WORKING P A P E R

Personality, Affects, and Forgiving Behavior in Games

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LABOR AND POPULATION

Personality, Affects, and Forgiving Behavior in Games^{*}

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Abstract

In this study, we ask two research questions: who forgives, and how? Prior studies have shown that more agreeable and less neurotic people have a higher tendency to forgive others, but we argue that these associations may be spurious because these studies measure forgiveness as a disposition using self-reported questionnaires. Our study shows how to combine two economic games to construct a behavioral measure of forgiveness. In the first game, the participants are unfairly mistreated; in the second game, we give the participants an opportunity to either reciprocate the injustice, or to forgive. Based on a sample of 468 students in Grades 5, 7, and 11, the results show that agreeableness, but not neuroticism (nor extraversion, conscientiousness, openness), predicts forgiving behavior in games. While it is widely believed that forgiveness has an emotional component, affects only mediate the justice evaluation of an offer in the first game. Thus, we conclude that whether a participant forgives or not in the second game involves a cognitive decision.

PERSONALITY, AFFECTS, AND FORGIVING BEHAVIOR IN GAMES

INTRODUCTION

Decisions related to forgiveness are ubiquitous in daily life. We all, from time to time, observe or encounter situations in which one person mistreats or harms another.

These situations often elicit emotional reactions in those who are mistreated or harmed, and in those who observe such situations. Sometimes people retaliate,

other times they walk away and forget, and still others they forgive. How people

respond to injustice has long intrigued social theorists and behavioral scientists; in

fact, whether or not to forgive a perpetrator is the most contested potential

response. The political philosopher Hannah Arendt (1958) is famous for arguing that forgiveness possesses the capacity to cure the irreversibility of a past predicament.

Without the ability to forgive, human acts would be “confined to one single deed

from which we could never recover; we would remain the victims of its

consequences forever, not unlike the sorcerer’s apprentice who lacked the magic

formula to break the spell” (p. 237). In contrast, game theorists predict that the

victim would be irrational to forgive the perpetrator if it incurred material or mental

costs (e.g., Axelrod 1980).¹

¹ Note however that the game theory language does not explicitly discuss forgiveness. Forgiveness in the game theory context is defined as cooperation following a defection.

Among sociologists, Howard (2003) argues that social justice will be possible only if we value forgiveness along with compassion and need, referring to the Marxist ideal of “meeting the needs of all, rather than in terms of deservingness and equity” (p. 5). In a different tradition, while Durkheim (1964) endorses the necessity of punishment to cement the society (pp. 70-110), Schwartz (1978) reminds us that resentment and hostility will remain, even after punishment, unless we forgive. Unfortunately, the sociological interest in studying forgiveness is limited and exclusively theoretical. Perkins (2002) suggests that sociologists should pay more attention to forgiveness and study “sociocultural and demographic variation in nonclinical populations” (p. 379). Our study is among the first sociological effort to empirically investigate two fundamental research questions on this topic: who forgives, and how? We combine two economic games to design a behavioral measure of forgiveness such that its associations with personality traits are less susceptible to biases than those based on a dispositional measure of forgiveness. We also examine the mediating role of affects behind injustice and forgiveness, and find an indirect piece of evidence that forgiveness involves a cognitive decision. Thus, our study contributes both substantively and methodologically to the literature.

BACKGROUND

Measuring Forgiveness: Questionnaire versus Behavior

Forgiveness is, perhaps surprisingly, difficult to define. McCullough, Pargament, and Thoresen (2000) define forgiveness as when the emotion, attitude, and behavior of either a victim, or an observer, become more positive, or less negative, toward a perpetrator. Enright and Coyle (1998), however, notes that forgiveness is “not pardoning,” “not excusing,” “not forgetting,” “not denying,” and “not reconciling”. The measurement of forgiveness also varies. For example, McCullough *et al.* (2000) proposes a motivational approach to the study of forgiveness that emphasizes the emotional change from avoidance or revenge, to benevolence. Berry and colleagues (2001) develop the Transgression Narrative Test of Forgiveness, a five-item scenario-based scale. Common among the vast majority of existing measures of forgiveness is that all rely on respondents’ self-reporting, rather than observations of forgiving behaviors. Noting potential problems of self-reported dispositional measures, McCullough, Hoyt, and Rachal (2000) suggest that researchers also include partner-reports, third-party observations, and behavioral indicators when measuring forgiveness.

In the game-theory tradition, there exists a classical, yet preliminary, behavioral measure of forgiveness that subsequent researchers of forgiveness have largely

ignored. In a series of computer simulations of two-person iterated Prisoner's Games, Axelrod (1984) finds that the optimal strategy is to cooperate in the first iteration and exactly follow the other player's move to either cooperate or defect in all subsequent iterations—a strategy called "TIT-FOR-TAT." He also notes a potentially better strategy, "TIT-FOR-TWO-TATS", in which a player once chooses to cooperate, instead of reciprocate with defection, when the other player defects in the previous iteration. He argues that TIT-FOR-TWO-TATS may produce an even better outcome because forgiving once could avoid falling into a vicious cycle of defections. Although forgiveness is defined in an extremely loose sense, Axelrod's seminal work not only demonstrates an effect of forgiveness, but also provides an example of how one may apply economic games to study forgiveness.

