

The Effect of Guilt on Altruism in the One-Shot Anonymous Prisoner's Dilemma Game

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THE EFFECT OF GUILT ON COOPERATION IN THE ONE-SHOT ANONYMOUS PRISONER'S DILEMMA GAME

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University of Pittsburgh, 2010

There exists a wide body of literature suggesting that individuals behave more altruistically in situations that 1) provide an opportunity for reciprocation and 2) are not anonymous. Past research investigating the altruistic functions of induced social emotions have been conducted solely in the context of either iterative and/or face-to-face interactions. As a result, the altruistic behaviors found in these studies cannot be solely attributed to these induced emotions. In light of these past works, the current study compared cooperation rates of individuals following either a guilt or neutral mood induction procedure in an anonymous, one-shot social dilemma (i.e. the prisoner's dilemma). Participants were 120 female undergraduates (60 engaged in a guilt induction procedure and 60 engaged in a neutral mood induction procedure) enrolled at a large university asked to participate in a one-shot social dilemma with a partner that they would never meet. Primary analyses found no evidence regarding group differences in rates of cooperation. Secondary analyses of subjective emotions ratings (i.e. guilt, happiness, sadness, anger, and fear) suggest that generalized negative affect may be associated with decreased rates of cooperation while positive affect may be associated with increase rates of cooperation. Future research investigating the effects of generalized negative and positive affect as well as specifically induced emotions needs to be conducted to further evaluate this suggestion.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	MODELS OF ALTRUISTIC BEHAVIOR	1
1.2	GUILT AND ALTRUISM	4
1.2.1	Contexts and Causes	4
1.2.2	Consequences	6
1.3	EXPERIMENTAL INDUCTION OF AFFECTIVE STATE	13
1.4	AFFECT AS INFORMATION	14
1.5	TWO-PERSON, TWO STRATEGY (2 x 2) MATRIX GAMES	15
1.5.1	The Prisoner's Dilemma	16
1.5.2	Strategies	17
1.6	VARIABLES EFFECTING COOPERATION RATES IN THE PRISONER'S DILEMMA	19
1.6.1	Payoff Matrix	19
1.6.2	Group Size (2-Person and N-Person Games)	20
1.6.3	Communication	21
1.6.4	Anonymity	22
1.6.5	Sex	22
1.6.6	Repetition (One-shot, Finitely Repeated, and Infinitely Repeated Games)	23
1.6.7	Expectations of Other's Behavior	23
1.7	AIMS OF THE CURRENT STUDY	25
2.0	METHODS	26
2.1	DESIGN AND OVERVIEW	26
2.2	PARTICIPANTS	26
2.3	MEASURES	26
2.3.1	Visual Analogue Scale	27
2.4	MOOD INDUCTION	27
2.5	PRISONER'S DILEMMA INTERACTION	27
2.6	PROCEDURE	29
3.0	RESULTS	31
3.1	PRELIMINARY RESULTS	31
3.1.1	Guilt Ratings as a Function of Experimental Group	32

3.1.2	Happiness Ratings as a Function of Experimental Group	34
3.2	PRIMARY ANALYSES	35
3.3	SECONDARYANALYSES	37
3.3.1	The Effect of Subjective Guilt on Cooperation Rate	37
3.3.2	The Effect of Subjective Happiness on Cooperation Rate	37
3.3.3	The Effect of Subjective Anger on Cooperation Rate	39
3.3.4	The Effect of Subjective Sadness on Cooperation Rate	40
3.3.5	The Effect of Subjective Disgust on Cooperation Rate	41
3.3.6	Exploratory Factor Analysis	42
4.0	DISCUSSION	44
APPENDIX A.	NEUTRAL PERSONAL EVENT DESCRIPTION	51
APPENDIX B.	GUILT PERSONAL EVENT DESCRIPTION	52
	BIBLIOGRAPHY	53

LIST OF TABLES

1.1	<u>The Prisoner's Dilemma</u>	17
1.2	<u>The Formal Prisoner's Dilemma</u>	20
2.3	<u>Monetary Payoff Structure for the Prisoner's Dilemma</u>	28
3.1	<u>Subjective Emotion Ratings by Group and Time</u>	32
3.2	<u>Binary Logistic Regression Analysis</u>	35
3.3	<u>Intercorrelations Among Independent and Dependent Variables</u>	38
3.4	<u>Factor Loadings and Communalities Based on a Principle Component Analysis</u>	43

LIST OF FIGURES

3.1 Subjective Guilt Ratings by Group and Time	38
3.2 Subjective Happiness Ratings by Group and Time	39
3.3 Subjective Anger Ratings by Group and Time	40
3.4 Subjective Sadness Ratings by Group and Time	41
3.5 Subjective Disgust Ratings by Group and Time	42

1.0 INTRODUCTION

Despite decades of work in the fields of psychology, economics, and mathematics, volumes of empirical works have struggled to find a place for altruism in conceptualizations of social behavior. Falling outside of the primarily accepted conceptual frameworks, altruistic behavior has remained at odds with many firmly established models of social behavior. As a result, many instances of altruistic behavior are considered to be anomalies within larger models, while relatively larger questions remain regarding their possible utility (Thaler, 1988). The central aim of the current manuscript is to investigate the ways in which specific emotions, serving as proximate mechanisms, might influence altruistic behaviors in a social dilemma of specific causes and consequences.

1.1 MODELS OF ALTRUISTIC BEHAVIOR

The current context of cooperative behavior has changed dramatically from those existing during the past century. Conceptualizations of altruistic behavior during the middle of the 20th century were dominated by formal models based on behaviors maximizing expected utility (De Cremer, Zeelenberg, & Murnighan, 2006). These models, including rational choice theory (Von Neumann & Morgenstern, 1944) and agency theory (Eisenhardt, 1989), emphasize that

individuals behave in ways that pursue their own self-interests while protecting themselves from other individuals' conflicting self-interested pursuits. Furthermore, these models states that these selfish ends are achieved through social transactions and interactions (De Cremer et al., 2006). More recently, works in the fields of psychology, economics, and mathematics have provided a great deal of insight towards the mechanisms of altruistic behavior. Two prominent models have emerged: kin selection and reciprocal altruism.

The first model, kin selection, was developed by Hamilton (1964) who noted that related individuals share a proportion of their genes due to common descent. Hamilton posited that as long as the benefit of an altruistic act to the relative (in relation to the degree of relatedness between the relatives) outweighs the harm to the individual (the cost of the altruistic act), genes causing the altruistic act will be selected for. Thus, natural selection can increase the frequency of a gene in the population that causes an altruistic act because of the benefits to those individuals who have copies of that same gene.

The second model, termed reciprocal altruism, was presented by Trivers (1971) and rests on the notion "if you scratch my back, I'll scratch yours". In reciprocal altruism, altruistic acts are made in the expectation that similar acts will be returned in the future either directly (Trivers, 1971) or indirectly (Alexander, 1987). The model posits that trading favors can yield a net reproductive benefit if both parties are cooperative.

Taken together, kin selection and reciprocal altruism explain a great deal of social behavior. Kin selection, for example, provides a model for altruistic behavior in social insects such as ants and termites (Wilson, 1975) and provides an explanation for the striking finding

that infanticide is 80 times more likely to occur in families with a stepparent (Daly & Wilson, 1987). The discovery of reciprocal altruism has had a similar impact, providing explanations for seemingly altruistic behavior in cleaner fish (Trivers, 1971), to the paradoxical 'live and let live' systems found in trench warfare in World War I (Axelrod, 1984).

Although these two models provide an explanation for much altruistic and cooperative behavior, individuals often act altruistically towards non-relatives in situations where there is no chance of reciprocation. For example, people routinely engage in behaviors such as returning wallets without taking money, voting in national elections, and leaving tips at restaurants they never plan to visit again. This anecdotal evidence is consistent with evidence from empirical studies of cooperation showing that individuals behave altruistically towards others in one-shot (i.e. non-iterated) social dilemmas. Frank, Gilovich, and Regan (1993) found that nearly 75% of individuals engaged in a one-shot social dilemma chose cooperation rather than defection following a 30-minute acquaintance period. Results from ultimatum games show similar results. In a study investigating cooperation in the ultimatum game "Divide Ten Dollars", it was found that most proposers generally offer a 50/50 split rather than proposing a greater amount for themselves (Forsythe, Horowitz, Savin, & Sefton, 1994). Similar cooperative results were found in ultimatum games by Guth and colleagues (Guth, Schmittberger, & Schwarze, 1982).

As Trivers (1971) noted, "many transgressions performed in private are likely to become public knowledge" (p. 50). This suggests that altruistic or cooperative behavior might be motivated by reputation or indirect-reciprocity (contingent behavior based on local

information) (Alexander, 1987). To test this notion, several studies have used double blind techniques to ensure that participants' responses remained anonymous to both other participants as well as experimenters. Generally these studies find that although cooperative behaviors decrease when one's reputation is not at stake, these behaviors still remain present (Hoffman, McCabe, Shachat, & Smith, 1994; Hoffman, McCabe, & Smith, 1996).

1.2 GUILT AND ALTRUISM

It has been argued by emotion theorists and economists alike that emotions can serve as proximate mechanisms for altruistic behavior (Buck, 2002; Elster, 1998; Fehr & Gächter, 2002; Gintis, 2002). Furthermore, it has been independently hypothesized by Frank (1988) and Hirshleifer (1987) that certain emotions allow for altruistic behaviors by competing with calculations stemming from rational self-interest.

One emotion in particular has been thought by emotions theorists to have specific altruistic functions: guilt (R. M. Nesse, 1990; Trivers, 1971). Guilt has primarily been conceptualized as a negative (i.e. unpleasant) affective state resulting from a potentially objectionable action or inaction by the self. Additionally, it is often accompanied by a preoccupation with the action/inaction as well as a pervasive desire to undo it (Baumeister, Stillwell, & Heatherton, 1994; Tangney, 1995).

1.2.1 Contexts and Causes

Guilt is generally seen as a social emotion that arises interpersonally, often in the context of shared values (Baumeister, 1998; Baumeister et al., 1994; Brooke, 1985; Millar & Tesser, 1988).

Furthermore, narrative data concerning guilt-inducing situations suggests that individuals feel guilty in social situations involving other-oriented empathic concern and connection (Baumeister et al., 1994; Tangney, 1992, 1995). Taken together, these data highlight the importance of interpersonal contexts in the induction of guilt feelings.

In addition to interpersonal contexts, the literature focuses primarily on two specific causes of guilt feelings. First, guilt arises in interpersonal situations in which harm, loss, and/or distress are inflicted on another individual (Baumeister et al., 1994). The second, and possibly more crucial cause, is a sense of blameworthiness for the action/inaction inflicted on the other individual (De Rivera, 1984; Lindsay-Hartz, 1984; McGraw, 1987; Shaver, 1985; Smith & Ellsworth, 1985; Tangney, 1991, 1992; Wicker, Payne, & Morgan, 1983). That is, a transgression against another individual alone is not enough to induce guilt feelings in an individual. One must also consider the impact of the transgression on the other individual within the interpersonal context. Narrative studies examining first-person accounts of guilt-inducing situations find that moral transgressions provide a strong component for the induction of guilt feelings in participants (Baumeister et al., 1994; Berndsen, Pligt, Doosje, & Manstead, 2004; Ferguson, 1997; McGraw, 1987; Tangney, 1992).

