman, McCabe, Shachat, & Smith, 1994). In one experiment (Hoffman et al., 1994), twelve dictators entered a private cubicle one-by-one where they found an envelope containing 20 slips of paper; half were 1 dollar bills, the other half were the same size as the bills but blank. The dictators were instructed to take exactly 10 slips in any combination of bills and blanks and then place the envelope containing the remaining 10 slips in a box. After all the dictators had taken their 10 items, the envelopes were given randomly to 12 recipient participants in another room. The experimenter could determine how many bills were left in each envelope, but could not identify which dictator had taken the bills from any particular envelope. In this anonymous situation, dictators were significantly less generous than they were in the standard experimenter-observed version of the procedure.

Providing a behavioral account for such results presents a serious challenge. Even without the anonymity component, a behavioral account of altruism would require identifying the reinforcers of altruistic acts. But individual altruistic acts cannot be reinforced. If psychologists should discover some occult reinforcer that follows an apparently altruistic act, then the act would, by definition, not be altruistic. How can a discipline that relies, for its explanatory power, on the concept of reinforcement explain acts which are, by definition, unreinforced? Rachlin (1994; 2002; 2003) has proposed a solution that parallels the solution to a corresponding problem in explaining self-control (Rachlin, 1992, 2000).

1.2 Analogy to Self-Control

Some self-controlled acts may be explained in terms of strict commitment (Ainslie, 1992) but most everyday-life instances of self-control cannot be so explained. Suppose I am walking down the street in a strange neighborhood and pass a bakery with an enticing smell wafting out the door. I am sorely tempted to go in, buy a cupcake, and eat it as I go on my way. It is too late to institute a commitment procedure such as putting a clothespin on my nose or walking down a different street. Nevertheless I do not give in to temptation; I walk straight ahead. What reinforces that act? Sometimes reinforcement of self-control is said to be delayed, but no particular delayed reinforcer is contingent on that particular act. Being healthy is correlated with a healthy pattern of eating and exercise, but not in a 1:1 manner with individual acts. The pattern of acts constituting healthy living is valuable in itself but no individual act comprising the pattern is either valuable or individually reinforced – unless you conceive that the entire pattern reinforces each of its own components. That is, the entire pattern serves as an Aristotelian *final cause* of its components (Rachlin, 1994).

A delay discount function plots the decline in the present value of a reward as a function of the delay to its receipt. The slope of the delay discount function is correlated with the temporal extent of the reinforced pattern. When the slope is steep, the temporal extent is narrow and the organism lacks self-control; when the slope is shallow, the temporal extent is wide and the organism behaves in a self-controlled manner. Thus, people with various addictions (alcohol, gambling, heroin, cocaine, cigarettes, etc.) have steeper delay discount functions than those without identified addictions (Bickel & Marsch, 2001); and children have steeper delay discount functions than adults (Green, Fry, & Myerson, 2006; Mischel, Shoda, & Rodriguez, 1989).

1.3 Altruism as a Behavioral Pattern

Altruism may be viewed in a corresponding way. While it is illogical to say that an altruistic act is done because it is valuable in itself or externally reinforced, it is perfectly logical to say that such an act is part of a valuable pattern. Giving a dollar to a panhandler on the street may never be reinforced as such but being a generous person may be reinforced. It would be highly inefficient for a donor to determine the probability of reinforcement on each occasion for each individual donation; rather, the *habit* of giving may be reinforced. That habit may be highly valuable even though no single component of the habit is valuable (just as being a non-smoker is valuable although each single act of cigarette refusal may be of very low value and perhaps never individually reinforced). A social discount function measures the decline in value of a reward as the social distance increases between the giver and the recipient. Just as shallow delay discount functions have been found to correlate with self-controlled behavior, shallow social discount functions have been found to correlate with altruistic behavior in other contexts. For example, in previous social discounting research, people whose social discount functions were shallower tended to behave more altruistically in public goods and dictator games than people whose social discount functions were steeper (Jones & Rachlin, 2009); people with steeper *delay* discount functions – who valued future rewards less – tended also to have steeper *social* discount functions – valued rewards to others less (Rachlin & Jones, 2008a); and people valued money given to relatives more than they valued money given to nonrelatives *at the same social distance* (Rachlin & Jones, 2008b).

