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Gratitude: a Basic Human Emotion for Initiating and Strengthening Interpersonal Relationships

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GRATITUDE: A BASIC HUMAN EMOTION FOR INITIATING AND STRENGTHENING INTERPERSONAL RELATIONSHIPS

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Gratitude may function to foster human sociality. Exactly how gratitude performs this putative function, however, is a question that has received little scientific attention. Many recent investigations—primarily concerned with the positive emotional outcomes associated with the experience of gratitude—have overlooked the fundamental mechanistic operations that might produce gratitude. My dissertation addresses this oversight by capitalizing on advancements in the evolutionary psychological study of function and internal regulatory variables. I approach gratitude as a psychological adaptation that functions to coordinate behaviors that initiate and strengthen interpersonal relationships in conjunction with an internal regulatory variable responsible for tracking interpersonal welfare valuation, the Welfare Tradeoff Ratio (WTR). I conducted three studies that induced gratitude between strangers (Study One), friends (Study Two), and siblings (Study Three), and assessed for changes in WTR. Positive changes in WTRs for strangers coincided with an emotional response of gratitude and a series of affiliative behaviors that presumably act to initiate new relationships. Null changes, as opposed to positive or negative changes, in the already high WTRs of friends and siblings for each other, also coincided with gratitude and behaviors that presumably act to strengthen established bonds.

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Chapter 1: Introduction

Gratitude appears to be a basic human emotion. Psychologists have proposed that the evolutionary, or ultimate, function of gratitude is to promote the formation and stabilization of interpersonal bonds (Bartlett, Condon, Cruz, Baumann, & DeSteno, 2012; McCullough, Kimeldorf, & Cohen, 2008). The aim of my current dissertation research is to provide an evolutionary-informed empirical explanation of gratitude's proximate function, that is, to explain how an act of benefit-delivery from a benefactor to a beneficiary produces gratitude and promotes behaviors, such as return-benefit delivery and interpersonal bonding, that potentially contribute to fitness. I begin this dissertation with a brief exposition of the process of gratitude elicitation. I then survey gratitude research that is related to my theoretical model, and present information on the evolved function of gratitude. I next introduce the Welfare Tradeoff Ratio (WTR - Tooby, Cosmides, Sell, Lieberman, & Sznycer, 2008), a cognitive variable theorized regulate cooperative and associative behaviors, and explain how WTR can inform the study of emotions in general, and gratitude in particular. Finally, I present my theoretical model and my central thesis - gratitude is a psychological adaptation whose function is to initiate new mutually-beneficial relationships and strengthen already established bonds. To conclude this introduction, I list the predictions that flow from my model and form the basis of three experimental studies.

Gratitude Elicitation and Moderating Factors

In the simplest terms, gratitude is an emotional response that is elicited when a beneficiary receives a benefit from a benefactor. Though the question of what constitutes a benefit has been debated for centuries (Seneca, 64C.E./2011), three properties of benefits have been documented as important moderators of gratitude elicitation (Tesser, Gatewood, & Driver, 1968). First, a beneficiary will not experience gratitude, or will experience significantly reduced gratitude, if the beneficiary perceives a benefit to be delivered as the result of obligation (e.g., duty, guilt or by coercion) (Weinstein, DeHaan, & Ryan, 2010). Second, the perceived intention of the benefactor to provide the benefit is an important factor in determining whether, and to what degree, gratitude will be elicited. If a benefactor unintentionally (i.e, accidentally) provides a benefit, gratitude felt by the beneficiary will be reduced or absent (Tsang, 2006). Third, gratitude will be heightened to the degree a benefit is costly to the benefactor, and by extension, valuable to the beneficiary (Algoe, Haidt, & Gable, 2008; Tsang, 2007; Wood, Brown, & Maltby, 2011). Thus, gratitude is best elicited when benefits are delivered in a manner that is free of obligation, intentional (as opposed to accidental), and costly to the benefactor.

Gratitude in the Relationship of Beneficiary and Benefactor

I hypothesize that gratitude was designed by natural selection to operate within the context of dyadic interpersonal relationships. Although few researchers explicitly couch gratitude in evolutionary terms (e.g., McCullough et al., 2008), a number of researchers study gratitude in a manner congruent to my approach. Algoe and colleagues (2008), for example, examined how feelings of gratitude correlated with increases in relationship closeness between pairs of sorority sisters during a week of institutionalized gift-giving. At the beginning of the week, Big Sisters (older members) were anonymously and randomly paired with Little Sisters (new members). Throughout the course of the week, Little Sisters were kept in the dark as to the identity of their assigned Big Sisters. At the end of each day, the Little Sisters would receive a personalized gift from their Big

Sisters. Then, at the end of the week, the identities of the Big Sisters were revealed to the Little Sisters. Throughout this entire process, as well as at a one week and one month follow-up, the researchers collected data about felt gratitude and perceived relationship closeness between the pairs of sorority sisters. As the researchers expected, the gratitude of the Little Sisters (i.e. the beneficiaries) toward the Big Sisters (i.e. the benefactors) correlated with the perceived relationship closeness of each pair at each of three post reveal data collection points (immediate, one week, and one month), and this effect was bolstered to the extent that the gifts were perceived to be effortful (i.e., specifically tailored to the Little Sister's personality) and costly. This field study, shows how gratitude's role in relationship formation and maintenance can be used (by sororities or behavioral researchers) to create strong and lasting relationships.

Building on these findings, researchers working with couples in familial and romantic relationships have used partner-specific gratitude elicitation as an intervention for improving satisfaction within these relationships. Using a manipulation in which couples are made to think about and subsequently transcribe the detailed ways in which they feel gratitude toward each other (e.g., by purposely recalling the last time one partner unexpectedly received a gift from the other), researchers have found that gratitude acts to revitalize romantic relationships (Algoe, Gable, & Maisel, 2010), and helps maintain intimate bonds within the family (Gordon, Impett, Kogan, Oveis, & Keltner, 2012).

Finally, some gratitude researchers have explored the effect of gratitude on relationship formation between strangers in an experimental setting (Bartlett et al., 2012; DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010). In two related behavioral experiments, researchers induced gratitude between strangers by having a confederate benefactor assist a participant beneficiary with a (seemingly) broken computer. After the gratitude manipulation, not only did participants preferentially choose to spend time with their benefactors, participants were willing to incur monetary costs to make sure their benefactors felt included in a social group.

In sum, the abovementioned findings are consistent with the idea that gratitude functions to initiate and strengthen interpersonal bonding of beneficiaries to their benefactors. This phenomenon occurs both in real world settings and in laboratories, and between strangers, new friends, romantic partners and family. The logic behind this phenomenon, however, is not as obvious as it may seem. There is no apriori reason for expecting that benefit reception should lead beneficiaries to bond with, rather than simply repay or even ignore, their benefactors. Thus, it is important to consider the ultimate, evolutionary, logic behind gratitude's putative role in the promotion of interpersonal bonding.

The Evolved Function of Gratitude

If gratitude is indeed an adaptation, there must be an adaptive problem (i.e., a fundamental problem of life) that it functions to solve. This adaptive problem must be, or must have been, a stable feature of humans' ancestral environment (i.e., a selection pressure) for a sufficient number of generations to allow the adaptation to become a species-typical feature of the organism's design (i.e., to spread to genetic fixation). By considering our recent past, it is possible to envisage the sort of adaptive problem that could have led to the evolution of gratitude in humans.

The lives of modern-day hunter gatherers provide the closest approximation to the lives of our recent ancestors (Tooby & Cosmides, 1990). While the idea of the “noble savage” has dominated popular thought for centuries, hunter-gathers actually live far more brutal and unforgiving lives than do people in industrial societies (Buss, 2001). In fact, researchers have discovered and are continuing to discover that ancestral humans probably lived in an environment in which the threats of injury, serious illness, starvation, famine, and violence were much more common than they are today (Kaplan, Hill, Lancaster, & Hurtado, 2000; Pinker, 2011). The support of one’s nuclear family would have been a significant buffer against the maladies of life in such a harsh environment. However, the increase in fitness provided by an adaption that fostered interpersonal relationships outside of one’s immediate family would have been substantial (Tooby & Cosmides, 1996).

Concordant with the work of Frank (1988), who suggests that gratitude evolved to solve the so-called “commitment problem,” I will test predictions that approach gratitude’s function as an adaptive mechanism that promotes the development and the maintenance of interpersonal relationships both within, and perhaps more importantly, outside of one’s family. Although invoking the concept of adaptation is a potentially “onerous” endeavor (Williams, 1966), I take this approach for the purpose of advancing the discussion. Gratitude appears to be a species-typical human universal (McCullough, Kilpatrick, Emmons, & Larson, 2001; McCullough et al., 2008) that bears many of the classic hallmarks of an adaptation, including effects related to human cooperation that conceivably affect fitness (per West, Griffin & Gardner, 2007)

By considering gratitude as an adaptation I aim to bridge the gap between psychological approaches to gratitude (e.g., Emmons & McCullough; 2003; Krumrei & Pargament, 2010; Toepfer & Walker, 2009; Watkins, Van Gelder, & Frias, 2011; Wood, Joseph, & Maltby, 2008), which exist in abundance, and evolutionary biological approaches to gratitude, which are nascent to say the least. To this end, an important cognitive mechanism may help explain how gratitude is regulated in an adaptive manner that promotes the development and maintenance of relationships.

The Welfare Tradeoff Ratio

Recent theoretical advances have suggested that much of human cooperation can be explained by reference to the output of cognitive mechanism known as the Welfare Tradeoff Ratio (WTR - Barlow, 2009; Sell, 2005; Tooby, et al., 2008). The WTR measure (see Chapter 2: Methods for Study One) provides an assessment of the quantity of resources (i.e., benefits such as money, food, attention, etc.) a given individual is willing to sacrifice (i.e., provide at a cost to self) for the sake of another individual. A high WTR indicates a willingness to sacrifice a large amount of resources, a low WTR indicates a willingness to sacrifice a small amount of resources, and a WTR of zero indicates no willingness to sacrifice any resources.

In a study of the psychometric properties of the WTR measure, Delton (2010) found WTR to be stable (i.e., to have good test-retest reliability) across a variety of measurement conditions, including on scales that measure resource tradeoffs with varying ranges and magnitudes. Furthermore, Delton (2010) found that friend and acquaintances accurately estimate the WTRs they hold for each other (i.e., *expected* WTR $_{\text{Other}\rightarrow\text{Self}}$ approximately equals *actual* WTR $_{\text{Other}\rightarrow\text{Self}}$) and that for each other have been found to be (Delton, 2010). Furthermore, construct validity for the WTR has been demonstrated cross-culturally with both Argentinian college students (Delton, 2010) and the Shaur of Ecuador (Lim, 2012).

Past research has theorized that WTRs regulate cognitive systems that deploy cooperative (and exploitive) behaviors (Tooby & Cosmides, 2008; Tooby et al., 2008). Consistent with this theory, Sznycer (2010) found that WTRs vary in a number of expected ways across four fundamental social categories: mates, siblings, friends, and acquaintances. WTRs for mates are the highest of these four categories. WTRs for siblings are the next highest, with WTR magnitude positively correlating with the coresidence duration of younger siblings with their older siblings, who use a variable cue of kinship (coresidence duration) to regulate kin selection, but not for older siblings, who use an invariant cue of kinship (whether or not the younger sibling was nursed by the same mother) to regulate kin selection (Lieberman, Tooby, & Cosmides, 2007). Regarding friends, as with mates, frequency of contact predicts higher WTRs. Furthermore, friend pairs were able to accurately estimate WTRs for each other. Finally, regarding acquaintances (co-workers and other individuals encountered in a professional or non-friend context), once again frequency of contact predicted higher WTRs.

Emotions and WTRs. A number of emotions are theorized to both affect and be affected by changes in WTRs. The most prominent of these are anger and gratitude; however, guilt, shame, empathy, and revenge have also been proposed to relate to WTR in important ways. Hypothetical scenarios that elicit guilt, for example by having subjects reflect upon the commission of an accidental transgression against a valued social partner, were shown to produce an increase in a qualitative measure of WTR for a target individual (i.e. a measure that used multiple real-world, non-monetary, examples of welfare tradeoffs); similar increases in WTR are also expected for people experiencing shame (Sznycer, 2010). Here, the actor has signaled a lower-than-actual WTR for to the other party, and the emotional mechanisms of guilt and shame appear to be important for communicating that, indeed, one's WTR for the other party is higher than recent interactions would suggest.

Anger is also importantly related to WTR. According to Sell and colleagues (2009) anger is produced when an actor receives cues that another individual has a lower WTR toward self than expected by self (i.e., *revealed* WTR $_{\text{Other}\rightarrow\text{Self}}$ < *expected* WTR $_{\text{Other}\rightarrow\text{Self}}$). According to the recalibrational theory of anger, the function of anger is to coordinate behaviors that raise, or recalibrate, the WTR of the anger-inducing individual toward the actor who expresses anger. Concurrent with this theory, participants presented with vignettes of individuals who showed obnoxious and intentional lack of regard for the participant's welfare, experienced an emotional response of anger for the ostensible purpose of raising the WTR of the other party.

Gratitude and WTR

One of this dissertations primary questions is, what happens when an individual indicates a higher welfare value for an actor than the actor expects (i.e., when revealed $\text{WTR}_{\text{Other}\rightarrow\text{Self}}$ > expected WTR $_{\text{Other}\rightarrow\text{Self}}$)? Initial investigations into this situation were conducted by Lim (2012). In a series of experiments, participants interacted with a computer program (a sham partner) playing a round robin WTR game. Each partner took turns revealing WTR decisions about his or her partner, with each round followed by a series of emotional response questions. While the participant was free to choose his or her WTR for the sham partner at will, the computer altered its WTR for the subject following a variety of predetermined patterns. Consistent with my theoretical model (see below), as the sham partner increased its WTR for the participant, the participant increased his or her WTR for the sham partner in turn, and responded with an emotional response of gratitude. Furthermore, the magnitude of the participant's increase in WTR positively correlated with reported gratitude. In a follow-up experiment, pairs of actual partners (acquaintances), playing the same WTR game, produced the same pattern of results. I hope to reconcile these existing findings on gratitude and WTR with my model.

Theoretical Model of Gratitude and WTR. The prototypical gratitude eliciting exchange involves the delivery of benefits (gifts in the form of material goods or acts of goodwill) from a benefactor (an actor delivering benefits) to a beneficiary (a recipient of benefits) (McCullough, et al. 2001). Until recently, benefits were considered the ipso facto cause of gratitude. In my model, benefit delivery from a benefactor to a beneficiary is just the first step in gratitude elicitation and related downstream cooperative behaviors (e.g., a verbal display of gratitude such as "Thank You!", the provision of return-benefits, and affiliative interpersonal behavior). According to my model, (i) the beneficiary first receives a benefit from the benefactor. (ii) Benefit reception provides information to the beneficiary that the benefactor's WTR for the beneficiary is higher than the beneficiary expected (i.e., the *revealed* $\text{WTR}_{\text{Benefactor}\rightarrow\text{Beneficiary}}$ is greater than the *expected* $\text{WTR}_{\text{Benefactor}\rightarrow\text{Beneficiary}}$). (ii) This revealed information (i.e., that the benefactor values the welfare of the beneficiary at a greater level than expected) will be accompanied by an emotional response of gratitude in the mind of the beneficiary. (iii) The beneficiary should, in turn, update (i.e., increase) WTR for the benefactor. This increase in WTR

$_{\text{Beneficiary} \rightarrow \text{Benefactor}}$ should not occur simply as a response to the initial benefit reception, but rather as a response to information, communicated via the act of benefit delivery that the benefactor values the beneficiary at a greater level than expected. Importantly, (iv) I expect that the intensity of gratitude will correlate with the magnitude of the increase in the beneficiary's WTR for the benefactor. (v) I also expect the beneficiary will be motivated to provide return-benefits to the benefactor, and (vi) that the beneficiary will be less likely to provide return-benefits to the benefactors when his/her identity is made anonymous to the benefactor. (vii) Nevertheless, overall return benefit-delivery should positively correlate with the beneficiary's updated WTR toward the benefactor. (viii) The beneficiary will preferentially remember the benefactor, and (ix) prefer to associate with the benefactor as a friend and future interaction partner.

(x) Prior relationship status and preexisting WTR values should attenuate the effects of gratitude and change in WTR for the benefactor. For strangers, delivery of even small benefits will lead to the expression of gratitude and increases in WTR. With respect to friends and siblings, gratitude should perform an equally important function, reaffirming the value one holds for another. However, the difference between established and new relationships, is that for friends and siblings there should be a higher threshold of gratitude activation – if benefit reception that indicates a higher than expected WTR (i.e., the *revealed* $\text{WTR}_{\text{Benefactor} \rightarrow \text{Beneficiary}}$ is greater than the *expected* WTR $_{\text{Benefactor} \rightarrow \text{Beneficiary}}$) is the most important factor in eliciting gratitude, then the magnitude of the benefit delivered, in order for it to elicit gratitude, needs to be large enough to exceed an already high expected WTR $_{\text{Benefactor} \rightarrow \text{Beneficiary}}$ (see Bar Tal et al., 1977). Thus when holding a benefit constant, gratitude will be less for friends and siblings than for strangers.