In addition to interpersonal transgressions as a cause of guilt feelings in individuals, it has also been suggested that mere positive inequity can also bring about feelings of guilt (Baumeister et al., 1994). That is, if one feels over-rewarded in an interpersonal context, guilt feelings may arise because 1) the individual feels as though they received more than they deserved, or 2) the individual feels as though their reward was at another individual's expense.

The suggestion of guilt stemming from feelings of positive inequity comes from narrative studies (Baumeister et al., 1994) as well as studies of imagined scenarios (Austin, McGinn, & Susmilch, 1980; Hassebrauck, 1986).

1.2.2 Consequences

A widespread consensus exists in the literature concerning the consequences of guilt feelings. It is generally agreed that while guilt feelings are caused by transgressions, the moral, self-conscious feeling of guilt motivates individuals to strengthen and reaffirm social relationships by engaging in reparative behaviors (Baumeister et al., 1994; Brock, 1969; Carlsmith & Gross, 1969; Devine & Monteith, 1993; Freedman, Wallington, & Bless, 1967; Higgins, 1987; Lewis, 1993; Regan, Williams, & Sparling, 1972; Tangney, 1992, 1995; Tangney & Dearing, 2002; Tangney, Miller, Flicker, & Barlow, 1996). Such reparative behaviors may include confession, apology, rectifying personal inequities, and/or helping behaviors.

Data from field experiments and phenomenological studies have shown that individuals who feel guilty are more likely to engage in helping behaviors than those who do not (Cunningham, Steinberg, & Grev, 1980; Darlington & Macker, 1966; Isen & Levin, 1972; Konecni, 1972; Lindsay-Hartz, 1984; Wicker et al., 1983). Field experiments typically place participants in a situation in which they have an opportunity to help another individual after engaging in a guilt induction procedure. These situations included such altruistic acts as helping a confederate pick up dropped papers (Cunningham et al., 1980; Isen & Levin, 1972; Konecni, 1972) or groceries (Regan et al., 1972), as well as agreeing to donate blood (Darlington &

Macker, 1966). Results of each of these studies demonstrate an increased frequency of helping behaviors in those participants who were engaged in guilt manipulations.

Similarly, empirical studies suggest that individuals who feel guilty are more agreeable to requests for altruistic deeds or compliance with research studies (Carlsmith & Gross, 1969; Freedman et al., 1967; Harris, Benson, & Hall, 1975; McMillen, 1976; Zemack-Rugar, Bettman, & Fitzsimons, 2007). Harris, Benson, and Hall (1975) observed men and women entering (guilty) and leaving (non-guilty) a catholic church during confession hours, recording the number of people donating and amount of each donation to the March of Dimes collectors. It was generally found that the number of donations were greater for those individuals entering the church as compared to those leaving the church.

Carlsmith and Gross (1969) induced guilt by having subjects administer electric shocks to a confederate. Following this procedure, participants were asked by a confederate to help recruit potential signers of a petition to save trees. In comparison to control and sympathy induction conditions, participants engaged in the guilt induction were more likely to comply with this request.

A similar study conducted by Freedman, Wallington, and Bless (1967) induced guilt feelings in participants by placing them in a situation in which they were likely to lie to the experimenter. It was found that those participants engaged in the guilt induction procedure were more likely to help a graduate student run a public opinions survey. Interestingly, an additional experiment found that the effect of the guilt induction occurs primarily when the

participant is not acting towards the person with whom the participant feels guilty (Freedman et al., 1967).

Consistent results were found by McMillan (1976) in a study using a similar guilt induction procedure. This study found that those participants who lied were more likely to help the experimenter circulate petitions. Another study using the same guilt induction procedure found increase compliance in helping to score tests among those who felt guilty.

Finally, Zemack-Rugar, Bettman, and Fitzsimons (2007) investigated the effects of nonconsciously primed emotions (i.e. guilt and sadness) on helping behaviors. It was found that those participants with nonconsciously primed guilt were more likely to agree to give charitable donations. These findings suggest that guilty individuals engage in more helping behaviors than sad individuals, even when these feeling aren't accessible to conscious awareness.

Phenomenological studies examining first-hand descriptions of guilt-induced situations suggest similarly altruistic behaviors. Reports examined by Wicker Payne, and Morgan (1983) as well as Lindsay-Hartz (1984) suggest that positive reparative actions are common in guilt-induced situations.

One significant limitation of these field and phenomenological studies is that they all involve face-to-face interactions with potential recipients of altruistic behaviors. With such designs, it remains impossible to distinguish whether these altruistic acts were a result of 1) guilt feelings (as suggested), 2) the chance for future reciprocity, or 3) effects of participant reputation. In exception, several studies have utilized methods from economic game theory in order to measure the effects of guilt and empathy. The use of economic games yields potential

methodological advantages to field and phenomenological studies. These methods have the potential to isolate the effects of guilt feelings by controlling for the effects of reputation by making interactions anonymous as well as controlling for the effects of reciprocity by specifying one-shot (non-iterated) games.

One study that controlled for effects of participant reputation was conducted by Ketelaar and Au (2003). These investigators induced feelings of guilt to a subset of participants between rounds of a repeated social bargaining game (i.e. the iterated Prisoner's Dilemma). It was found that those participants with induced feelings of guilt cooperated at higher levels than those participants in control conditions. Furthermore, it was found that those participants who were uncooperative in initial rounds of the social bargaining game tended to show the largest effects of guilt manipulations in later rounds. Although these results suggest that feelings of guilt motivate cooperative behavior, because this game was iterated, it remains unclear whether participants behaved altruistically as a result of guilt feelings or chance of reciprocity.

The effects of emotion induction were successfully isolated by controlling for both reputation and reciprocity in an investigation of the empathy-altruism hypothesis conducted by Batson and Moran (1999). The empathy-altruism hypothesis (see Batson, 1991) states that in order to avoid feelings of guilt, an individual who feels empathy for another is altruistically motivated to increase the other's welfare. Empirical studies inducing empathy have generally supported this hypothesis in the context of varying economic games. In a study testing the effects of induced empathy on allocations in a public-goods social dilemma conducted by

Batson and colleagues (Batson et al., 1995), it was found that as empathy increased for an individual, so did the allocations given to that individual. Also consistent with the empathy-altruism hypothesis, a more recent study showed that induced empathy was related to increased rates of cooperation in a one-shot Prisoner's Dilemma game (Batson & Moran, 1999). This study, controlling for the effects of reciprocity (by implementing a one-shot social dilemma) as well as reputation (participants remained anonymous), provides the best evidence that emotions can influence altruistic behavior.

However, even in light of this study it still remains unclear whether guilt (as opposed to empathy as avoidance of guilt) will result in similar altruistic effects. In order to test this notion, a guilt induction (rather than an empathy induction) procedure would need to be conducted prior to an anonymous, one-shot social dilemma which similarly controls for the effects of reputation and reciprocity, respectively.

Interestingly, along with the widespread empirical evidence suggesting that guilt involves such approach-oriented behaviors such as reparation and confession of transgressions, there exists some evidence suggesting that guilt (at least in some specified contexts) may also motivate avoidance behaviors. For example, in a previously mentioned study by Freedman, Wallington, and Bless (Freedman et al., 1967), it was found that although all 3 experiments showed that participants engaged in guilt manipulations complied more than controls, guilty participants complied more frequently when the requests did not involve interacting with the victim. Based on these results, it has been suggested that facing the victim provides a guilt cue (i.e. an aversive state) that participants seek to avoid (Baumeister et al., 1994).

In addition to these findings, it has also been suggested that individuals feeling guilt are reluctant to share these feelings with others. In a study conducted by Notarius, Wemple, Ingraham, Burns, and Kollar (1982) examining the responses of guilty participants towards irate and unpleasant accusers, it was found that increased guilt was associated with lack of facial expressiveness. These results dovetail nicely with Baumeister et al.'s (1994) suggestion that interactions with accusers act as guilt cues that individuals seek to avoid.

These two studies highlight the idea that guilt feelings induce a conflict between approach and avoidance behaviors. Their results suggest that although guilty individuals are highly motivated to repair transgressions, they seek to do so without further induction of guilt feelings, primarily by avoiding further contact with the victims of their transgressions.

Taken together, these works yield a great amount of information regarding guilt feelings including context, causes, and consequences. While some studies show that guilt can lead to avoidance behavior (Freedman et al., 1967; Notarius et al., 1982), in most cases when future contact is unavoidable, studies show a clear prosocial and altruistic effect. Although these works suggest that guilt feelings increase altruistic behaviors, there does not exist empirical evidence of increased altruistic behavior of guilt-feeling individuals in situations that 1) do not involve kin, 2) allow no chance for future reciprocity, and 3) have no effect on reputation. For example, many of the field studies finding positive associations between guilt induction procedures and altruistic acts required that the participant meet the potential recipient face-to-face (e.g. Cunningham et al., 1980; Darlington & Macker, 1966; Isen & Levin, 1972; Konecni, 1972; Lindsay-Hartz, 1984; Wicker et al., 1983). In such studies, it is impossible to distinguish

whether these altruistic acts were due to 1) guilt manipulation procedures or 2) the effects possible future reciprocity and or reputation. Without such empirical evidence, the altruistic effects found in previous studies cannot be solely attributed to guilt feelings.

The only study that has measured the effects of emotion in an anonymous, one-shot social situation was that conducted by Batson and Moran (1999). This study differs from the proposed study in that empathy was manipulated rather than guilt. As previously mentioned, the empathy-altruism hypothesis states that increased empathy results in an increased motivation to avoid feelings of guilt. Thus, Batson and Moran (Batson & Moran, 1999) used a more indirect investigation of guilt than that of the proposed study.

To independently test the effects of guilt on altruistic behavior, participants engaged in guilt manipulations would need to be measured in situations with unrelated partners, controlling for the effects of reciprocity and reputation. That is, the effects of guilt manipulations would need to be measured in anonymous, one-shot (i.e. non-iterated) social situations. Accordingly, the proposed study will use an anonymous, double-blind variation of the one-shot Prisoner's Dilemma on participants engaged in a guilt manipulation task. Findings will advance the literature by measuring the association between guilt feelings and altruistic behavior in a situation that does not include additional variables known to increase altruistic behavior.

The proposed study will have implications for the conceptual understanding of the putative altruistic and prosocial effects of emotions on behavior. The current literature on guilt focuses primarily on its relationship enhancing functions. Erroneous attributions of guilt

feelings to such functions could have great implications for research on emotion, emotion and behavior regulation , and close relationships (Baumeister et al., 1994). The proposed study aims to investigate the true, independent effects of guilt in a potentially altruistic social situation. Such work may potentially aid in finding a place for altruism among current conceptualizations of social behavior.