Nevertheless, computer simulations such as those reported in Axelrod (1984) may not be capable of fully capturing the reality of complex human behaviors, especially when forgiveness may be viewed as inherently irrational by game-theory economists. In this present study, we seek to conduct economic games in a laboratory setting to measure actual forgiving behaviors. This approach may alleviate problems of both the self-reported method and computer simulations.

Forgiving Behavior in Games

We measure forgiveness by employing an adjacent pair of economic games. In

experimental economics, a player (the “proposer”) presents an offer to the other player (the “receiver”). If the receiver is given the opportunity to reject the offer, it is called an ultimatum game. If the receiver must always accept whatever offer presented to him/her, it is called a dictator game. These economic games may shed light on the sense of justice. Henrich and Henrich (2007) report a detailed set of comparisons between the ultimatum game and the dictator game: In the ultimatum game, the proposer would raise their offer because the receiver may decide to reject the offer. This higher offer may be a result of the influence of social norms or external pressures. The proposer may also take the expectation of the receiver into consideration; otherwise, both of the proposer and the receiver would gain nothing. On the other hand, in the dictator game, the proposer has no incentive to take into account the receiver’s reaction, so they could propose whatever amount they like. Thus, the dictator game may provide a real test of what constitutes the “fair” proportion in the eye of the proposer.

In our study, we first let the participants play the role of receiver in an ultimatum game, with an imaginary peer playing the proposer role. In this game, the participants are treated unfairly, either unfavorably or favorably. We then conduct a second, dictator game, in which the participants switch to the proposer role with the same imaginary peer now being in the receiver role. In other words, the participants

in this second game are given the opportunity to reciprocate the unfair treatment they received in the first game. We are particularly interested in how they respond in the second game after being given a substantially low reward in the first game (lower, that is, than equal -- presumably the fair amount of reward). Will they retaliate by making a substantially lower (than equal) amount of reward in return, or will they forgive by making a fair (say, an equal, or possibly higher than equal reward) offer in return? In this way, we establish a setting in which individuals interact with each other that is both isolated from confounding influences and a mirror image of the actual social world. Our empirical approach may be considered a study of “field-laboratory” sociology; this methodological innovation for a behavioral measure of forgiveness is the first of our contributions.

Forgiveness and Emotions/Affects

Injustice can be either positive (when the actual reward is greater than the “just” reward) or negative (when the actual reward is smaller than the “just” reward) (see, Jasso 1983). Injustice triggers emotions, and the valence of injustice matches the valence of emotions (Jasso 2006). When someone is treated unfairly in a favorable direction, we expect to observe positive affects, whereas when someone is treated unfairly in an unfavorable direction, we expect to observe negative affects—more specifically, anger (Roberts 1995). Anger at injustice contains several elements: the

pain of injury, and the temptation to revenge (Schimmel 1979). A major task of forgiveness is to overcome these strongly negative emotions (Enright, Gassin, and Wu 1992). Prior studies have hypothesized, but not yet empirically tested, the proposition that anger may mediate the relationship between injustice and forgiveness (e.g., Huang and Enright 2000; Weiner et al. 1991). In addition, McCullough *et al.* (2000) alludes to the possibility that cognition may also play a role in the process of forgiveness. The second contribution we attempt to make in this present study is to test empirically whether the link between injustice and forgiveness is only mediated by affects, and to infer indirectly whether cognition might also be involved.

Personality Traits and Forgiveness

Prior studies have shown that more agreeable and less neurotic people have a higher tendency to forgive others (Ashton et al. 1998; Emmons 2000; McCullough et al. 2001; McCullough 2001; Berry et al., 2001). However, these studies have used questionnaires to measure both personality traits and forgiveness as self-reported dispositions. Self-reported measures pose a serious methodological concern in addressing the research question of who forgive because “common method biases” (Podsakoff et al. 2003) may overstate the associations between personality traits and forgiveness. Not only is it possible for some “deeper” personality trait (as an

unobserved third factor) to cause a spurious correlation between personality traits and forgiveness. The face validity of the associations may also be questioned because there are similar, and even the same, items in both the forgiveness scale and the personality scale (measuring, e.g., agreeableness). Hence, the third contribution we attempt to make is to assess whether previously documented associations between personality traits and dispositional forgiveness are found in forgiving behavior in a laboratory-like setting that mimics an actual social situation.

In brief, this study applies a methodologically innovative design borrowed from experimental economics to answer two research questions: (1) what personality traits predict forgiving behaviors (i.e., who forgive), and (2) whether affects and/or cognition mediate the link between injustice and forgiveness (i.e., how they forgive).

METHOD

Participants

We recruited a total of 468 student participants in the 5th, 7th, and 11th grades from New Taipei City and Penghu County in Taiwan.² New Taipei City is located in

² Specifically, 188 students (including 66 5th graders, 63 7th graders, and 59 11th graders) were recruited in New Taipei City, and 280 students (including 94 5th graders, 86 7th graders, and 100 11th graders) in Penghu County. These students were recruited through the school administrators and teachers, and their parents/guardians had to sign a consent form ahead of time. Fewer than 10% of

northern Taiwan (next to the nation's capital, Taipei City), with a population of almost 4 million. Penghu County consists of a number of remote islands, with a population of approximately 100,000. Agriculture and fisheries still play a vital role in Penghu County, whereas manufacturing and service/commercial sectors are the primary industries in New Taipei City. In brief, there are substantial differences in the family background of the participants from these two counties. Thus, even though the sample is not nationally representative, it covers a wide range of the population.

