Exploring the Conflict between Self-Interest and Concern for Others

DISSERTATION

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Abstract

Humans are social animals, in that we are adapted for living in groups and require assistance from others to survive (Caporael & Brewer, 1995). Thus, it stands to reason that people would not be solely self-interested, but instead would care about the welfare of other people some of the time. Indeed, a great deal of research has demonstrated the extent to which people are social, finding that loneliness is a risk factor for death (House, Landis, & Umberson, 1988), that people react negatively to minimal amounts of ostracism (Williams, 2007), and that people will give others money even when they have no reason to do so (Forsythe, Horowitz, Savin, & Sefton, 1994). Despite the wealth of evidence that seems to suggest that people do care about others, some argue that these are just varied expressions of self-interest.

The purpose of the current research was to develop and test a new measure of concern for others that lacks obvious egoistic counter-explanations. In doing so, this research will examine personality and situational variables that affect concern for others, and will examine the neural correlates of concern. Study 1 introduces this measure, the dual gamble task, and finds that people are not solely self-interested even when egoistic reasons for showing concern for others are stripped away. Further, this study finds that there is reliable variation by personality, in that those high in empathy show more

concern for others, and those high in psychopathy show less concern. Studies 2 and 3 investigate the relationship between personality and situational manipulations of concern, demonstrating that those high in psychopathy will show concern for others if they are properly motivated to do so. Finally, study 4 examines the neural correlates of concern for others, finding that those high in empathy react to others' decisions and outcomes much in the same way they do their own. Together, these studies demonstrate that people are not solely self-interested, and highlight the importance of individual differences in concern for others.

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Publications

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Fields of Study

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Chapter 1: Concern for Others in the Social and Behavioral Sciences

"…Given a full chance to act in his own interest, nothing but expediency will restrain (man) from brutalizing, from maiming, from murdering – his brother, his mate, his parent, or his child. Scratch an 'altruist,' and watch a 'hypocrite' bleed."

Michael Ghiselin, *The Economy of Nature and the Evolution of Sex*, 1974

The standard view of human nature is that people are motivated solely by self-interest. Although economics is the field most obviously allied with the view of humans as solely self-interested ('*homo economicus*,') there is a general tendency in the social sciences to go beyond the data in attributing self-interested motives to people when no evidence of such motivation exists (Dawes, 2004). This perspective is nicely captured in the quote above, which is the concluding statement on the implications of evolutionary theory for human nature (in a chapter entitled, 'The antisocial contract;" Ghiselin, 1974). This view of humans as solely self-interested is so pervasive that even laypeople share it, as demonstrated by the fact that people tend to overestimate the extent to which others are motivated by self-interest (Miller, 1999; Ratner & Miller, 2001), and are more likely to behave prosocially if their behavior can be framed as self-interested (Holmes, Miller, & Lerner, 2002). Further, people demonstrate a tendency toward *attributional cynicism*, or

reconstruing seemingly selfless actions according to selfish motives with no basis for doing so (Crichter & Dunning, 2011).

Although this view of human nature as solely self-interested is widespread, it has not gone unchallenged. *Homo economicus* has been contested by behavioral economics research showing that the assumptions of rationality and self-interest are not always tenable (see Kahneman, Slovic, & Tversky, 1982; Camerer, 2003). The fact that contributions in economic games are ever above zero can be interpreted as an indication that people are not always rational or self-interested, since the best outcome for any individual is to contribute nothing (Dawes & Thaler, 1988). For instance, when people play a dictator game, in which one participant is given an allocation of money by the experimenter and told that they can share any amount (including none) with another participant, most people on average give something rather than nothing (Forsythe, Horowitz, Savin, & Sefton, 1994; Camerer, 2003), indicating that people are not just out for themselves. Additionally, social psychological research has demonstrated unequivocally that people cannot thrive in isolation – we need one another. Evidence for this comes from the fact that people are incredibly sensitive to ostracism (Williams, 2007), even if the person doing the ostracizing is loathed, such as a member of a hate group (Gonsalekorale & Williams, 2007). Further, social isolation is detrimental to health, as lonely people get poorer quality of sleep, have reduced cardiovascular functioning, and increased risk of early death (Cacioppo, Hawkley, Berntson, Ernst, Gibbs, Stickgold, & Hobson, 2002; Hawkley, Burleson, Berntson, & Cacioppo, 2003; House, Landis, & Umberson, 1988). Social inclusion is so important for our species that

we are said to be defined by *obligatory interdependence*; humans are adapted for social living, as actions like fending off predators require the help of others (Caporael & Brewer, 1995). In addition, even though many people have a dismal view of human nature, they still trust others to a high degree. This is exemplified by the 'trust paradox,' whereby people report that others are untrustworthy, and yet when given a chance to put their trust in others (in the form of sending money in the trust game), those same people show relatively high behavioral levels of trust (Fetchenhauer & Dunning, 2009). Overall, it has become clear that concern for others is prevalent and is an important aspect of social behavior, and that the view of people as solely self-interested is untenable, at least in its strongest form.

Many researchers in behavioral economics, psychology, and neuroscience now take seriously the notion that people are not solely self-interested, and a great deal of progress has been made in demonstrating that people will often (though not always) demonstrate concern for others (see Caporael, Dawes, Orbell, & van de Kragt, 1989; Mansbridge, 1990; Rilling & Sanfey, 2011). Now that this has been documented, a new wave of research is beginning to explore the cognitive and neural mechanisms that allow for this more altruistic form of social cognition. Although prior research has demonstrated that people are concerned for others, the full nature and boundary conditions of this concern are unknown. This dissertation will explore who shows concern for others, when they show concern for others, and how this concern for others is manifested.

Although people do clearly care about others, the nature of this concern is still up for debate. That is, many have called into question the extent to which behaviors that indicate concern for others are motivated by "true altruism," or an ultimate motivation for the welfare of another (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997). For instance, even when there is no external reward for behaving prosocially towards others, egoistically-minded critics would say that it is difficult to definitively rule out internal selfish motives such as behaving prosocially to feel good about oneself (Andreoni, 1989, 1990) or to allow oneself an identity as a moral person (Teske, 1997). In order to avoid getting stuck in a debate that may have no resolution, it is best to clarify what I mean by concern for others, and relate this to prior disputes over altruism and egoism.

'Concern for others' is presently defined as a motivational state comprised of a desire for the positive well-being of another person or persons. According to this definition, concerns for self and others are separate components, and when concern for others outweighs concern for the self, then a person may behave altruistically. The present definition of concern for others can be contrasted with emotional states like empathy and compassion. These emotions and concern for others likely do overlap, although the present definition does not assume that emotional arousal is a necessary component of concern for others. This definition is also similar to the notion of other-regarding preferences from the economics literature, which is behavior that is consistent with a desire for a positive outcome for others (see Cooper & Kagel, forthcoming). However, concern for others is presently conceptualized as a motivational state, whereas

other-regarding preferences refer to behavior that is suggestive of an underlying concern for others.

Finally, it is also necessary to situate the current research in the debate over true altruism. This debate has focused on whether or not all instances of altruism are really driven by an ultimate selfish motivation. A distinction has been drawn between proximal motivations and ultimate motivations, with proximal motives being more peripheral and ultimate motives being central. For instance, a woman may offer to help a classmate with his homework, when her goal is really to get his phone number. Here, helping the classmate is the proximate goal that is done in service of the ultimate goal of getting his phone number. So any prosocial behavior is suspect, as there could always be an ultimate concern for oneself lurking behind what appears to be concern for others (Kenrick, 1991). Although the true altruism debate has yielded an impressive set of research results (see Batson, 1991), this debate has seemingly reached an impasse, as neither side is convinced by the arguments against their respective positions. Therefore, in the present research discussions of true altruism will be set aside in order to make progress in better understanding the nature of concern for others, although this will be returned to in the discussion. The present research will instead focus on psychological states of concern for others, although instances where there is an obvious ultimate self-regarding motivation in concern for others (e.g., a person might want a boxer to win a fight because he placed a large wager on that outcome) will be treated as egoistic and ignored. Next, the different approaches to concern for others will be reviewed. This will be limited to cases of concerns for unknown others; that concern for others exists is most obvious in the realm

of family, friends, and romantic partners, so evidence that it exists for unknown others is more compelling. Also, in much of this research there could be an obvious egoistic counter-explanation for demonstrated concern – if the other is known, he or she may also know or find out how he or she was treated in the experiment and reward or punish the participant accordingly.