1.3 EXPERIMENTAL INDUCTION OF AFFECTIVE STATE

Psychologists interested in emotion have used a variety of methods to vary the affective states of participants in order to measure their behavioral effects. These include quasi-experimental methods such as 1) classification based on current affective state as assessed prior to examination, 2) the comparison of non-clinical participants with clinically diagnosed patients, and 3) the use of naturally occurring emotions based on environmental events (Gerrards-Hesse, Spies, & Hesse, 1994). One limitation to these methods is the inability to standardize variables across participants.

In contrast to quasi-experimental procedures, the experimental induction of emotion manipulates affective state as an independent variable. Gerrards-Hesse et al. (1994) have classified 5 groups of experimental induction procedures based on both stimulus and purpose of affective induction. These include affective inductions based on the 1) mental generation of affective states, 2) mental generation of affective states with the instruction to re-experience the emotional state, 3) presentation of affective stimuli, 4) presentation of need-related emotional situations, and 5) generation of affectively relevant physiological states.

Past research suggests that experimental affective inductions based on the guided mental generation of emotional state such as the Autobiographical Recollections Method (ARM) have been particularly effective (Goodwin & Williams, 1982). This method instructs participants to recall salient past events pertaining to specific affective states, often times with the further instruction to relive the experience by writing a narrative transcription. Brewer and colleagues (Brewer, Daughtie, & Lubin, 1980) conducted a study comparing the effectiveness of the ARM with control conditions including the well validated Velten mood induction procedure (Velten, 1968). It was found that the ARM was more effective in producing negative moods as measured by the Depression Adjective Check List (Lubin, 1981), and the Beck Depression Inventory (Beck, Steer, & Farbin, 1988).

Another advantage of the ARM is that in addition to general inductions of negative moods, it has been used to successfully induce several other specific affective states. For example, Ketelaar and Au (2003) used the ARM involving writing a detailed description of an event to induce feelings of guilt in participants. A similar variation of the ARM was used by Lerner and Keltner (Lerner & Keltner, 2001), to reliably induce feelings of fear and anger in participants.

1.4 AFFECT AS INFORMATION

It is interesting to note that although mood induction procedures such as the ARM are often induced with reference to previous experiences, the effects of these induced emotions effect current external situations within the laboratory. That is, recollections of past affective states produce current effective states which, in turn, influence present conditions. Originally

presented by Schwartz and Clore (1983b), the affect as information model was developed to explain the tendency of individuals to (mis)attribute negative affective states to external sources regarding motivations and behaviors. More specifically, this model states that because negative affective states are so overwhelmingly salient and aversive, they may serve as 'stand ins' for current situations (T. Ketelaar & W. T. Au, 2003; Ketelaar & Todd, 2001; Tooby & Cosmides, 1990). This interpretation explains the effects of seemingly irrelevant affective induction procedures on current motivations and behaviors which are widely shown in the affective literature (e.g. T. Ketelaar & W. T. Au, 2003; Lerner & Keltner, 2001; Schwarz & Clore, 1983b).

1.5 TWO-PERSON, TWO STRATEGY (2 x 2) MATRIX GAMES

In order to examine the social functions of guilt, it is imperative to engage participants in a situation with the particular causes and consequences associated with guilt. The various two-person, two-strategy matrix games provide precise and simple models of social dilemmas in which emotions play a role in decision making processes. It has been posited that several of these games (and analogues of these games) represent the specific problems that emotions function to solve (Gibbard, 1990; R. Nesse, 1999; R. M. Nesse, 1990; Trivers, 1971).

To this end, two-person, two-strategy games have been widely used in the literature to tap into the functions of a variety of emotions (e.g. Batson & Moran, 1999; T. Ketelaar & W. T. Au, 2003; Trivers, 1971) and even emotion related disorders (see Colman & Wilson, 1997). Exactly 78 of such games exist, 12 of which are ordinally distinct, symmetric 2 x 2 games (Rapoport & Guyer, 1966). Of these 12 games, 4 unique archetypal 2 x 2 games remain: The

Prisoner's Dilemma (Luce & Raiffa, 1957), Chicken (or Hawk/Dove) (Maynard-Smith, 1982; Russell, 1959), Leader (Rapoport, 1967a), and Hero (Luce & Raiffa, 1957) games.

The preferences for the 4 games range from 1 (least preferred outcome) to 4 (most preferred outcome). One player chooses a row (representing either cooperation or defection) while the other player simultaneously chooses a column (representing either cooperation or defection).¹ Which one of the four possible outcomes shown in each matrix is contingent upon both players' choices. If both players cooperate, they both get R, the reward for mutual cooperation. If one player cooperates but the other defects, the cooperating player gets S, suckers payoff, while the defecting player gets T, temptation to defect. If both defect, both get P, punishment for mutual defection. The crucial distinction between these games lies primarily in the relationships between these four possible outcomes.

1.5.1 The Prisoner's Dilemma

The prisoner's dilemma is named after the anecdote that was originally used to illustrate it (see Table 1.1). In this scenario, two prisoners are held in separate cells after having been arrested for a major crime that they are guilty of committing. The prosecutor has only enough evidence to convict them of a minor offense, for which the punishment is 1 year in jail. Each prisoner is then given the choice of confessing or remaining silent. If one confesses (defects) while the other remains silent (cooperates), the confessor will be released without imprisonment, while the other is sentenced to 20 years in prison. If both confess, the two prisoner's get an

¹ It has been argued that the terms *cooperation* and *defection* are not applicable to all economic games (see Brosig & Colman, 2004). Thus, following other works, in the description of these economic games, the current proposal defines cooperation as a strategic choice maximizing joint gain and defection as a strategic choice maximizing individual gain (Guyer & Rapoport, 1974).

intermediate sentence of 5 years in jail. Each makes a choice without knowing what the other prisoner will choose. The outcome of what will happen to both prisoners is jointly dependent on the decisions of each. The dilemma arises because no matter what the other prisoner does, the best action is to confess. If Prisoner A confesses and Prisoner B also confesses, Prisoner A gets 5 years in jail (as opposed to 20 years in jail if Player A remained silent). If Prisoner A confesses and Prisoner B remains silent, Prisoner A gets 0 years in jail (as opposed to 1 year in jail if Prisoner A remained silent).

Table 1.1: The Prisoner's Dilemma

		Prisoner A	
		CONFESS	REMAIN SILENT
Prisoner B	CONFESS	5 years for each	0 years for B, 20 years for A
	REMAIN SILENT	20 years for A, 0 years for B	1 year for each

The formal Prisoner's Dilemma requires that the preference for the four possible outcomes be $T > R > P > S$. The Prisoner's Dilemma also assumes that the players cannot get out of the dilemma by forming another cooperative venture, namely taking turns exploiting one another. This second condition will be satisfied as long as $2R > S + T$. These two criteria define the formal Prisoner's Dilemma (Axelrod, 1984).

1.5.2 Strategies

Defection is the dominant strategy in the one-shot Prisoner's Dilemma game making mutual defection a dominant-strategy equilibrium (Lipman, 1986). This is a result of the fact that each

player will receive a larger payoff by defecting regardless of whether their partner chooses to cooperate or defect in return. This is not true in one-shot Chicken, Leader, and Hero games, which have no single dominant strategy. In each of these games there exist two Nash equilibria, namely, Player A defecting while Player B cooperates, and vice versa.

One advantage of two-person, two-strategy matrix games in the study of emotions on altruism decision making is that they provide a method of measuring the effects of mood on decision making without communication. Although this aspect limits the ecological validity of the proposed study, it allows for the isolation of mood effects, controlling for the possible influences of factors inherent to communication, such as speech, prosody, and facial expression. In other words, this permits a focus on the influences of the internal affective dimension of an emotional experience rather than the social signaling dimension. While each dimension is potentially of great interest, the focus here is to test hypotheses aimed specifically at the internal feeling state as likely to influence decision making. Additionally, this approach allows for anonymous participation. This is imperative for the proposed study, as it allows for the investigation of cooperation without having to account for the effects of reputation.

Of the four archetypal 2 x 2 games, the proposed study requires a game with specific properties. The use of the one-shot Prisoner's Dilemma game has several conceptual and methodological advantages. Most importantly, it presents participants with a non-zero sum situation, ideal for the measurement of decision making. Second, one Nash equilibria exists for the Prisoner's Dilemma game (unlike the Chicken, Leader, and Hero games); defection. Thus, participants' decisions can be attributed solely on mood, rather than the anticipation of a

particular response by their partner. Third, decisions in the Prisoner's Dilemma game are highly relevant to the social emotion of guilt. This is in contrast to the Chicken game, for example, which involves each player attempting to prevail over the other by instilling fear (Rapoport, 1964; Snyder, 1971).

1.6 VARIABLES EFFECTING COOPERATION RATES IN THE PRISONER'S DILEMMA

1.6.1 Payoff Matrix

Previous research has shown that the rate of cooperation observed in the iterated Prisoner's Dilemma increases/decreases as a function of the payoff structure specified in the game (Sally, 1995). Numerous indices of cooperation have been presented within the literature (Bonacich, Shure, Kahan, & Meeker, 1976; Komorita, Sweeney, & Kravitz, 1980; Rapoport, 1967b; Rapoport & Chammah, 1965a). Experimental findings from these studies generally suggest that 1) cooperation rates increase as R and S increase and 2) cooperation rates decrease as T and P increase (see Table 1.2). For example, Rapoport and Chammah (1965a) created seven variants of the Prisoner's Dilemma by manipulating payoff matrices. The expected cooperation rates of these variants were then calculated based on interval ratios. It was found that one such interval ratio: $r = (R - P)/(T - S)$ produced expected cooperation rates associated with experimental data. These ranged from an average 26.8% cooperation rate for an r of 1/50 to an average cooperation rate of 72.3 for an r of 1/2. Other indices of payoff matrices have also been shown to be greatly associated with cooperation rates (see Bonacich et al., 1976).

Table 1.2 The Formal Prisoner's Dilemma

		Prisoner A	
		CONFESS	REMAIN SILENT
Prisoner B	CONFESS	R=3, R=3 Reward for mutual cooperation	S=0, T=5 Sucker's payoff, and temptation to defect
	REMAIN SILENT	T=5, S=0 Temptation to defect and sucker's payoff	P=1, P=1 Punishment for mutual defection

1.6.2 Group Size (2-Person and N-Person Games)

Empirical studies investigating the relationship between group size and rate of cooperation in N-person ($N > 2$) Prisoner Dilemma games have universally found that as the size of the group increases, the rate of cooperation decreases (R. M. Dawes, 1980). It should be noted, however, that several studies have compared cooperation rates of N-person games which varied in other potentially confounding ways (e.g. payoff structure). For example, Marwell and Schmitt (1972) found lesser rates of cooperation in 3-person Prisoner Dilemma games than 2-person Prisoner Dilemma games, though with unequated payoff structures. Similar studies have shown lower rates of cooperation in 3- and 6-person Prisoner Dilemma games than in comparable 2-person Prisoner Dilemma games (Bixenstine, Levitt, & Wilson, 1966; Rapoport & Chammah, 1965a).