I will not go into detail about the particular psychology that motivates a benefactor to deliver an initial benefit. It is important to note, however, that during the evolutionary history of gratitude, this initial step could have arisen without the need for costly effort on behalf of the benefactor, that is, with the benefactor providing a residual, or by-product, benefit (Tooby & Cosmides, 1996). Furthermore, though I will not explore what happens in the mind of the benefactor upon reception of the gratitude signal, though I expect the benefactor should update his or her welfare valuation of the beneficiary in turn. Thus, an initial act of benefit delivery could lead to cycles of increasing mutual regard that snowball into a strong interpersonal relationship.

Predictions

I plan to test seven predictions that flow from the theoretical model of gratitude outlined in this dissertation:

1. Reception of benefits (perceived to be costly, freely given, intentional - as opposed to accidental, and costly) will provide information that the benefactor values the welfare of the beneficiary at a level higher than expected. This difference in expected and reveled WTR of the beneficiary for the benefactor will lead the beneficiary to report an experience of gratitude.
2. The beneficiary will increase the degree to which he or she values the welfare of the benefactor, measureable as an increase in WTR toward the benefactor.
3. Reported gratitude will correlate with change in WTR.

4. The benefactor will preferentially provide return benefits to the beneficiary. However the benefits need to be attributable to the sender. Otherwise they cannot function to increase the probability of continued, mutually-beneficial interaction. Thus, the beneficiary will be motivated to provide fewer return benefits to the benefactor when placed under a condition of anonymity.
5. Gratitude and change in WTR will correlate with the amount of return benefits the beneficiary provides to the benefactor. However, the absolute magnitude of WTR (post manipulation) will be the best predictor of return-benefit delivery.
6. The beneficiary will experience an enhanced person-specific memory of the benefactor. This memory effect will facilitate the development of a mutually beneficial relationship by allowing the beneficiary to recall more details about the benefactor as compared to other members of the social environment. Also, the beneficiary will preferentially associate with the benefactor as compared to other members of the social environment.
7. The magnitude of reported gratitude will depend on the beneficiary's existing relationship with the benefactor, and will be proportionate to the increase in welfare valuation caused by benefit reception. Because gratitude's function in the establishment of new relationships entails (i.e., will be associated with) the largest positive change in WTR, more gratitude will be elicited toward benefactors with initially low welfare value (e.g., strangers) than toward benefactors with initially high welfare value (e.g., friend or siblings for whom high levels of mutual regard are already established). Thus, for friends and siblings gratitude, and related effects, will be attenuated compared to strangers.

Chapter 2: Study One Methods

In this section, I outline the methods for first of three studies conducted at the University of Miami under the approval of the University of Miami Internal Review Board. External funding for the studies was provided by the John Templeton Foundation in conjunction with the Greater Good Science Center at the University of California, Berkeley.

Does benefit reception elicit gratitude, increase welfare valuation, and motivate relationship-enhancing behavior?

To provide a comprehensive answer to this question, I tested the following predictions. When a benefactor directs a benefit toward a participant, the participant will: report gratitude for the benefactor (Prediction1); increase his/her WTR for the benefactor (Prediction2); and this increase in WTR will positively correlate with the intensity of gratitude (Prediction 3); the participant will preferentially deliver return benefits to the benefactor, though this will be attenuated by a condition of anonymity (Prediction 4); the final magnitude of WTR will predict the amount of benefits returned (Prediction 5); and the participant will preferentially remember and associate, as a social partner, with the benefactor (Prediction 6).

Participants

258 Introductory Psychology students enrolled at the University of Miami participated in this study (126 males; Mean age ± St. Dev: 19.26 ± 1.60). Data from one participant was lost due to a computer malfunction. Participants received course credit and $10 compensation. Each study session lasted approximately 1 hour.

Design

In this study, participants first engaged in a four-person group introduction designed to introduce players to one another. Following this introduction session, participants separated, provided WTRs for each of the other players, and played a game of Cyberball in which participants were included, excluded, or excluded then included by a specific player acting as a benefactor. After Cyberball participants completed questions regarding their reactions to the Cyberball game and provided their WTRs for each player again. Finally, participants played a Dictator Game, which served as an opportunity for the participant to provide benefits to the other players, and completed a short survey. Participants were then debriefed and dismissed. Computer games were programmed using E-Prime 2.0 and, unbeknownst to participants, both the Cyberball game and Dictator Game were preprogrammed as described below.

Group Introduction. Upon arrival to the experiment, the participant and three confederates waited together in a common area and were then led to a nearby room to get to know each other before beginning the experiment. Everyone was photographed, and these photographs were uploaded for use in the computer games. The researcher next facilitated a brief round of self-introductions using a list of prepared questions. The participant and confederates were all asked to answer each question (e.g., hometown, career aspirations, favorite type of music, etc.) Each confederate provided unique answers, which were prepared and memorized prior to the experiment. The answers provided by each confederate were pre-rated to ensure they were equally memorable for the purpose of testing how well the participant remembered each confederate. After the introduction session was over, the researcher led the participant and confederates to separate rooms to begin the computer games. (In fact, the three confederates, who were blind to their respective roles in the study, waited together in a single room for the duration of the session).

Baseline WTR. The participant completed a measure of WTR for each of the three other players. The WTR measure, adapted from Osiński (2009) asks participants to make 10 hypothetical decisions about whether they would prefer to receive a certain amount of money for themselves ($85, $75, $65,…., $5, $0) or to have $75 go to the other player. WTR is calculated by finding the amount at which the participant switches from electing money for him/her self to electing $75 for the other person and dividing this amount by $75. This gave a possible range of WTRs from 1.13 ($85/$75) to 0.00 ($0/$75).

Cyberball. Following the collection of baseline WTRs, the participant played a modified version of Cyberball, a computerized game of catch in which a person can be made to feel included, by being thrown the ball, or made to feel excluded, by not being thrown the ball (Eisenberger, Lieberman, & Williams, 2003; Williams, & Jarvis, 2006). The game began by assigning three players to be Standard Players and one player to be the Treasurer; the participant was always one of the three Standard Players. Participants were told the rules of the game: the Treasurer earned $.50 for tossing the ball to a Standard Player, while a Standard Player earned $.50 only when tossing the ball to the Treasurer. The incentive in the game was to toss the ball to the Treasurer, and thus earn as much money as possible. The game continued until $30 had been distributed (the Treasurer always earned $15.00), though this termination criterion was not made known to the participant.

Participants were randomly assigned to one of three experimental conditions: Exclusion, Inclusion, or Exclusion then Inclusion. Participants in the Exclusion condition never received the ball for the entire game. The Treasurer tossed the ball to the two other Standard players at equal odds such that each earned $7.50 while the participant earned $0.00. Participants in the Inclusion condition were tossed the ball at equal odds as the other Standard Players. All Standard Players earned approximately $5.00. Participants in the Exclusion then Inclusion condition did not receive the ball for the first half of the game, that is, until $15.00 had been distributed amongst the Treasurer and two other Standard Players. After this point, participants were then included by one of the Standard Players (termed the Benefactor). Although the Treasurer continued to exclude the participant by only tossing the ball to the Benefactor and the other Standard Player (termed the Third Party), the Benefactor tossed the ball to the participant 80% of the time. In this condition participants could earn as much as $3.00. [Note: In both the Exclusion condition and the Inclusion condition, there are two third parties. However, for the purpose of facilitating statistical comparisons in data analyses, one is termed Benefactor and one is termed Third Party.]

Cyberball Reactions. After Cyberball, first, using a 7-point Likert-type scale (anchors: 1=strongly disagree; 7=strongly agree) I assessed the degree to which participants experienced the following feelings during the first half (i.e., midgame) and second half (i.e, endgame) of the Cyberball game: included, accepted, welcomed, noticed, considered, equally treated, excluded, rejected, isolated, ignored, not considered, and not equally treated. I aggregated the responses for how included, accepted, welcomed, noticed, considered, and equally treated the participant felt into a variable termed Included (Included Midgame: Cronbach's alpha = .93; Included Endgame: Cronbach's alpha = .92). Similarly, I aggregated the responses for how excluded, rejected, isolated, ignored, not considered, and not equally treated the participant felt into a variable termed Excluded (Excluded Midgame: Cronbach's alpha = .94; Excluded Endgame: Cronbach's alpha = .95). As described in the manipulation check section below, these variables were used as manipulation checks to determine the effectiveness of the experimental conditions.

Next, I measured the degree to which participants agreed or disagreed with 10 statements about each player's behavior during Cyberball, presented in a prerandomized order: "I felt included by this player." "I felt excluded by this player." "I felt grateful toward this player." "I felt thankful toward this player." "I felt appreciative of this player's behavior." "I felt angry toward this player." "I felt disgusted by this player's behavior." "I felt like I wanted to repay this player." "I felt that I was obligated and had to repay to this player." "I felt indebted (like I owed something) to this player." The questions about feeling included and excluded by a particular player were used in the Manipulation Check section to confirm that each player (e.g., The Treasurer in the Exclusion condition) produced a condition specific emotional response (e.g. more feelings of exclusion than the other players). I aggregated responses to questions about feeling grateful, thankful and appreciative toward a particular player into a measure termed Gratitude (Gratitude Benefactor: Cronbach's alpha = .96 ; Gratitude Third Party: Cronbach's alpha = .96; Gratitude Treasurer: Cronbach's alpha = .96) which was used as a key dependent measure. Reponses to items about anger, disgust, obligation, and indebtedness were collected but were not analyzed.

Follow-up WTR. Participants then completed another WTR measure for each player.

Dictator Game. All participants were "randomly" assigned to the role of dictator in a multi-person Dictator Game that included the same three players from Cyberball. Participants were given a $10 endowment and told they could keep the entire endowment or divide it amount amongst all 4 players in any manner they saw fit. The three confederates were assigned to the role of recipients and had no influence on the outcome: they merely received the amount (if any) of money that the dictator gave them. Half of the participants were told that their identity as Dictator would be known to the participants (Identified condition) whereas the other half was told that their identity would not be known (Anonymous condition).

Final Survey. Participants were asked a variety of follow-up questions including a series of memory recall questions about each player. Participants then answered which player they would prefer as a friend, which player they would prefer to work with again as a partner if given the chance, as well as their favorite (most positive) and least favorite (most negative) player.

Data Analyses. For each participant, I computed the difference between baseline WTR and follow-up WTR for each of the three other players. I call this WTR change, ΔWTR. When positive, ΔWTR indicates that the participant increased his or her welfare valuation of another player. When negative, ΔWTR indicates that the participant decreased his or her welfare valuation of another player.

Manipulation Check. I conducted two manipulation checks based on responses to questions answered directly after the Cyberball manipulation: one to ensure that the

Cyberball conditions generated different overall sentiments of exclusion versus inclusion and another to ensure that reactions to specific players differed in the expected ways.

All results were calculated is SPSS version 21. All p-values are two-tailed.

Chapter 3: Study One Results

Baseline WTR. I did not expect any differences across conditions in baseline WTRs. To verify this, I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and baseline WTR for the each of the three other players as dependent variables. There was no main effect of player: $F(2, 352) = .27$, $p=.761$, partial $\eta^2 = .00$, no main effect of Cyberball condition: $F(2, 176) = 1.20$, $p=.302$, partial $\eta^2 = .01$, and no interaction between player and Cyberball condition: $F(4, 352) = .193$, $p=.939$, partial $\eta^2 = .00$. The mean baseline WTR across conditions and players was $M = .54$, St.Dev = .33.

Manipulation Check. Overall feelings of exclusion and inclusion in Cyberball were strongly inversely correlated: exclusion midgame and inclusion midgame, $r = -.87$, $p < .001$; exclusion endgame and inclusion endgame, $r = -.91$, $p < .001$. Thus, I created two metric variables to assess combined overall feelings of exclusion and inclusion at two points during the game. Exclusion Midgame is a combination of exclusion midgame questions and reverse-scored inclusion midgame questions. Exclusion Endgame is a combination of exclusion endgame questions and reverse-scored inclusion endgame questions. When high, these Exclusion metrics can be interpreted as reflecting feelings of exclusion, while when low, these metrics can be interpreted as representing feelings of inclusion.

To see how Exclusion Midgame and Exclusion Endgame were affected by condition, I next conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and Exclusion Midgame and Exclusion Endgame as dependent variables. There was a main effect of Exclusion

Midgame versus Endgame: $F(1, 158) = 7.82$, $p=.003$, partial $\eta^2 = .05$. There was main effect of Cyberball condition: $F(2, 158) = 48.62$, $p<.001$, partial $\eta^2 = .38$. Finally, there was an interaction between Exclusion and Cyberball condition: $F(2, 158) = 28.72$, $p<.001$, partial $\eta^2 = .27$.

As can be seen in Table 1, each Cyberball condition produced a unique pattern of overall sentiments concerning feelings of exclusion. The Exclusion condition produced the strongest feelings of exclusion, which increased from midgame to endgame. The Exclusion then Inclusion condition produced feelings of exclusion that decreased from the midgame to endgame. This result is result suggests that inclusion on behalf of the Benefactor, which occurred only in this condition, was sufficient to cause a reduction in overall feelings of exclusion between midgame and endgame. Finally, the Inclusion condition produced the lowest feelings of exclusion, which did not change between midgame and endgame.

Table 1. Midgame versus Endgame Feelings of Exclusion (feelings of exclusion and reverse-scored feelings of inclusion) in Cyberball

		Cyberball Condition				
		Exclusion		Exclusion then Inclusion		Inclusion
Feelings of Exclusion	Midgame	4.3	<	5.3	>	2.7
		∧		∨		=
	Endgame	5.1	=	5.0	>	2.8

* Greater than (>) or less than (<) represent mean differences at $p<.05$

Looking within each condition, I next checked to see if each player (Treasurer, Third Party, and Benefactor) differed with respect to the feelings of exclusion they generated in participants. [Note: player-specific feelings of exclusion were inversely correlated with player-specific feelings of inclusion: Benefactor Exclusion- Inclusion, r =

-.67, p <.001; Third Party Exclusion- Inclusion, r = -.52, p <.001; Treasurer Exclusion-Inclusion, r = -.80, p <.001. However, because the strength of these correlations varied considerably, I choose to separately analyze player-specific feelings of exclusion and inclusion.]

I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and player-specific feelings of exclusion as dependent variables. There was a main effect of Player-specific Exclusion: Wilks' $\Lambda = .586$, $F(2, 157) = 55.51$, $p<.001$, partial $\eta^2 = .41$. There was a main effect of Cyberball condition: $F(2, 158) = 17.58$, $p<.001$, partial $\eta2 = .18$. Finally, there was an interaction between Player-specific Exclusion and Cyberball condition: Wilks' $\Lambda = .247$, $F(4, 314) = 79.38$, $p<.001$, partial $\eta2 = .50$ (see Table 2.)

Table 2. Feelings of Player-specific Exclusion in Cyberball

	Cyberball Condition				
	Exclusion		Exclusion then Inclusion		Inclusion
Benefactor	5.3	>	2.0	<	3.4
	=		Λ		=
Third Party	5.2	=	5.6	>	3.5
	Λ		=		V
Treasurer	6.1	=	5.9	>	2.5

Greater than (>) or less than (<) represent mean differences at p<.05.

In the Exclusion condition, I expected and found that participants felt especially excluded by the Treasurer as compared to the other players. Participants reported feelings more excluded by the Treasurer (M=6.05; SD=1.40) than by the Third Party (M=5.21; SD=1.72), $t(72) = 4.16$, $p < .001$, and Benefactor (M=5.26; SD=1.65), $t(72) = 4.22$, $p < .001$, to whom feelings of exclusion did not significantly differ, $t(72) = .35$, $p = 726$.

In the Exclusion then Inclusion condition, I expected and found that participants felt less excluded by the Benefactor than by the other players. Participants reported feeling less excluded by the Benefactor (M=2.04; SD=1.41) than by the Treasurer (M=5.92; SD=1.54), $t(46) = -12.16$, $p < .001$, and Third Party (M=5.62; SD=1.62), $t(46) = -10.79$, $p < .001$, to whom feelings of exclusion did not significantly differ, $t(46) = 1.08$, $p = .288$. Finally, in the Inclusion condition, I expected and found that participants felt least excluded by the Treasurer. Participants reported feeling less excluded by the Treasurer (M=2.46; SD=1.40) than by the Third Party (M=3.49; SD=1.76), $t(40) = -3.63$, $p = .001$, and Benefactor (M=3.41; SD=1.47), $t(40) = -3.68$, $p = .001$, to whom feelings of exclusion did not significantly differ, $t(40) = .30$, $p = 762$.

Again looking within each condition, I finally checked to see if each player (Treasurer, Third Party, and Benefactor) differed with respect to the feelings of inclusion they generated in participants. I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and player specific feelings of Inclusion as dependent variables. There was a main effect of Player-specific Inclusion: Wilks' $\Lambda = .424$, $F(2, 157) = 106.57$, $p<.001$, partial $\eta^2 = .58$. There was a main effect of Cyberball condition: Wilks' $\Lambda = .424$, $F(2, 157) = 106.57$, $p<.001$, partial $\eta^2 = .58$. Finally, there was an interaction between Player-specific Inclusion and Cyberball condition: Wilks' $\Lambda = .189$, $F(4, 314) = 101.90$, $p<.001$, partial $\eta^2 = .57$ (see Table 3.)