Economics of concern for others

The field most closely identified with the view that people are primarily driven by self-interest is economics. This likely traces back to Adam Smith's (1776/2008) assertion that "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages." Of course, this type of statement only suggests that self-interest is a powerful motive that can lead to positive outcomes for others, not that it is the only motivation that people have. In fact, in his earlier work on morality, Smith (1759/2000) stated, "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortunes of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it." Despite this clear statement that people do care about others, modern economic theory has largely focused on material self-interest and ignored the possibility of concern for others (see Sen, 1979; Simon, 1993). For instance, much of game theory as applied to economics has focused on games in which two people compete, with the assumption that the most desirable outcome for both is to do as well as possible for oneself with no regard

for the outcomes of the other (von Neumann & Morgenstern, 1944). For years, this assumption of people as utility maximizers in the narrowest sense prevailed, and the nature of the games did not allow for strong inferences to be drawn regarding altruistic versus selfish motivations. In the typical version of the most popular economic game, the prisoner's dilemma, two players affect one another in their decisions to cooperate or defect. Cooperation means that one will choose an outcome that will benefit both self and other collectively, even if it is not the best possible outcome for the self. Defection means that one is choosing a self-interested action at the (possible) expense of another, though if both players make this choice it would lead to both being worse off than if both had cooperated. The problem with using this as a measure of concern for others is that one may defect for a number of reasons, including unmitigated self-interest or a lack of trust in the other person. Thus, research on economic games and economic theory in general largely proceeded without questioning the assumption that concern for others was either non-existent or weak enough to be irrelevant.

It was not until another game came along, the ultimatum game, that the field of economics really started taking seriously the notion that people were not solely self-interested. In the ultimatum game, one player, the proposer, decides how to split an amount of money with another player, the responder, who can veto the outcomes for both players if the offer is unsatisfying (Guth, Schmittberger, & Schwarze, 1982). The proposer's behavior is not terribly interesting, because again, giving to the other could be a function of altruism or belief that the other will reject a low offer. A solely self-interested responder, however, should accept any non-zero offer regardless of how unfair

it is – it is always better to get something than to get nothing. However, this is not what the initial studies on the ultimatum game found, nor has it been the typical finding after decades of research in the area. Instead, many responders in the original study rejected unfair offers (Guth et al., 1982), and one review of ultimatum game behavior across studies found that low (i.e., 20% or less) offers are rejected approximately 50% of the time (Camerer, 2003). This demonstrates that people are concerned with fairness, although it only examines an insistence that oneself be treated fairly. However, subsequent research on altruistic punishment has found that some people are willing to pay a cost to punish those who are unfair to others in economic games (i.e., third party punishment; Fehr & Fischbacher, 2004).

Although fairness is an important consideration in demonstrating that people are not solely self-interested, it is not exactly the same as concern for others (Singer & Steinbeis, 2009). Fortunately, concern for others has been more directly addressed with a modified version of the ultimatum game in which the responder no longer has any power over what happens to the proposer. In this dictator game, the first player is given an allocation of money by the experimenter, and that player can give any amount of it (including none) to the second player, who is only a passive recipient (Forsythe et al., 1994). If concern for others is dependent upon getting some material benefit, then participants should give no money to others in the dictator game. However, many people do show concern for others by giving others money when they have no material reason to do so (Forsythe et al., 1994; Henrich, Boyd, Bowles, Camerer, Fehr, Gintis, & McElreath, 2001). Results from these studies (and many more like them), have led many

economists to update their views of human nature. There are now a number of models of behavior that include a component for other-regarding preferences (e.g., Rabin, 1993; Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000). Further, even though many still doubt the ultimate motivations behind concerns for others (i.e., arguing against true altruism; Andreoni, 1990), few would argue that people are only out for themselves in the most proximal, narrow sense.

Despite the fact that concern for others seems to be widely accepted in the field of economics, a number of researchers have questioned the findings from the dictator game, and have attempted to demonstrate that it is a subpar measure of concern for others, with varying degrees of success. One criticism of economic games in general has been that they are typically played for low stakes (often $20 or less), so people may behave more selfishly if they played for more money. However, research on stake size has not supported this view, at least as an alternative explanation for dictator game results. A number of studies have varied whether participants split $10 or $100, and have found that although first players in the high stakes condition do give less to second players than in the low stakes condition, the differences are not statistically significant (List & Cherry, 2008; Carpenter, Verhoogen, & Burks, 2005). This fits with research on increasing stakes in other types of economic games, which has found that increasing the stakes (often by playing games in locations that allow participants to make as much as three months' earnings in a single study) frequently does lead to some change in behavior, but certainly does not lead to people behaving in ways that could be described as solely self-interested

(Cameron, 1999; Munier & Zahara, 2003; Johansson-Stenman, Mahmud, & Martinsson, 2005).

Some researchers skeptical of the inferences drawn regarding concern for others using the dictator game have pointed out that it is very different from real-world situations, and thus may say little about human nature. For instance, one difference between experiments using the dictator game and real-life is that participants are given an allocation of money by the experimenter in dictator games, but earn their money in the real world. Consistent with this idea, when participants earn their allocations in the lab through performance (i.e., answering questions correctly on a GMAT exam), giving in the dictator game does drop drastically to near-zero levels (Cherry, Frykblom, & Shogren, 2002). Also, giving in the dictator game is often uncorrelated with real-world charitable contributions (Gurven & Winking, 2008; Wiessner, 2009), further supporting the notion that giving in this game says little about what people are actually like. Although these findings are noteworthy, they do little to damage the reputation of the dictator game or concern for others more generally, since they largely just spell out boundary conditions in concern for others. This can be seen in the fact that people give more money in dictator games if they get to pick the charity (Eckel & Grossman, 1996), which is likely more similar to situations in which real-world giving might be expected to occur. However, this does not prove that altruism is underestimated in the lab, just as the previously mentioned studies do not prove it is overestimated in the lab. Rather, these results demonstrate that there is no single 'real-world situation,' but instead a variety of contextual variables that could increase or decrease any construct, including concern for

others. Further, the goal of experiments is not to perfectly match all variables to real-world settings, but rather to recreate the relevant real-world psychological states in the lab so they can be studied with precision (Aronson, Wilson, & Brewer, 1998).

A more compelling criticism of the dictator game is that it measures more than just concern for the other person. For instance, some have argued that the standard dictator game presents participants with implied experimental norms suggesting that they should give some money to the other person. That is, in the typical dictator game, people are asked how much they want to give to the other person, suggesting that giving is the normative response. Consistent with this hypothesis, when participants also have the option to take money from the other player, giving in the dictator game drops drastically, although the most selfish option (taking all of the other person's money) does not dominate either (List, 2007; Bardsley, 2008).

The dictator game has also been criticized as a measure of concern for others on the grounds that it is that it is sensitive to concerns about being perceived as fair (by self or others, such as the experimenter). Bolstering this argument are experiments showing that participants who are given a standard dictator game with an option of not playing for lower stakes are far more likely to accept the option of not playing (Dana, Cain, & Dawes, 2006). That is, a significant number of participants would rather take $9 and leave the responder with nothing than actually play the dictator game in a way that allows them to receive $9 and give the participant $1 (or any other split they would like). Similarly, when participants in a dictator game are given an additional option of playing an unattractive lottery, this also leads to reduced dictator game giving (Oberholzer-Gee &

Eichenberger, 2008). In other experiments, researchers have separated decision and outcome in a way to give the participants making the decisions 'plausible deniability' (such as by making allocation decisions random if they did not make a response in time), and this too has led to a decrease in dictator game giving (Dana, Weber, & Kuang, 2007).

The field of economics now does largely recognize the importance of concern for others, in the form of other-regarding preferences and concerns for fairness (see Fehr & Schmidt, 2006; Kolm, 2006). Although economics initially focused on people as solely self-interested, more recent research in behavioral economics (often using the dictator game) has made an astounding amount of progress in a relatively short amount of time. Despite this, questions still remain regarding the inferences drawn using the dictator game, especially since it may introduce experimental norms that one should give to the other, and may elicit concerns for being perceived as fair.

Psychology of concern for others

Economics as a discipline has a number of strengths that allow it to make novel contributions to the literature on concern for others. These include always using behavioral measures, ensuring that participants understand all tasks and are motivated (by money) to perform them, and avoiding deception so that participants have no reason to doubt what they are being told. Nonetheless, economics does have shortcomings as well, such as an unwillingness to go beyond behavior to specify the thoughts, emotions, and motives that underlie concern for others. Psychology, particularly personality and social psychology, is well-suited to fill in these gaps to provide a more complete picture of concern for others.