The clearest evidence of the independent effect of group size on rate of cooperation was shown by Bonacich and colleagues (Bonacich et al., 1976). Data from a comparison within a larger study examined cooperation rates in 3-, 6-, and 9-person Prisoner Dilemma games with

equated payoff structures. Consistent with other experimental results, it was found that the rate of cooperation decreased as group size increased. One possible interpretation of these results is that the temptation to defect should increase in relation to group size because the harm from defection would be diffused among a greater number of individuals (see R. M. Dawes, 1980). Such interpretations have obvious societal implications.

1.6.3 Communication

Several studies have demonstrated that economic games allowing various forms of communication substantially increase rates of cooperation in comparison to games allowing little or no communication (Bixenstine et al., 1966; Brechner, 1977; R. Dawes, 1980; Edney & Harper, 1978, 1979; Jerdee & Rosen, 1974; Rapoport, Chammah, Dwyer, & Gyr, 1962). This finding has been particularly noted by Dawes and colleagues (Dawes, McTavish, & Shaklee, 1977) as well as Loomis (1959).

Dawes et al. (1977) compared rates of cooperation among 4 groups: 1) those that could not communicate, 2) those permitted to communicate only about topics irrelevant to the game, 3) those permitted to communicate about topics relevant to the game without declaring intentions, and 4) those permitted to communicate about topics relevant to the game as well as declare intended decisions. Results showed that as the level of communication increased, so did the level of cooperation, eliciting cooperation rates of 30%, 32%, 72%, and 71% respectively for each of the 4 groups. Significant differences between groups 2 and 3 suggest that relevant communication greatly enhances the rate of cooperation. Interestingly, results also suggest that the ability to declare intentions does not contribute beyond this. Consistent with these

results, Loomis (1959) found higher rates of cooperation in groups permitted to exchange notes with prewritten promises of cooperation in comparison to groups not given permission to exchange notes.

1.6.4 Anonymity

Due to the influences of reputation and social desirability, it has generally been hypothesized that those individuals whose identity is public in economic games will cooperate at higher rates than those whose identity remains anonymous or private. This hypothesis was tested directly by Fox and Guyer (1978). This study engaged participants in one of two conditions of a 4-person, iterated Prisoner's Dilemma game. In the first condition, labeled *public choice*, participants were introduced to each other prior to the experiment, were able to see each other during the experiment, and were informed of each other's choices after each trial. In the second condition, labeled *anonymous choice*, subjects had no introduction, were unable to see each other during the course of the experiment, and were not informed of each other's choices after each trial. Results showed that, on average, participants in the public choice condition cooperated at a 12% higher rate in comparison to those in the *anonymous choice* condition. Similar effects of anonymity have been found by Bixenstine et al. (1966) and Jerdee and Rosen (1974).

1.6.5 Sex

Several studies have examined data from economic games regarding sex differences. One of the most straightforward of these investigations was conducted by Rapoport and Chammah (1965b). This study compared the rates of cooperation in the iterated Prisoner's Dilemma with

varied payoff structures between groups comprised of only men, only women, and both men and women. The most striking group differences were between cooperation rates of groups comprised of two men and groups comprised of two women, which were 59% and 34% respectively. Cooperation rates in the mixed groups were around 50%. These results suggest that in iterated PD games, men cooperate with same sex partners at higher rates than women cooperate with same sex partners.

1.6.6 Repetition (On-shot, Finitely Repeated and Infinitely Repeated Games)

Specific predictions in the areas of game theory (see Axelrod, 1984) and behavioral ecology (see Trivers, 1971) state that rates of cooperation will be greater in situation of infinitely repeated interactions than in one-shot (single trial) interactions. These predictions are based on the notion that the opportunity to punish defectors and reward cooperators decreases the temptation to defect in early interactions. These prediction have been supported convincingly by the success of “tit for tat” strategies in repeated social interactions (Axelrod, 1984; Axelrod & Hamilton, 1981).

These predictions change dramatically when the number of interactions is specified (i.e. in finitely repeated interactions). As noted by Luce and Raiffa (1957) and others (e.g. Axelrod, 1984), if the last trial of a repeated set of interactions is known, defection becomes the dominant strategy in that final interaction (as there is no chance for retribution in subsequent interactions). Once it is recognized by players that a defective response is virtually assured on the last trial, the second to last trial becomes, strategically, the last trial then the third to last,

and fourth to last, etc. This notion of backward induction results in an equilibrium in which all trials elicit defection in all players.

The experimental research only partially supports these specific predictions. Studies by Murnighan and Roth (Murnighan & Roth, 1983; Roth & Murnighan, 1978) manipulated the probability that a repeated Prisoner's Dilemma interaction would continue in order to examine changes in rates of cooperation. Results from these studies found that the probability of continuing (set at .895, .5, or .105) interacted with game payoff structures to affect the rate of cooperation, with higher probabilities resulting in greater rates of cooperation. A similar association between repetition and rate of cooperation was found by Gallo and McClintock (Gallo & McClintock, 1965).

Contrary to these results, a review conducted by Kreps and colleagues (Kreps, Milgrom, Roberts, & Wilson, 1982) found that rates of cooperation decreased as the number of trials increased. Similarly, a meta-analysis conducted by Sally (1995) found lower cooperation rates in repeated games in comparison to one-shot games. Additional analyses related to the payoff structure of the repeated games included within the meta-analysis led the author to suggest that the temptation to defect may be balanced by the continuous influence of positive reward as well as the group loss of the benefits of mutual cooperation.

1.6.7 Expectations of Other's Behavior

Several studies have collected data pertaining to participants' expectations of partners' behavior (e.g. Dawes et al., 1977; Frank et al., 1993; Kelley & Stahelski, 1970; Messe & Sivacek, 1979). Because these data are often collected after engagement in the economic game, it has

been argued that they have little bearing on the effect of these expectations on one's own behavior (Acevedo & Krueger, 2005).

One study, conducted by Acevedo and Krueger (2005), engaged participants in multiple rounds of the Prisoner's Dilemma against a computerized opponent. The probability of reciprocity was manipulated in several conditions ranging from .5 (a lack of reciprocity) to 1.0 (complete reciprocity). The authors hypothesized that greater likelihoods of reciprocity would elicit higher rates of cooperation. Indeed, the results showed that the rate of cooperation increased monotonically with the probability of reciprocity, suggesting that individuals account for other's behavior when playing economic games when this information is available.

1.7 AIMS OF THE CURRENT STUDY

The aim of the proposed study is to examine the ways in which a specific social emotion (i.e. guilt) influences altruistic behavior in anonymous, one-shot social dilemmas. More specifically, the proposed study will examine rates of cooperation in the one-shot Prisoner's Dilemma game in women after engaging participants in a guilt mood induction procedure. These cooperation rates will then be compared to those given a neutral mood induction procedure. The current study will include only women as they provide a more convenient sample and, based on past research, tend to cooperate less frequently with one another than male-male or male-female dyads. Additionally, participants will be asked to predict their partner's behavior prior to deciding whether or not to cooperate with their partner. Stemming from works suggesting that the function of guilt is to motivate individuals to repair violations of moral rules, it is

hypothesized that those individuals engaged in the guilt induction procedure will cooperate at higher levels than those participants engaged in neutral mood induction procedures.

If it is found that individuals engaged in a guilt induction procedure behave altruistically at greater rates than those engaged in a neutral mood induction procedure, it would suggest that subjective feelings of guilt increase altruistic behavior. Alternatively, if it is found that the rates of cooperation are similar between groups, it would suggest that subjective feelings of guilt and anger have little effect on cooperative behavior in anonymous, one-shot social situations.

2.0 METHODS

2.1 DESIGN AND OVERVIEW

The current study used a posttest-only control group design. There was a single, between-subjects variable (Group) with two levels (Guilty and Control) as well as a within-subjects variable (Time) with three levels.

2.2 PARTICIPANTS

Participants were 120 female undergraduates enrolled at a large university who participated in partial fulfillment of requirements for their Introductory Psychology course. Mean age was 18.55 years ($SD = .860$). The majority of participants were Caucasian (80.8%), with the remainder describing themselves as Asian (11.7%), African American (5.8%), biracial (.8%), and other (.8%). There were no group differences regarding age or race (all p 's $> .10$).

2.3 MEASURES

2.3.1 Visual Analogue Scale (VAS)

Participants were instructed to rate the intensity of 6 subjective emotions (Guilty, Happy, Sad, Angry, Disgusted, and Fearful) by marking an *X* on a VAS measuring 3.5 inches from center to each of two endpoints (*Not at all* to *Extremely*) representing how strongly they felt each emotion at that very moment. The visual analogue scale was scored from 0 to 7, with 0 being indicative of the minimum amount of subjective emotion and 7 being indicative of the maximum amount of subjective emotion. A score of 3.5 occurred at the midway point. These subjective emotion ratings were taken at three specific time points: 1) prior to engaging in the mood induction procedure (see below), 2) directly following the mood induction procedure, and 3) following the Prisoner's Dilemma Interaction.

2.4 MOOD INDUCTION

After providing initial ratings of subjective emotion, participants were instructed to write a detailed description of an event for a period of 10 minutes. In addition to this written description, participants were specifically instructed to allow themselves to take on the feelings that were present at that time during the mood induction procedure.

Participants were randomly assigned to one of two conditions: guilt and neutral. Those participants assigned to the guilt condition (experimental) were instructed to write a detailed description of a recent event that made them feel guilty, ashamed, or self-blaming [this guilt induction procedure was used by Ketelaar and Au (2003) and adapted from Schwarz and Clore

(1983a)] (See Appendix B). Those participants assigned to the neutral condition (control) were instructed to write a detailed description of a typical school day (See Appendix A).

2.5 PRISONER’S DILEMMA INTERACTION

Completion of the Prisoner’s Dilemma Interaction consisted of three separate questions asked of each participant. The first question required each participant to predict the decision that their partner would make; either to cooperate or to defect. The second question required each participant to rate how confident they were in this prediction on a 7-point, likert-type scale. Finally, each participant was required to state their decision; either to cooperate or defect with their partner.

It was hypothesized that those participants given the guilt induction procedure would cooperate at higher rate than those participants given the neutral induction. To minimize ceiling effects in the comparison between guilt and neutral inductions, a payoff matrix intended to elicit low rates of cooperation was chosen (See Table 3). This payoff matrix produced cooperation rates of 45.8% in iterated games conducted by Rapoport and Chammah (1965).