The conceptual basis for the analogy between self-control and altruism is the notion that people's relation to their future selves is analogous to their relation to other people (Ainslie, 1992; Rachlin, 2000; Trope & Lieberman, 2003). But this analogy only goes so far. On an empirical level, human *delay* discount functions are steeper when higher-valued rewards are discounted than when lower-valued rewards are discounted (e.g., Green, Myerson, & McFadden, 1997) while the reverse is the case for *social* discounting (Rachlin & Jones, 2008a). On a conceptual level, first, there is no process in social discounting analogous to commitment in delay discounting. You can commit to give so much money to such and such a charity in the future, but that commitment operates over time not social space. Of more relevance to the present experiment, anonymity cannot be controlled in delay discounting. The donor and recipient are the same person. A participant in a delay discounting task might be asked to choose hypothetically between $200 right now and $1,000 in 10 years. The participant is assumed to believe that 10 years hence she will remember that, in the past, she herself chose to forgo a smaller reward for the $1,000. It is conceivable that, with long delays, a person might forget a prior choice and be surprised at the sudden windfall; such forgetfulness might even be anticipated at the point of choice. But it would be difficult if not impossible to vary participants' knowledge of their own past sacrifices independently of delay itself. However, with social discounting, it is relatively easy to vary hypothesized knowledge by the recipient of the participant's identity – as in the present experiment.

1.4 Social Discounting

Like delay discounting, social discounting is hyperbolic:

$$v=\frac{V}{1+kN^s} \quad (1)$$

where *V* is the value of the undiscounted reward, *v* is the discounted value, *N* is the social distance, *k* is a constant measuring degree of discounting, and *s* is a constant measuring sensitivity to social distance (Jones & Rachlin, 2006). Unlike delay discounting, where sensitivity (*s*) has usually been found to be less than unity (e.g., Green & Myerson, 1996), social discount functions have almost always been well fit with $s = 1$. We do not ignore *s* in Equation 1, however, because in the Observed condition of the present experiment it was found to be less than unity.

The general procedure for assessing social discounting was essentially the same across all prior studies. First, participants were asked to imagine making a list of the 100 people closest to them with #1 as the closest and #100 perhaps a person they barely knew. Then (in a booklet format) participants were asked a series of hypothetical questions of the form: “Which would you prefer, $*X* for yourself or $75 for the N^{th} person on your list?” *X* varied from question to question on a page, typically from 0 to 85 in either ascending or descending order. The rank order of social distance (*N*), varied from page to page, between 1 and 100. This method, very similar to that used to assess delay discounting (e.g., Green, Myerson, & McFadden, 1997; Rachlin, Raineri, & Cross, 1991), generated crossover points that were used to fit Equation 1. In all cases, the fit was quite good (R^2 between 0.97 and 0.99).

In previous studies of social discounting, degree of anonymity has not been specified in the instructions. Do participants imagine that recipients of money they chose to give will know who they are? Or will their generosity be anonymous? Does a participant imagine that her father will somehow be notified if she chooses $50 for herself rather than $75 for him? What if she is imagining that he is actually watching over her shoulder while she makes these choices? The present experiment examines how two contextual variables, anonymity of reward delivery and observation of choice, affect social discounting. Participants completed social discounting questionnaires that were virtually identical to those used in past experiments (e.g., Jones & Rachlin, 2006, 2009; Rachlin & Jones, 2008a, 2008b, 2009). However, participants in one group (Anonymous) were told to assume that the rewards chosen for another person would be delivered anonymously. Participants in another group (Observed) were told to assume that when making choices (of the type, “Which would you prefer, $*X* for yourself or $75 for the N^{th} person on your list?”) the relevant person (*N*) was watching them.[1]

[1]Although there are problems with hypothetical rewards in the laboratory, real rewards create their own set of problems. With hypothetical rewards, participants are asked to imagine a real-world context and to choose within that context. Real monetary rewards obtained in the laboratory may impose a context of narrow maximization of monetary amount that may differ from the real-world context of primary interest to the experimenter. A participant in the laboratory, trying to imagine what she would do in a hypothetical real-world situation, may come closer to that situation than one simply trying to maximize monetary reward. This is especially the case in studies of altruistic behavior and cooperation. It would be self-defeating to study altruistic behavior in a context that encourages participants to maximize their own monetary rewards.

2. Materials and Methods

2.1 Participants

207 undergraduate students (115 female, 92 male), recruited through the psychology subject pool at Stony Brook University, were randomly assigned to one of three groups: Anonymous, Observed, and Standard. Twenty-seven participants failed to complete the 7 pages of the questionnaire and were excluded from all analyses. The remaining numbers in each group were: Anonymous (n=62), Observed (n=57), and Standard (n=61).