Personality differences in concern for others

Not all people are motivated by the welfare of others to the same degree. Any evening news program will alternate among stories of violent crime, corporate greed, and altruistic behavior. Long before the field of economics acknowledged that some people might have other-regarding preferences or endorse norms of fairness, psychologists realized that people have a variety of motivations, including both self- and other-interested motivations (e.g., Maslow, 1943). More recent theory and research on social value orientation (SVO) has sought to understand the motivation behind behavior in social dilemmas (Messick & McClintock, 1968; Van Lange, De Cremer, Van Dijk, Van Vugt, 2007), and has identified a number of different value orientations that serve to characterize the motivations for this behavior. SVO is calculated by having participants take part in a variant of a decomposed game, in which they make repeated decisions between two pairs of outcomes for themselves and others (Pruitt, 1967; Messick & McClintock, 1968). Behavior on this task suggests two broad orientations: prosocial, which reflects maximizing mutual gains or equality, and proself, which reflects maximizing one's own outcomes. Proself can be further divided into those who are primarily individualistic, which reflects the desire to maximize the outcomes for the self with no concern for others, and those who are primarily competitive, which reflects the desire for better outcomes relative to others (Van Lange, 2004). Unsurprisingly, those who are characterized as prosocial are more likely to cooperate in one-shot prisoner's dilemmas than those characterized as proself (Van Lange, 1999). Further, those characterized as prosocial by SVO measures are more likely to behave prosocially

outside of the lab, demonstrating a greater willingness than those characterized as proself to volunteer time (McClintock & Allison, 1989), and to use public transportation (Van Vugt, Meertens, & Van Lange 1995).

Although research on SVO has clearly demonstrated that there are individual differences in the willingness to cooperate with others, this research is limited in some ways as well. First, participants are typically asked to make hypothetical decisions to measure SVO (Au & Kwong, 2004), and it does not predict behavior as well when the behavior it is predicting is played for money rather than points (although it is still a significant predictor of behavior regardless; Balliet, Parks, & Joireman, 2009). Additionally, because SVO infers personality types from behavior, it says little about participants' states of mind, and why they show differences in concern for others. That is, although the SVO construct does demonstrate that there are multiple motives behind behavior in social dilemmas, it says nothing about the nature of these motives. For instance, some people may desire equality of outcomes due to dispositionally high levels of empathy (e.g., Eisenberg & Fabes, 1990), whereas others do so because of their values (e.g., Schwartz, 2009). Although this has been addressed to some degree by further splitting the two broad orientations into many more – early theorists put forth eight distinct orientations (McClintock, 1972), and recent theorists have proposed five (Van Lange, 2004). But splitting can only do so much to address this issue, as inferring dispositions from only behavior is self-limiting, since it cannot reveal what a person is thinking or feeling in a given situation.

Other contemporary research on the personality differences in concern for others has spelled out the beliefs and emotions behind this concern, but early research on this topic (and in the field in general) largely began by only examining behavior. Some of the earliest research in personality psychology attempted to understand the basis of altruism by searching for evidence of character in the consistency of moral behavior across situations, but this was initially judged as a failure after the cross-situational correlations in behaviors like honesty were found to be relatively low (Harthsorne & May, 1928; see Bem & Allen, 1974 for an overview). Even once researchers went beyond just behavior to examine personality, they still found little success with individual difference approaches. Research on altruistic personality found that personality was weakly correlated with prosocial behavior across situations, whereas situational manipulations were much more predictive (Latane & Darley, 1970; Darley & Batson, 1973; Mischel, 1968). Although both the search for character and for an altruistic personality were initially judged as failures, more recent attempts to understand the nature of personality and concern for others has been more successful (see Penner & Orom, 2009).

With the movement from conceiving of personality as universal, invariant traits operating regardless of the situation to probabilistic tendencies to have different thoughts, emotions, and to experience different states that interact with situations (e.g., Mischel & Shoda, 1995), the Five Factor Model has probably been the most successful and widely studied approaches to personality (e.g., McCrae & Costa, 1987; Digman, 1990; John, 1990). The Five Factor Model extracts five higher order personality factors (the Big Five) from the natural language used by laypeople (see John & Srivastava, 1999 for a review).

These five factors have been found across cultures (McCrae, Costa, Del Pilar, Rolland, & Parker, 1998), are partially heritable (Jang, Livesly, & Vernon, 1996), and have been related to differences in brain structure (DeYoung, Hirsh, Shane, Papademetris, Rajeevan, & Gray, 2010) and function (Canli, Zhao, Desmond, Kang, Gross, & Gabrieli, 2001). Included in the Big Five traits is agreeableness, which is the desire to have positive interactions with others (Costa & McCrae, 1992; Graziano & Eisenberg, 1997). Supporting this view, those high in self-reported agreeableness are more likely to react to conflict in ways that reduce rather than exacerbate it (Graziano, Jensen-Campbell, & Hair, 1996), and are more likely than those low in agreeableness to help others, particularly when those others are unrelated (Graziano, Habishi, Sheese, & Tobin, 2007). Although the desire to have positive interactions with others could be the result of either selfish or selfless motivations, theory on aspects of the Big Five, which focuses on splitting the five higher-order traits into ten lower-level aspects (two for each trait), has found that one of the aspects of agreeableness is compassion for others (the other is politeness; DeYoung, Quilty, & Peterson, 2007). Theory on the structure of the Five Factor Model has further spelled out an even lower-level beyond aspects, facets, and these include both altruism and tenderheartedness (Costa, McCrae, & Dye, 1991; DeYoung et al., 2007).

Cognitive structures such as deeply held values could also be construed as facets of agreeableness[1], and are clearly related to individual differences in concerns for others.

[1] Despite the positive correlations between agreeableness and prosocial values (e.g., Roccas, Shagiv, Schwartz, & Knafo, 2002) this research has existed outside of the domain of the Five Factor Model, and proponents of values theory contend that values are distinct from the Big Five at both the trait and facet level (e.g. Roccas et al., 2002).

Basic values are beliefs that are linked to emotion and motivation that are thought to transcend situations (Schwartz, 2009). Schwartz's (1992) theory of basic values includes both self-enhancement values (i.e., achievement and power) and self-transcendent values (i.e., benevolence and universalism), indicating that concerns for both self and others are prevalent across cultures. Early research in this area was more fruitful than other early personality research, as values of responsibility moderated the link between what people believed they should do (i.e., personal norms) and their behavior in those situations (Schwartz & Clausen, 1970; Schwartz, 1973).

In addition to individual differences in positive traits, there are also important individual differences in negative traits that relate to (lack of) concern for others as well. Specifically, the 'dark triad' of psychopathy, narcissism, and Machiavellianism are three separate but interrelated personality traits that characterize those with antisocial dispositions (Paulhus & Williams, 2002). Machiavellianism is a manipulative disposition that describes a willingness to exploit others for personal gain (Christie & Geis, 1970; Wilson, Near, & Miller, 1996). Unsurprisingly, this has been linked to selfish behavior in social dilemmas, with those high in Machiavellianism (high Machs) being more likely to defect in trust games (Gunnthorsdottir, McCabe, & Smith, 2002). Further, because these individuals view others in purely instrumental terms, high Machs will demonstrate as much prosocial behavior as low Machs, but only if it suits their needs (Wilson et al., 1996; Hawley, 2003). For instance, high Machs are far less likely than low Machs to offer help to someone in anonymous situations, but this difference is nearly eliminated in highly public settings (Bereczekei, Birkas, & Kerekes, 2010).

Narcissism is another of the 'dark triad,' although it affects concern for others differently than does Machiavellianism. Individuals high in narcissism tend to have arrogant, grandiose beliefs about themselves and exaggerate their self-importance (Raskin & Hall, 1979; Paulhus, 1998). Since those high in narcissism view themselves as better than others, they respond poorly when they are challenged, and narcissists are often characterized as having inflated yet fragile egos (Morf & Rhodewalt, 2001). For instance, narcissists are more likely than others to aggress after insult (Bushman & Baumeister, 1998) and rejection (Twenge & Campbell, 2003), and narcissistic men are more likely to endorse sexually coercive beliefs following sexual refusal (Baumeister, Catanese, & Wallace, 2002; Bushman, Bonacci, van Dijk, & Baumeister, 2003). Also, those high in narcissism tend to have a sense of entitlement (Emmons, 1984), and this likely contributes to the fact that they are more likely to behave selfishly in social dilemmas (Campbell, Bush, Brunnell, & Shelton, 2005).