Procedure

The basic procedure involves an ultimatum game followed by a dictator game. We made the participants believe that they were randomly paired to play a series of economic games³ in which one participant (the proposer) was to offer a proportion of tokens to the other participant while keeping the remainder; in fact, none of our participants were proposers and all were receivers. In the first phase of the games (the ultimatum game), the participant in the role of a receiver would decide whether or not s/he would accept the offered tokens and fill out a series of questionnaires concerning how they felt about the offer. In the second phase of the games (i.e., the

students we had contacted declined to participate in the study.

³ See Appendix A for concrete details, such as how the randomization worked and how the experimenters instructed the participants throughout the experimental procedure.

dictator game), the participants were told to play the role of a proposer and make an offer to the participant who had previously played the role of a proposer and would now be the receiver. In other words, the imaginary “pair” of participants switched roles in this second phase. We consider the number of tokens the participant was willing to offer in the second phase of the games as a behavioral measure of forgiveness. The participants also completed questionnaires measuring their personality traits and collecting basic demographic information.

Specifically, in the eye of the participants, the other participant (the proposer) was to allocate tokens worth twenty dollars in the first phase of games. The proposer was indeed a “phantom” participant. Instead, the experimenters randomly determined that half of the participants (the receiver in this first phase of games) would receive five out of a total twenty dollars, and the other half would receive fifteen out of twenty dollars. We refer to the first group as “under-rewarded” and the second group as “over-rewarded”; According to justice theory (Jasso 1983), both groups were treated unjustly in the ultimatum game, only in different directions. The participants (all in the receiver role in this phase, while imagining that the offer was made by another fellow participant randomly assigned as the proposer) would now decide to either accept or reject the offer, as in a typical ultimatum game. Unlike typical ultimatum games in behavioral economics, however, the offer (either five or

fifteen dollars, out of a total of twenty dollars) was by design unfair. We measured the participants' self-reported positive and negative affects to capture the potential emotional reactions elicited from the receivers by the unfair offers.

In the second phase, the participants were told that they would now play the role of the proposer, and that they would decide how much out of thirty dollarsworth of tokens they would be willing to give to their partner, who had played the role of proposer in the previous phase (i.e., the ultimatum game) and treated them either favorably or unfavorably. However, they were also told that the receiver would have no choice but to accept whatever amount of tokens were given to them in this second phase (i.e., a dictator game). Hence, the participants were given an opportunity to reciprocate—to either return the favor to those in the over-reward condition, or retaliate against those who treated them unfavorably in the under-reward condition. Our primary interest in this present study is understand whether or not the participants in the under-reward condition would choose *not* to retaliate, which we interpret as a forgiving behavior. Moreover, the participants should be willing to do whatever s/he wants to because their partners (the receivers) would have no choice of rejecting the offer—that is, there would be no consequences whatsoever.

Variables

Personality Traits. We use the 29-item version of the Big Five factors to measure personality traits, as in the Wisconsin Longitudinal Study (Wollmering 2007). This is a shorter version of the typical Big Five Personality Inventory (John, Donahue, and Kentle 1991). We construct summated scores for Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (see Appendix B). All of Cronbach's α internal-consistency coefficients for the five scales of personality traits are either equal to, or below 0.7 (see the last column of Table 1). These internal consistency measures are low, by conventional standards, presumably due to the relatively small number of items in each scale.⁴ We suspect that the major source of bias such low internal consistency in scales might introduce into our analysis is a measurement error. In the exploratory analysis, we employ statistical models to adjust for measurement errors in the explanatory variable (Griliches 1986; Tam 2000) and they yield essentially the same results as the standard regression analyses.⁵

⁴ It is certainly possible that the low internal consistency coefficients are the result of a number of other factors, such as loss of fidelity in translation, cultural differences in personality structure, age differences in comprehensibility or self-perception, or even all of the above. If so, one might question the reliability and validity of these personality measures.

⁵ A major methodological concern in the analysis is the relatively low reliability (or more precisely, internal consistency coefficients) for the personality traits. The estimated effects of unreliably measured explanatory variables may be biased downward (Greene 2000: 375-80; Treiman

Dependent Measures. We construct the following dependent measures: (a)

Rejection Rate: We construct a dummy variable to indicate whether the respondent rejected (coded 1) or accepted (coded 0) the offer, which the phantom proposer had given, in the ultimatum game in Phase 1; (b) *Positive and Negative Affects:* After deciding whether to reject the offer, the respondent rated how happy s/he felt, facing such an unfair offer (either an under-reward or an over-reward) on a Likert scale labeled from “very unhappy” (rated 1) to “very happy” (rated 7), then immediately following the question on happiness, how angry s/he felt, also on a Likert scale from “not at all angry” (rated 1) to “very angry” (rated 7). These two questions measure the respondent’s positive and negative affects towards an unfair offer;⁶ (c) *Offer in Return:* In Phase 2, the respondent became the proposer in a

2009: 258-61). We estimate a statistical model that adjusts for measurement errors in the explanatory variable (Hausman 2001). Consider $Y = a + bX + e$, where X is the observed personality trait with true score, Z , and measurement error, u (i.e., $X = Z + u$). The true effect of Z can be obtained as follows:

$$p \lim \beta = \left(\frac{\sigma_Z^2}{\sigma_Z^2 + \sigma_u^2} \right) b = \rho b, \quad (1)$$

where we use the internal consistency coefficient (Cronbach’s α) for ρ in Eq. (1).