2.2 Procedure

Participants were given a 7-page questionnaire to complete. Each questionnaire was prefaced by an instruction page which was the same for all participants. It read:

> The following experiment asks you to imagine that you have made a list of the 100 people closest to you in the world ranging from your dearest friend or relative at position #1 to a mere acquaintance at #100. The person at number one would be someone you know well and is your closest friend or relative. The person at #100 might be someone you recognize and encounter but perhaps you may not even know their name.
>
> You do not have to physically create the list – just imagine that you have done so.
>
> On the following pages you will be asked to answer a series of questions about a person at a given social distance. For each page, imagine the person who best fits the position (#1 to #100) and answer each question.

Seven social distances [*N*'s] were presented: #1, #2, #5, #10, #20, #50, and #100, each on its own page. The amount of money to forgo in order to give $75 to another person began with $0 and then increased in $10 increments from $5 to $85. Each page contained the following instructions:

> Now imagine the following choices between an amount of money for you and an amount for the #[N] person on the list. Circle A or B to indicate which you would choose in EACH line.

A. $0 for you	B. $75 for person #[N]
A. $5 for you	B. $75 for person #[N]
	--------Down To-------
A. $85 for you	B. $75 for person #[N]

For the Standard group, there were no additional instructions. For the Anonymous group, the following sentence was placed at the end of the instructions on each page (immediately prior to the list of choices): "If you choose B, person #[*N*] would be given $75 and not told who it was from." For the Observed group, the following sentence was instead placed at the end of the standard instructions on each page: "Imagine that person #[*N*] is observing you while you make all of these choices."

3. Results

A crossover point was determined for each page of the questionnaire. The crossover point was the average of the largest amount the participant was willing to forgo and the smallest amount the participant chose for him or herself. For example, if a participant preferred $75 for person #10 over $15 for herself, but preferred $25 for herself over $75 for person #10, the crossover point for person #10 would be $20. In other words, the crossover point was the point at which the participant switched from choosing B to choosing A. Exclusive preference for option A (money for oneself) was considered a $0 crossover point; exclusive preference for option B (money for another person) was considered a $90 crossover point.

Figure 1 shows the median crossover points for each of the 7 social distances tested for the Observed (top panel), Anonymous (center panel), and Standard (bottom panel) groups. Error bars indicate the inter-quartile range. Allowing only *V* and *k* to vary in fitting Equation 1 to median crossover points (*s* set equal to 1.0), obtained *V* varied between $84.2 (Observed), $86.1 (Anonymous), and $86.4 (Standard). Due to the similarity in obtained *V*, *V* was set to $85.6 (the average of the three obtained *V*s), and Equation 1 was fit to the data with only *k* free to vary. The solid regression line in Figure 1 is the best fit of Equation 2 (with *V* set at $85.6) for each panel. The resulting *k*-values were 0.022 for the Observed group, 0.055 for the Anonymous group, and 0.068 for the Standard group as indicated in Table 1.

The median crossover points for each group were also fit to an exponential function of the form: $v = Ve^{-kN}$. In all cases, the hyperbolic model (Equation 1) provided a superior fit. Whether using two free parameters (*V* and *k*) or just one (*k*, with *V* set to the average from the 2-parameter fit), R^2 was at least .04 greater for the hyperbolic fit than for the exponential fit.

After Equation 1 was fit to the median crossover points for each group, the average value determined for *V* ($85.6) was used to fit Equation 1 (with only *k* free to vary) to the crossover points of each participant individually. The median individual *k*-values across participants were very similar to the medians for each group as a whole (all within 0.002), as shown in Table 2.

A one-way ANOVA found no significant difference in individual *k* between any of the groups [$F(2, 177) = 1.62$, $p > .20$]. As is typical with social discounting (Rachlin & Jones, 2008a), the distribution of individual *k*-values was highly skewed. A log transformation significantly reduced the skew of the distribution. With individual log-*k*, there was still no significant difference between the Anonymous and Standard groups (Tukey post-hoc, $q = 0.34$, $p = .97$, Cohen's $d = 0.04$). There was, however, a significant difference between the Observed and Anonymous groups ($q = 5.23$, $p = .00$, $d = 0.65$) and between the Observed and Standard groups ($q = 4.88$, $p = .00$, $d = 0.62$) [ANOVA: $F(2, 177) = 8.45$, $p = .00$].