Psychopathy is perhaps the most relevant of the 'dark triad' to discussions of concern for others, as those high in psychopathy are characterized by their callousness, lack of empathy, and antisocial behavior (Herve, 2007). Incarcerated individuals high in psychopathy are arrested at an earlier age, commit more offenses per year both in and out of prison, and have higher rates of recidivism than similar individuals who are lower in psychopathy (Hart & Hare, 1997; Porter & Porter, 2007). Even in non-clinical samples, psychopathy is positively related to self-reported antisocial behavior (Lynam, Whiteside, & Jones, 1999; Mullins-Nelson, Salekin, & Leistico, 2006) and selfish behavior in social dilemmas (Mokros, Menner, Eisenbarth, Alpers, Lange, & Osterheider, 2008; Koenigs,

Kruepke, & Newman, 2010). Additionally, psychopathy is one of the few risk factors for both reactive aggression (harming another person out of frustration) and instrumental aggression (harming another person to achieve a goal), as most other predictors are only related to the former (Blair, 2001; Woodworth & Porter, 2002). This suggests that most individuals are unlikely to harm others, and only do so when overwhelmed with anger or frustration (displaying reactive aggression). However, those individuals higher in psychopathy have little inhibition against harming others, and will do so if it serves their interests (displaying instrumental aggression). Again, a lack of empathy for others is thought to be at least partially responsible for the negative actions of those with psychopathy, with some even questioning the legal culpability of clinical psychopaths on the basis that they are incapable of showing empathy (Glenn, Raine, & Laufer, 2011); however, even though those high in psychopathy clearly are antisocial and do not demonstrate empathy for others, the notion that they are unable to do so is an untested assumption that has been prevalent in the literature for decades (Cleckley, 1976).

Finally, no discussion of individual differences in concern for others would be complete without mentioning gender. Both evolution and biology (e.g., Taylor, Klein, Lewis, Gruenewald, Gurung, & Updegraff, 2000; Taylor, 2002) and social roles and norms (e.g., Eagly, 1987; Wood & Eagly, 2002) nudge women in the direction of being more caring and nurturing than men, and there is a great deal of evidence for this in the literature. Women behave more prosocially than men in economic games (Eckel & Grossman, 1998; but see Camerer, 2003), and are less antisocial in a number of domains (see Moffit, Caspi, Rutter, & Silva, 2001 for an overview). Further, it is easy to find

evidence for gender differences in nearly every personality variable mentioned above, including higher rates of prosocial value orientation (Van Lange et al., 1997), higher levels of agreeableness (Costa, Terraceiano, & McCrae, 2001), empathy (Baron-Cohen & Wheelwright, 2004), prosocial values (Schwartz & Rubel, 2005), and lower rates of individualistic social value orientation (Van Lange et al., 1997), lower levels of psychopathy (Cale & Lilienfeld, 2002), narcissism (but women may be catching up; Twenge, Konrath, Foster, Campbell, & Bushman, 2008), and Machiavellianism (see Wilson et al., 1996). Additionally, women are more likely to have relational self-construals (Cross & Madson, 1997), which is a way of defining oneself on the basis of relationships with close others (Markus & Kitayama, 1991; Gabriel & Gardner, 1999). Despite all of this evidence in favor of women being more concerned for others, some have argued that these differences are either nonexistent or relatively small (Jaffee & Hyde, 2000; Hyde, 2005). Furthermore, null effects are often not reported or are uninterpretable, so they are likely to go unnoticed. There are also countless studies that reveal more complex patterns regarding concerns for others, such as women showing greater concern in interpersonal contexts, and men showing greater concern in intergroup contexts (Gabriel & Gardner, 1999). If there are gender differences in concern for others, these are likely manifested through personality differences and susceptible to situational variation, so it is more productive to focus on those areas than on gender *per se* in understanding this concept.

The social psychology of concern for others

Although great progress has been made in finding reliable individual differences in concern for others, initial attempts to find these were unsuccessful (e.g., Hartshorne & May, 1928). Much of the research on the social psychology of concern for others began with these initial failures of personality psychology to account for behavior. Specifically, the five stage model of helping behavior (Darley & Latane, 1970) specifies the conditions that are necessary for someone to provide help to another, and clearly explicates how and why someone might fail to provide help to another. In that sense, this model is less about the necessary components of concern for others and more about how concern for others might be dissociated from prosocial behavior through processes like distraction due to competing goals (Darley & Batson, 1973), diffusion of responsibility (Darley & Latane, 1968), and pluralistic ignorance (Latane & Darley, 1968).

The bulk of the social psychological research that directly examines how concern for others may be affected situationally involves increasing empathy for others, often through perspective taking (Coke, Batson, & McDavis, 1978; Batson, 1991). Empathy, or empathic concern, is "an other-oriented emotional response elicited by and congruent with the perceived welfare of someone else" (Batson, 2009). This is essentially identical to the definition of concern for others given earlier, with the addition of some degree of emotional arousal[2]. Thus, it is unsurprising that higher amounts of situational or dispositional empathic concern are related to prosocial behavior (Eisenberg & Miller, 1987), whereas lower levels of situational or dispositional empathic concern are

[2] Empathic concern as presently defined is essentially the same as compassion, "the feeling that arises in witnessing another's suffering and that motivates a subsequent desire to help," (Goetz, Keltner, & Simon-Thomas, 2010), and sympathy, "feelings of sorrow or concern for the distressed or needy other" (Eisenberg, 2010).

associated with antisocial behavior (Miller & Eisenberg, 1988). Increased empathic concern not only increases general prosocial behavior, but it seems to encourage behavioral concern for others in situations when none might be expected, as it is related to higher levels of cooperation in a one-shot prisoner's dilemma when the other person is known to have defected in advance (Batson & Ahmad, 2001), and decreased desire to punish cheaters in an economic game (Condon & DeSteno, 2010).

Although the present definition of empathy is common, there are many others, including sharing emotional states, personal distress, and perspective taking (Batson, 2009). These different concepts are related to concern for others more generally, but less directly than empathic concern. Sharing emotional states may be both an antecedent to or a consequence of caring for another person, but one does not necessarily have to care about someone else just because of a shared emotional state. Personal distress is thought to be a self-directed negative emotion at another's misfortune, and this leads to a desire to reduce one's own suffering rather than another's (Batson, Fultz, & Schoenrade, 1987). Those made to feel personal distress are more likely to help others when it is the only way to relieve their distress, but will escape the situation if possible (Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983). Thus, this is really not about concern for others at all, but rather concerns for oneself.

Perspective taking on the other hand does lead to concern for others, and it does so through empathic concern. That is, when an individual is directed to take the perspective of someone who is suffering, he or she is more likely to feel empathic concern for that person (Coke et al., 1978; Batson, 1991). Perspective taking does have

other effects as well, such as increased overlap of mental representations of self and other (Davis, Conklin, Smith, & Luce, 1996)[3]. Classic research in this area has found that those in close relationships show a high degree of self-other overlap (Aron, Aron, Tudor, & Nelson, 1991), reflecting the fact that this is characteristic of having a high degree of concern for others. Overlap of self and other mental representations can also occur when someone joins highly valued group (Smith & Henry, 1996), leading to increased concern for the others with whom one shares a self-representation. Thus, perspective taking increases both empathic concern and self-other overlap, both of which are important determinants of concern for others.

In addition to emotion-sharing, perspective taking, and self-other overlap, there are a number of other situational determinants of empathic concern, including values affirmation (Crocker, Niiya, & Mischowski, 2008), meditation training (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008), low socioeconomic status (Piff, Krauss, Cote, Cheng, & Keltner, 2010), and being a victim of suffering (Vollhardt, 2009). Additionally, empathy it is not the only emotion relevant to concern for others. For instance, guilt and shame are 'self-conscious emotions' that differentially relate to concern for others, in that guilt leads to increased concern and a focus on others, whereas shame leads to decreased concern and a focus on oneself (see Tangney, Stuewig, & Mashek, 2007). 'Moral emotions,' on the other hand, are emotional states that are induced when seeing moral acts in others, and these include awe, gratitude, admiration, and elevation (Haidt, 2003). Moral emotions lead to altruistic behavior (Schnall, Roper, & Fessler, 2010) and concern

[3] Although self-other overlap can lead to increased empathic concern for others, it is not solely responsible for the link between empathy and helping behavior (see Batson et al., 1997).

for others, even if those others are outgroup members (Freeman, Aquino, & McFerran, 2009).

That moral emotions can result in a concern for outgroup members is somewhat surprising, given the vast research on the effects of shared ingroup identity on concern for others. This research has demonstrated that when people identify highly with a group, they tend to care more about the group's outcomes (De Cremer & Van Vugt, 1999; De Cremer & Van Dijk, 2002). High identification with a group leads to self-categorization as an ingroup member, which transforms (personal) self-interest into group-interest (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Even when groups are experimentally created in the laboratory, people are quick to feel positivity toward and show concern for ingroup members (Tajfel, Billig, Bundy, & Flament, 1971; Brewer, 1979; Van Bavel & Cunningham, 2009). Additional research has shown that people are more likely to cooperate with and provide help to ingroup members than outgroup members (Dovidio, Gaertner, Validzic, Matoka, Johnson, & Frazier, 1997) and that people are more likely to solve problems of collective action if interacting with ingroup members (Kramer & Brewer, 1984).