Table 3. Player-Specific Feelings of Inclusion in Cyberball

	Cyberball Condition				
	Exclusion		Exclusion then Inclusion		Inclusion
Benefactor	2.2	<	6.1	>	3.4
	=		∨		=
Third Party	2.0	=	1.7	<	3.2
	∨		=		∧
Treasurer	1.7	=	1.7	<	5.3

Greater than (>) or less than (<) represent mean differences at p<.05.

In the Exclusion condition, I expected and found that participants least included by the Treasurer as compared to the other players. Participants reported feeling less included by the Treasurer (M=1.70; SD=1.10) than by the Third Party (M=2.04; SD=1.23), t(72) = -3.57, p = .001, and Benefactor (M=2.19; SD=1.46), t(72) = -3.32, p = .001, to whom feelings of inclusion did not significantly differ, t(72) = 1.05, p = 295.

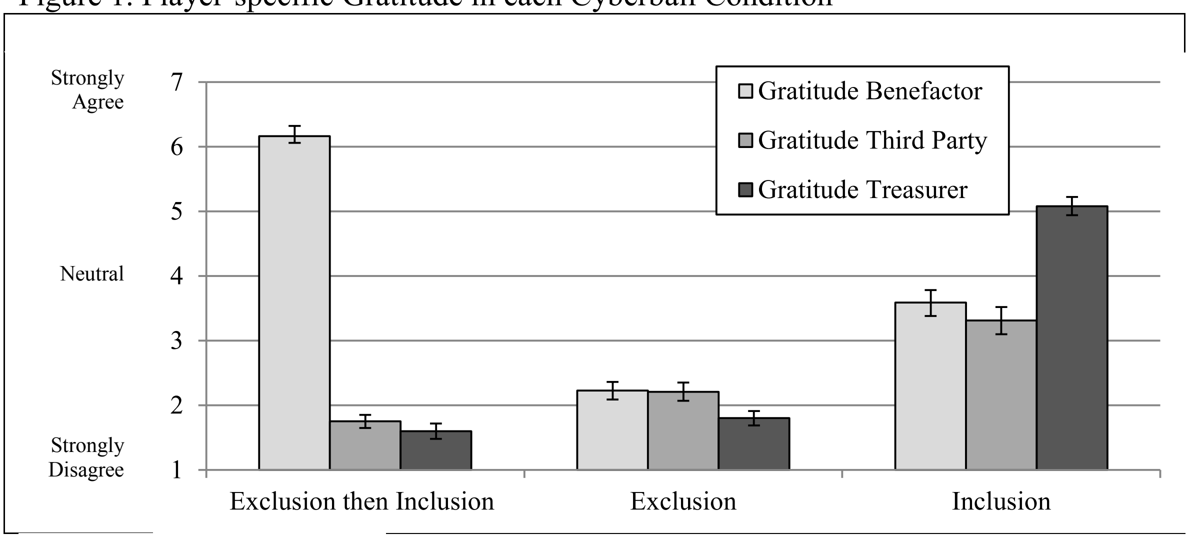
In the Exclusion then Inclusion condition, I expected and found that participants felt more included by the Benefactor than by the other players. Participants reported feelings more included by the Benefactor (M=6.21; SD=1.07) than by the Treasurer (M=1.71; SD=1.38), t(46) = 16.98, p < .001, and Third Party (M=1.67; SD=1.00), t(46) = 18.00, p < .001, to whom feelings of inclusion did not significantly differ, t(46) = .19, p = .847.

Finally, in the Inclusion condition, I expected and found that participants felt preferentially included by the Treasurer. Participants reported feeling more included by the Treasurer (M=5.27; SD=1.42) than by the Third Party (M=3.17; SD=1.52), t(40) = 8.11, p < .001, and Benefactor (M=3.44; SD=1.34), t(40) = 5.97, p < .001, to whom feelings of inclusion did not significantly differ, t(40) = 1.36, p = .182.

Did benefit reception elicit gratitude (Prediction 1)? I expected that different Cyberball conditions would elicit different amounts of gratitude. Specifically, I expected that participants in the Exclusion then Inclusion condition would report the more gratitude toward the Benefactor than toward any other player in any other condition.

To check for an interaction between player-specific gratitude and Cyberball condition, I conducted a repeated measures GLM analysis entering gratitude scores for the Treasurer, Third Party, and Benefactor as within-subjects variables and condition as the between subjects factor. There was a main effect of player: Wilks' $\Lambda = .309$, $F(2, 157) = 175.83$, $p<.001$, partial $\eta^2 = .69$. There was a main effect of Cyberball condition: $F(2, 158) = 61.15$, $p<.001$, partial $\eta^2 = .44$. Finally, there was an interaction between player and Cyberball condition: Wilks' $\Lambda = .113$, $F(4, 314) = 154.93$, $p<.001$, partial $\eta^2 = .66$ (see Figure 1).

Figure 1. Player-specific Gratitude in each Cyberball Condition



Error bars represent standard error

I predicted that the locus of this interaction would be in the Exclusion then Inclusion condition, where the gratitude for the Benefactor would be significantly greater than the gratitude for either the Treasurer or Third party. I found this to be the case.

Narrowing analyses to just the Exclusion then Inclusion condition, I conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' Λ = .084, $F(2, 45) = 245.20$, $p<.001$, partial $\eta^2 = .92$. Participants reported significantly greater gratitude toward the Benefactor (M=6.16; SD=.97) than both the Third party (M=1.75; SD=.93; $t(46) = 19.93$, $p<.001$; Cohen's d = 5.88) and the Treasurer (M=1.60; SD = .77; $t(46) = 23.18$, $p<.001$; d = 6.82). The difference between gratitude toward the Third Party and the Treasurer was not significant, $t(46) = 1.23$, p=.231.

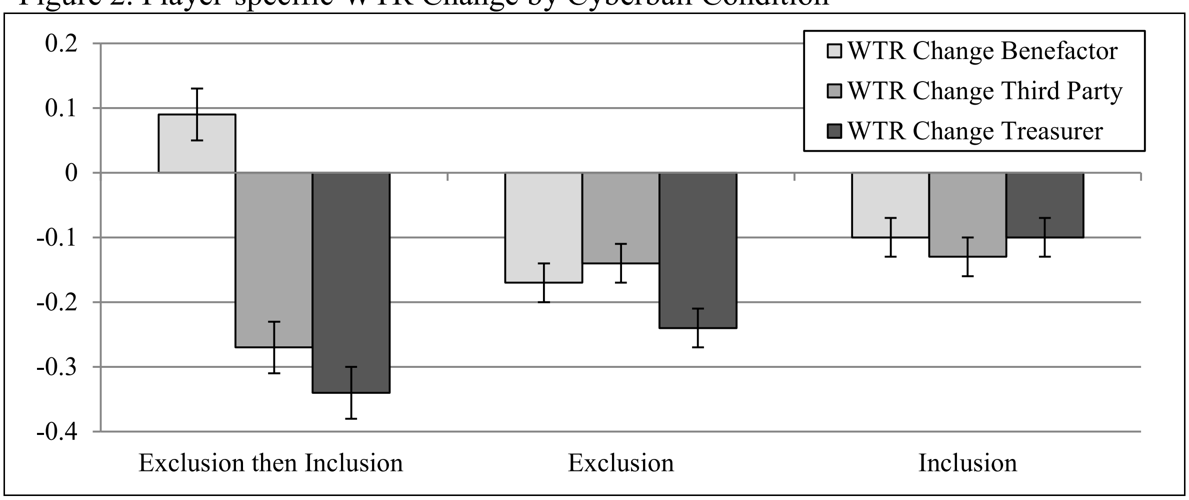
In the Exclusion condition, I again conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' Λ = .735, $F(2, 71) = 12.82$ $p<.001$, partial $\eta^2 = .27$. Gratitude for the Treasurer (M=1.80; SD=1.11) was significantly less than Gratitude for the Benefactor, (M=2.23; SD=1.13), $t(72)= -4.52$, $p<.001$, and Gratitude for the Third Party (M=2.21; SD=1.17), $t(72)= -5.02$, $p<.001$, which did not significantly differ from each other, $t(72)= .312$, p=.756.

In the Inclusion condition, I again conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' Λ = .401, $F(2, 39) = 29.17$ $p<.001$, partial $\eta^2 = .60$. Gratitude for the Treasurer (M=5.08; SD=1.35) was significantly greater than Gratitude for the Benefactor, (M=3.59; SD=1.20), $t(40)= 5.32$, $p<.001$, and Gratitude for the Third Party (M=3.31; SD=1.35), $t(40)= 7.60$, $p<.001$, which did not significantly differ from each other, $t(40)= 1.74$, p=.090.

Did benefit reception cause an increase WTR for the benefactor (Prediction 2)? I expected different Cyberball conditions would cause different changes in WTR. Specifically, I expected participants in the Exclusion then Inclusion condition would indicate at positive change in WTR for the Benefactor, whereas ΔWTR toward other players, across conditions, would be null or negative.

To determine whether there was an interaction between ΔWTR and Cyberball condition, I conducted a repeated measures GLM analysis entering ΔWTR for the Treasurer, Third Party, and Benefactor as within-subjects variables and condition (Exclusion, Inclusion, or Exclusion then Inclusion) as the between subjects factor. There was a main effect of player: Wilks' Λ = .732, $F(2, 169) = 30.96$, $p<.001$, partial $\eta^2 = .27$. There was no main effect of Cyberball condition: $F(2, 170) = 1.10$, $p=.337$, partial η^2 = .01. Finally, there was an interaction between player and Cyberball condition: Wilks' Λ = .643, $F(4, 338) = 20.84$, $p<.001$, partial $\eta^2 = .20$ (see Figure 2).

Figure 2. Player-specific WTR Change by Cyberball Condition



Error bars represent standard error.

I predicted that the locus of the interaction between ΔWTR and condition would be in the Exclusion then Inclusion condition, where the ΔWTR for the Benefactor would be significantly more positive than the ΔWTR for either the Treasurer or Third party. I found this to be the case. Narrowing analyses to just the Exclusion then Inclusion condition, I conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' $\Lambda = .420$, $F(2, 52) = 35.95$, $p<.001$, partial $\eta^2 = .58$. In the Exclusion then Inclusion condition, participants' positive ΔWTR for Benefactor (M=+.09; SD=.29) was significantly greater than participants' ΔWTR for the Third Party (M=-.27; SD=.30), $t(57) = 6.73$, $p <.001$, and Treasurer (M=-.35; SD=.34), $t(62) = 9.00$, $p < .001$. Furthermore, participants' negative ΔWTR for the Treasurer was significantly greater than participants' ΔWTR for the Third Party, $t(60) = -2.58$, $p =.012$.

To analyze ΔWTR in the Exclusion condition, I again conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. There was a small main effect of player type, $F(2, 120) = 5.42$, $p=.007$, partial $\eta^2 = .08$. The negative ΔWTR for Treasurer (M=-.22; SD=.27) was significantly greater than participants' negative ΔWTR for the Benefactor (M=-.15; SD=.25), $t(62) = -2.32$, $p = .023$, and Third Party (M=-.13; SD=.24), $t(62) = -3.79$, $p < .001$, which were not significantly different from each other, $t(62) = 1.19$, $p = .239$.

Finally, looking at ΔWTR in the Inclusion condition, I conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. There no main effect of player type, $F(2, 114) = 1.076$, $p=.344$, partial $\eta^2 = .02$.

Did reported gratitude correlate with change in WTR (Prediction 3)? Participants in each condition recorded a ΔWTR score and level of gratitude toward all three players. I expected gratitude would correlate with WTR change across Cyberball conditions.

Furthermore, I expected this correlation would be strongest in the Exclusion then Inclusion condition, and especially toward the Benefactor in this condition.

An analysis that examined the ΔWTR-gratitude score pairings for all players for all participants across all conditions revealed a significant positive correlation, $r=.37$, $p<.001$, $N=478$ pairings, 95% CI: .29 to .44. In the Exclusion then Inclusion condition, this correlation was $r=.53$, $p<.001$, $N=179$ pairings, 95% CI: .42 to .63. And, finally, narrowing to scores toward just the Benefactor in the Exclusion then Inclusion condition, the correlation was still large and positive, $r=.5$, $p<.001$, $N=38$ participants. The larger the positive ΔWTR, the greater the gratitude reported.

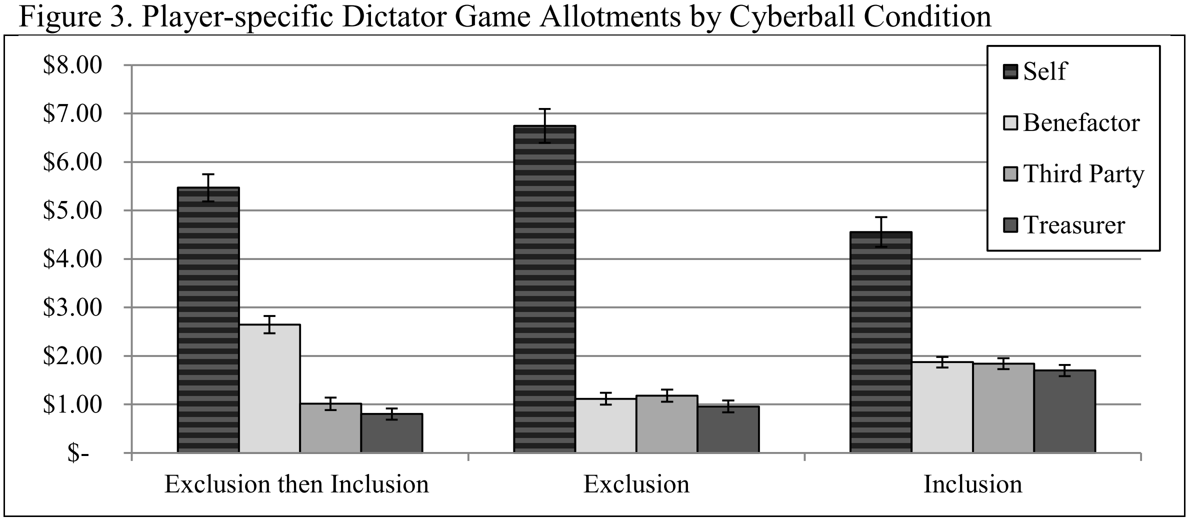
In the Exclusion condition, the correlation was not significant, $r=.12$, $p=.093$, $N=191$ pairings. However, in the Inclusion condition there was a correlation between gratitude and WTR Change was significant, $r=.32$, $p<.001$, $N=135$ pairings, 95% CI: .16 to .46.

Did the beneficiary preferentially provide return-benefits to the benefactor? And did anonymity attenuate the amount of return-benefits (Prediction 4)? I expected different Cyberball conditions would cause participants to allocate different amounts of return-benefits. Specifically, I expected participants would provide the largest return-benefits to Benefactors in the Exclusion then Inclusion condition. Finally, I expected that anonymity would reduce allocation amounts to all players other than the participant.

I conducted a repeated measures GLM analysis entering proportion of money allocated to self, Benefactor, Third Party, and Treasurer as the within-subjects variables and Cyberball condition and Dictator condition (identified or anonymous) as between subjects factors. I found a main effect of player on amount allocated, Wilks' $\Lambda = .359$, F(3,226) = 134.27, $p<.001$, partial $\eta^2 = .64$. Across conditions, participants allocated significantly more money to themselves than to Benefactors, Third Parties, and Treasurers (Self versus Benefactor: t(233) = 14.12, $p <.001$; Self versus Third party: t(233) = 16.53, $p <.001$; Self versus Treasurer: t(233) = 16.53, $p <.001$). In addition, participants allocated significantly more to Benefactors, followed by Third Parties, and lastly Treasurers (Benefactor versus Third Party: t(233) = 5.71, $p <.001$; Benefactor versus Treasurer: t(233) = 7.54, $p <.001$; Third Party versus Treasurer: t(233) = 3.84, $p <.001$). There was no main effect of Cyberball condition: F(2, 228) = 1.44, p=.239, partial $\eta^2 = .01$. There was also no main effect of Dictator Game condition: F(1, 228) = 1.03, p=.311, partial $\eta^2 = .00$

I found three significant interactions that help explain allocation patterns: a). player and Cyberball condition, Wilks' $\Lambda = .581$, F(6, 452) = 23.53, $p<.001$, partial $\eta^2 = .24$ b.) player and Dictator condition, Wilks' $\Lambda = .941$, F(3, 226) = 4.60, p=.004, partial $\eta^2 = .06$, and c.) player, Cyberball condition, and Dictator condition, Wilks' $\Lambda = .945$, F(6, 452) = 2.16, p=.046, partial $\eta^2 = .03$ (see Figure 4 – this figure collapses data from the anonymous and identified Dictator Game condition).

Figure 3. Player-specific Dictator Game Allotments by Cyberball Condition



Error bars represent standard error.