Area under the curve (AUC) is a normalized measure not dependent on functional form (Myerson, Green, & Warusawitharana, 2001). It is calculated by first expressing crossover points as a percentage of *V* then connecting the crossover points by straight lines, then summing the areas of the trapezoids so formed, then dividing that sum by the area of the rectangle, $V * \boldsymbol{N}_{MAX}$. AUC varies from 1.0 (no discounting) to 0 (complete discounting). In the present experiment, AUC was .619, .424, and .366 for the Observed, Anonymous, and Standard group medians respectively. For individual participants, the median AUCs (and inter-quartile ranges) were .658 (.526), .419 (.302), and .390 (.356) for the Observed, Anonymous, and Standard groups respectively. As with log-*k*, there was no significant difference in AUC between the Anonymous and Standard groups (Tukey post-hoc, $q = 0.94$, $p = .78$, Cohen's $d = 0.13$) but a significant difference between both the Observed and Anonymous ($q = 5.11$, $p = .00$, $d = 0.65$) and the Observed and Standard ($q = 6.02$, $p = .00$, $d = 0.73$) groups [ANOVA: $F(2, 177) = 10.40$, $p = .00$].

Despite the close fit for all three sets of medians, the worst fit, that for the Observed group, does show systematic deviation from the regression line. Crossover points at lesser social distances (specifically: 2, 5, and 20) show greater discounting than described by the regression line whereas greater social distances (i.e., 50 and 100) show less discounting than indicated by the line. This indicates a lack of sensitivity to social distance which might be captured by a fractional exponent, *s* in Equation 1. Allowing *V*, *k*, and *s* to vary in Equation 1 had little effect on the fits for the Anonymous ($s = 0.93$) and Standard groups ($s = 0.94$). However, the resulting values for the Observed group were $102.5 for *V*, 0.165 for *k*, and 0.56 for *s*. The dashed regression line in Figure 1 shows the best fit of Equation 1 for the Observed group ($R^2 = .97$).

4. Discussion

Although the null hypothesis cannot be proven, the overall similarity in performance of the Anonymous and Standard groups in terms of fits of all 3 constants of Equation 1 suggests that the standard instructions – those given in the Standard group and in past research on social discounting – imply anonymous reward delivery. The Observed group, however, showed substantially less social discounting (as measured by both log-*k* and AUC) than either of the other two groups. As with dictator games (Hoffman, McCabe, & Smith, 1998), decreasing anonymity increased generosity in the social discounting task.

In the present experiment, the Observed group was not simply a not-Anonymous group. Instead, participants in the Observed group were hypothetically identified by the recipient (the recipient knew who the donor was) and observed (the recipient knew what the alternatives were), making it impossible to determine if the different results for this group were due to lack of anonymity in reward-delivery, lack of anonymity during the act of choosing, or both. Experimenter-anonymity was not separately addressed. Each participant was assigned a code that could have been used to contact him or her at a later date, so the procedure was not completely anonymous. Still, the similarity in performance for students in the Standard condition and those in previous studies with less experimenter anonymity (one-on-one interaction immediately before and after the questionnaire administration) suggests that experimenter anonymity is much less crucial than recipient anonymity in its effect on amount forgone.

The present findings suggest further consideration of the variables at work in any procedure involving choices with hypothetical rewards. Participants are typically given minimal instructions in such tasks, being asked little more than to imagine that the consequences of their choices are real. The similarity in social discounting with real and hypothetical rewards (Locey, Jones, & Rachlin, 2011) and the power of delay discount functions obtained with hypothetical rewards to predict the degree of various real-world addictive behaviors (Bickel & Marsch, 2001) suggest that participants are successful in this basic imaginative task.

5. Conclusions

Game theorists within economics have long known that with certain procedures (e.g., dictator games) anonymity affects altruistic behavior. The present experiment identifies social discounting tasks as another such procedure. Moreover, whereas game theory experiments generally study recipients at a single social distance from donors (strangers or fellow students), the present experiment extends those findings to recipients over a range of social distances and quantifies the effect in terms of the constants of Equation 1.

This experiment also provides some support for the analogy between altruism as measured by social discounting and self-control as measured by delay discounting. As the conditions of social discounting were made more like those of delay discounting, by removing anonymity between donor and recipient, the sensitivity parameter (s) of Equation 1 decreased to a fractional value as typically found in delay discounting experiments.

The experiment also replicates game-theory findings of a core of altruistic behavior even under conditions of complete anonymity. Given that under those conditions no one would know who the donor was, there was no possibility of direct reciprocation. Informal questioning of about 50 participants indicates that the social distance of a random classmate is about equivalent to #75 on the scale used here. At that point, the median Anonymous-group participant expressed willingness to forgo about $15 for him or herself in order to anonymously give the recipient $75. As indicated in the introduction, we believe that such behavior is not explicitly reinforced but rather is part of a pattern of behavior that may be socially reinforced or may be valuable in itself. Tests of this speculation await further experiments.