Table 2.3 Monetary Payoff Structure for the Prisoner’s Dilemma

		Prisoner A	
		CONFESS	REMAIN SILENT
Prisoner B	CONFESS	\$4.00 Player A, \$4.00 Player B	\$1.00 Player A, \$6.00 Player B
	REMAIN SILENT	\$6.00 Player A, \$1.00 Player B	\$3.50 Player A, \$3.50 Player B

The total payoff given to participants consisted of 1) game earnings from the Prisoner's Dilemma interaction, as well as 2) a random amount of money generated by the computer. (Participants were not informed of the upper and lower limits of this random amount of money, but were told that it could be positive or negative.) The purpose of this random sum of money was to ensure that each participant's response remained anonymous to the experimenter. The experimenter was only aware of the total payoff of each participant (in order to allocate earnings). Thus, it was impossible for the experimenter to infer each participant's behavior based solely on their total payoff.

2.6 PROCEDURE

Upon arrival to the study, each participant was seated in a separate room and given a consent form to review and an initial set of subjective emotion ratings. Following the completion of the consent form, two questionnaires and subjective emotion ratings, the principle investigator gave each participant a detailed briefing of the one-shot Prisoner's Dilemma game to be played with their partner. This detailed briefing included a description of 1) the decisions that each participant as well as their partner would be asked to make (i.e. to cooperate or defect), 2) the specific monetary payoffs resulting each possible outcome from the Prisoner's Dilemma, and 3) a description and justification of the random number of dollars given to each participant. During this time, and throughout the experiment, efforts were made to ensure that participants were never to come face to face with one another.

Once the Prisoner's Dilemma game had been described to both participants, each was given the mood induction procedure. Participants were instructed to read the directions

carefully prior to writing their responses. Additionally, participants were asked to remain focused on the personal event even if they were to finish the written response prior to the end of the 10 minute segment. Participants were given the second set of subjective emotion ratings directly following the mood induction procedure.

Participants were then seated, one directly following the other, to answer the three questions (see above) pertaining to the Prisoner's Dilemma game. Directly after finishing the game, both participants were given a third and final set of subjective emotion ratings. Finally, each participant was given a total payoff consisting of game earnings and the random sum as well as a debriefing sheet explaining the aims of the study.

3.0 RESULTS

3.1 PRELIMINARY RESULTS

Descriptive data regarding subjective emotion ratings by group can be found on Table 3.1 (See Figures 1, 2, 3, 4, and 5 for graphical representations of subjective guilt, happiness, anger, sadness, and disgust feelings, respectively). Subjective emotion ratings at three time points were independently analyzed for both Guilt and Happiness using mixed repeated-measures ANOVA's with experimental condition (Control or Guilt) as a between-subjects factor. Each used an alpha level of 0.05. (Ratings of Sadness, Anger, Disgust, and Fear were highly correlated with ratings of Guilt and thus were not included in further preliminary analyses).

Table 3.1 Subjective Emotion Ratings by Group and Time

Group	<u>Time 1</u>		<u>Time 2</u>		<u>Time 3</u>		<u>Total</u>
	M	SD	M	SD	M	SD	M
Guilty							
Control	0.84a	1.24	0.74a	1.02	1.15a	1.35	0.91
Experimental	0.83a	1.15	3.52b	1.68	2.12c	1.68	2.16
Happy							
Control	3.97a	1.07	3.73a	1.43	3.69a	1.43	3.80
Experimental	4.34a	1.11	2.77b	1.50	3.42c	1.40	3.51
Sad							
Control	1.50a	1.42	1.47a	1.43	1.35a	1.34	1.44
Experimental	1.31a	1.40	3.04b	1.77	1.82a	1.57	2.06
Angry							
Control	0.74a	1.19	1.03a	1.32	0.81a	0.93	0.86
Experimental	0.61a	0.86	2.44b	1.96	1.17c	1.45	1.41
Disgusted							
Control	0.62a	1.18	0.78a	1.20	0.83a	1.19	0.74
Experimental	0.33a	0.63	2.30b	2.06	1.29c	1.62	1.31
Fearful							
Control	1.31a	1.62	0.85b	1.23	1.18a,b	1.28	1.11
Experimental	0.81a	1.17	1.28a,b	1.66	1.55b	1.84	1.21
Total							
Control	1.50	1.29	1.43	1.27	1.50	1.25	1.48
Experimental	1.37	1.05	2.56	1.77	1.90	1.59	1.94
Total	1.43	1.17	2.00	1.52	1.70	1.42	1.71

3.1.1 Guilt Ratings as a Function of Experimental Group

A significant main effect of experimental condition was found, $F(1, 106) = 31.544, p < .001$, suggesting that, averaged over time, those participants in the experimental condition reported more intense feelings of guilt than those in the control condition. A significant main effect of time was also found, $F(2, 212) = 41.728, p < .001$, suggesting that, averaged over experimental condition, participants reported significantly different intensities of subjective guilt feelings

over time. Post-hoc Bonferroni tests (at $p < .05$) were conducted to examine further the effect of time. These pairwise comparisons found that, averaged over experimental condition, subjective emotion ratings were different at all 3 time points. It was found that mean subjective emotion ratings at time 1 (0.840), time 2 (2.064), and time 3 (1.518) significantly differed from one another.

The interaction effect between the repeated measures factor time and experimental condition was also statistically significant, $F(2, 212) = 50.547, p < .001$. Similar to the main effect of time, post-hoc Bonferroni tests (at $p < .05$) were conducted to examine further this interaction.

Regarding participants in the control group, mean subjective guilt ratings did not differ at any two time points (all p 's $> .10$). The highest mean guilt ratings were found at time 3 (1.045) (which did not significantly differ from time 1 or time 2), followed by time 1 (.847) (which did not significantly differ from time 2 or time 3), followed by time 2 (.738) (which did not significantly differ between time 1 or time 3).

For participants within the experimental group, pairwise comparisons found that all mean subjective guilt ratings differed from one another (all p 's $< .001$). In contrast to those in the control group, the highest mean guilt ratings were found at time 2 (3.389), followed by time 3 (1.991), followed by time 1 (.833).

In summary of the effects of guilt on condition, it was found that subjective guilt ratings increased significantly between time 1 and time 2 only within the experimental group. No significant difference was found in guilt ratings between time 1 and time 2 within the control

group. This suggests that the guilt induction procedure was indeed successful in the induction of guilt feelings.

3.1.2 Happiness Ratings as a Function of Experimental Group

A significant main effect of experimental condition was not found $F(1, 107) = 1.286, p = .259$, suggesting that, averaged over time, participants in the control and experimental conditions reported subjective feelings of happiness similarly.

A significant main effect of time was found, $F(2, 214) = 34.478, p < .001$, suggesting that, averaged over experimental condition, participants reported significantly different intensities of subjective happiness feelings over time. Post-hoc Bonferroni tests (at $p < .05$) were conducted to examine further the effect of time. These pairwise comparisons found that, averaged over experimental condition, subjective emotion ratings were different at all 3 time points. It was found that mean subjective emotion ratings at time 1 (4.158), time 2 (3.328), and time 3 (3.614) significantly differed from one another.

The interaction effect between the repeated measures factor time and experimental condition was also statistically significant, $F(12, 214) = 17.255, p < .001$. Similarly to subjective guilt ratings, regarding participants in the control condition, mean subjective happiness ratings did not differ at any two time points (all p 's $> .10$). The highest mean happiness ratings were found at time 1 (3.975), followed by time 3 (3.765), followed by time 2 (3.741). Also similarly to subjective guilt ratings, regarding participants in the guilt condition, pairwise comparisons found that all mean subjective happiness ratings differed from one another (all p 's $< .001$). The

highest mean happiness ratings were found at time 1 (4.340), followed by time 3 (3.463), followed by time 2 (2.916).

In summary of the effects of happiness on condition, it was found that subjective happiness ratings decreased significantly between time 1 and time 2 only within the experimental group. No significant difference was found in guilt ratings between time 1 and time 2 within the control group.

3.2 PRIMARY ANALYSES

Preliminary analyses concerning subjective ratings of guilt and happiness as a function of experimental group suggest that the procedure for inducing guilt was indeed an effective experimental manipulation. With these findings, we were in good shape to test the primary hypothesis concerning group differences in rates of cooperation. As previously stated, it was hypothesized that those participants within the experimental (guilt) group would cooperate at higher rates than those participants in the control (neutral) group. Contrary to this hypothesis, a binary logistic regression model contrasting the rate of cooperation in the two conditions did not reveal a significant effect for group, $\chi^2(1, N = 109) = .081, p = .776$ (odds ratio = 1.115). Together with preliminary analyses suggesting the effective manipulation of emotion following the mood induction procedure, this finding suggests that guilt feelings do not increase an individual's propensity to cooperate with others in anonymous, one-shot situations.

In light of this primary analysis, it is possible that the effect of group would only be shown among those individuals in the experimental condition who reported high levels of guilt. In this, participants in the experimental group were divided by self-reported subjective guilt

ratings at Time 2 into two groups: 1) those with self-reported subjective guilt ratings greater than two standard deviations above the mean at Time 1 and 2) those with self-reported subjective guilt ratings lesser than two standard deviations above the mean at Time 1. A second binary logistic regression contrasting the rate of cooperation in the two conditions was conducted including only those participants in the guilt conditions with self-reported subjective guilt ratings at Time two greater than two standard deviations above the mean at Time 1. In contrast to the primary hypothesis, this analysis also did not reveal a significant effect for group, chi-square (1, N=92) = .740, $p = .390$ (odds ratio = .878).

Additionally, because the hypothesized action tendencies resulting from guilt (reaffirming social bonds) are potentially in contrast with those of anger (punishment), an additional logistic regression model was conducted including the predictors of group, anger (Time 2), and the group x anger (Time 2) interaction. Results of the analyses are shown in Table 3.2. Analyses suggested that group and the group x anger (Time 2) interaction were not significant. In contrast, anger (Time 2) significantly contributed to the model, suggesting that when controlled for group, subjective anger ratings at time 2 were predictive of cooperation rates.

Table 3.2 Binary Logistic Regression Analysis

Predictor	B	Wald chi-square	P	Odds Ratio
Group	-0.973	2.709	0.100	0.378
Anger (Time 2)	-0.348	4.708	0.030	0.706
Anger (Time 2) x Group	0.346	1.411	0.235	1.414

3.3 SECONDARY ANALYSES

As mentioned in the preliminary analyses, the guilt induction procedure not only resulted in significant changes in subjective guilt feelings, but also with each of the other measured emotions (happiness, anger, sadness, and disgust) aside from fear. Furthermore, these affects were significantly correlated with one another (See Table 5). Thus, two sets of secondary analyses were conducted. The first set analyzed the effects of subjective ratings of guilt happiness, anger, sadness, and disgust at Time 2 on cooperation using binary logistic regression analyses. These analyses were conducted for each emotion to examine effects of cooperation rates 1) among the entire sample, 2) within the experimental group, and 3) within the control group. The second set of analyses consisted of an exploratory factor analyses to determine if there were one or more underlying composite affective states that might be related to cooperation rates.