⁶ These items are crude measures intended to capture “affects”—the valence of emotions, instead of specific emotions. We focus on affects because we are not confident in the ability of questionnaire to distinguish among various kinds of emotions.

dictator game, making an offer in return to the unfair (either under-reward or over-reward) offer in the previous ultimatum game. We use the percentage of tokens (out of thirty dollars) the respondent offered the (imaginary) partner (the proposer in Phase 1)—especially whether or not they retaliate in response to an unfair, unfavorable treatment—as the behavioral measure of forgiveness.

Control Variables. We include the following demographic and socioeconomic characteristics as control variables in the multivariate analysis if they are correlated with at least one of the personality traits, or they predict the dependent variable(s): gender (coded 1 if female), grade level, number of siblings, father's education (in years of schooling), mother education (using two dummy variables for higher or lower than the father's education, with parents having the same level of education being the reference category), relative grade point average in class (two dummy variables for top ranking and middle ranking, with low ranking being the reference category), and location (coded 1 for Penghu County, and coded 0 for New Taipei City).

Analytic Sample. Participants with missing data on any of the above variables (except parental education⁷) are not included. This listwise deletion leads to an analytic sample of 404 participants (about 86% of the original sample).

⁷ We use mean substitution for father's education and mother's education, adding a dummy variable each to indicate missing values on each of these variables.

Hypotheses

We hypothesize that, in Phase 1, an unfair under-reward in the ultimatum game would elicit a negative affect in the participants, whereas an unfair over-reward would elicit a positive affect. Negative affects would then lead to a higher rejection rate for the offer, whereas positive affects would lead to a lower rejection rate. In the dictator game of Phase 2, we hypothesize that participants who were under-rewarded in the ultimatum game of Phase 1 would make a lower offer in return than those who were over-rewarded.

We define forgiveness as making a higher offer in return in the dictator game of Phase 2 for those in the under-reward condition in Phase 1; for those in the over-reward condition in Phase 1, a higher offer in return is considered reciprocation. Because “deficiency is felt more keenly than comparable excess” (Jasso 2006:328, see also Whitmeyer 2004 for a review), we also expect the magnitude of effects to be smaller in the over-reward condition than in the under-reward condition.

Concerning the relationship between injustice and affects, we hypothesize that under-rewards may elicit anger whereas over-rewards may elicit happiness. We further hypothesize that these positive and negative affects explain differences in the process of forgiveness, in terms of rejection rates in the ultimatum game of Phase 1 (mainly as justice evaluation), and the offer in return during the dictator game of

Phase 2.

Following previous research on personality and forgiveness, we hypothesize that agreeableness and neuroticism both predict forgiving behavior, whereas openness, conscientiousness, and extraversion do not. However, our study provides a stronger test of the causality responsible for these correlations reported in earlier studies.

Also, our study will examine the affective mechanisms responsible for the association between personality traits and forgiveness. Specifically, we expect that more agreeable participants, and less neurotic participants, may be less likely to reject an under-reward in the ultimatum game of Phase 1, and to make a higher offer in return in the dictator game of Phase 2. If affects play an important role in forgiving behaviors, we expect that more agreeable participants and less neurotic participants will express a less negative affect in the under-reward condition, and a more positive affect in the over-reward condition.

RESULTS

Experimental Results Regarding Over- and Under-Rewards

Table 1 presents descriptive statistics on the two experimental conditions: over-reward versus under-reward. There are no statistically significant differences in any of the personality traits, demographic, or socioeconomic characteristics. Hence,

the randomization procedure appears to be adequate.

Participants facing an unfair over-reward in the ultimatum game of Phase 1 were happier ($t = 7.94, p < .001$) and less angry ($t = -9.01, p < .001$) than those facing an unfair under-reward. The former group was also 11% less likely to reject the unfair offer in the same game ($t = -3.41, p < .001$). In the dictator game of Phase 2, those who had been favorably treated (over-rewarded) in Phase 1 would make a 15% higher offer in return (49.98% versus 34.81%) than those who had been unfavorably treated (under-rewarded) ($t = 8.29, p < .001$). All of these above differences are highly statistically significant, suggesting that participants' affective reactions and their likelihood of accepting an offer are predicted by the degree of unfairness (either favorable or unfavorable) of that offer. When given an opportunity to revenge an under-reward, or return the favor of an over-reward, at least some of the participants did so.

Moreover, if the unjustly over-rewarded participants in the ultimatum game of Phase 1 were to reciprocate in the dictator game of Phase 2, we would expect that the offers they made in return would exceed 50%, but they offered an average of exactly 50%. Similarly, perfect reciprocity would predict that the under-rewarded participants would make an offer of 25% in return in the dictator game of Phase 2, whereas they indeed made an average offer of 35%—which is higher than expected.