To look at effect of Cyberball condition on player-specific allotments (interaction a), I first ran repeated-measures GLM in the Exclusion then Inclusion condition with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was a significant effect of player in this condition, Wilks' Λ = .258, $F(3, 72) = 69.00$, $p<.001$, partial $\eta^2 = .74$. The participant allocated significantly more to self (M$5.47; SD=2.43) than to the Benefactor (M=$2.65; SD=1.53; $t(74) = 6.90$, $p < .001$), Third Party (M=$1.01; SD=1.10; $t(74) = 11.68$, $p < .001$), and Treasurer (M=$.80; SD=.99; $t(74) = 12.53$, $p < .001$). The participant allotted significantly more money to the Benefactor than to the Third Party, $t(74) = 7.46$, $p < .001$, and the Treasurer, $t(74) = 8.69$, $p < .001$. Finally, the participant allocated more to the Third Party than the Treasurer, $t(74) = 2.24$, $p = .028$.

In the Exclusion condition, I next ran a repeated-measures GLM with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was significant effect of player in this condition, Wilks' Λ = .617, $F(3, 77) = 15.92$, $p<.001$, partial $\eta^2 = .38$. The participant allocated significantly more to self (M$6.74; SD=3.12) than to the Benefactor (M=$1.12; SD=1.07; $t(78) = 11.99$, $p < .001$), Third Party (M=$1.18; SD=1.11; $t(78) = 11.82$, $p < .001$), and Treasurer (M=$.96; SD=1.08; $t(78) = 12.39$, $p < .001$). The allotment for the Benefactor did not significantly differ from the Third Party, $t(78) = 1.22$, $p =.228$. However, the participant allocated significantly less to the Treasurer than to both the Benefactor, $t(78) = -2.89$, $p =.005$, and Third Party $t(78) = -3.00$, $p = .004$.

Finally, in the Inclusion condition, I ran a repeated-measures GLM with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was a also significant effect of player in this condition, Wilks' $\Lambda = .325$, $F(3, 76) = 52.61$, $p<.001$, partial $\eta^2 = .67$. The participant allocated significantly more to self (M\$4.56; SD=2.75) than to the Benefactor (M=\$1.87; SD=.99; $t(79) = 6.52$, $p < .001$), Third Party (M=\$1.84; SD=.99; $t(79) = 6.57$, $p < .001$), and Treasurer (M=\$1.70; SD=1.04; $t(79) = 6.94$, $p < .001$). Allotment for the Benefactor did not significantly differ from allotment for both the Third Party, $t(79) = .59$, $p = .555$, and the Treasurer $t(79) = 1.74$, $p = .086$. Furthermore, allotment for the Third Party and Treasurer did not significantly differ, $t(79) = 1.57$, $p =.121$.

Regarding the interaction between Dictator Game condition (irrespective of Cyberball condition) and player-specific allotments (interaction b), Anonymous Dictators gave allotted more money to self (M=\$6.14; SD=3.03) than Identified Dictators (M=\$5.17; SD=2.77), $t(232) = 2.54$, $p =.012$. Amounts given by Anonymous Dictators to Benefactors (M=\$1.77; SD=1.61) did not significantly differ from amounts given by Identified Dictators (M=\$1.94; SD=1.14), $t(232) = .91$, $p =.363$. However, amounts allocated to the Third Party (Anonymous: M=\$1.06; SD=1.06; Identified: M=\$1.58; SD=1.12; $t(232) = 3.58$, $p <.001$) and Treasurer significantly decreased for Anonymous versus Identified Dictators (Anonymous: M=\$0.98; SD=1.09; Identified: M=\$1.30; SD=1.10; $t(232) = 2.18$, $p =.030$).

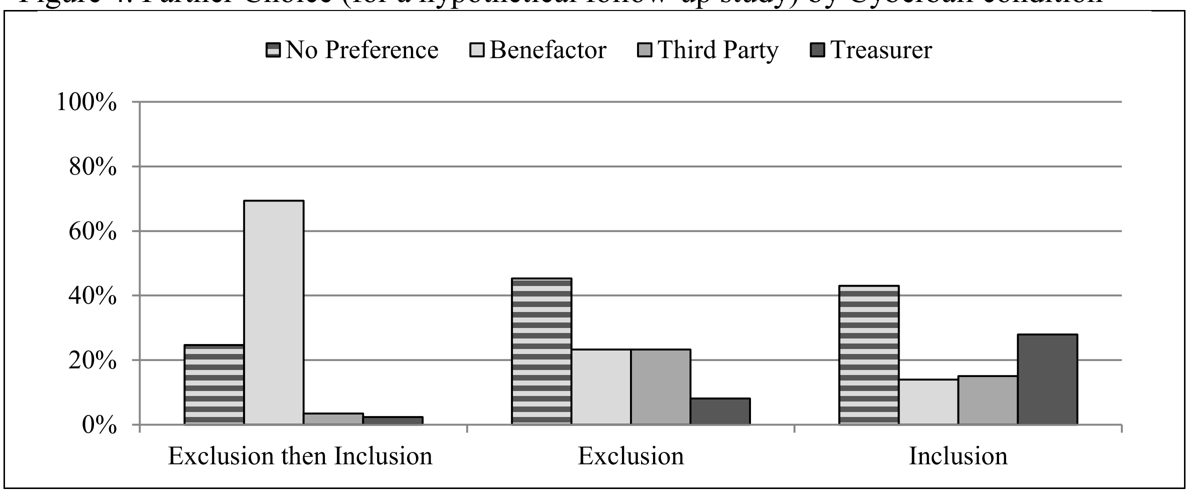
To determine the locus of the three-way interaction between Cyberball condition and Dictator Game condition (interaction c), I conducted three follow-up repeated measures GLMs, one for each Cyberball condition, with proportion of money allocated to self, Benefactor, Third Party, and Treasurer as the within-subjects variables and Dictator condition (identified or anonymous) as between subjects factors. The interaction was not significant in the Exclusion then Inclusion condition, Wilks' Λ = .932, $F(3, 71) = 1.72$, $p = .170$, partial $\eta^2 = .07$ or in Exclusion condition, Wilks' Λ = .955, $F(3, 75) = 1.72$, $p = .323$, partial $\eta^2 = .05$. However, there was a significant interaction in the Inclusion condition. Wilks' Λ = .892, $F(3, 76) = 3.07$, $p = .033$, partial $\eta^2 = .11$.

In the Inclusion condition, Anonymous Dictators allotted significantly more money to self than Identified Dictators (Anonymous: M=$5.40; SD=3.06; Identified: M=$4.02; SD=2.42; t(78) = 2.25, p =.028). Anonymous Dictators allotted significantly less money than Identified Dictators to both the Benefactor (Anonymous: M=$1.54; SD=1.12; Identified: M=$2.08; SD=.85; t(78) = 2.48, p =.017) and the Third Party (Anonymous: M=$1.45; SD=1.06; Identified M=$2.09; SD=.85:; t(78) = 2.94, p =.004). However, Dictator Game condition did not affect allotments to the Treasurer (Anonymous: M= $1.52; SD=1.11=; Identified: M= $1.81; SD=1.00; t(78) = 1.20, p =.233)

What best predicts return-benefit delivery: gratitude, WTR change, or follow-up WTR (Prediction 5)? Looking at Dictator game allocations for the Benefactor, in the Exclusion then Inclusion condition, Dictator Game allotments did not correlate with gratitude, r= .13, p=.412, N=42 pairings, 95% CI: -.18 to .42. Dictator Game allotments marginally correlated with ΔWTR,, r= .25, p=.052, N=59 pairings, 95% CI: -.01 to .48. However, Dictator Game allotments significantly correlated with follow-up WTR,, r= .34, p=.004, N=69 pairings, 95% CI: .11 to .53.

Does the participant preferentially remember and associate, as a social partner, with the Benefactor (Prediction 6)? A repeated measures GLM with memory recall for each player entered within-subjects variables, and Cyberball condition entered as a between subjects factor revealed no effect of condition on player-specific memory recall, Wilks' Λ = .992, $F(4, 506) = .50$, $p=.739$. However, at the conclusion of the study when participants were asked to select whom they would prefer to work with again as a partner, participants in the Exclusion then Inclusion condition overwhelming selected the Benefactor (see Figure 4). This same pattern holds for responses to the questions of whom the participant would prefer as a friend and which player was the participant's favorite.

Figure 4. Partner Choice (for a hypothetical follow-up study) by Cyberball condition



Chapter 4: Study Two Methods

What is the relationship between gratitude and welfare valuation in the established relationships of friends?

Study Two tested all predictions from Study One, except for the memory effect of Prediction 6 which I did not expect to vary because participants in this study already knew each other well. Because the expectation of benefit delivery should reduce positive the intensity of gratitude as well as change in WTR, I predict a counterintuitive pattern: though participants will report gratitude to their benefactor when the benefactor is their friend, reported gratitude will be attenuated, and will not be an important predictor of return benefit delivery.

Participants

112 participants (60 males; Mean age ± St. Dev: 18.91 ± .94), comprising pairs of one University of Miami undergraduate student accompanied by one friend, participated in this study. Data from one participant was lost due to a computer malfunction. Participants from the Introductory Psychology Course received course credit. All participants received $20 compensation. Each study session lasted approximately 1 hour.

Design

Study Two employed the same experimental paradigm as Study One, but replaced the Benefactor with the participant’s friend. Thus, Study Two used two actual participants (two friends) and two confederates. Each participant pair was assigned to the same Cyberball condition.

Data Analyses. Same as Study One.

Manipulation Check. Same as Study One.

Chapter 5: Study Two Results

Baseline WTR. As with Study One, I did not expect any differences in baseline WTR based on Cyberball condition. However, I did expect baseline WTRs for friends to be higher than baseline WTRs for other players. To verify this, I ran a repeated measures GLM entering condition (Inclusion, Exclusion, or Exclusion then Inclusion) as fixed factor, and baseline WTR for all players as dependent variables. There was a main effect of player: Wilks' Λ = .576, F(2, 73) = 26.82, p<.001, partial η^2 = .42, no main effect of Cyberball condition: F(2, 74) = 3.09, p=.052, partial η^2 = .08, and no interaction between player and Cyberball condition: Wilks' Λ = .963, F(4, 146) = .689, p=.601, partial η^2 = .02

To follow up on the main effect of player on baseline WTR, I compared the baseline WTRs for friends (i.e., Benefactors), Third Parties, and Treasurers. As expected, baseline WTRs for friends (M = .69, St.Dev = .32.) were higher than baseline WTRs for the Third Party (M = .41, St.Dev = .33), t(80) =7.36, p <.001, and Treasurer (M = .42, St.Dev = .33), t(79) =7.44, p<.001, which did not significantly differ, t(80) =7.36, p <.001.

Manipulation Check. Because Study One and Study Two used an identical manipulation, I conducted the same manipulation checks as Study One. Again, overall feelings of exclusion and inclusion in Cyberball were strongly inversely correlated: Exclusion Midgame and Inclusion Midgame, r = -.82, p < .001; Exclusion Endgame and Inclusion Endgame, r = -.93, p < .001. Thus, again, I created two metric variables to assess combined overall feelings of exclusion and inclusion: Exclusion Midgame and Exclusion Endgame.

To see how Exclusion Midgame and Exclusion Endgame were affected by condition, I next conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and Exclusion Midgame and Exclusion Endgame as dependent variables. There was a main effect of Exclusion (Midgame versus Endgame): $F(1, 108) = 28.33$, $p<.001$, partial $\eta^2 = .21$. There was main effect of Cyberball condition: $F(2, 108) = 37.60$, $p<.001$, partial $\eta^2 = .41$. Finally, there was an interaction between the Exclusion dependent variables and Cyberball condition: $F(2, 108) = 14.84$, $p<.001$, partial $\eta^2 = .22$.

As can be seen in Table 4, each Cyberball condition produced a unique pattern of overall sentiments concerning feelings of exclusion. The Exclusion condition produced the strongest feelings of exclusion, which increased between midgame and endgame. The Exclusion then Inclusion condition produced feelings of exclusion that did not change between the middle and the end of the game. This result is contrary to the expectation that inclusion by the Benefactor (here, one's friend), would be sufficient to cause an overall reduction in feelings of exclusion. Finally, the Inclusion condition produced the lowest feelings of exclusion, which increased between the middle and the end of the game.

Table 4. Midgame versus Endgame Feelings of Exclusion (feelings of exclusion combined with reverse-scored feelings of inclusion) in Cyberball

		Cyberball Condition				
		Exclusion		Exclusion then Inclusion		Inclusion
Feelings of Exclusion	Midgame	4.1	=	4.6	>	2.4
		∧		=		∧
	Endgame	5.1	>	4.5	>	2.7

Greater than (>) or less than (<) represent mean differences at $p<.05$.

Looking within each condition, I next checked to see if each player (Treasurer, Third Party, and Benefactor) differed with respect to the feelings of exclusion they generated in participants. [Note: player-specific feelings of exclusion were inversely correlated with player-specific feelings of inclusion: Benefactor Exclusion- Inclusion, -.71, p <.001; Third Party Exclusion- Inclusion, -.52, p <.001; Treasurer Exclusion-Inclusion, -.83, p <.001. However, because the strength of these correlations varied considerably, I choose to separately analyze feelings of player-specific exclusion and inclusion.]

I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and player-specific feelings of Exclusion as dependent variables. There was a main effect of Player-specific Exclusion: Wilks' $\Lambda = .677$, $F(2, 107) = 25.55$, $p<.001$, partial $\eta^2 = .32$. There was a main effect of Cyberball condition: $F(2, 108) = 17.49$, $p<.001$, partial $\eta^2 = .25$. Finally, there was an interaction between Player-specific Exclusion and Cyberball condition: Wilks' $\Lambda = .400$, $F(4, 214) = 31.13$, $p<.001$, partial $\eta^2 = .37$ (see Table 5.)

Table 5. Feelings of Player-specific Exclusion in Cyberball

	Cyberball Condition				
	Exclusion		Exclusion then Inclusion		Inclusion
Benefactor	5.1	>	2.5	<	3.7
	=		Λ		=
Third Party	5.2	=	5.1	>	4.1
	Λ		Λ		V
Treasurer	6.0	=	5.8	>	2.5

Greater than (>) or less than (<) represent mean differences at p<.05.
The Benefactor is the participant's friend.

In the Exclusion condition, I expected and found that participants would report more feelings of rejection by the Treasurer than by the other players. Participants reported feelings more excluded by the Treasurer ($M=6.03$; $SD=1.34$) than by the Third Party ($M=5.19$; $SD=1.41$), $t(35) = 4.74$, $p < .001$, and Benefactor ($M=5.08$; $SD=1.34$), $t(35) = 3.85$, $p < .001$, to whom feelings of exclusion did not significantly differ, $t(35) = -.66$, $p =.513$.

In the Exclusion then Inclusion condition, I expected and found that feelings of exclusion would be less for the Benefactor than the other players. Participants reported feeling less excluded by the Benefactor ($M=2.51$; $SD=1.66$) than by the Treasurer ($M=5.76$; $SD=1.57$), $t(36) = -7.27$, $p < .001$, and Third Party ($M=5.14$; $SD=1.69$), $t(36) = -5.97$, $p < .001$. Participants also reported feeling less excluded by the Third Party than by the Treasurer, $t(36) = -2.96$, $p =015$.

Finally, in the Inclusion condition, I expected and found that participants felt especially excluded by the Treasurer compared to the other players. Participants reported feeling less excluded by the Treasurer ($M=2.47$; $SD=1.91$) than by the Third Party ($M=4.05$; $SD=1.89$), $t(37) = -4.98$, $p < .001$, and Benefactor ($M=3.66$; $SD=1.86$), $t(37) = -2.79$, $p = .008$, to whom feelings of exclusion did not significantly differ, $t(37) = -1.26$, $p = .214$.

Again looking within each condition, I finally checked to see if each player (Treasurer, Third Party, and Benefactor) differed with respect to the feelings of inclusion they generated in participants. I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and player specific feelings of Inclusion as dependent variables. There was a main effect of Player-specific

Inclusion: Wilks' $\Lambda = .610$, $F(2, 107) = 34.23$, $p<.001$, partial $\eta^2 = .39$, partial $\eta^2 = .58$. There was a main effect of Cyberball condition: $F(2, 108) = 22.97$, $p<.001$, partial $\eta^2 = .30$. Finally, there was an interaction between Player-specific Inclusion and Cyberball condition: Wilks' $\Lambda = .284$, $F(4, 214) = 46.83$, $p<.001$, partial $\eta^2 = .47$ (see Table 6.)

Table 6. Feelings of Player-Specific Inclusion in Cyberball

	Cyberball Condition				
	Exclusion		Exclusion then Inclusion		Inclusion
Benefactor	2.6	<	5.7	>	3.1
	=		∧		∨
Third Party	2.4	=	2.5	=	2.6
	∧		∧		∧
Treasurer	1.7	=	1.9	<	5.4

Greater than (>) or less than (<) represent mean differences at $p<.05$.
The Benefactor is the participant's friend.

In the Exclusion condition, I expected and found that participants would report lesser feelings of inclusion by the Treasurer than by the other players. Participants reported feeling less included by the Treasurer ($M=1.72$; $SD=1.21$) than by the Third Party ($M=2.36$; $SD=1.29$), $t(35) = -3.76$, $p = .001$, and Benefactor ($M=2.58$; $SD=1.25$), $t(35) = -4.00$, $p = .001$, to whom feelings of inclusion did not significantly differ, $t(35) = 1.44$, $p = 160$.