3.3.1 The Effect of Subjective Guilt on Cooperation Rate

Subjective guilt ratings were not associated with rates of cooperation among the entire sample, chi-square (1, N=109) = 2.109, $p = .146$ (odds ratio = .865), nor were they associated with cooperation within the control group, chi-square (1, N=109) = .808, $p = .369$ (odds ratio = .789). Surprisingly, within the experimental group, subjective guilt ratings were associated with increased rates of defection, chi-square (1, N=109) = 4.639, $p = .031$ (odds ratio = .694).

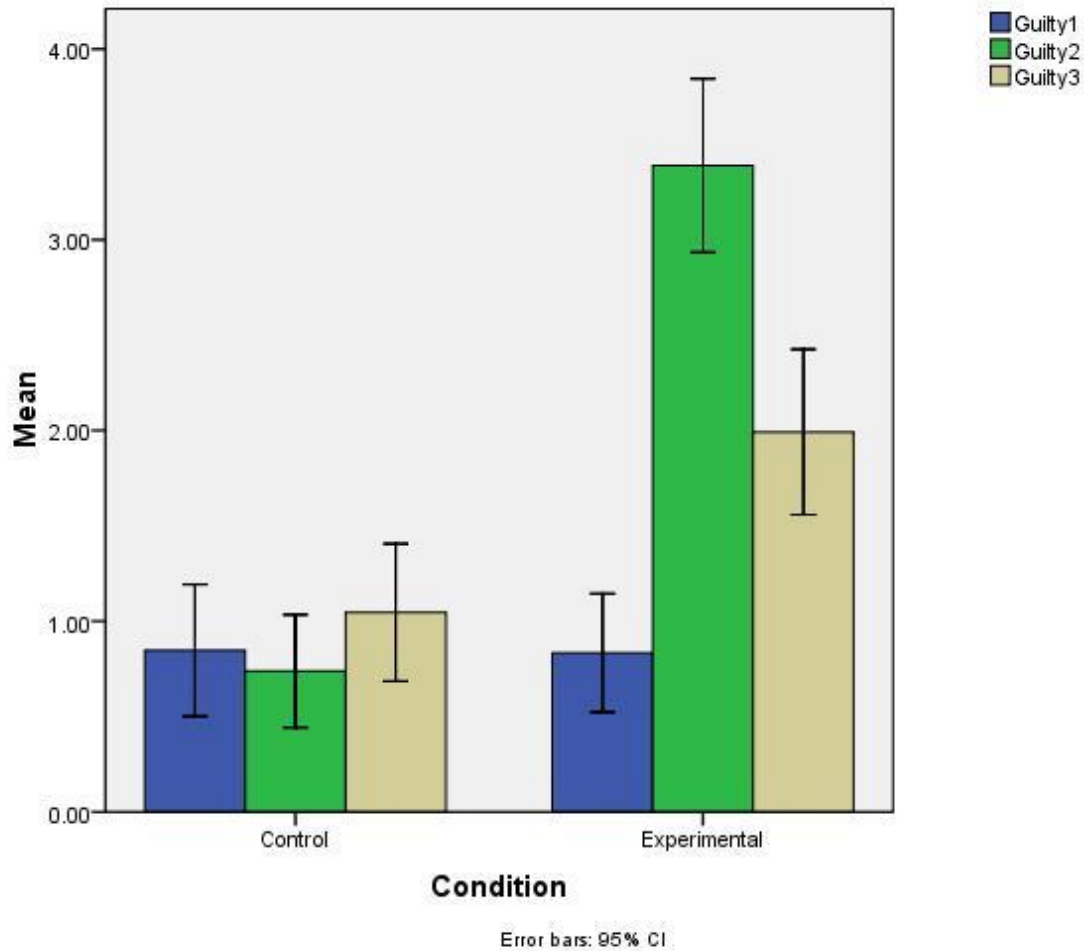


Figure 3.1: Subjective Guilt Ratings by Group and Time

3.3.2 The Effect of Subjective Happiness on Cooperation Rate

Among the entire sample, subjective happiness ratings were predictive of increase rates of cooperation, chi-square (1, N=109) = 5.174, $p = .023$ (odds ratio = 1.348). This effect was even stronger within the experimental group, chi-square (1, N=109) = 10.847, $p = .001$ (odds ratio = 2.020). In contrast, within the control group subjective happiness ratings were only moderately associated with rates of cooperation, chi-square (1, N=109) = .066, $p = .797$ (odds ratio = 1.051).

Table 3.3 Intercorrelations Among Independent and Dependent Variables

	Mean	SD	1	2	3	4	5	6	7	8	9
1 Guilt	2.07	1.94	-								
2 Happiness	3.35	1.51	**-.43	-							
3 Anger	1.61	1.69	**0.59	**-.53	-						
4 Sadness	2.12	1.74	**0.65	**-.63	**0.61	-					
5 Disgust	1.37	1.71	**0.60	**-.35	**0.59	**0.45	-				
6 Fear	1.00	1.37	**0.35	**-.30	**0.53	**0.41	**0.49	-			
7 Age	18.55	0.89	-0.08	-0.06	-0.02	0.03	0.06	-0.02	-		
8 Prediction of Partners' Choice	4.21	1.36	-0.01	0.12	-0.04	0.08	-0.03	-0.06	-0.04	-	
9 Choice	0.51	0.50	-0.14	*0.27	-0.15	-0.08	-0.04	-0.18	0.13	**0.47	-

Note: Emotion ratings taken from Time 2. Correlations with Choice are point biserial. * indicates significant correlation at the .05 level. ** indicates significant correlation at the .01 level.

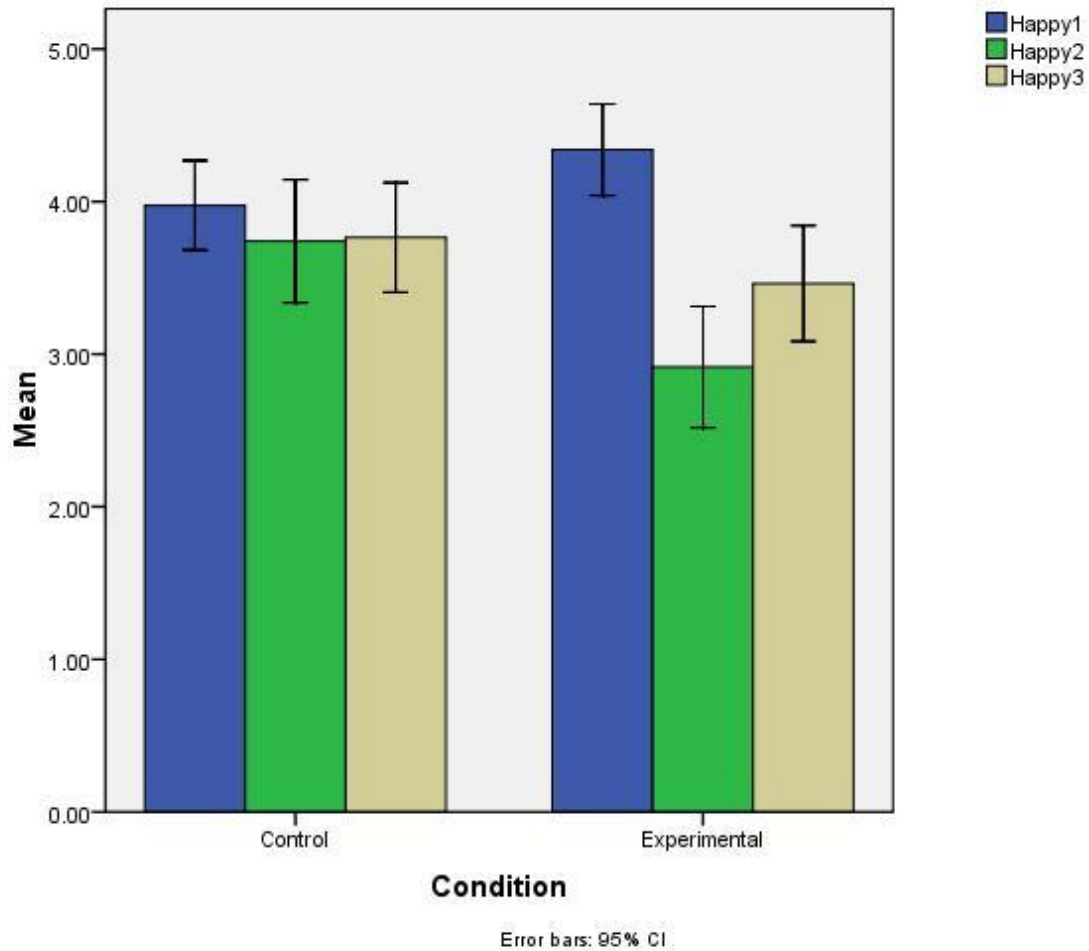


Figure 3.2: Subjective Happiness Ratings by Group and Time

3.3.3 The Effect of Subjective Anger on Cooperation Rate

Among the entire sample, subjective anger ratings were not associated with rates of cooperation, chi-square (1, N=109) = 2.410, $p = .121$ (odds ratio = .836), nor were they associated with cooperation rates within the control condition, chi-square (1, N=109) = .000, $p = .993$ (odds ratio = .998). When examined only within the experimental condition, it was found that subjective anger ratings were predictive of increased rates of defection, chi-square (1, N=109) = 5.082, $p = .024$ (odds ratio = .706).