Although people are quick to extend concern to fellow members of a valued ingroup, they are less likely to demonstrate concern for outgroup members (Cikara, Bruneau, & Saxe, 2011). Further, even when empathic concern is induced, this often only leads to prosocial behavior toward ingroup members, as group membership moderates the relationship between empathy and helping (Sturmer, Snyder, Omoto, 2005; Sturmer, Snyder, Kropp, & Siem, 2006). Further, even though belonging to a valued ingroup does

not necessarily lead to dislike or hatred of an outgroup (Brewer, 1979; Brewer, 1999), intergroup contexts do provide a fertile ground for the development and expression of aggression, hatred, and antisocial behavior amongst certain people (e.g., those high in social dominance orientation or right wing authoritarianism; Sidanius & Pratto, 1999; Altemeyer, 1988) and under certain conditions (e.g., threat; see Riek, Mania, & Gaertner, 2004). Further, the characteristics of others can also affect the concern that is shown to them, as people are more likely to feel contempt toward outgroup members that are low in both competence and warmth (Fiske, Cuddy, Glick, & Xu, 2002).

This research on intergroup contexts highlights the fact that just as there are both positive and negative personality traits that affect concern for others, so too are there positive and negative situational variables that do the same[4]. For instance, being placed in a social role (Haney, Banks, & Zimbardo, 1973) or group (Reicher, Spears, & Postmes, 1995) in which the norms are to treat others poorly can lead to conformity to those norms, and thus a decrease in concern for others. Additionally, making cues for aggression (such as weapons) salient increases aggressive thoughts, and this leads to aggressive behavior (Berkowitz & LePage, 1967). Exposure to aggressive cues in the form of violent media also desensitizes people to aggression (Bartholow, Bushman, & Sathir, 2006), and suffering (Bushman & Anderson, 2009), both of which are at least partially responsible for the effects of violent media on aggression (for reviews see Anderson & Bushman, 2001; Bushman & Huesmann, 2006). Although the effects of

[4] Although the Milgram (1963) obedience studies may seem like the classic example of a situational decrease in concern for others, both reports and video footage indicate that the participants in the study were disturbed by the aggressive actions they were performing. Thus, it is not clear that this is an example of a situational decrease in concern for others.

violent cues on aggressive behavior are strong, not everyone is affected equally by them. Those high in agreeableness are unaffected by violent cues, and instead think prosocial thoughts when confronted with aggressive cues (Meier, Robinson, & Wilkowski, 2006), reflecting the fact that personality can interact with the situation to affect concern for others.

Neuroscience of concern for others

Economics and psychology have both made substantial contributions to the scientific understanding of concern for others. There has been some research combining the two approaches (e.g., Loewenstein, Thompson, & Bazerman, 1989), and some would say behavioral economics is a combination of psychology and economics (Camerer, 1999), but neuroscience is uniquely suited to unite both under a common framework that provides new answers to old questions about concern for others. There has been an explosion of neuroscientific research in the last decade, as research using neuroscientific methods has already incorporated many of the aforementioned approaches to study concern for others. Three areas of research in particular stand out as most relevant. These are the neuroscience of economic game play, the brain differences that distinguish those chronically lacking in concern for others (i.e., psychopaths) from the normal population, and neural reactions to viewing others in pain.

Neuroeconomics

Neuroeconomics aims to combine the study of economics, psychology, and neuroscience to address basic questions regarding topics such as decision-making and value (Sanfey, Loewenstein, McClure, & Cohen, 2006). Initial research in this area has

used functional magnetic resonance imaging (fMRI) in order to understand the neural correlates of social decision making, and has found that prosocial behavior is rewarding (see Rilling & Sanfey, 2011 for a review). Specifically, cooperating with others has been shown to be associated with increased activity in reward-related regions of the brain, such as ventromedial preftrontal cortex (vmPFC), orbitofrontal cortex (OFC), and the striatum, which is comprised of nucleus accumbens (Nac) and caudate nucleus (Decety, Jackson, Sommerville, Chaminade, & Meltzoff, 2004; Rilling, Gutman, Zeh, Pagnoni, Berns, & Kilts, 2002; Tabibnia & Lieberman, 2007). Similarly, research on charitable donation has found that simply giving to others is related to increased activity in reward areas (Moll, Krueger, Zahn, Pardini, de Oliveira-Souza, & Grafman, 2006). Additionally, research on altruistic punishment has found that this too is rewarding, as paying to reduce an unfair player's outcomes is also related to increased activation in the striatum (de Quervain, Fischbacher, Treyer, Schellhammer, Schnyder, Buck, & Fehr, 2004). However, increased activity in reward-related regions to prosocial behavior is not a uniform response. For example, providing for others is only rewarding if those others also give something back, suggesting that the reciprocity of others matters (Rilling, Sanfey, Aronson, Nystrom, & Cohen, 2004). Also, seeing others get rewarded is rewarding, unless there is a pre-existing inequality such that the person with more money is getting rewarded (Tricomi, Rangel, Camerer, & O'Doherty, 2010).

This effect of pre-existing inequality fits with other neuroeconomics research demonstrating neural evidence for an aversion to inequality. Specifically, when evaluating the attractiveness of pairs of outcomes for self and other, those characterized

as prosocial on a social value orientation task showed a positive correlation between amygdala activity and unfair offers (Haruno & Frith, 2010). The amygdala, once thought to be solely devoted to fear or negativity processing, is now thought to be involved in the processing of motivationally relevant stimuli (Sander, Grafman, & Zalla, 2003; Cunningham, Van Bavel, & Johnsen, 2008). Thus, this result suggests that the possibility of an unequal distribution between self and other is attention-grabbing and salient, at least among those with a prosocial value orientation.

Perception of pain in others

In addition to finding that we may experience the pleasure of others, we may also be able to empathetically experience their pain as well. Research on pain perception has shown that when one person views another in pain, there is increased activation in some of the same brain regions associated with the processing of physical pain (e.g., actually receiving a painful shock), including the anterior cingulate cortex (ACC) and insula (Jackson, Meltzoff, & Decety, 2005; Singer, Seymour, O'Doherty, Kaube, Dolan, & Frith, 2004). Activation in the insula and the ACC when participants view another person in pain has been interpreted as a sharing of the affective, but not sensory, response to pain (Singer et al., 2004). As such, this response suggests that we may be able to literally feel the pain of others and act to eliminate this response. Additional research has found that merely viewing the facial expressions of those in pain can generate this effect (Botvinick et al., 2005). As with the research on increased activity in reward-related regions for prosocial behavior, this response is not obligatory; it is greater when observing pain in moral as opposed to immoral people (Singer, Seymour, O'Doherty, Stephan, Dolan, &

Frith, 2006, Hein & Singer, 2008), and reduced if one believes that the other person is responsible for his/her own pain (Decety, Echols, & Correll, 2009). Additionally, increased activity in pain-related regions (i.e., insula and ACC) to viewing others in pain has been correlated with self-reported empathy (Lamm, Batson, & Decety, 2007). Similarly, increased activity in pain-related regions to the facial expressions of those in pain is correlated with self-reported empathy (Saarela, Hlushchuk, Williams, Schurmann, Kalso, & Hari, 2007). Finally, one study found that physicians did not show a pain-related response in insula or ACC when viewing someone in pain (relative to non-physician controls), further demonstrating that this is effect is susceptible to variation according to context (Cheng, Lin, Liu, Hsu, Lim, Hung, & Decety, 2007).

Neuroscience of psychopathy

Psychopathy is a personality disorder characterized by a lack of empathy for others (Hare & Neumann, 2008). This lack of empathy in those high in psychopathy is thought to be produced by deficits in neural systems that give rise to the development of moral reasoning, namely the amgydala, which is responsible for allowing people to learn stimulus-reinforcement pairings, and the orbitofrontal cortex (OFC), which is responsible for signaling the appropriateness of different outcomes (Blair, 2007). Specifically, it is thought that children with amygdala deficits in forming stimulus-reinforcement pairings fail to develop an association between their actions (e.g., harming others) and the social cues emitted as a result of those actions (e.g., others' cries of distress). As a result, these individuals fail to feel bad when harming others or feel good when rewarding others. This is supported by research showing that children with tendencies toward psychopathy

demonstrate reduced amygdala and/or OFC activity to emotional faces (Marsh et al., 2008), and in reversal learning tasks (Finger et al., 2008). Similarly, adults higher in psychopathy show reduced amygdala and/or OFC activity to emotional words (Kiehl et al., 2001) and faces (Birbaumer et al., 2005; Marsh & Blair, 2008), to fear conditioning (Gordon, Baird, & End, 2004), when making judgments about moral dilemmas (Glenn, Raine, & Schug, 2009), and when deciding to cooperate or compete in a prisoner's dilemma (Rilling et al., 2007). Additionally, damage to these regions has been found to lead to more utilitarian (and thus less emotional) moral judgments (Koenigs et al., 2007), a lack of guilt when behaving selfishly (Krajbich, Adolphs, Tranel, Denburg, & Camerer, 2009), and a lack of concern for social and moral conventions (Anderson, Bechara, Damasio, Tranel, & Damasio, 1999).