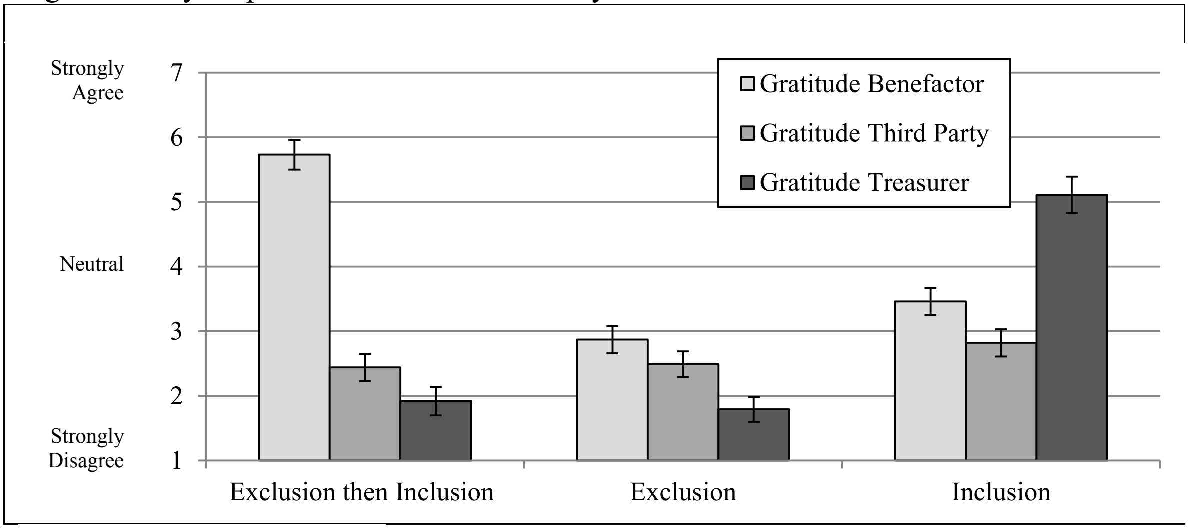
In the Exclusion then Inclusion condition, I expected that feelings of inclusion would be greatest for the Benefactor as compared to the other players. Participants reported feeling more included by the Benefactor ($M=5.70$; $SD=1.49$) than by the Treasurer ($M=1.95$; $SD=1.41$), $t(36) = 8.76$, $p < .001$, and Third Party ($M=2.46$; $SD=1.59$), $t(36) = 7.47$, $p < .001$. However, participants also reported feeling more included by the Benefactor (i.e., their friend) than by the Third Party, $t(37) = 2.19$, p =035.

Finally, in the Inclusion condition, I expected that participants would feel preferentially included by the Treasurer as compared to the other players. Participants reported feeling more included by the Treasurer (M=5.37; SD=1.79) than by the Third Party (M=2.63; SD=1.20), $t(37) = 8.69$, $p < .001$, and Benefactor (M=3.08; SD=1.51), $t(37) = 6.44$, $p < .001$. However, participants also reported feeling more included by the Benefactor than by the Third Party, $t(37) = 2.61$, p =013.

Did benefit reception elicit gratitude (Prediction 1)? I expected different Cyberball conditions would elicit different amounts of gratitude. Specifically, I expected participants in the Exclusion then Inclusion condition would report the more gratitude toward the Benefactor than toward any other player in any other condition.

To check for the effect of condition of player specific gratitude, I conducted a repeated measures GLM analysis, entering gratitude scores for the Treasurer, Third Party, and Benefactor as within-subjects variables and condition as the between-subjects factor. There was a main effect of player: Wilks' $\Lambda = .521$, $F(2, 107) = 49.09$, $p<.001$, partial $\eta^2 = .48$. There was a main effect of condition: $F(2, 108) = 19.17$, $p<.001$, partial $\eta^2 = .58$. Finally, there was an interaction between player and condition: Wilks' $\Lambda = .230$, $F(4, 214) = 58.07$, $p<.001$, partial $\eta^2 = .52$ (see Figure 5)

Figure 5. Player-specific Gratitude in each Cyberball Condition



Error bars represent standard error
The Benefactor is the participant's friend.

I predicted that the locus of this interaction would be in the Exclusion then Inclusion condition, where the gratitude for the Benefactor would be significantly greater than the gratitude for either the Treasurer or Third party. I found this to be the case. Narrowing analyses to just the Exclusion then Inclusion condition, I conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' $\Lambda = .272$, $F(2, 35) = 46.84$, $p<.001$, partial $\eta^2 = .73$, N=37. Participants reported significantly greater gratitude toward the Benefactor (M=5.73; SD=1.40) than both the Third Party (M=2.44; SD=1.29; $t(36) = 8.94$, $p<.001$; Cohen's $d = 2.94$) and the Treasurer (M=1.92; SD =1.32; $t(36) = 9.80$, $p<.001$; $d = 3.22$). Also, gratitude reported toward the Third Party was significantly greater than gratitude for the Treasurer, $t(36) = 3.75$, $p=.001$, $d = 1.24$.

In the Exclusion condition, I again conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' $\Lambda = .493$, $F(2,34) = 17.50$ $p<.001$, partial $\eta^2 = .51$. Gratitude for the Treasurer (M=1.79; SD=1.12) was significantly less than

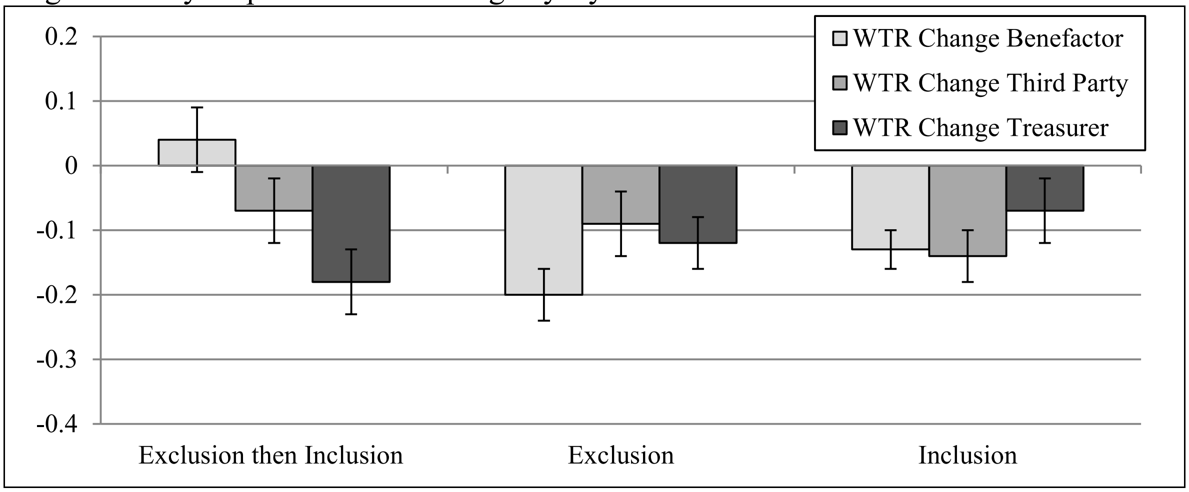
Gratitude for the Benefactor, (M=2.87; SD=1.26), t(35)= -5.65, p<.001, and Gratitude for the Third Party (M=2.49; SD=1.17), t(35)= -4.51, p<.001. Furthermore, Gratitude for the Third Party was less than Gratitude for the Benefactor, t(35)= 2.12, p=.041.

In the Inclusion condition, I again conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' Λ = .306, F(2, 26) = 40.91 p<.001, partial η^2 = .69. Gratitude for the Treasurer (M=5.11; SD=1.71) was significantly greater than Gratitude for the Benefactor, (M=3.46; SD=1.28), t(37)= 6.58, p<.001, and Gratitude for the Third Party (M=2.82; SD=1.31), t(37)= 9.10, p<.001. Furthermore, Gratitude for the Third Party was less than Gratitude for the Benefactor, t(37)= -4.06, p=<.001.

Did benefit reception cause an increase WTR for the benefactor (Prediction 2)? I expected different Cyberball conditions would cause different changes in WTR. Specifically, I expected participants in the Exclusion then Inclusion condition would indicate at positive change in WTR for the Benefactor, whereas WTR change toward other players, across conditions, would be null or negative.

To determine whether there was an interaction between WTR change and Cyberball condition, I conducted a repeated measures GLM analysis entering ΔWTR for the Treasurer, Third Party, and Benefactor as within-subjects variables and condition (Exclusion, Inclusion, or Exclusion then Inclusion) as the between subjects factor. Multivariate tests indicated no main effect of player: F(2, 148) = .39, p=.673, partial η^2 = .00, and no main effect of Cyberball condition: F(2, 74) = 1.94, p=.151, partial η^2 = .05. However, there was a significant interaction of player and Cyberball condition: F(4, 148) = 3.79, p=.006, partial η^2 = .09 (see Figure 6).

Figure 6. Player-specific WTR Change by Cyberball Condition



Error bars represent standard error.
The Benefactor is the participant's friend.

I predicted that the locus of the interaction between ΔWTR and condition would be in the Exclusion then Inclusion condition, where the ΔWTR for the Benefactor would be significantly more positive than the ΔWTR for either the Treasurer or Third party. I found this to be the partially correct. Narrowing analyses to just the Exclusion then Inclusion condition, I conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. There was a near significant main effect of player type, $F(2, 42) = 3.05$, $p=.058$, partial $\eta^2 = .13$. ΔWTR for the Benefactor ($M=+.04$; $SD=.27$; $N = 25$) was not significantly greater than ΔWTR for the Third Party ($M= -.07$; $SD=.25$; $N = 26$), $t(23) =1.61$, $p=.121$, or the Treasurer ($M= -.18$; $SD=.25$; $N = 26$), $t(23) = .98$, $p =.336$. However, ΔWTR for the Benefactor was significantly greater than ΔWTR Treasurer, $t(21) = 2.39$, $p =.028$.

In the Exclusion condition, as well as in the Inclusion condition, I again conducted a repeated measures GLM analyses entering ΔWTR for the three players as the within-subjects variables. However, in both conditions (Exclusion: Wilks' $\Lambda = .887$, $F(2, 25) = 1.60$, $p=.222$, partial $\eta^2 = .11$; Inclusion: $F(2, 54) = 2.47$, $p=.094$, partial $\eta^2 = .08$)

there was no main effect of player on ΔWTR.*Does gratitude correlate with change in WTR (Prediction 3)?* An analysis that examine the gratitude-ΔWTR score pairings for all players for all participants across all conditions revealed a significant positive correlation, $r=.39$, $p<.001$, $N=265$ pairings. Narrowing to just the Exclusion then Inclusion condition, this correlation was $r=.42$, $p<.001$, $N=77$ pairings. And, finally, narrowing to scores toward just the Benefactor in the Exclusion then Inclusion condition, the correlation disappeared, $r=.10$, $p=.649$, $N=25$ participants.

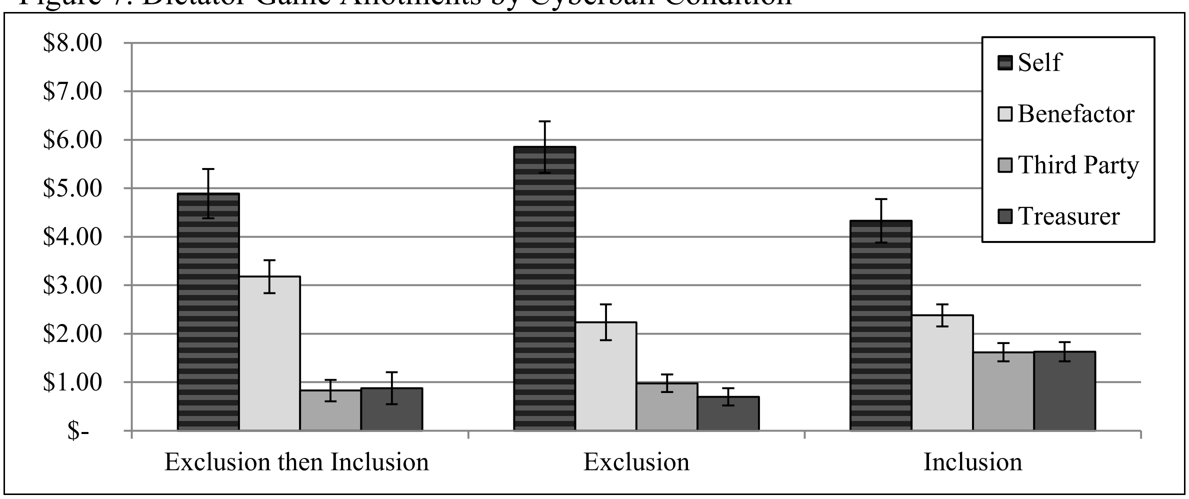
In the Exclusion condition, the correlation between gratitude and ΔWTR was significant, $r=.26$, $p=.012$, $N=92$ pairings, 95% CI: .06 to .44. In the Inclusion condition there was also a significant correlation, $r=.52$, $p<.001$, $N=96$ pairings, 95% CI: .36 to .65.

Did the beneficiary preferentially provide return-benefits to the benefactor? And did anonymity attenuate the amount of return-benefits (Prediction 4)? I expected different Cyberball conditions would cause participants to allocate different amounts of return-benefits. Specifically, I expected participants would provide the largest return-benefits to Benefactors in the Exclusion then Inclusion condition. I also expected preferential allocation for Benefactors (i.e., the participant's friends) in both the Exclusion condition and the Inclusion condition. Finally, I expected that anonymity would reduce allocation amounts to all players other than the participant.

To test for the above mentioned pattern of expected effects, I conducted a repeated measures GLM analysis entering proportion of money allocated to self, Benefactor, Third Party, and Treasurer as within-subjects variables and Cyberball condition and Dictator condition (Identified or Anonymous) as between subjects factors. I found a main effect of player on amount allocated, Wilks' $\Lambda = .404$, $F(3, 88) = 43.33$,

$p<.001$, partial $\eta^2 = .60$. Across conditions, participants allocated significantly more money to themselves than to Benefactors, Third Parties, and Treasurers (Self versus Benefactor: $t(95) = 5.67$, $p <.001$; Self versus Third party: $t(95) = 10.12$, $p <.001$; Self versus Treasurer: $t(95) = 9.84$, $p <.001$). In addition, participants allocated significantly more to Benefactors than to Third Parties, $(95) = 6.54$, $p <.001$; and Treasures: $t(95) = 6.02$, $p <.001$, to whom allocation amounts did not differ $t(95) = .54$, $p =.591$). There was no main effect of Cyberball condition: $F(2, 90) = .57$, $p=.570$, partial $\eta^2 = .01$. There was also no main effect of Dictator Game condition: $F(1, 90) = 1.75$, $p=.189$, partial $\eta^2 = .02$, partial $\eta^2 = .00$. However, there was a significant interaction of player and Cyberball condition: Wilks' $\Lambda = .844$, $F(6, 178) = 2.59$, $p=.020$, partial $\eta^2 = .08$. Finally, there was no interaction of player and Dictator condition: Wilks' $\Lambda = .985$, $F(3,88) = .46$, $p=.712$, partial $\eta^2 = .01$, and no 3-way interaction: Wilks' $\Lambda = .950$, $F(6,176) = .77$, $p=.596$, partial $\eta^2 = .03$ (see Figure 7 – this figure collapses data from the anonymous and identified Dictator Game condition).

Figure 7. Dictator Game Allotments by Cyberball Condition



Error bars represent standard error.
The Benefactor is the participant's friend.

To look at effect of Cyberball condition on player-specific allotments (interaction a), I first ran repeated-measures GLM in the Exclusion then Inclusion condition with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was a significant effect of player in this condition, Wilks' Λ = .352, $F(3, 31) = 19.01$, $p<.001$, partial $\eta^2 = .65$. The participant allocated significantly more to self (M=\$4.89; SD=2.98) than to the Benefactor (M=\$3.18; SD=2.00; $t(33) = 2.35$, $p = .025$), Third Party (M=\$0.83; SD=1.27; $t(33) = 6.11$, $p < .001$), and Treasurer (M=\$.88; SD=1.91; $t(33) = 5.40$, $p < .001$). The participant allotted significantly more money to the Benefactor than to the Third Party, $t(33) = 5.68$, $p < .001$, and the Treasurer, $t(33) = 4.25$, $p < .001$, to whom allocation amounts did not differ, $t(33) = .15$, $p = .881$.

In the Exclusion condition, I next ran a repeated-measures GLM with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was significant effect of player in this condition, Wilks' Λ = .250, $F(3, 28) = 28.04$, $p<.001$, partial $\eta^2 = .75$. The participant allocated significantly more to self (M\$5.85; SD=2.97) than to the Benefactor (M=\$2.24; SD=2.07; $t(30) = 4.34$, $p < .001$), Third Party (M=\$.98; SD=1.03; $t(30) = 7.29$, $p < .001$), and Treasurer (M=\$0.70; SD=0.98; $t(30) = 7.87$, $p < .001$). The participant allotted significantly more money to the Benefactor than to the Third Party, $t(30) = 3.11$, $p =.004$, and the Treasurer, $t(30) = 3.73$, $p =.001$. The participant also allocated more money to the Treasurer than to the Third Party, $t(30) = 2.47$, $p =.019$.