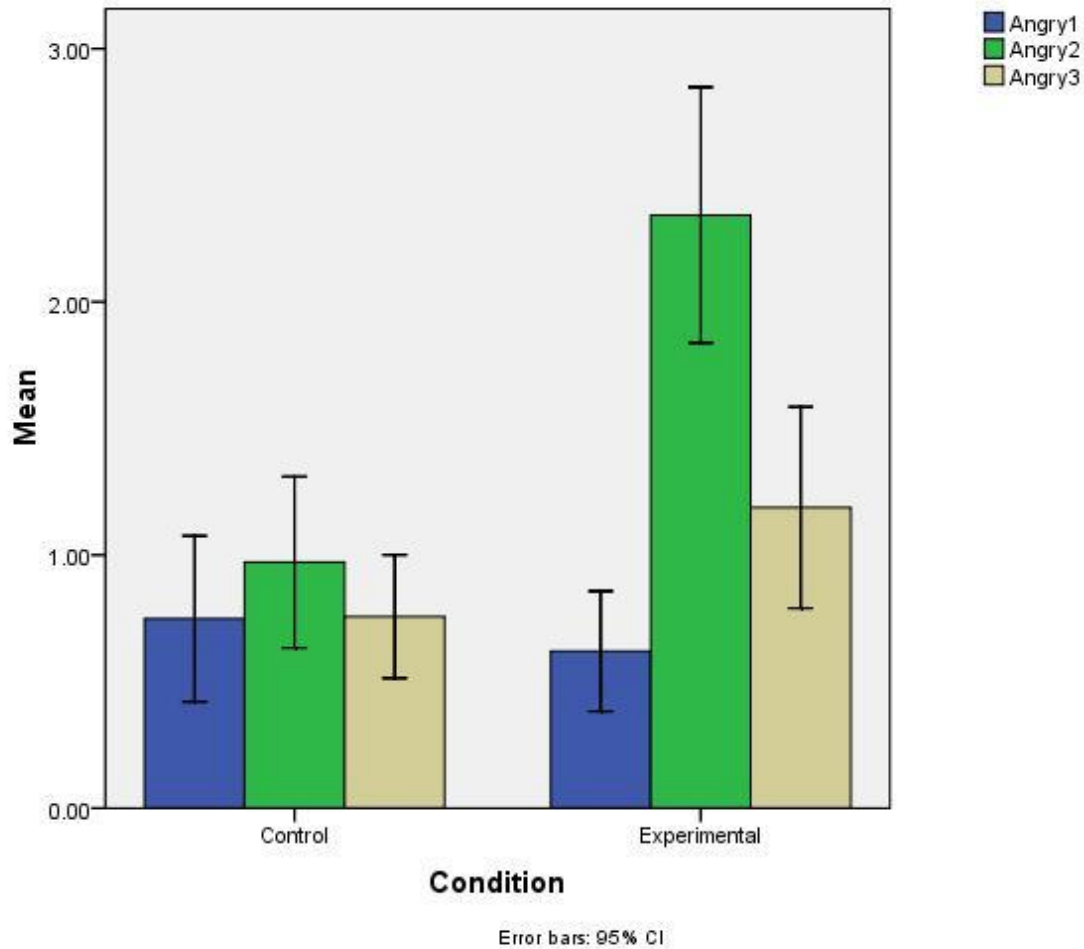


Figure 3.3: Subjective Anger Ratings by Group and Time

3.3.4 The Effect of Subjective Sadness on Cooperation Rate

Among the entire sample, subjective sadness ratings were not associated with rates of cooperation, chi-square (1, N =109) = .743, $p = .389$ (odd ratio = .908), nor were they associated with cooperation rates within the control condition, chi-square (1, N=109) = .458, $p = .499$ (odds ratio = 1.149). When examined only within the experimental condition, it was found that subjective sadness ratings were predictive of increased rates of defection, chi-square (1, N=109) = 3.986, $p = .046$ (odds ratio = .723).

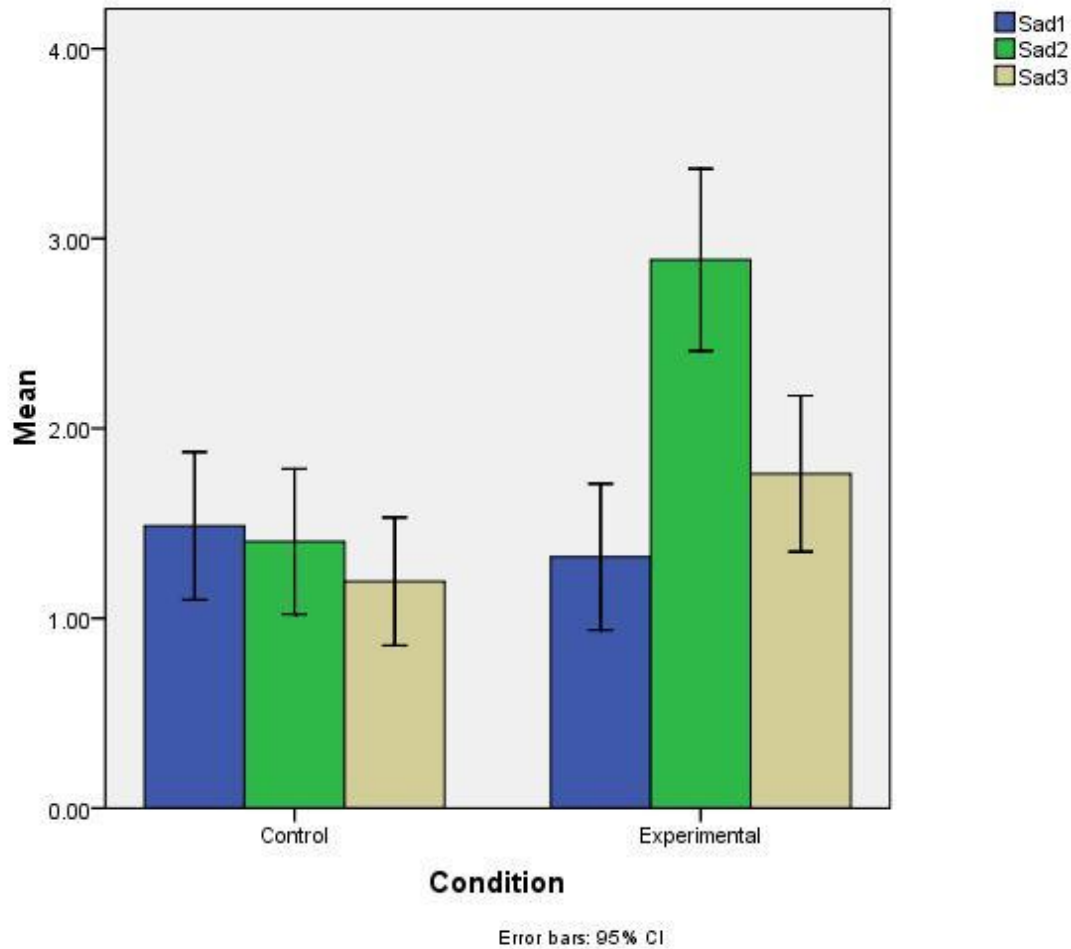


Figure 3.4: Subjective Sadness Ratings by Group and Time

3.3.5 The Effect of Subjective Disgust on Cooperation Rate

Among the entire sample, subjective disgust ratings were not associated with rates of cooperation, chi-square (1, N=109) = .183, $p = .669$ (odds ratio = .953). Similarly, no associations were found within the experimental group, chi-square (1, N=109) = .182, $p = .670$ (odds ratio = .941), or within the control group, chi-square (1, N=109) = .381, $p = .537$ (odds ratio = .844).

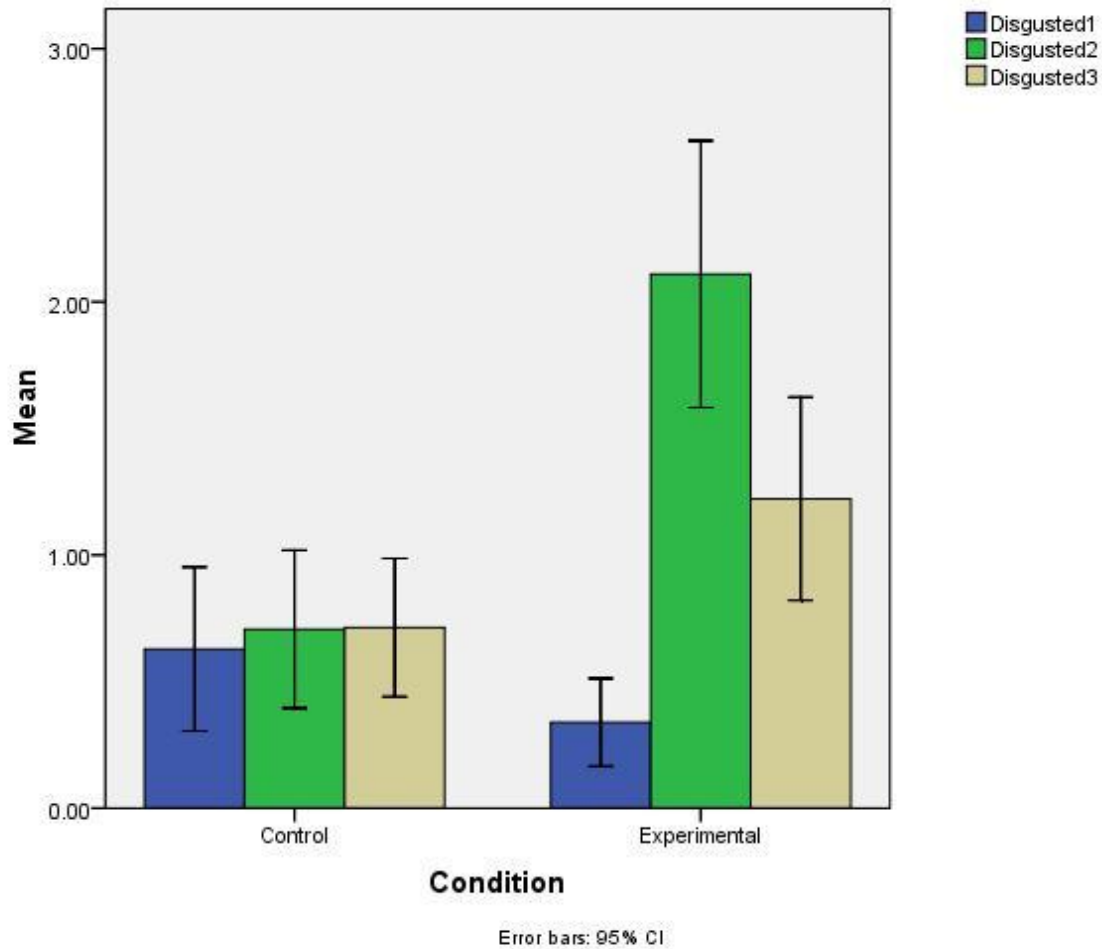


Figure 3.5: Subjective Disgust Ratings by Group and Time

3.3.6 Exploratory Factor Analysis

Prior to conducting the exploratory factor analysis, the factorability of the 6 emotion ratings was examined. First, all of the emotion ratings were correlated with one another at either above .3 or below -.3. Second, communalities were all above .3, further confirming that each emotion rating shared some common variance with each of the other emotion ratings. Given these indicators, emotions of guilt, happiness, anger, sadness, disgust, and fear were each included in the analysis.

Principle component analysis was used as the primary purpose of the factor analysis was to identify potential composite affective states. The analysis yielded one factor, with initial eigenvalues showing this factor to explain 59.252% of the variance for the entire set of emotion ratings (See Table 8). An approximately normal distribution was evident for the extracted factor which was well suited for parametric statistical analyses. As such, the single extracted factor was then used to predict cooperation rates using a binary logistic regression 1) among the entire sample, 2) within the experimental group, and 3) within the control group.

Table 3.4 Factor Loadings and Communalities Based on a Principle Component Analysis

Emotion	Factor Loading	Communality
Guilt	0.818	0.668
Happy	-0.712	0.507
Sad	0.823	0.678
Angry	0.843	0.710
Disgusted	0.755	0.570
Fearful	0.649	0.422
Eigenvalue	3.555	-
% of Variance	59.252	-

Consistent with analyses concerning specific emotions, the extracted factor was not associated with rates of cooperation among the entire sample, chi square (1, N=109) = 3.518, $p = .061$ (odds ratio = .690), nor was it associated with cooperation rates within the control group (1, N=109) = .036, $p = .850$ (odds ratio = .925). The extracted factor was associated with cooperation rates within the experimental group (1, N=109) = 9.553, $p = .006$ (odds ratio = .376).