In sum, the neuroscientific research has demonstrated that, in general, we experience reward when having mutually rewarding interactions with others, we experience the pain of others when they are in pain, and that these effects are moderated by individual differences in personality (i.e., empathy) and situational variation (i.e., character of interaction partner). Further, those high in psychopathy are less likely to show increased activity in reward related regions when behaving prosocially, and those high in psychopathy demonstrate functional deficits in regions of the brain related to normal emotional responding.

Concern for others: Who, when, and how

The combined literature on concern for others indicates that on average, people do care about others, although there are a number of reliable individual differences in this

general tendency, especially amongst those high in agreeableness and/or psychopathy. Further, some situations are more likely to elicit concern for others, such as if a group membership is made salient. Finally, concern for others has been demonstrated in a number of different ways, including willingness to accept painful shocks on someone else's behalf, the desire to give others money at a cost to the self, and neural activity to rewards and pain for others. However, questions remain about the nature of concern for others, particularly regarding how it is demonstrated. Again, the dictator game is perhaps the best measure, since it is behavioral, does not involve any complex deception, and involves a monetary cost. However, despite its positive characteristics, the dictator game has drawbacks as well, such as the possibility that the structure of it communicates to participants that they should give some money to the other person. These issues with the dictator game make it an imperfect measure of concern for others, and may call into question whether or not people really care about others when there is a monetary cost involved. Further, since the inferences about variation in concern for others rests on the quality of the measures used to assess it, it is crucial to improve upon the dictator game to get a complete and accurate understanding of situational and individual differences in concern for others.

This dissertation examines these questions by introducing a new measure of concern for others, the dual gamble task, which has many of the advantages of economic measures of concern while minimizing the drawbacks. The dual gamble task allows for stronger inferences to be made regarding whether or not people are solely self-interested. Additionally, this new measure is used to further explore individual differences and

situational variation in concern for others, and to examine the neural correlates of it as well.

This dissertation includes four studies exploring the nature of concern for others, specifically who shows concern, under what conditions they show concern, and how this concern is realized in the brain. Study 1 introduces a new measure of concern for others, the dual gamble task, to better examine whether people are solely self-interested or if there are some who are concerned for others. This study also explores the personality correlates of concern for others. Studies 2 and 3 use the dual gamble task to test theory regarding concern for others and psychopathy by examining whether those high in subclinical psychopathy are ever able to show concern for others. Finally, study 4 investigates the neural correlates of concern for others by examining fMRI responses to the dual gamble task, and how that relates to personality.

Chapter 2: Introducing a New Measure

Concern for others has been demonstrated in a variety of domains, including willingness to give money in economic games (i.e., the dictator game; Forsythe et al., 1994), willingness to provide assistance to someone in need (Darley & Batson, 1973), willingness to trade places with someone who is about to receive pain (Batson, Duncan, Ackerman, Buckley, & Birch, 1981), and neural reactions to seeing someone else in pain (Jackson et al., 2005). Any measure of concern for others has both benefits and drawbacks, and there is no perfect measure of this (or any other) construct. Perhaps the best measure of concern for others is the dictator game, in which one participant is given an allocation of money, any amount of which can be shared with another person (Forsythe et al., 1994). This is a useful measure of concern for others since it requires a clear cost to demonstrate concern, and involves no elaborate deception that participants may doubt. However, the dictator game also has drawbacks, such as the fact that behavior in the game may be affected by experimental norms suggesting that participants should give some money to others. Supporting this notion is the fact that if the norms are changed (by providing participants with additional choices), people show less concern for others (List, 2007; Bardsley, 2008). Additionally, having decision equivalent to outcome may also inflate concern on this measure by making unfair behavior salient to

participants themselves; supporting this is the fact that when decision and outcome are separated, participants are less likely to give to others (Dana et al., 2007). Also, although having concern come at a cost is useful, concern for self and others is confounded such that giving more to others necessarily means giving less to the self, so concerns for self and other cannot be assessed independently. Finally, the single-trial nature of the dictator game is not ideal, since multiple-trial measures allow for higher reliability.

This study reports the development of a new paradigm, the dual gamble task, which allows for the examination of separate components of self and other concern. In this paradigm, participants decide to take or pass a series of paired gambles, with one gamble being for oneself and one gamble being for others. Critically, this new measure circumvents some of the issues associated with the dictator game. First, participants get no material benefit from making good decisions for others, and there are no experimental norms suggesting that participants should make good decisions for others, or even attend to what happens with others' gambles when making decisions. Further, there is no implicit motive to reciprocate since participants do not know the outcomes of others' decisions until the study is concluded. That is, the actions of the other players are not known until the end of the study, so no interactive effects can be known (one can only make inferences about how others may play). Second, this measure allows for repeated trials, and thus greater reliability of measurement, without changing the nature of the interaction between self and others. Third, decision and outcome are separate, so concerns that participants are worried about appearing fair to themselves should be reduced. This will also be useful when coupled with physiological data, such as fMRI, as

concern for others can be observed both in the decisions that people make for others, as well as their reactions to the outcomes that occur.

By orthogonalizing the outcomes for self and others, independent effects of concerns for self and others can be estimated and examined. For instance, if someone only cares about him or herself and not at all about others, then only the quality of the self gambles (i.e., the expected value of the self gamble) will predict the likelihood of taking a pair of gambles, and the quality of the other gambles (i.e., the expected value of the other gambles) will be irrelevant in predicting taking behavior. However, if someone does care about others, then the quality of both the self and other gambles will predict taking behavior. Finally, if a person is deliberately trying to hurt others (such as those with a competitive social value orientation; see Van Lange, 2004), then the quality of the other gambles will be negatively related to taking a pair of gambles. This final example also demonstrates that this cannot solely be a measure of attention to others, as someone who is trying to hurt others would need to attend to the other gambles, but would use the information very differently than someone who is concerned for others. Although attention to others is a necessary component of concern for others, it is not sufficient.

Study 1

The present study was designed to develop a new measure of concern for others that has the advantages of economic games (i.e., it is behavioral, participants are paid based on their decisions, and it does not involve deception) without the same drawbacks (i.e., experimental norms suggesting that participants should give to others, single-trial measure, decision and outcome are identical, self and other outcomes are hydraulic). This

new measure, the dual gamble task, allows for the examination of separate components of self and other concern. In this paradigm, participants decide to take or pass a series of paired gambles, with one gamble being for oneself and one gamble being for an unknown other (see figure 1).

This first study will determine if people care about others when given no reason to do so. This will be examined by looking at the quality of the gambles taken for others. Further, this initial study will determine if there are meaningful individual differences in concern for others. Specifically, individual differences in empathy and psychopathy are expected to affect concern for others, and thus the types of decisions that individuals make for others.

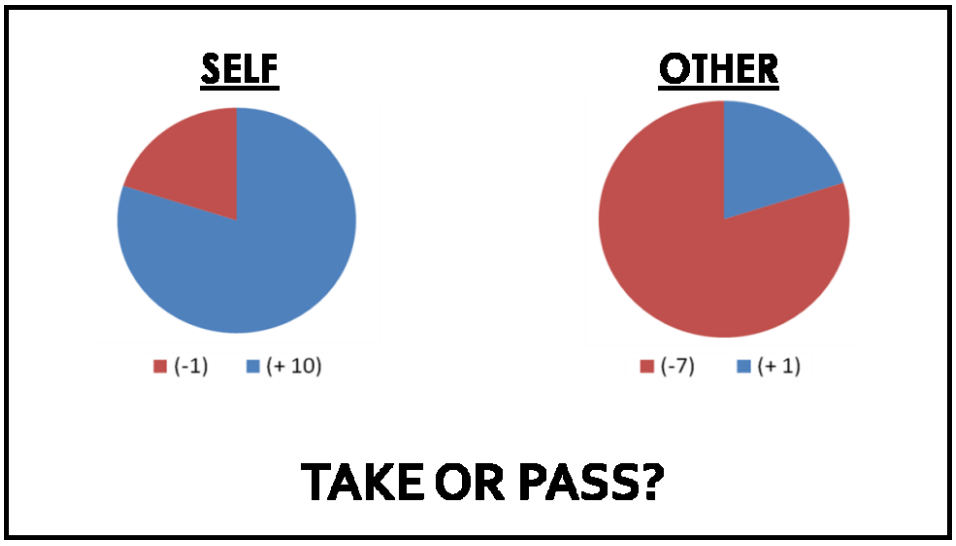

Figure 1: Example trial of dual gamble task

Methods

Participants and design

Participants were 36 Ohio State University undergraduates (16 females) who successfully completed the study for partial course credit. Participants were randomly assigned to one of two between-participants conditions (order of materials: questionnaires before or after dual gamble task).