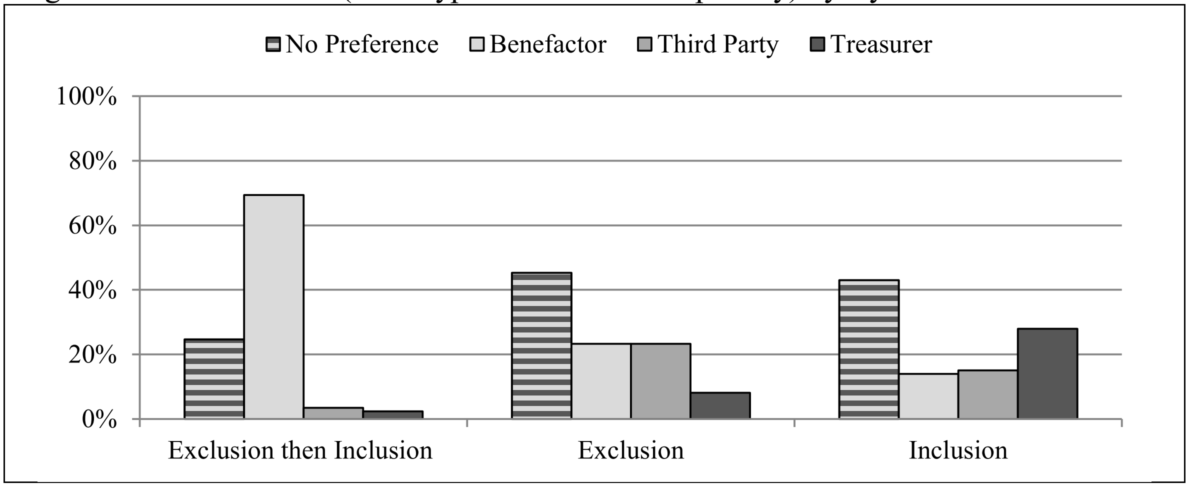
Finally, in the Inclusion condition, I ran a repeated-measures GLM with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was a also significant effect of player in this condition, Wilks' Λ = .581,

$F(3, 28) = 28.00$, $p=.001$, partial $\eta^2 = .42$. The participant allocated significantly more to self (M\$4.33; SD=2.49) than to the Benefactor (M=\$2.38; SD=1.25; $t(30) = 3.29$, $p = .003$), Third Party (M=\$1.62; SD=1.08; $t(30) = 4.38$, $p < .001$), and Treasurer (M=\$1.63; SD=1.10; $t(30) = 4.34$, $p < .001$). The participant allotted significantly more money to the Benefactor than to the Third Party, $t(30) = 2.51$, $p = .016$, and the Treasurer, $t(30) = 2.51$, $p =.018$, to whom allocation amounts did not differ, $t(30) = .44$, $p = .662$.

What best predicts return-benefit delivery: gratitude, WTR change, or follow-up WTR (Prediction 5)? Looking at Dictator game allocations for the Benefactor, in the Exclusion then Inclusion condition, Dictator Game allotments trended toward correlating with gratitude, r= .31, p=.078, N=34 pairings, 95% CI: -.03 to .59. Dictator Game did correlate with ΔWTR, r= .41, p=.049, N=24 pairings, 95% CI: .01 to .70. However, Dictator Game did not correlate with follow-up WTR,, r= .32, p=.114, N=26 pairings, 95% CI: -.08 to .63.

Does the participant preferentially associate with the Benefactor (Prediction 6)? When participants were asked to select which of the players they would prefer to work with again as a partner, participants in the conditions overwhelming selected their siblings, regardless of Cyberball condition (i.e. regardless of whether or not their sibling acted as a benefactor) (see Figure 8). This same pattern held for responses to the questions of whom the participant would prefer as friend, and which player was the participant's favorite.

Figure 8. Partner Choice (for a hypothetical follow-up study) by Cyberball Condition



Chapter 6: Study Three Methods

What is the relationship between gratitude and welfare valuation in the established relationships of siblings?

Study Three tested the same predictions from Study Two. However, this study used sibling pairs instead of friend pairs.

Participants

82 participants (23 males; Mean age ± St. Dev: 20.35 ± 2.18), comprising pairs of one University of Miami undergraduate student accompanied by one sibling, participated in this study. Participants from the Introductory Psychology Course received course credit. All participants received $20 compensation. Each study session lasted approximately 1 hour.

Design

Study Three employed the same experimental paradigm as Study Two, but replaced the Benefactor confederate with the participant's sibling. Thus, Study Three used two actual participants (two siblings) and two confederates. Each participant pair was assigned to the same Cyberball condition.

Data Analyses. As with Studies One and Two, I did not expect any differences in baseline WTR based on Cyberball condition.

Manipulation Check. Because Study One and Study Two used an identical manipulation, I conducted the same manipulation checks as with these studies.

Chapter 7: Study Three Results

Baseline WTR. As with Study One and Study Two, I did not expect any differences in baseline WTR based on Cyberball condition. However, I did expect baseline WTRs for siblings to be higher than baseline WTRs for other players. To verify that baseline WTR did not differ based on condition or player type, I ran a repeated measures GLM entering condition (Inclusion, Exclusion, or Exclusion then Inclusion) as fixed factor, and baseline WTR for all players as dependent variables. There was a main effect of player: Wilks' $\Lambda = .304$, $F(2, 47) = 53.82$, $p<.001$, partial $\eta^2 = .70$, no main effect of Cyberball condition: $F(2, 48) = .47$, $p=.629$, partial $\eta^2 = .02$, and no interaction between player and Cyberball condition: Wilks' $\Lambda = .909$, $F(4, 94) = 1.16$, $p=.336$, partial $\eta^2 = .05$.

To follow up on the main effect of player on baseline WTR, I compared the baseline WTRs for siblings (i.e., Benefactors), Third Parties, and Treasurers. As expected, baseline WTRs for siblings (M = .81, St.Dev = .25.) were higher than baseline WTRs for the Third Party (M = .44, St.Dev = .31), $t(56) =7.78$, $p <.001$, and Treasurer (M = .40, St.Dev = .25), $t(53) =10.13$, $p <.001$. Baseline WTR for the Third Party was slightly higher than baseline WTR for the Treasurer, $t(54) =2.11$, $p =.039$, though I assume this to be the result of type 1 error due to small sample size, as these baseline WTRs are highly correlated (N=55, $r=.87$, $p<.001$) and there is no apriori reason to except the baseline WTRs to differ between these players.

Manipulation Check. As with Study One and Study Two, Feelings of Exclusion and Inclusion in Cyberball were strongly inversely correlated: Exclusion Midgame and Inclusion Midgame, $r = -.83$, $p < .001$; Exclusion Endgame and Inclusion Endgame, r = -

.90, p < .001. Thus, I again created two metric variables to assess combined overall feelings of Exclusion and Inclusion: Exclusion Midgame and Exclusion Endgame.

To see how Exclusion Midgame and Exclusion Endgame were affected by condition, I next conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and Exclusion Midgame and Exclusion Endgame as dependent variables. There was a main effect of Exclusion (Midgame versus Endgame): $F(1, 79) = 26.36$, $p<.001$, partial $\eta^2 = .25$. There was main effect of Cyberball condition: $F(2, 79) = 32.70$, $p<.001$, partial $\eta^2 = .45$. Finally, there was an interaction between the Exclusion measures and Cyberball condition: $F(2, 79) = 3.19$, $p=.046$, partial $\eta^2 = .08$.

As can be seen in Table 7, each Cyberball condition produced a unique pattern of overall sentiments concerning feelings of Exclusion. The Exclusion condition produced the strongest feelings of Exclusion, which increased between the midgame and endgame. The Exclusion then Inclusion condition produced feelings of Exclusion that did not change between the middle and the end of the game. The Inclusion condition produced the weakest feelings of Exclusion, which increased between the middle and the end of the game.

Table 7. Overall Feelings of Exclusion (feelings of exclusion and reverse-scored feelings of inclusion) in Cyberball

		Cyberball Condition				
		Exclusion		Exclusion then Inclusion		Inclusion
Feelings of Exclusion	Midgame	4.2	=	4.3	>	2.4
		∧		=		∧
	Endgame	5.1	>	4.6	>	2.8

* Greater than (>) or less than (<) represent mean differences at p<.05

Looking within each condition, I next checked to see if each player (Treasurer, Third Party, and Benefactor – the participant's sibling) differed with respect to the feelings of exclusion they generated in participants. I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and player-specific feelings of Exclusion as dependent variables. There was a main effect of Player-specific Exclusion: Wilks' $\Lambda = .564$, $F(2, 78) = 30.11$, $p<.001$, partial $\eta^2 = .44$. There was a main effect of Cyberball condition: $F(2, 79) = 8.56$, $p<.001$, partial $\eta^2 = .18$. Finally, there was an interaction between Player-specific Exclusion and Cyberball condition: Wilks' $\Lambda = .238$, $F(4, 156) = 40.91$, $p<.001$, partial $\eta^2 = .51$ (see Table 8.)

Table 8. Player-Specific Feelings of Exclusion in Cyberball

	Cyberball Condition				
	Exclusion		Exclusion then Inclusion		Inclusion
Benefactor	5.2	>	2.4	<	3.9
	=		Λ		=
Third Party	5.2	=	5.6	>	3.5
	=		=		V
Treasurer	5.6	=	5.9	>	2.6

* Greater than (>) or less than (<) represent mean differences at p<.05
* The Benefactor is the participant's sibling

In the Exclusion condition, I expected participants would report more feelings of exclusion from the Treasurer, but instead found that participants felt equal levels of social rejection from all players. Participants reported feelings equally excluded by the Treasurer ($M=5.65$; $SD=1.83$) and Third Party ($M=5.23$; $SD=1.37$), $t(25) = 1.01$, $p = .323$, by the Treasurer and Benefactor ($M=5.23$; $SD=1.37$),), $t(25) = 1.02$, $p = .319$, as well as by the Benefactor and Third Party, $t(25) = 0.00$, $p = 1.00$.

In the Exclusion then Inclusion condition, I expected and found that participants felt less excluded by the Benefactor as compared to the other participants. Participants reported feeling less excluded by the Benefactor (M=2.36; SD=1.81) than by the Treasurer (M=5.89; SD=1.75), $t(27) = -7.35$, $p < .001$, and Third Party (M=5.57; SD=1.75), $t(27) = -7.25$, $p < .001$, to whom feelings of exclusion did not differ, $t(27) = -.93$, $p =.360$.

Finally, in the Inclusion condition, I expected and found that participants felt less excluded by the Treasurer as compared to the other players. Participants reported feeling less excluded by the Treasurer (M=2.57; SD=1.67) than by the Third Party (M=3.50; SD=1.50), $t(27) = -2.72$, $p = .011$, and Benefactor (M=3.89; SD=1.93), $t(27) = -3.16$, $p = .004$, to whom feelings of exclusion did not significantly differ, $t(27) = 1.65$, $p = .110$.

Again looking within each condition, I finally checked to see if each player (Treasurer, Third Party, and Benefactor – the participant's sibling) differed with respect to the feelings of inclusion they generated in participants. I conducted a repeated measures GLM entering condition (Exclusion then Inclusion, Exclusion, or Inclusion), as a fixed factor and player-specific feelings of inclusion as dependent variables. There was a main effect of player-specific inclusion: Wilks' $\Lambda = .401$ $F(2, 78) = 58.36$, $p<.001$, partial $\eta^2 = .60$. There was a main effect of Cyberball condition: $F(2, 79) = 31.29$, $p<.001$, partial $\eta^2 = .44$. Finally, there was an interaction between Player-specific Exclusion and Cyberball condition: Wilks' $\Lambda = .196$, $F(4, 156) = 49.17$, $p<.001$, partial $\eta^2 = .56$ (see Table 9.)

Table 9. Player-Specific Feelings of Inclusion in Cyberball

	Cyberball Condition				
	Exclusion		Exclusion then Inclusion		Inclusion
Benefactor	2.2	<	6.2	>	3.6
	=		∨		=
Third Party	2.0	=	1.7	>	3.2
	=		=		∧
Treasurer	1.6	=	1.6	<	5.4

* Greater than (>) or less than (<) represent mean differences at $p<.05$
* The Benefactor is the participant’s sibling

In the Exclusion condition, I expected participants would report feeling the least included by Treasurer, but instead found that participants felt equal levels of inclusion from all players. Participants reported feeling equally included by the Treasurer (M=1.62; SD=1.27) and Third Party (M=1.96; SD=1.22), $t(25) = -1.00$, $p = .327$, by the Treasurer and Benefactor (M=2.15; SD=1.12), $t(25) = -1.74$, $p = .095$, as well as by the Third Party and Benefactor, $t(25) = -.93$, $p = .363$.

In the Exclusion then Inclusion condition, I expected and found that participants felt preferentially socially included by the Benefactor as compared to the other players. Participants reported feelings more included by the Benefactor (M=6.21; SD=1.32) than by the Treasurer (M=1.64; SD=1.10), $t(27) = 14.73$, $p < .001$, and Third Party (M=1.71; SD=1.01), $t(27) = 16.68$, $p < .001$, to whom feelings of inclusion did not differ, $t(27) = .27$, p =787.

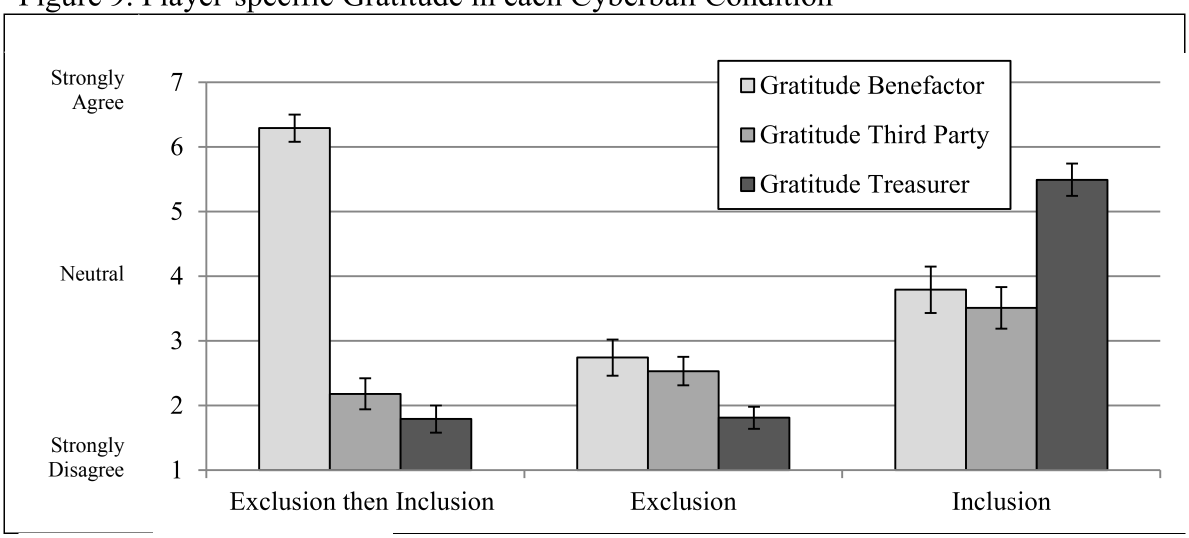
Finally, in the Inclusion condition, I expected and found that participants felt preferentially socially included by the Treasurer as compared to the other players. Participants reported feeling more included by the Treasurer (M=5.43; SD=1.53) than by the Third Party (M=3.21; SD=1.73), $t(27) = 5.84$, $p < .001$, and Benefactor (M=3.57;

SD=1.93), t(27) = 4.49, p < .001, to whom feelings of inclusion did not differ, t(27) = 1.15, p =259.

Did benefit reception elicit gratitude (Prediction 1)? I expected different Cyberball conditions would elicit different amounts of gratitude. Specifically, I expected participants in the Exclusion then Inclusion condition, who received a costly and intentional benefit, would report the more gratitude toward the Benefactor than toward any other player in any other condition.

To check for the effect of condition of player-specific gratitude, I conducted a repeated measures GLM analysis, entering gratitude scores for the Treasurer, Third Party, and Benefactor as within-subjects variables and condition as the between-subjects factor. There was a main effect of player: Wilks' Λ = .400, F(2, 78) = 58.58, p<.001, partial η^2 = .60. There was a main effect of Cyberball condition: F(2, 79) = 73.38, p<.337, partial η^2 = .36. Finally, there was an interaction between player and Cyberball condition: Wilks' Λ = .178, F(4, 156) = 53.53, p<.001, partial η^2 = .58 (see Figure 9).

Figure 9. Player-specific Gratitude in each Cyberball Condition



Error bars represent standard error.
The Benefactor is the participant's sibling.