Although our results are consistent with the prediction of the distributive justice theory in that excess is indeed felt less strongly than deficiency (Jasso 2006), it is unclear whether or not equity is viewed by our participants as the reference to the just reward. In fact, this argues for a three-group experimental design that includes an equal reward (i.e., 10/10 in distribution) in future research.

Behavioral economic theory predicts that a rational participant in a dictator game would maximize his/her reward by keeping all the money to himself/herself, offering nothing to the partner. For example, Forsythe et al. (1991) reported that some 40% of participants would offer nothing at all in a stand-alone dictator game. Conducting the ultimatum game in which the participant was unfairly treated followed by a dictator game, we observed a very different behavioral pattern. Looking closely at the distribution of offers in return in the ultimatum game (detailed results not shown, but available upon request), only 3% of the participants offered no tokens in the dictator game, and 40% of the participants offered half of the tokens. We argue that being unfairly treated in the first phase triggered the participants' sense of justice, rather than rational calculations, so that they were more willing to offer a fair number of tokens in the second phase.

Regression Results about the Mediating Role of Affects

While the preceding results are based on randomized experimentation, we use

regression analysis to examine the mediating role of affects on the reward status of forgiving behaviors. We present parallel sets of results for rejection rate (Phase 1, in a linear probability model, although logistic regression model leads to the same conclusion) and for the offer in return (Phase 2, standard multiple regression) in Table 2—first including the reward status, then adding affects followed by other controls.

Those participants in the under-reward condition were 10.7% more likely to reject the unfair offer than those in the over-reward condition. The difference fell to 1.8% when the affective reactions are included, and fell further to 1.3% when additional socio-demographic controls were added. This pattern suggests that affective reactions completely explain the difference in rejection rates between the two experimental conditions of reward status. Hence, the decisions of participants to either accept or reject an unfair offer seems to be directly associated with their affective reactions.

In contrast, those participants who were under-rewarded in Phase 1 made a 15.2% lower offer in return in the dictator game in Phase 2 than participants who were over-rewarded in Phase 1. This difference was reduced by approximately a third to about 10.6% when we controlled for affective reactions, and then socio-demographic controls, but the difference remained statistically significant. Thus,

there is no evidence that affective reactions mediate the effect of unfair treatment on the return offer. In other words, whether and how the participants distribute the tokens in Phase 2 seems to involve a more complicated socio-behavioral process than simply reciprocation, retaliation, or forgiveness due to affective reaction.

We then examine the relationship between personality traits and the four dependent measures by reward status. These regression results are presented in Table 3 (over-reward) and Table 4 (under-reward), with parallel pairs of models, with and without control variables. Extraverts were more likely to reject an over-reward offer, and participants scored high on openness felt less happy receiving an over-reward than their counterparts. These correlations hold with, or without, socio-demographic controls, indicating that extraversion and openness are associated with reciprocating behaviors. All other personality traits made no difference in the over-reward conditions, and thus were not predictive of reciprocation.

In the under-reward condition (Table 4, the main focus of the present study), results show that agreeableness appeared to be associated with lower rejection rates in Phase 1, higher percentages offered in return in Phase 2, and more positive affects. However, only one correlation remains statistically significant after introducing socio-demographic controls: more agreeable participants made a greater offer in

return in the dictator game of Phase 2 than less agreeable participants--indicating their stronger propensity to forgive. This finding of an association between agreeableness and forgiveness is consistent with prior research based on self-reported questionnaires, but constitutes stronger evidence because our behavioral measure of forgiveness is less susceptible to common method bias (Podsakoff et al. 2003). Also consistent with prior studies is the null finding with respect to extraversion, openness, and conscientiousness. This is inconsistent with prior research that neuroticism has no predictive power on forgiving behavior, suggesting that the finding based on dispositional measures of forgiveness may not hold true for behavioral measures of forgiveness.

DISCUSSION

In this study, we address two research questions: who forgives, and how? Instead of using a self-reported questionnaire to measure forgiveness as a disposition, which may suffer from common method biases (Podsakoff et al. 2003), we devise a behavioral measure of forgiveness in a field-laboratory setting by combining two economic games. While earlier studies have reported that more agreeable and less neurotic people score higher on the dispositional scale of forgiveness (e.g., Ashton et al. 1998; Emmons 2000; McCullough 2001; McCullough et al. 2001; Berry et al. 2001), our results show that, among the Big-Five personality traits, only agreeableness

predicts forgiving behavior in games. This finding suggests that the association between neuroticism and forgiveness may be spurious.

In addition, we find that an unfair, unfavorable offer in a dictator game may arouse immediate negative affects (anger), which may lead to a rejection of the offer. This affective reaction does not mediate the decision to retaliate or forgive when the participants are given the opportunity to make an offer in return in the second game. Thus, we infer that forgiveness is not merely driven by the affective process, but must involve a cognitive component. While prior research has mostly emphasized the affective component of forgiveness and paid relatively little attention to the cognitive process of forgiveness (c.f., McCullough 2000), this finding suggests that the affective component may be only a part of the process of evaluating the justice of a situation (Jasso 2006). Based on this finding, we argue that forgiveness is best conceived of as the cognitive process between perception of injustice and how the unfairly mistreated respond to perceived injustice (c.f., the basic model of justice processes in Hegtvedt 2006). The emphasis on the cognitive component in forgiveness is indeed consistent with recent theoretical developments (e.g., Miceli and Castelfranchi 2011).