4.0 DISCUSSION

The aim of the current study was to examine the effects of induced guilt feelings on cooperation in a one-shot, anonymous social situation. In the elicitation of guilt feelings, the autobiographical recollection method was used, which has been shown to be an effective mood induction procedure. Additionally, the prisoner's dilemma was used to isolate the effects of emotion, controlling for the altruistic tendencies resulting from reciprocal altruism and reputation, which have been shown to increase cooperation rates in previous works. It was hypothesized that those participants who were given the guilt induction procedure would be more likely to cooperate than those participants who were given the neutral mood induction procedure. Results did not support these hypothesized group differences. Implications of this primary analysis in light of secondary analyses concerning subjective emotions ratings are discussed.

Although no group differences were found in the current study, careful inspection of subjective emotion ratings following the mood induction procedure suggest that it was not due to the ineffectiveness of the procedure itself. Compared with similar studies measuring the effects of guilt on cooperation in economic games (i.e. Ketelaar and Au, 2003; Batson and Moran, 1999), the current study induced comparable levels of subjective guilt.

Study 2 of Ketelaar and Au (2003) instructed participants to indicate self-reported guilt (as well as several other emotions) following proposals in an ultimatum game. These ratings were reported on a scale ranging from 0 (not at all) to 6 (extremely). On this integer-based likert-type scale, 24 individuals reported a guilt rating of 0, 7 individuals reported a guilt rating

of 1, 3 individuals reported a guilt rating of 3, and 2 individuals reported a guilt rating of 3. Data regarding other emotions were not reported in the manuscript. These self-reported guilt ratings were dichotomously recoded to represent 1) those individuals who felt *no* guilt and 2) those individuals who felt *some* guilt. Ketelaar and Au (2003) found that those individuals who felt some guilt were more likely to make generous (as opposed to selfish) offers in a second ultimatum game.

Mean guilt ratings in the current study (control group = .73, guilt group = 3.39) compare favorably to those reported in Ketelaar and Au (2003) (control group = 0, guilt group = 1.58) though similar cooperative effects were not found in the current study. This suggests that the intensity of guilt feelings induced in the current study was not too low to produce the hypothesized increase in rates of cooperation.

Batson and Moran (1999) instructed participants in low- and high-empathy conditions to indicate the degree to which they were currently feeling several empathy adjectives toward the other participant in a prisoner's dilemma game. These included sympathetic, warm, compassionate, softhearted, tender, and moved and were reported on a 7-point likert-type scale ranging from 1 (not at all) to 7 (extremely). These adjectives were then averaged to form an index of self-reported empathy. Mean guilt ratings in the current study (control group = .73, guilt group = 3.39) were slightly less intense when compared with those of Batson and Moran (1999) (low empathy condition = 3.50, high empathy condition = 5.10).

Within the entire sample a cooperation rate of 51.4% was found. More specifically, within the control group, a cooperation rate of exactly 50% was found while in the

experimental group, a cooperation rate of 52.7% was found. The 50% cooperation rate found within the control group was near the predicted rate of 45.8% (based on past studies using similar payoff matrices) stated in the methods section above. Thus, the current study was successful in eliciting rates of cooperation within the control group which minimized ceiling effects in the comparison between guilt and neutral inductions.

Despite the current study's successful induction of guilt feelings in the experimental group and cooperation rate within the control group, the primary hypothesis was not supported. More specifically, it was not found that those participants in the experimental condition cooperated at higher rates than those participants in the control condition. This finding is in contrast with the generally accepted view that guilt feelings increase rates of cooperation stemming from the current state of the literature.

In order to isolate the effects of reciprocal altruism and reputation, the current study was conducted in ways that differ from those with the closest methodologies. These specific differences provide clues as to the reasons for which the current study may not have resulted in the expected findings. Ketelaar and Au (2003), for example, successfully controlled for the effects of participant reputation by rendering their game anonymous. An important difference between this study and the current one is that Ketelaar and Au (2003) used an iterated prisoner's dilemma game, rather than a one-shot prisoner's dilemma game. As a result, altruistic behaviors found in Ketelaar and Au (2003) could be the result of either reciprocal altruism, guilt, or some interaction between the two. In contrast, the effects of guilt were carefully isolated within the current study. Taken together, findings from Ketelaar and Au

(2003) and the current study suggest that, when isolated from the effects of reciprocal altruism, guilt does not have an effect on altruistic behavior.

Although both control for the effects of reciprocal altruism and reputation, the current study also differs from that of Batson and Moran (1999) in two important ways. First, the mood induction procedure used in the current study was not directly related to the other individual playing the game. Rather, and in accordance with the Affect as Information hypothesis (Schwartz & Clore, 1983b), the mood induction procedure related to people with whom the subject had interacted with in her past. In contrast, the mood induction procedure used by Batson and Moran (1999) referred specifically to the subjects' partners to be played with in the game. Second, Batson and Moran (1999) measured the effects of empathy (as avoidance of guilt) while the current study measured the effects of guilt directly. Taken together, findings from Batson and Moran (1999) and the current study suggest that although feelings of empathy can induce altruistic behavior in one-shot anonymous social situations, feelings of guilt cannot.

Although the guilt induction procedure was relatively effective in inducing feelings of guilt and reducing feelings of happiness, additional and unanticipated effects on other emotions were also found. Ratings of 3 of the other negative emotions (i.e. sadness, anger, and disgust) were also significantly higher at Time 2 when compared to Time 1. Secondary analyses examining effects of subjective guilt, happiness, anger, sadness and disgust were able to shed some light on specific effects.

Subjective guilt ratings showed no evidence of increasing cooperation rates. In fact, subjective guilt ratings, as well as subjective ratings of anger and sadness were associated with

increased rates of defection within the experimental group (though not among the entire sample or within the control group). Alternatively, subjective happiness ratings were associated with greater rates of cooperation among the entire sample as well as within the experimental group (but not within the control group). In addition, results from the exploratory factor analysis yielded a single component of similar negative affects and opposing positive affect. One interpretation of these findings is that in one-shot, anonymous social situations, negative affect may increase rates of defection while positive affect might increase rates of cooperation. Regarding the effects of happiness, this interpretation would be consistent with empirical studies demonstrating a positive association between positive affect and altruistic behavior (Isen, Horn, & Rosenhan, 1973; Isen & Levin, 1972; Levin & Isen, 1975; Lu & Argyle, 1991; Moore, Underwood, & Rosenhan, 1973).

It should be noted that ratings of subjective happiness predicted increased cooperation rates among the entire sample as well as within those participants given the guilt induction procedure. Subjective happiness ratings did not predict cooperation among those participants given the neutral mood induction procedure. It may be that subjective happiness ratings in the context of a negative mood induction procedure (as in the guilt induction procedure) better predict cooperation than baseline subjective happiness (as in the control condition). Future research in the area of emotions and altruism should investigate the effects of specific emotions as well as global negative and positive affect in relation to altruistic behavior.

Several additional methodological limitations should also be taken into consideration in the interpretation of the current study's findings. As previously mentioned, the mood induction

procedure used in the current study elicited not only the hypothesized increase in guilt and the expected decrease in happiness, but also significant increases in anger, sadness, and disgust. As a result, the mood induction procedure elicited an increase in generalized negative affect and a decrease in positive affect. It is possible that emotion specific altruistic behaviors could be predicted with a more circumscribed mood induction procedure. Future research should investigate the effects of both generalized positive and negative affect as well as specific emotions on altruism in certain context.

Participants were also asked to predict their partner's behavior prior to making their decision to cooperate or defect. Results showed that a partner predictions (cooperate or defect) were highly correlated with participant decision (cooperate or defect) (See Table 5.). It is possible that by asking participants to make this prediction directly prior to their decision a cognitive bias towards the same decision as their partner might be activated. Interpretation of the results must take this into consideration.

Furthermore, the current study selected specific variables concerning the Prisoner's Dilemma that may differentially affect cooperation rates in those in guilt and neutral conditions. These include group size, payoff matrix, as well as sex of participant. Only specific studies isolating the effects of these independent factors could shed light on these possible interactions.

Another potential limitation of the current study relates to the conditions of anonymity. As mentioned in the methods section, the current study went to great lengths to insure that both the experimenter and other partner were blind to each participant's choices. This was

done by giving each participant a random sum of money in addition to the money that they earned playing the prisoner's dilemma game. It has been argued by Hoffman et al. (1996) that even in such double blind experiments, an implicit audience still remains. That is, even in light of stakes to maintain anonymity, an implicit concern exists for what others may think of their behaviors. Certainly, such double-blind conditions do not exist outside of the laboratory where "someone is always watching".

Finally, the sample used in the current study was restricted only to college-aged females, due in part to convenience. It remains possible that the inclusion of males or individuals of a broader age range might have affected the results.

In summary, the current study measured the effects of induced guilt on altruistic behavior in a one-shot, anonymous social situation. Although primary analyses found no evidence regarding group differences in rates of cooperation, secondary analyses suggest that generalized negative affect may be associated with decreased rates of cooperation while positive affect may be associated with increased rates of cooperation. Future research investigating the effects of general negative and positive affect as well as specifically induced emotions needs to be conducted to further evaluate this suggestion.

APPENDIX A

NEUTRAL PERSONAL EVENT DESCRIPTION

Please write a description of a typical school day. It will be most helpful to us if you take the time to describe this event as vividly and in as much detail as possible. Please try to include some of the background information that led up to this event and to describe any immediate consequences.

Make sure that you include the details of what happened, exactly how you felt at the time, why you felt this way, and what you thought about.

You may find it helpful to take a few minutes before writing anything to remember this event as clearly as you can, to “get into the experience” so as to recall the event as it happened and how you felt at the time. Write your description at the bottom of this page, and continue on the next several pages if necessary. Please take the next 10 minutes for this task. The experimenter will let you know when the 10 minutes is over. If you finish early, go back and reread your description and add any forgotten details.

APPENDIX B

GUILTY PERSONAL EVENT DESCRIPTION

Please write a description of a recent event, preferably within the past year, that made you feel really guilty, ashamed, and self-blaming. It will be most helpful to us if you take the time to describe this event as vividly and in as much detail as possible. Please try to include some of the background information that led up to this event and to describe any immediate consequences.

Make sure that you include the details of what happened, exactly how you felt at the time, why you felt this way, and what you thought about.

You may find it helpful to take a few minutes before writing anything to remember this event as clearly as you can, to “get into the experience” so as to recall the event as it happened and how you felt at the time. Write your description at the bottom of this page, and continue on the next several pages if necessary. Please take the next 10 minutes for this task. The experimenter will let you know when the 10 minutes is over. If you finish early, go back and reread your description and add any forgotten details.

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