I predicted that the locus of this interaction would be in the Exclusion then Inclusion condition, where the gratitude for the Benefactor would be significantly greater than the gratitude for either the Treasurer or Third party. I found this to be the case. Narrowing analyses to just the Exclusion then Inclusion condition, I conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' $\Lambda = .091$, $F(2, 26) = 129.27$, $p<.001$, partial $\eta 2 = .91$, $N=28$. Participants reported significantly greater gratitude toward the Benefactor ($M=6.29$; $SD=1.11$) than both the Third Party ($M=2.18$; $SD=1.28$; $t(27) = 13.95$, $p<.001$; Cohen's $d = 3.80$) and the Treasurer ($M=1.78$; $SD =1.26$; $t(27) = 15.45$, $p<.001$; $d = 4.21$). The difference between gratitude toward the Third Party and the Treasurer was not significant, $t(27) = 1.56$, $p=.132$.

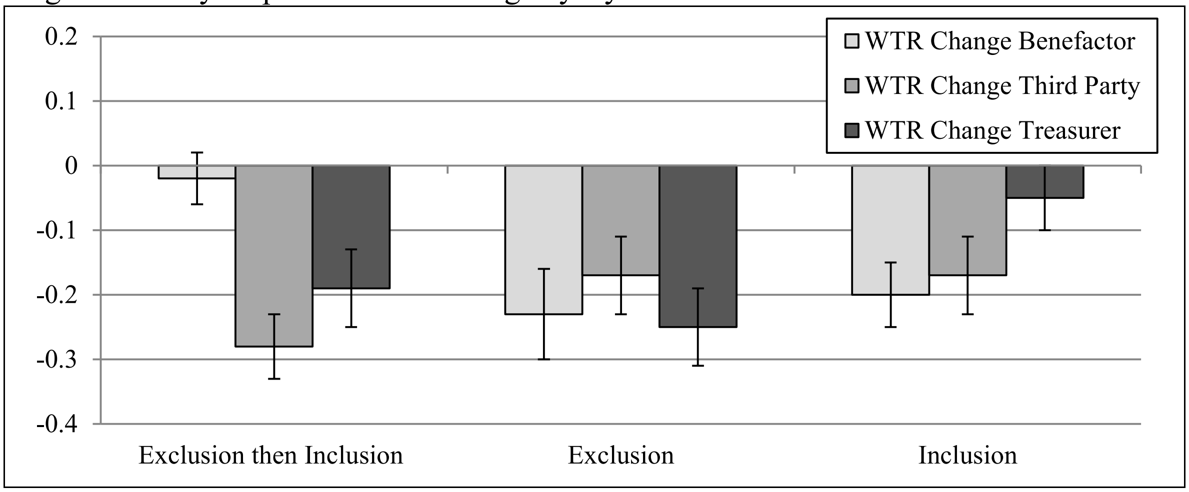
In the Exclusion condition, I conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' $\Lambda = .634$, $F(2,24) = 6.89$ $p<.001$, partial $\eta^2 = .36$. Gratitude for the Treasurer ($M=1.81$; $SD=.85$) was significantly less than Gratitude for the Benefactor, ($M=2.74$; $SD=1.40$), $t(25)= -3.71$, $p=.001$, and Gratitude for the Third Party ($M=2.53$; $SD=1.14$), $t(25)= -3.12$, $p=.004$, which did not significantly differ from each other, $t(25)= 1.17$, $p=.254$.

In the Inclusion condition, I again conducted a repeated measures GLM analysis entering gratitude for the three players as the within-subjects variables. Multivariate tests revealed a main effect of player type, Wilks' $\Lambda = .481$, $F(2, 26) = 14.03$, $p<.001$, partial $\eta^2 = .52$. Gratitude for the Treasurer ($M=5.49$; $SD=1.34$) was significantly greater than Gratitude for the Benefactor, ($M=3.79$; $SD=1.91$), $t(27)= 4.44$, $p<.001$, and Gratitude for the Third Party ($M=3.51$; $SD=1.70$), $t(27)= 5.39$, $p<.001$, which did not significantly differ from each other, $t(27)= 1.14$, $p=.264$.

Did benefit reception cause an increase WTR for the benefactor (Prediction 2)? I expected different Cyberball conditions would cause different changes in WTR. Specifically, I expected participants in the Exclusion then Inclusion condition would indicate at positive change in WTR for the Benefactor, whereas WTR change toward other players, across conditions, would be null or negative.

To determine whether there was an interaction between WTR change and Cyberball condition, I conducted a repeated measures GLM analysis entering ΔWTR for the Treasurer, Third Party, and Benefactor as within-subjects variables and condition (Exclusion, Inclusion, or Exclusion then Inclusion) as the between subjects factor. Multivariate tests indicated no main effect of player Wilks' $\Lambda = .983$, $F(2, 46) = .39$, $p=.680$, partial $\eta^2 = .02$, and no main effect of Cyberball condition: $F(2, 47) = .23$, $p<.337$, partial $\eta^2 = .01$. However, there was a significant interaction of player and Cyberball condition: Wilks' $\Lambda = .640$, $F(2, 92) = 5.75$, $p<.001$, partial $\eta^2 = .20$ (see Figure 10).

Figure 10. Player-specific WTR Change by Cyberball Condition



Error bars represent standard error.
The Benefactor is the participant's sibling.

I predicted that the locus of the interaction between ΔWTR and condition would be in the Exclusion then Inclusion condition, where the ΔWTR for the Benefactor would be significantly more positive than the ΔWTR for either the Treasurer or Third party. I found this to be the partially correct. Narrowing analyses to just the Exclusion then Inclusion condition, I conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. There was a significant main effect of player type, $F(2, 36) = 8.62$, $p=.001$, partial $\eta^2 = .33$. Participants ΔWTR for Benefactor ($M=-.02$; $SD=.17$; $N = 22$) was significantly greater than participants' ΔWTR for the Third Party ($M=-.28$; $SD=.28$; $N=23$; $t(21) = 3.87$, $p =.001$), and Treasurer ($M=-.23$; $SD=.26$; $N=21$; $t(18) = 2.97$, $p =.008$), which were not significantly different from each other, $t(19) = .86$, $p = .398$.

In the Exclusion condition, I again conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. However, there was no main effect of player on ΔWTR, Wilks' $\Lambda = .748$, $F(2, 15) = 2.53$, $p=.113$, partial $\eta^2 = .25$.

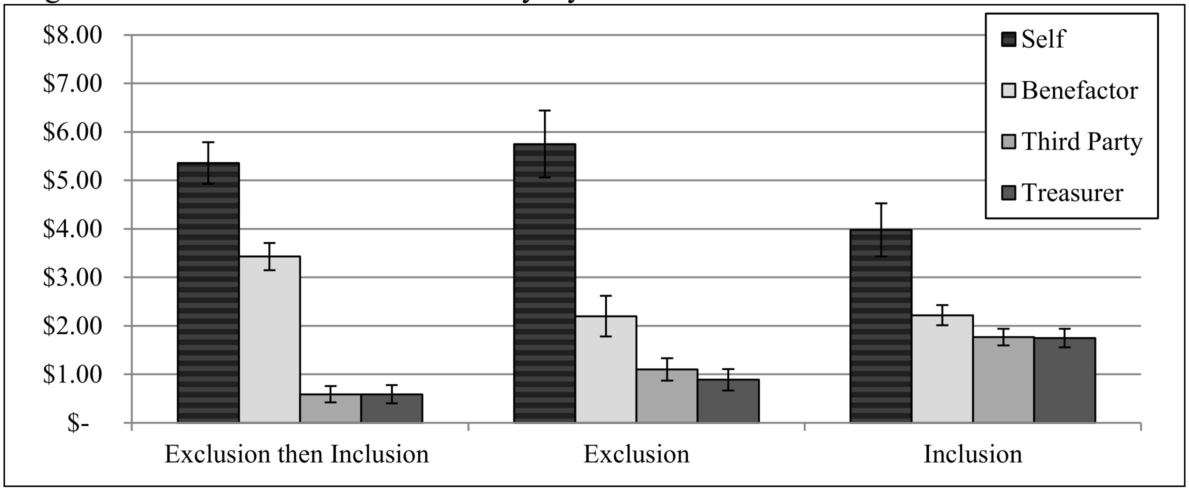
Finally, in the Inclusion condition, I conducted a repeated measures GLM analysis entering ΔWTR for the three players as the within-subjects variables. There was a main effect of player type. $F(2, 26) = 6.49$, $p=.005$, partial $\eta^2 = .33$. ΔWTR the Treasurer (M=-.06; SD=.21) was significantly less negative than ΔWTR for the Benefactor (M=-.20; SD=.21), $t(15) = -3.88$, $p =.001$, and Third Party (M=-.17; SD=.25), $t(13) =-2.20$, $p =.047$, which were not significantly different from each other, $t(15) = 1.58$, $p =.134$.*Does gratitude correlate with change in WTR (Prediction 3)?* An analysis that examines the gratitude-ΔWTR score pairings for all players for all participants across all conditions revealed a significant positive correlation, $r=.41$, $p<.001$, N=194 pairings. Narrowing to just the Exclusion then Inclusion condition, this correlation was $r=.49$, $p<.001$, N=66 pairings. And, finally, narrowing to scores toward just the Benefactor in the Exclusion then Inclusion condition, the correlation disappeared, $r=.15$, $p=.318$, N=22 participants.

In the Exclusion condition, the correlation between gratitude and ΔWTR was not significant, $r=.23$, $p=.068$, N=62 pairings. However, in the Inclusion condition there was also strong and significant correlation, $r=.46$, $p<.001$, N=56 pairings, 95% CI: .22 to .64.

Did the beneficiary preferentially provide return-benefits to the benefactor? And did anonymity attenuate the amount of return-benefits (Prediction 4)? I expected different Cyberball conditions would cause participants to allocate different amounts of return-benefits. Specifically, I expected participants would provide the largest return-benefits to Benefactors in the Exclusion then Inclusion condition. I also expected preferential allocation for Benefactors (i.e., siblings) in both the Exclusion condition and the Inclusion condition. Finally, I expected that anonymity would reduce allocation amounts to all players other than the participant.

To test for the above mentioned pattern of expected effects, I conducted a repeated measures GLM analysis entering proportion of money allocated to self, Benefactor, Third Party, and Treasurer as within-subjects variables and Cyberball condition and Dictator condition (Identified or Anonymous) as between subjects factors. Wilks' $\Lambda = .294$, $F(3, 64) = 51.11$, $p<.001$, partial $\eta^2 = .71$. Across conditions, participants allocated significantly more money to themselves than to Benefactors, Third Parties, and Treasurers (Self versus Benefactor: $t(71) = 4.98$, $p <.001$; Self versus Third party: $t(71) = 8.74$, $p <.001$; Self versus Treasurer: $t(71) = 8.89$, $p <.001$). In addition, participants allocated significantly more to Benefactors than to Third Parties, $(71) = 6.52$, $p <.001$; and Treasures: $t(71) = 6.70$, $p <.001$, to whom allocation amounts did not differ $t(71) = 1.38$, $p =.172$). There was no main effect of Cyberball condition: $F(2, 66) = .90$, $p=.412$, partial $\eta^2 = .03$. There was also no main effect of Dictator Game condition $F(1, 66) = .19$, $p=.665$, partial $\eta^2 = .00$. However, there was a significant interaction of player and Cyberball condition: Wilks' $\Lambda = .607$, $F(6, 128) = 6.06$, $p<.001$, partial $\eta^2 = .22$. Condition did not affect the pattern of allocation, reported above, but did moderate the size of allocation amounts. Finally, there was no interaction of player and Dictator condition: : Wilks' $\Lambda = .902$, $F(3,64) = 2.33$, $p=.083$, partial $\eta^2 = .10$, and no 3-way interaction: Wilks' $\Lambda = .901$, $F(6,128) = 1.14$, $p=.345$, partial $\eta^2 = .05$ (see Figure 11 – this figure collapses data from the anonymous and identified Dictator Game condition).

Figure 11. Dictator Game Allotments by Cyberball Condition



Error bars represent standard error.
The Benefactor is the participant's sibling.

To look at effect of Cyberball condition on player-specific allotments (interaction a), I first ran repeated-measures GLM in the Exclusion then Inclusion condition with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was a significant effect of player in this condition, Wilks' Λ = .142, F(3, 20) = 40.42, p<.001, partial η^2 = .86. The participant allocated significantly more to self (M=$5.36; SD=2.04) than to the Benefactor (M=$3.43; SD=1.36; t(22) = 3.05, p = .026), Third Party (M=$0.59; SD=0.82; t(22) = 8.40, p < .001), and Treasurer (M=$0.59; SD=0.82; t(22) = 8.32, p < .001). The participant allotted significantly more money to the Benefactor than to the Third Party, t(22) = 8.44, p < .001, and the Treasurer, t(22) = 7.82, p < .001, to whom allocation amounts did not differ, t(22) = .00, p = 1.00.

In the Exclusion condition, I next ran a repeated-measures GLM with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was significant effect of player in this condition, Wilks' Λ = .312 , F(3, 22) = 16.21, p<.001, partial η^2 = .69. The participant allocated significantly more to self (M$5.75; SD=3.46) than to the Benefactor (M=$2.20; SD=2.15; t(24) = 3.34, p = .003), Third Party (M=\$1.10; SD=1.15; $t(24) = 5.26$, $p < .001$), and Treasurer (M=\$0.89; SD=1.09; $t(24) = 5.60$, $p < .001$). The participant allotted significantly more money to the Benefactor than to the Third Party, $t(24) = 2.60$, $p = .016$, and the Treasurer, $t(24) = 3.01$, $p = .006$, to whom allocation amounts did not differ, $t(24) = 1.65$, $p = .112$.

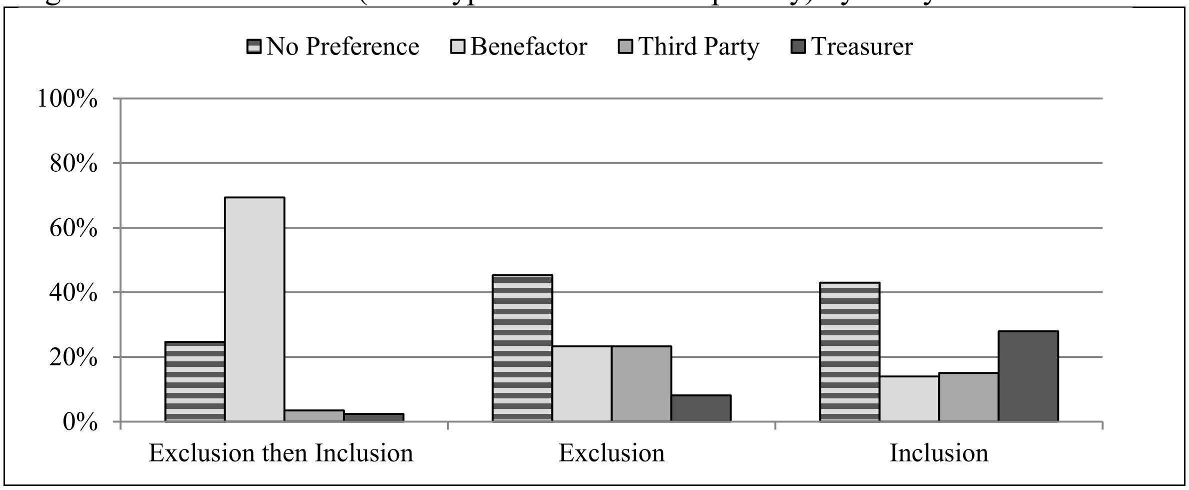
Finally, in the Inclusion condition, I ran a repeated-measures GLM with Dictator Game allotments for self, Benefactor, Third Party, and Treasurer entered as dependent variables. There was a also significant effect of player in this condition, Wilks' $\Lambda = .562$, $F(3, 21) = 5.46$, $p<.001$, partial $\eta^2 = .44$. The participant allocated significantly more to self (M\$3.98; SD=2.68) than to the Benefactor (M=\$2.23; SD=1.03; $t(23) = 2.43$, $p = .023$), Third Party (M=\$1.77; SD=0.88; $t(23) = 3.14$, $p = .005$), and Treasurer (M=\$1.75; SD=0.93; $t(23) = 3.10$, $p = .005$). The participant allotted significantly more money to the Benefactor than to the Third Party, $t(23) = 2.88$, $p = .008$, and the Treasurer, $t(23) = 2.79$, $p = .010$, to whom allocation amounts did not differ, $t(23) = .27$, $p = .788$.

What best predicts return-benefit delivery: gratitude, WTR change, or follow-up WTR (Prediction 5)? Looking at Dictator game allocations for the Benefactor, in the Exclusion then Inclusion condition, Dictator Game allotments significantly correlated with gratitude, $r= .47$, $p=.025$, N=23 pairings, 95% CI: .07 to .74. Dictator Game allotments did not correlate with ΔWTR, $r= .03$, $p=.915$, N=19 pairings, 95% CI: -.43 to .48. Dictator Game allotments also did not correlate with follow-up WTR, $r= .30$, $p=.207$, N=20 pairings, 95% CI: -.16 to .66.

Does the participant preferentially associate with the Benefactor (Prediction 6)? Participants demonstrated the same pattern or Reponses as participants with friends.