Procedure

Dual gamble task. Participants were given approximately 10 minutes of verbal instruction on the nature of the decision task, which included two practice trials that were directed by the experimenter (see appendix for full instructions). Specifically, participants were informed[5] that they would be making decisions in the form of gambles, and the different components of gambles (i.e., probability and value) were explained to participants. All participants were then informed that they would take or pass pairs of gambles, with one gamble for another person, and one gamble for the self. It was further explained that their decision options were to take both gambles (meaning the outcomes of the gambles matter), or pass on both gambles (meaning the outcomes of the gambles do not matter). All participants were informed that they would not know the person with whom they were matched. Participants then made decisions to take or pass pairs of gambles. Each participant was presented with 80 pairs of gambles, presented in 4 blocks of 20 pairs of gambles each. The sides of the display that self and other gambles were on were counterbalanced and orthogonal to condition. For every trial, the participant was

[5] There is no deception in this study (or any of the studies described in this dissertation).

provided with information about the probability and value for both the self and other gambles. After making a decision, participants were provided with feedback telling them whether and how much they had won or lost for themselves and others, although they were not provided with a running tally of scores. The self and other gambles were orthogonal, so probabilities, values, and outcomes were randomly assigned to each. The probability of winning a gamble varied on each trial between 80%, 60%, 40%, or 20%, and the values for each gamble varied on each trial between +10, +7, +4, +1, -1, -4, -7, and -10[6] (see figure 1 for example trial of task).

Personality assessment. All participants filled out a paper-and-pencil questionnaire packet that included measures that assess both positive and negative aspects of personality, as well as questions about task strategy and beliefs. Those in the *questionnaires first* condition received all questionnaires after finding out that they could make some money in the study but before hearing the specific instructions, whereas those in the *questionnaires last* condition received all questionnaires after completing all 80 gambles but before finding out the results of the gambles.

Personality questionnaires included in the questionnaire packet were the Toronto Empathy Questionnaire (TEQ; Spreng, McKinnon, Mar, & Levine, 2009) and the Levenson Self-Report Psychopathy scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995). On the TEQ participants respond to 16 items on a five-point scale (ranging from 0 – 4) asking how frequently they feel or behave in the way described. The scale response

[6] Values were presented in points that were converted to dollars when participants were paid out; participants did not know the conversion rates when they were playing, but were informed that more points means more money, and that the winnings of others would not impact them in any way.

options are “never,” “rarely,” “sometimes,” “often,” and “always.” Sample items include “I enjoy making other people feel better,” and “I am not really interested in how other people feel” (reverse coded). Higher scores on the TEQ indicate more frequently feeling or behaving in the way described and thus higher levels of empathy. The scale is scored by averaging the 16 items ($M = 2.77$, $SD = 0.56$). The reliability of the scale was reasonably high ($\alpha = .88$).

The LSRP was designed to be a measure of psychopathy in non-incarcerated samples. Participants respond to 26 items on a four-point scale (ranging from 1 – 4) that contains “disagree strongly,” “disagree somewhat,” “agree somewhat,” and “agree strongly.” Sample items include “for me, what’s right is whatever I can get away with,” and “people who are stupid enough to get ripped off usually deserve it.” This measure does not assess antisocial behavior (as the Hare Psychopathy Checklist, a clinical measure of psychopathy, does; Hare, 2003), but rather, the beliefs and traits that underlie such behavior. Prior research using this measure has found that it is correlated with the PCL-R in incarcerated samples (Brinkley, Schmitt, Smith, & Newman, 2001). Higher scores on the LSRP indicate more agreement with the items, and thus higher levels of psychopathy. The scale is scored by averaging the 26 items ($M = 2.05$, $SD = 0.48$). The reliability of the scale was reasonably high ($\alpha = .84$).

Results

In order to determine if people show concern for others overall, decisions to take or pass pairs of gambles were predicted on the basis of different information about the gambles. Specifically, participants could base their decisions on the value of the self

gamble, the value of the other gamble, or some interaction of the two. To examine these questions, choice behavior (take or pass) was modeled using multilevel logistic regression (PROC GLIMMIX; Schabenberger, 2005). Choice behavior was modeled at the 1st level as a function of (a) the expected value for self (b) the expected value for others, and (c) the interaction of self and other expected values. To model how personality variables moderated these effects, these variables were modeled separately at the 2nd level (standardized scores were used for all analyses). All interactions effects between 1st and 2nd level variables were explicitly modeled. All estimates are provided in Table 1.

Effect	Estimate	t	p
Intercept	-0.04194	-0.49	ns
SelfEV	0.4029	22.29	<.001
OtherEV	0.07476	5.3	<.001
SEV*OEV	0.005768	1.15	ns

Table 1: Estimates and p values, study 1

Participants were 7.2% more likely to take a gamble for each 1 point increase in expected value for the self (as seen in the significant main effect of SelfEV, $F_{1,35} = 496.85$, $p < .0001$; see table 1 for all estimates and p values)[7]. Providing support for the hypothesis that people, on average, consider the consequences for others as well as the self, participants were also 1.3% more likely to take a gamble for each 1 point increase in

[7] Although PROC GLIMMIX was used for all analyses, for increased interpretability parameter estimates were calculated in PROC MIXED. PROC MIXED treats the DV as continuous, whereas PROC GLIMMIX treats the DV as logistic. PROC MIXED effects were not used for statistical testing, only for graphing the results (similar to plotting raw response latencies when analyses are based on log RTs).

the expected value for the other (as seen in the significant main effect of OtherEV $F_{1,35}$ = 28.11, p < .0001). The interaction between SelfEV X OtherEV was not significant ($F_{1,35}$ = 1.32, p = 0.26).

In addition to the general tendency for participants to demonstrate concern for others, it was also expected that there would be meaningful variation in this behavior. Consistent with previous work demonstrating that those high in psychopathy do not care about others (e.g., Mokros et al., 2008), participants higher in psychopathy were less likely to base these decisions on information about potential gains and losses for others (significant interaction between OtherEV X Psychopathy, $F_{1,35}$ = 7.26, p = .01; $\beta_{HighPsycho}$ = -0.4%, $\beta l_{owPsycho}$ = 2.0%). Just as those high in psychopathy are thought to have little or no concern for others, those high in dispositional empathy are essentially the opposite (and indeed, these to personality scores are significantly negatively correlated, r = -.45, p < .05). As expected, those individuals high in empathy were more likely to demonstrate concern for others (OtherEV X Empathy, $F_{1,35}$ = 5.28, p < .05; $\beta_{HighEmpathy}$ = 1.3%, $\beta_{LowEmpathy}$ = 0.2%). Importantly, there were no effects of question order on either decisions or personality scores (all p's > .30). Further, orientation also did not significantly affect concern for others, nor did gender (all p's > .20).

Discussion

This study revealed that people do show concern for others, and are not solely self-interested. With that said, people are definitely demonstrating self-interested behavior, and self-interest is clearly more powerful that concern for others in this context. Nonetheless, few (if any) people doubt the notion that people care about getting rewards

for themselves, and it is unsurprising that self-interest would be a more powerful motivation in a setting where individuals are making decisions for someone they will never interact with or even meet. What is more noteworthy is that people, on average, do show concern for others in this situation. There are no norms suggesting that a person should care about the other, and self and other outcomes are separate, so a person could reasonably assume that everyone can and should just focus on themselves.

In addition to the general tendency to care about others, there were also reliable individual differences. Those higher in empathy showed more concern, and those higher in psychopathy showed less concern. Further, the fact that questionnaire order did not affect either decisions in the dual gamble task or personality scores indicates that this was not driven by self-perception of one's own behavior (i.e., upon realizing that one has not paid attention to the other's information, one might self-report being low in empathy and high in psychopathy).

The present study fits well with prior research in a number of different fields that has used a variety of methods of demonstrating concern for others. However, the present research goes beyond those studies in that it allows for stronger inferences to be drawn about concern for others, since any reasons for demonstrating concern that might exist in the standard version of the dictator game have been stripped away. With that said, an egoistically-minded critic might express dissatisfaction with the fact that both the participant (immediately) and the researcher (eventually) know how the participant behaved, allowing for concern over judgment by others or guilt from the self. Also, by presenting participants with the information about others, it could be argued that

participants believe they should use this information. Although these issues over ultimate versus proximate concern for others will be covered in greater depth in the discussion, in the interim it is worth mentioning that since both good and bad gambles are presented, a participant could reasonably ignore the other gambles completely with a clear conscience. That is, a participant with no concern for others that never even looks at the other gambles could feel that he is not guilty of anything, since he is neither trying to help nor hurt the other. Similarly, the current presentation of the information about others says nothing about how it should be used, and participants could just as easily construe it as a type of game that they want to win by beating the other person. However, few if any people seemed to adopt that type of construal, and instead it seems that at least some people do show concern for others.