Sociologists have long been concerned with inequality and distributive justice. Social psychologists in particular have studied the perception of justice (Hegtvedt

and Markovsky 1995). While scholars have identified reactions to justice/injustice (as part of consequences of justice evaluation) as an important topic in justice research (Jasso and Wegener 1997; Hegtvedt 2006), sociologists have paid limited attention to such issues, and there has been little research published on forgiveness as a reaction to injustice. Our study is a first attempt to connect the psychological research on forgiveness to the sociological literature on justice, adapting methods from behavioral economics.

This attempt is only a beginning of a study on the phenomenon of forgiveness. Forgiveness has implications for not only the victim and perpetrator, but others whose interests and well-being are not directly affected (Exline et al. 2003). As in the framework on studying justice (Jasso 2006), future research should examine the observer's reactions to situations in which a person is mistreated by another: Would they intervene, and when given the opportunity, or even the power, to intervene, would they punish the perpetrator, or would they forgive? We may apply similar paradigms to "third-party punishment" in experimental economics (Fehr and Fischbacher 2004) to examine these issues. When we go beyond the dyadic interaction to consider the social domain, we are moving one step further toward answering the fundamental question about how the formation of a society is possible (Elias 1978).

As social theorists such as Arendt (1958) and Howard (2003) have suggested, forgiveness plays an important function with respect to social cohesion in restoring social justice and promoting reconciliation. It is time for sociologists to begin carefully examining what it is, and how it works.

Appendix A: Concrete Details of Experimental Procedure

The school teachers helped us gather the students into classrooms where the experiments took place. We randomly assigned the participants into two groups by asking them each to draw a card. Those participants who draw a card of a black suit (spades/clubs) stayed in the room, while those participants who drew a card of a red suit (hearts/diamonds) went to another room. Simultaneously, the participants were told they were matched by the numbers and the suit. For example, the student who drew the ace of spades was partnered with the student who drew the ace of hearts; the student who drew the ace of clubs was partnered with the student who drew the ace of diamonds. After the black and the red were separated, the experimenter in each room then asked the participants, who had drawn cards from the same suit, to draw another card in order to randomize the numbers. The participants were then seated according to the cards drawn.

We had videotaped the instructions, and the experimenter showed the video clip of the instructions to the participants. In this video, we told the participants that their partners, who had a card of the opposite color, would divide a total of twenty dollars between them. So, the blacks were told that the reds would distribute some tokens to him/her, and the reds were informed the blacks would be making the distribution. In addition, the participants were told that their partners, the

“proposers”, had two options to choose from in deciding how many tokens s/he would keep to him-/herself, and how many tokens s/he would give the participant.

Our first experimental design proceeded as follows:

Under-Reward versus Over-Reward. In the under-reward condition, these two options were (a) the “proposer” kept ten dollars to him-/herself and gave the unseen partner the remaining ten dollars (10, 10), and (b) the “proposer” kept fifteen dollars and gave the participant the remaining five dollars (15, 5). In the over-reward condition, the two options were (c) the “proposer” kept ten dollars to him-/herself and gave the participant the remaining ten dollars (10, 10), and (d) the “proposer” kept five dollars and gave the participant the remaining fifteen dollars (5, 15). We told participants in the under-reward group that the “proposer” chose (b): giving five dollars to them and keeping fifteen dollars for themselves. We told participants in the over-reward group that the “proposer” chose (d): giving fifteen dollars to them and keeping five dollars for themselves.

After showing the participants the video clip, the assistant left the room (pretending to go to the other room) and came back with a batch of envelopes containing the tokens the participants assigned to the “proposer” role would give to the participants. The assistant gave the envelopes to the participants, and the experimenter asked the participants to decide whether or not they would be willing

to accept the tokens given to them by the “proposer” and to mark their answers on the envelope. If they chose to accept the offer, they and the other participants both got to keep the tokens. If they chose to decline the offer, neither of them got to keep anything. The participants also filled out a questionnaire. The assistant then collected the envelopes and the questionnaires. This was the end of Phase 1.

The experimenter then showed the second video clip of instructions to the participants. This time we asked the participants to play the “proposer” role, and to decide how much, out of thirty dollars, they would give to their partners who had formerly played the “proposer” role and assigned a certain amount of tokens to them in the previous phase of game. Unlike the previous phase, we told them that the other participants (formerly in the “proposer” role) must accept the tokens they were given, and the participants in both rooms would be able to take home the value of the tokens they earned in the game. After deciding, they handed in their answers and Phase 2 finished.

Appendix B: Questionnaire Items for the Big Five Personality Traits

The items appearing on the questionnaire are a checklist of statements.