Again, regardless of Cyberball condition, siblings heavily preferred each other as future interaction partners (see Figure 12).

Figure 12. Partner Choice (for a hypothetical follow-up study) by Study and Condition



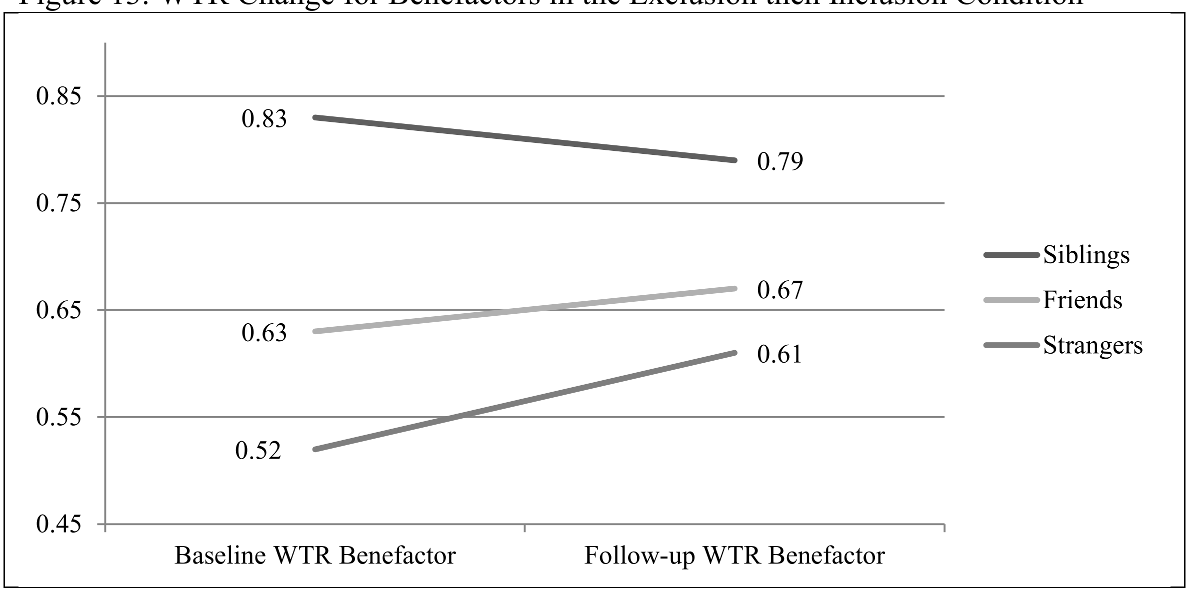
Chapter 8: Cross Study Comparisons

Did the delivery of benefits by the Benefactor, either a stranger, one's friend, or one's sibling, in the Exclusion then Inclusion condition, lead to a greater increase in participants' gratitude for the Benefactor as compared to the gratitude for the other players in this condition (Predictions 1 and 7)? Consistent with prediction one, Gratitude for the Benefactor in the Exclusion then Inclusion condition was the highest reported gratitude across studies (see results for each study). To test predication 7, looking in the Exclusion then Inclusion condition, I ran a univariate GLM with Gratitude for the Benefactor entered as a dependent variable, and participant type entered as a fixed factor. Contrary to Prediction 7, which predicted an attenuation effect for friends and siblings, this reported gratitude for the Benefactor was not statistically different between studies, $F(2, 109) = 2.18$, $p=.118$.

Did the costly and intentional delivery of benefits by the Benefactor, either a stranger, one's friend, or one's sibling, in the Exclusion then Inclusion condition lead to a greater increase in participants' WTR for the Benefactor as compared to change in WTR for other players in this condition (Predictions 2 and 7)? To test these predications, looking in the Exclusion then Inclusion condition, I ran a univariate GLM with baseline WTR for the Benefactor entered as a dependent variable, and participant type entered as a fixed factor. As expected baseline differed by participant type, $F(2, 115) = 9.08$, $p= <.001$. Baseline WTRs of siblings ($M=.83$; $SD=.24$) were higher than baseline WTRs for friends ($M=.62$; $SD=.33$), $t(47) = 2.43$, $p = 019$, and strangers ($M=.52$; $SD=.32$), $t(90) = 4.35$, $p <.001$. However, baseline WTRs for friends were not significantly higher than baseline WTRs for strangers, $t(93) = 1.48$, $p =.143$.

I next looked at follow-up WTRs in the Exclusion then Inclusion condition. I ran a univariate GLM with follow-up WTR for the Benefactor entered as a dependent variable, and participant type entered as a fixed factor. There was a marginal effect of participant type on follow-up WTR, $F(2, 124) = 2.80$, $p = .065$. Follow-up WTRs for siblings ($M=.79$; $SD=.27$), were higher than follow-up WTRs for strangers ($M=.61$; $SD=.34$), $t(98) = 2.39$, $p = .019$, which did not significantly differ from follow-up WTRs for friends ($M=.67$; $SD=.34$), $t(102) = .77$, $p=.444$. Furthermore, follow-up WTRs for siblings were not significantly different from follow-up WTRs for friends $t(48) = 1.43$, $p = .161$. Thus, in terms of WTR, the Exclusion then Inclusion condition effectively caused the WTRs of strangers to look more like the WTRs of friends, and the WTRs of friends to look more like the WTRs of siblings (see Figure 13).

Figure 13. WTR Change for Benefactors in the Exclusion then Inclusion Condition



Did the intensity of gratitude predict change in WTR (Predictions 3 and 7)? Looking at the Exclusion then Inclusion condition, gratitude for the Benefactor and

ΔWTR for the Benefactor significantly correlated for participants in Study One. However, gratitude for the Benefactor and ΔWTR for the Benefactor did not correlate for friends or siblings.

Was there a difference in desire to return benefits to players across conditions? In particular, did the participant preferentially provide return benefits to the Benefactor, a stranger, sibling, or friend, in the Exclusion then Inclusion condition (Predictions 4 and 7)? In the Exclusion then Inclusion condition, I ran a univariate GLM with return benefits to the benefactor entered as a dependent variable, and participant type entered as a fixed factor, revealed a marginal main effect of participant type on return benefits between studies. $F(2,129)=2.59$, $p=.079$. Looking only at simple effects, siblings allocated more money to each other (M=$3.43; SD=1.36) than strangers allocated to their Benefactors (M=$2.65; SD=1.53), $t(96) = 2.21$, $p = .029$, while allocation amounts between friends (M=$3.18; SD=2.00) were not significantly greater than strangers, $t(107) = 1.52$, $p = .133$, or significantly less than siblings, $t(55) = -.54$, $p = .592$.

Was follow-up WTR the best predictor of return-benefit delivery (Prediction 5)? To determine what is a better predictor of return benefit delivery, I correlated ΔWTR, follow-up WTR, and gratitude with return benefit-delivery to the Benefactor (see Table 10). For strangers, follow-up WTR, as opposed to ΔWTR, was the best predictor of return benefit delivery; gratitude did not predict variance in return benefit delivery. For friends, ΔWTR and gratitude both predicted return benefit delivery, while follow-up WTR did not. Finally, for siblings, only gratitude predicted return benefit delivery.

Table 10. Predictors of Return Benefit Delivery to the Benefactor in Exclusion then Inclusion Condition

	Strangers	Friends	Siblings
WTR Change	**N=59, r=.25, p=.026**	**N=24, r=.41, p=.024**	N=19, r=.03, p=.458
Follow-Up WTR	**N=69, r=.34, p=.002**	N=26, r=.32, p=.057	N=20, r=.30, p=.103
Gratitude	N=42, r=.23, p=.073	**N=34, r=.34, p=.023**	**N=23, r=.40, p=.037**

**All tests are one-tailed.*

I ran a follow-up linear regression of ΔWTR, follow-up WTR, and gratitude on return benefits toward the Benefactor, looking across all conditions. A similar pattern of results emerged. For strangers, follow-up WTR, β=.39, $t(116) = 4.38$, $p < .001$, and gratitude, $\beta = .35$, $t(116) = 4.01$, $p < .001$, significantly predicted return benefit delivery, $R^2 = .33$, $F(3, 116) = 19.23$, $p < .001$. For friends, ΔWTR, β=.30, $t(70) = 2.43$, $p = .018$, and gratitude, β=.25, $t(70) = 2.12$, $p = .037$, significantly predicted return benefit delivery, $R^2 = .21$, $F(3, 70) = 6.36$, $p = .001$. Finally, for siblings only gratitude, β=.46, $t(51) = 3.25$, $p = .002$, predicted return benefit delivery. $R^2 = .27$, $F(3, 51) = 6.39$, $p = .001$.

Do participants preferentially associate with the Benefactor (Prediction 6)? In the Exclusion then Inclusion condition, all participants across studies preferentially associate with the Benefactor. However, friends and siblings preferentially associate with each other irrespective of condition.

Chapter 9: Discussion

This dissertation introduces an important variable to the study of gratitude. This variable, known as the Welfare Tradeoff Ratio (WTR), not only helps explain much of the variance in gratitude, it also helps sheds light on how gratitude functions in established versus new relationships. In this discussion, I will review the seven predictions that I tested across three studies. I aim to explain where the predictions were verified, and where they failed to hold. Finally, I will consider the overall implications of this dissertation for the study of gratitude.

Prediction 1- Benefit reception will lead participants to report gratitude. This prediction was verified for strangers, friends and siblings. Recalling prediction 7, I expected friends and siblings to have attenuated gratitude, as compared to strangers. My finding that gratitude did not differ for strangers, friends or siblings stands in contrast to Bar Tal and colleagues' (1977) finding that imagined gratitude (i.e., a hypothetical gratitude reaction), in response to the reception of an identical benefit, was greater for acquaintances than for family members. These contradictory findings suggest that more research is needed to better explain the relationship between benefit reception, gratitude, and relationship status.

Prediction 2 -Benefit reception will cause a beneficiary to increase WTR for a benefactor. For strangers, alone, this prediction was verified. Strangers reported post manipulation WTRs for their benefactors that were significantly higher than pre manipulation WTRs. For friends and siblings, however, benefit reception was not associated with an increase in WTR. In these established relationships, where WTR is already high, the effects of benefit reception appeared to stabilize, rather than increase or decrease, WTR. Accordingly, the statistically unchanged WTRs for friends and siblings in the Exclusion then Inclusion condition of Cyberball were significantly higher than the reductions in WTR for friends and siblings in the Exclusion (friends: $t(52)=3.47$, $p=.001$; siblings: $t(39)=2.88$, $p=.001$) and Inclusion conditions (friends: $t(55)=3.02$, $p=.004$; siblings: $t(40)=3.18$, $p=.003$). The fact that WTRs decreased in two of the three experimental conditions, suggests that both siblings and friends are actively recalibrating WTRs for each other based on information from the social environment. The lack of special treatment in both the Exclusion condition and the Inclusion condition may act as a signal that one's friend or sibling is less invested in one's welfare than expected, thus leading to a reduction in WTR.

Alternatively, the reason WTRs are not increased in established relationships, even after an instance of benefit reception, could be that high WTRs have less room to increase. It is also possible that the size of the benefit required to increase WTR is a function of preexisting WTR magnitude. My studies used a constant benefit (6 receptions of a ball, worth up to $3.00, and the psychological benefit of social reinclusion), however, and thus cannot speak to the potential interactions between benefit size, preexisting WTR levels, and WTR change.

Prediction 3 - Reported gratitude will correlate with change in WTR. This prediction was mostly accurate. Considering just gratitude toward the benefactor in the Exclusions then Inclusion condition, this prediction held for strangers, but not for friends and siblings. The WTR of siblings and friends in this condition as mentioned above, did not change, and thus did not provide much variance for a correlation.

Looking across all three studies, across all experimental conditions, however, ΔWTR significantly predicted gratitude, $r=.38$, $p<.001$, $N=927$ pairings, as does follow-up WTR, $r=.45$, $p<.001$, $N=1054$ pairings. As can be seen in Figures 2, 6, and 10, most participants in Studies One-Three experienced a negative WTR change toward other players. Likewise, as can be seen in Figures 1,5, and 9 most of the gratitude reported by participants across studies was less than neutral, and can be interpreted as a lack of gratitude or ingratitude. Thus, the overall relationship between ΔWTR and gratitude can be thought to work in two directions that logically follow from the positive correlation. As WTR increases it predicts gratitude, and as WTR decreases it predicts gratitude's opposite emotional response, ingratitude.

Prediction 4 - The beneficiary will preferentially provide return benefits to the benefactor. This prediction held across studies. In the Exclusion then Inclusion condition, the beneficiary provided more return benefits to the benefactor than to any other player. This preferential provision of return benefits holds for strangers, friends, and siblings, and the amount of return benefits (approximately $3.00), did not significantly differ between studies. However, friends and siblings preferentially provided return benefits to each other even when not acting as benefactors, compared to other players, across conditions.

Prediction 5 – Follow-up WTR will best predict the return of benefits. This prediction held for strangers only. In the Exclusion then Inclusion condition follow-up WTR predicts return benefit-delivery for strangers, but not friends and siblings. This is not surprising considering follow-up WTR for friends and siblings was not significantly different from baseline WTR, and thus provided little variance for correlating with variance in return benefit delivery. For friends and siblings, gratitude proved to be the best predictor of return-benefit delivery.

Prediction 6 – Participants will preferentially associate with the Benefactor. This prediction held across studies. Strangers preferentially associate with their benefactors, which replicates previous findings in the gratitude literature (Bartlett et al.,2012; DeSteno et al., 2010). However, friends and siblings preferentially associate with each other regardless of experimental condition. Future studies might explore how the appearance of a (stranger) benefactor could affect the strong preferential association of friends and siblings.

Prediction 7 – For friends and siblings gratitude will be attenuated, and will not be an important predictor of return-benefit delivery. This prediction did not hold. In fact, I found a pattern nearly opposite of what I predicted. Looking only at the Exclusion then Inclusion condition, gratitude was not attenuated for friends and siblings.

Furthermore, I found that ΔWTR and follow-up WTR, as opposed to gratitude, were important predictors of return benefit delivery for strangers, while for friends ΔWTR and gratitude worked moderately well at predicting this behavior. For siblings, however, only variance in gratitude significantly predicted return benefit delivery (See Table 10). A simple linear regression, looking across conditions, confirmed the same pattern of results. Thus, it appears that ΔWTR, follow-up WTR (i.e., absolute magnitude of WTR), differentially predict return benefit delivery for strangers, friends, and siblings. Finally, it appears that as relationships become closer (as measured by an increased overall magnitude of WTR), changes in WTR become less effective at predicting variation in return benefit delivery, while gratitude, by contrast, becomes more effective at predicting return benefit delivery.

Conclusions about Gratitude and WTR

Only one other researcher has explored the relationship between gratitude and WTR (Lim, 2012). However, Lim's study used WTR as a manipulation, as opposed to using it as an outcome, to see how change in WTR $_{Other \rightarrow Self}$ affected a participant's emotional state (see Introduction). My studies, by comparison, examined change in $WTR_{Self \rightarrow Other}$ after an act of benefit reception, and how this ΔWTR is associated with gratitude and related affiliative behaviors. Therefore, this dissertation can speak to the role of WTR in a traditional gratitude eliciting interaction.

The psychological literature on gratitude, to the extent that it considers gratitude in the context of interpersonal relationships, is consistent with my findings on how relationships change following an event of benefit reception: beneficiaries report feeling gratitude toward, and preferentially associate with, their benefactors. However, I have shown gratitude is not the only variable that is affected by benefit reception. At least for strangers, gratitude is accompanied by an important cognitive change, a positive increase in WTR (i.e., a change in the willingness to sacrifice one's own resources for the sake of another). Though I found that benefit reception did not significantly change the WTRs of friends and siblings, despite eliciting gratitude, perhaps this non-significant change in WTR can be thought of as a stabilization of WTR because friends and siblings, who were made to ignore, or simply refrain from interacting with each other during Cyberball, actually decreased their WTRs for each other. Thus it appears that when WTR is high (such as between friends and siblings), an act of benefit reception, can both keep WTR high and elicit gratitude.

In my primary experimental condition, the Exclusion then Inclusion condition of Cyberball, a benefactor delivered a benefit (the chance to earn as much as $3.00 and the psychological benefit of social reclusion) to the beneficiary at a cost to self. Participants then repaid this benefit in the Dictator game, where the average return benefit to the benefactor was $2.92(SD:1.66). On the surface this may look like a simple exchange, yet beneficiaries preferentially associated with and felt gratitude toward their benefactors. Perhaps more importantly, beneficiaries either changed their willingness to sacrifice their own resources for their benefactors (as in Study One), or kept this willingness high when it was already high (as in Studies Two and Three).

I proposed that gratitude's evolved function is to initiate (in the case of strangers) and strengthen (in the case of friends and siblings) interpersonal relationships in a way that could conceivably contribute to fitness. I intend to have provided preliminary evidence for this claim. However, future studies are necessary, for example, to explain the computational structure that underlies gratitude elicitation, to elucidate the relationship between gratitude and biological theories of reciprocity, and to continue exploring the relationship between gratitude and WTR. Nevertheless, I hope to have laid the foundation for an approach to the study of gratitude that will stimulate further research.

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