How do such patterns arise over the course of an organism's lifetime? One possible answer is by "group selection," a process in behavioral evolution, proposed to explain altruism in biological evolution (Rachlin, 2002). Group selection can work in the evolution of altruism in cases where the rate of replacement of individuals (individual organisms in biological evolution, individual acts in behavioral evolution) within groups is low relative to the rate of replacement of groups in populations (Boyd, Gintis, Bowles, & Richerson, 2005). Although there is considerable dispute about whether this condition applies in the biological evolution of innate altruistic behavior, innate behavior is often patterned (eating, sleeping, aggression, sex, etc.) and these patterns can evolve over the lifetimes of individual organisms into highly complex forms in response to environmental contingencies (Teitlebaum, 1977; Rachlin, 1995).

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Highlights

- Three groups of undergraduates completed a social discounting task
- Hypothetical recipients were either anonymous, observing, or not specified
- A hyperbolic social discounting function well-described data from each group
- Observed-group participants were more altruistic than those in both other groups

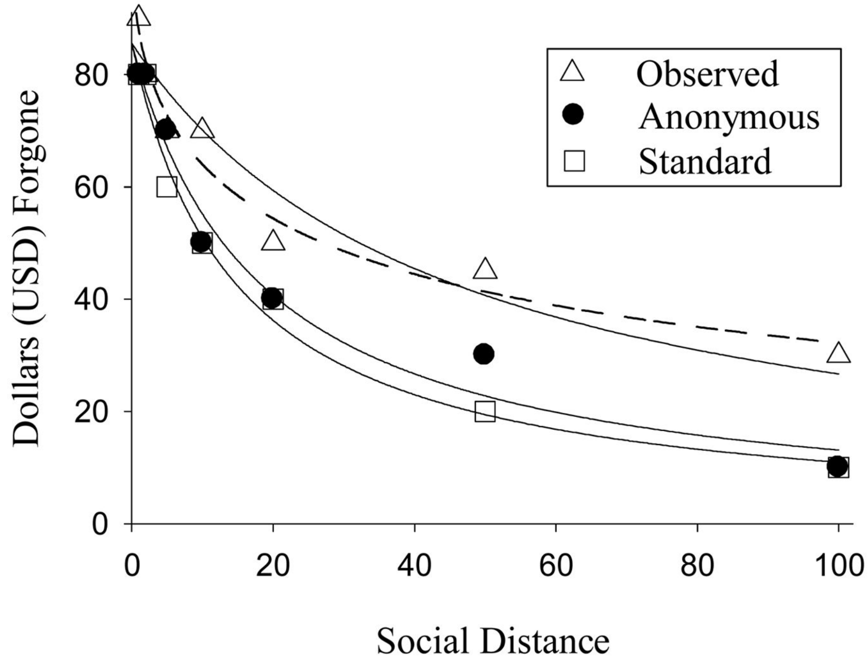

Figure 1.

The median amount of hypothetical money forgone to give $75 (USD) to another person at each social distance for the Observed (open triangles, top line), Anonymous (closed circles, middle line), and Standard (open squares, bottom line) groups. The solid lines are the best-fitting versions of Equation 1 with two free parameters ($s = 1$). The dashed line is the best-fitting version of Equation 1 for the Observed group with three free parameters.

Table 1

Equation 1 Parameters Fit to Median Crossover Points

	V	*k*	*s*	R^2
# Observed	102.5	0.165	0.56	0.97
Anonymous	88.2	0.072	0.93	0.98
Standard	88.5	0.086	0.94	0.99
Observed	84.2	0.022	1.00*f*	0.92
Anonymous	86.1	0.055	1.00*f*	0.98
Standard	86.4	0.068	1.00*f*	0.99
mean	85.6			
## Observed	85.6*f*	0.023	1.00*f*	0.92
## Anonymous	85.6*f*	0.054	1.00*f*	0.98
## Standard	85.6*f*	0.066	1.00*f*	0.99

f fixed at this value

dashed line in Figure 1

solid lines in Figure 1

Table 2

Equation 1 Parameters Fit to Individual Participant Functions

	Median				Mean			Standard Deviation		
	k	**R^2**	**log-*k***	**AUC**	***k***	**log-*k***	**AUC**	***k***	**log-*k***	**AUC**
Observed	0.021	0.82	−1.68	.621	0.084	−1.72	.643	0.187	0.86	.332
Anonymous	0.052	0.88	−1.29	.453	0.307	−1.21**	.456**	1.176	0.69	.240
Standard	0.067	0.88	−1.17	.404	0.141	−1.24**	.423**	0.186	0.69	.266

For all groups, *V* was fixed at 85.6 (the mean indicated in Table 1) and *s* was fixed at 1.0

** sig. diff from Observed group ($p < .01$)