Respondents answered yes or no to statements describing themselves. We use the summated score for each scale in our analysis, taking into account reversely-worded items. The Agreeableness scale includes the following six items: “I see myself as someone who [tends to find fault with others], [is sometimes rude to others], [is generally trusting], [can be cold and aloof], [is considerate to almost everyone], and [likes to cooperate with others].” The Conscientiousness scale includes the following six items: “I see myself as someone who [does a thorough job], [is a reliable worker], [tends to be disorganized], [is lazy at times], [does things efficiently], and [is easily distracted].” The Extraversion scale includes the following six items: “I see myself as someone who [is talkative], [is reserved], [is full of energy], [tends to be quiet], [is sometimes shy, inhibited], and [generates a lot of enthusiasm].” The Neuroticism scale includes the following five items: “I see myself as someone who [can be tense], [is emotionally stable, not easily upset], [worries a lot], [remains calm in tense situations], and [gets nervous easily].” The Openness scale includes the following six items: “I see myself as someone who [prefers the conventional, traditional], [prefers work that is routine and simple], [values artistic, aesthetic experiences], [has an active imagination], [wants things to be simple and clear-cut], and [is sophisticated in

art, music, or literature].”

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Table 1. Descriptive Statistics

	Over-Reward		Under-Reward		
	Mean	SD	Mean	SD	
Personality Traits					α
Openness	3.38	0.68	3.40	0.68	0.45
Conscientiousness	3.58	0.82	3.71	0.76	0.69
Extraversion	3.91	0.80	3.79	0.86	0.70
Agreeableness	4.26	0.70	4.25	0.69	0.49
Neuroticism	3.83	0.91	3.69	0.91	0.64
Social Demographic Characteristics					
Female	0.51	--	0.51	--	
Grade level	7.90	2.52	7.96	2.54	
Penghu county	0.62	--	0.59	--	
Father's years of schooling	12.33	2.42	12.52	2.57	
Mother's education higher than father's	0.18	--	0.12	--	
Mother's education lower than father's	0.26	--	0.28	--	
Father's education missing	0.16	--	0.15	--	
Mother's education missing	0.13	--	0.14	--	
Number of siblings	1.52	0.97	1.40	0.88	
GPA (top third)	0.32	--	0.32	--	
GPA (middle third)	0.34	--	0.41	--	
Dependent Measures					t
Positive affect (Happiness)	5.25	1.61	3.90	1.79	7.94
Negative affect (Anger)	1.61	1.15	2.95	1.79	-9.01
Rejection rate (Yes/No)	0.06	--	0.17	--	-3.41
Offer in return (%)	49.98	19.25	34.81	17.48	8.29
<i>N</i>	205		199		

Table 2: Regression Coefficients (Standard Errors in Parentheses) Examining the Mediating Role of Affects for the Effects of Reward Status on Rejection Rate and Offer in Return

		Rejection Rate			Offer in Return (%)	
Under-reward	0.107 (3.39)**	0.018 (0.58)	0.013 (0.41)	-15.176 (8.30)**	-10.552 (5.34)**	-10.650 (5.37)**
Positive affect		-0.023 (1.96)	-0.017 (1.44)		0.831 (1.45)	1.426 (2.52)*
Negative affect		0.044 (2.80)**	0.046 (2.80)**		-2.608 (3.81)**	-2.125 (3.11)**
Female			-0.028 (0.88)			0.234 (0.13)
Grade level			0.013 (2.03)*			1.518 (4.20)**
Penghu county			-0.016 (0.50)			-0.665 (0.37)
Father's years of Schooling			-0.009 (1.05)			-0.148 (0.35)
Mother's education higher than father's			-0.080 (1.75)			-3.921 (1.30)
Mother's education lower than father's			0.030 (0.71)			-3.411 (1.47)
Father's education missing			-0.065			-5.061

			(1.29)			(1.48)
Mother's education missing			0.065			8.804
			(1.03)			(2.29)*
Number of siblings			-0.020			0.820
			(1.40)			(0.65)
GPA (top third)			0.009			1.683
			(0.23)			(0.76)
GPA (middle third)			0.026			0.435
			(0.68)			(0.19)
Constant	0.063	0.110	0.137	49.984	49.821	35.317
	(3.72)**	(1.38)	(0.92)	(37.18)**	(13.09)**	(4.54)**
R^2	0.03	0.11	0.14	0.15	0.20	0.25
N		404			404	

* p<0.1, ** p<0.5, *** p<0.01

Table 3: Regression Coefficients (Standard Errors in Parentheses) Examining the Relationship between Personality Traits and the Four Dependent Measures, Over-Reward Condition

	Rejection Rate		Offer in Return (%)		Positive Affect		Negative Affect	
Openness	-0.022	-0.024	1.375	0.029	-0.362	-0.343	0.001	0.070
	(1.08)	(1.10)	(0.64)	(0.01)	(2.21)*	(2.03)*	(0.01)	(0.57)
Conscientiousness	0.021	0.008	-0.955	-1.579	-0.081	0.017	0.089	0.066
	(0.61)	(0.23)	(0.41)	(0.67)	(0.49)	(0.10)	(0.76)	(0.62)
Extraversion	0.066	0.068	-1.783	-1.413	-0.008	0.012	0.076	0.015
	(2.41)*	(2.33)*	(0.90)	(0.71)	(0.05)	(0.08)	(0.71)	(0.14)
Agreeableness	-0.035	-0.028	-0.878	-0.347	0.299	0.252	-0.214	-0.184
	(0.93)	(0.79)	(0.46)	(0.17)	(1.78)	(1.48)	(1.79)	(1.67)
Neuroticism	0.010	0.002	1.031	0.025	-0.076	-0.007	-0.016	-0.027
	(0.31)	(0.07)	(0.48)	(0.01)	(0.48)	(0.04)	(0.15)	(0.25)
Female		-0.004		0.555		-0.018		-0.284
		(0.12)		(0.21)		(0.08)		(1.85)
Grade level		0.004		2.440		0.006		-0.088
		(0.60)		(4.40)**		(0.12)		(2.86)**
Penghu county		-0.022		-2.723		-0.203		0.518
		(0.62)		(1.01)		(0.87)		(3.64)**
Father's years of schooling		0.004		0.062		-0.089		0.073
		(0.35)		(0.08)		(1.40)		(2.27)*
Mother's education higher than father's		0.027		-6.520		-0.176		0.512

		(0.44)		(1.50)		(0.54)		(1.97)
Mother's education lower than father's		-0.029		-4.724		-0.173		-0.056
		(0.69)		(1.18)		(0.51)		(0.29)
Father's education missing		-0.094		-2.324		-0.111		-0.073
		(1.88)		(0.49)		(0.27)		(0.22)
Mother's education missing		0.070		4.389		-0.260		0.184
		(1.10)		(0.84)		(0.54)		(0.48)
Number of siblings		0.021		-1.076		-0.232		0.205
		(1.22)		(0.60)		(1.64)		(1.98)*
GPA (top third)		0.059		2.559		-0.167		-0.089
		(1.17)		(0.76)		(0.56)		(0.42)
GPA (middle third)		-0.009		-0.859		0.086		-0.125
		(0.20)		(0.24)		(0.30)		(0.61)
Constant	-0.083	-0.139	55.525	47.075	5.810	6.942	1.967	1.254
	(0.32)	(0.50)	(2.92)**	(2.20)*	(3.65)**	(3.97)**	(1.81)	(1.16)
R^2	0.05	0.08	0.01	0.12	0.04	0.08	0.02	0.17
N		205			205		205	

* p<0.1, ** p<0.5, *** p<0.01

Table 4: Regression Coefficients (Standard Errors in Parentheses) Examining the Relationship between Personality Traits and the Four Dependent Measures, Under-Reward Condition

	Rejection Rate		Offer in Return		Positive Affect		Negative Affect	
Openness	0.051	0.053	-2.156	-2.550	0.086	0.068	-0.020	0.046
	(1.23)	(1.15)	(1.38)	(1.35)	(0.42)	(0.30)	(0.09)	(0.19)
Conscientiousness	-0.020	-0.009	0.114	1.062	0.321	0.239	-0.258	-0.253
	(0.45)	(0.20)	(0.06)	(0.57)	(1.65)	(1.28)	(1.32)	(1.22)
Extraversion	0.035	0.043	0.543	1.302	-0.082	-0.086	0.232	0.229
	(1.07)	(1.21)	(0.38)	(0.77)	(0.50)	(0.47)	(1.41)	(1.26)
Agreeableness	-0.103	-0.069	6.753	6.449	0.494	0.370	-0.228	-0.172
	(2.24)*	(1.51)	(3.63)**	(3.43)**	(2.47)*	(1.83)	(1.21)	(0.87)
Neuroticism	-0.010	-0.014	2.505	2.931	-0.006	-0.027	-0.051	-0.012
	(0.29)	(0.40)	(1.61)	(1.76)	(0.03)	(0.16)	(0.28)	(0.07)
Female		-0.058		1.920		0.363		-0.299
		(0.99)		(0.67)		(1.42)		(1.07)
Grade level		0.022		0.905		-0.183		0.003
		(1.71)		(1.60)		(3.31)**		(0.05)
Penghu county		0.008		2.182		0.501		-0.193
		(0.15)		(0.84)		(2.10)*		(0.76)
Father's years of schooling		-0.013		-0.215		0.031		-0.021
		(1.04)		(0.43)		(0.58)		(0.36)
Mother's education higher than father's		-0.174		-2.516		-0.297		0.058

		(2.51)*		(0.60)		(0.74)		(0.14)
Mother's education lower than father's		0.090		-5.342		-0.276		0.676
		(1.29)		(1.72)		(0.92)		(2.09)*
Father's education missing		-0.058		-5.493		0.438		-0.591
		(0.70)		(1.08)		(0.93)		(1.35)
Mother's education missing		0.110		8.682		-0.716		0.825
		(1.02)		(1.49)		(1.47)		(1.75)
Number of siblings		-0.054		2.167		-0.048		-0.228
		(2.00)*		(1.13)		(0.35)		(1.76)
GPA (top third)		-0.007		1.701		-0.575		0.385
		(0.10)		(0.49)		(1.61)		(1.14)
GPA (middle third)		0.085		1.134		-0.698		0.690
		(1.22)		(0.37)		(2.31)*		(2.19)*
Constant	0.414	0.255	1.683	-13.039	0.655	2.903	4.261	3.850
	(1.29)	(0.57)	(0.12)	(0.67)	(0.42)	(1.57)	(2.65)**	(1.92)
R^2	0.05	0.14	0.08	0.14	0.08	0.20	0.04	0.12
N		199			199		199	199

* p<0.1, ** p<0.5, *** p<0.01