Chapter 3: Understanding Everyday Psychopathy

Although the term "psychopath" evokes images of serial killers and mass murderers, this is only one behavioral manifestation of a set of antisocial personality characteristics. Every day, those who may not traditionally be considered psychopaths engage in behavior reflecting a lack of concern for the welfare of others. This can range from mundane behaviors, such as damaging another's car and not leaving a note, to potentially more serious actions like neglecting one's children. These types of behaviors reflect an "everyday psychopathy" that is committed by people that would be considered in the normal range by most standards. Thus, the critical aspect of psychopathy is not violent or even criminal behavior, but rather a callous attitude and a lack of concern for others. Indeed, this has been one of the central components of most conceptualizations of psychopathy since its inception (Cleckley, 1976; Herve, 2007). Both human nature and social norms encourage people to care for one another, which they largely do (see Warneken & Tomasello, 2009, for a recent overview). However, although most people exhibit some level of concern for the well-being of others, individuals higher in psychopathy are notable for their lack of such concern[8].

[8] Psychopathy, sociopathy, and antisocial personality disorder are overlapping constructs whose relations are still being debated (e.g., Walsh & Wu, 2008). Psychopathy is the focus here because it is a well-defined construct with clear specifications of how it relates to concern for others.

Many assume that this lack of concern arises from an inability to care about others (e.g., Spiecker, 1988), and there is a great deal of neuroimaging evidence showing neural differences in how those high and low in psychopathy process emotional information (e.g., Marsh et al., 2008; Kiehl et al., 2001; Glenn, Raine, & Schug, 2009). However, no research has directly manipulated the motivation to care about others in order to determine whether this deficit stems from a lack of ability or a lack of motivation. In two studies, those higher in psychopathy were provided with the motivation to care about others to determine if this would cause them to show an increase in empathetic behavior towards others. As an initial test of this, undergraduates high in self-reported psychopathy were used as the sample; although there are likely many differences between incarcerated psychopaths and undergraduates high on a self-report measure of psychopathy, it is important to understand the basis of everyday psychopathy.

That psychopathy is a developmental disorder (e.g., Blair, 2007) associated with differential brain activity (e.g., Gordon, Baird, & End, 2004) might suggest that adults higher in psychopathy are unlikely to ever care about others, and this is largely considered to be the case (Hare, 1993). Supporting this view of psychopathy as a disorder of ability, one recent study found that criminals higher in psychopathy were impaired at reasoning about social contract rules, despite showing no deficits in more general reasoning abilities (Ermer & Kiehl, 2010). Other research has found that individuals higher in psychopathy are unable to properly recognize emotions in others (e.g. Blair et al., 2002; Marsh & Blair, 2008), which is an important component of empathy (Marsh, Kozak, & Ambady, 2007). Additionally, there is some evidence that treatments that work

on those without psychopathy may actually make those with psychopathy *worse* (Rice, Harris, & Cormier, 1992; but see Salekin, 2002, and Skeem, Monahan, & Mulvey, 2002). One recent review argues that although it is inappropriate to conclude that those higher in psychopathy are completely untreatable, the existing evidence suggests that treatment of adults with psychopathy is not particularly successful (Salekin, Worley, & Grimes, 2010). Current suggestions for how to treat individuals higher in psychopathy include working around their empathy deficits, such as highlighting the low status of criminal behavior (Hemphill & Hart, 2002) or otherwise convincing them that their antisocial behavior goes against their own self-interest (Hare, 1993). Also, as previously mentioned, offenders with psychopathy have higher rates of recidivism than offenders lower in psychopathy (e.g., Harris, Rice, & Cormier, 1991), suggesting that change is less likely for these individuals.

Everyday Psychopathy. Although the bulk of the research on psychopathy has focused on those who have been incarcerated for criminal behavior, it is also important to understand what motivates everyday psychopathy. It has been estimated that approximately 1% of the population could meet criteria to be considered "psychopathic" (Hare, 1993), but there are likely many who do not meet these criteria that still occasionally engage in behavior that could be considered psychopathic, such as negligent parents. Furthermore, both theory and data support the view of psychopathy as a dimensional construct in both children (Murrie, Marcus, Douglas, Lee, Salekin, & Vincent, 2007) and adults (Edens, Marcus, Lilienfeld, & Poythress, 2006; Guay, Ruscio, Knight, & Hare, 2007). Higher levels of psychopathy in non-incarcerated samples has

been positively related to self-reported antisocial behavior (e.g., Lynam, et al., 1999; Mullins-Nelson, et al., 2006), self-reported violence and alcohol use (Neumann & Hare, 2008), self-reported indirect aggression (Warren & Clarbour, 2009), behaving selfishly in social dilemmas (Mokros, et al., 2008; Rilling et al., 2007; Koenigs, et al., 2010), hypercompetitive achievement orientations (Ross & Rausch, 2001), greater self-reported willingness to violate moral standards for money (Glenn, Koleva, Iyer, Graham, & Haidt, 2009), and self-reported and behavioral measures of cheating in college (Nathanson, Paulhus, & Williams, 2006; Williams, Nathanson, & Paulhus, 2010). Furthermore, antisocial dispositions, rather than criminal behaviors *per se*, are widely considered to be the defining feature of psychopathy (cf. Skeem & Cooke, 2010, Hare & Neumann, 2010).

In addition to the many studies that have explored the individual differences in dispositions and behavior produced by subclinical psychopathy (see LeBreton, Binning, & Adorno, 2006), a number of studies have begun to explore the neural and cognitive differences in brain activity thought to underlie these differences. Undergraduates higher in psychopathy as measured by the Levenson Self-Reported Psychopathy scale (LSRP; Levenson, Kiehl, & Fitzpatrick, 1995) show deficiencies in passive avoidance and response modulation (Lynam et al., 1999), reduced heart rate reactivity (Osumi, Shimazaki, Imai, Sugiura, & Ohira, 2007), and perform worse on the Iowa Gambling Task (Mahmut, Homewood, & Stevenson, 2008), which is a measure thought to assess orbitofrontal cortex (OFC) functioning (Bechara, Damasio, Damasio, & Anderson, 1994). However, research with other non-incarcerated populations (i.e., community samples), often using other measures of psychopathy such as the Psychopathic Personality

Inventory (PPI; Lilienfeld & Andrews, 1996) or the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 2003), has been less consistent in detecting similar patterns of cognitive deficits as seen in incarcerated populations (see Gao & Raine, 2010)

Much of the aforementioned research on differential brain activity produced by psychopathy has relied on those in non-incarcerated populations, although it has also tended to involve those considered psychopathic on the PCL-R (e.g., Blair et al., 2006), a measure that is administered by a clinician that treats psychopathy as discrete rather than dimensional (Hare, 2003). However, other research on the neuroscience of psychopathy has also found deficits in those higher in self-reported psychopathy in non-incarcerated samples. For instance, participants higher in self-reported psychopathy showed less amygdala and OFC activation when playing a prisoner's dilemma game than those lower in psychopathy (Rilling et al., 2007). Other research has found reduced OFC activity among those higher in self-reported psychopathy while they are deceiving others (Fullam, McKie, & Dolan, 2009), and reduced amygdala activity among those high in self-reported psychopathy when interpreting others' emotional states (Gordon et al., 2004). Additionally, when engaged in competitive interaction with others, those higher in psychopathy showed less OFC activity (Lotze, Veit, Anders, & Birbaumer, 2007). Together, these results indicate that those higher in self-reported psychopathy in a non-incarcerated population do show some similar neural deficiencies in brain activation as those higher in psychopathy in incarcerated populations.

Psychopathy: Disorder of ability or motivation? Although psychopathy clearly produces a lack of concern for others, is it really the case that this is due to a lack of

ability to care about others? Classic descriptions of psychopaths seem to suggest otherwise, as these individuals are often described as charming, indicating some ability to function socially. For instance, in Cleckley's influential work *The Mask of Sanity* (1976), he describes psychopaths as possessing "…general suavity and social charms," and says that "…the typical psychopath will seem particularly agreeable and make a distinctly positive impression when he is first encountered." This image of psychopaths as charming manipulators seems at odds with the view that they are afflicted with the inability to understand social and emotional cues. Further, empirical research on the malleability of other psychopathy-related deficits suggests that these can be overcome. For instance, children with tendencies toward psychopathy can overcome the inability to recognize the emotional expressions of others when being directed to attend to the eyes of other individuals (Dadds et al., 2006). Furthermore, some research suggests that the lack of empathy in individuals higher in psychopathy resides with the motivation to care about others, rather than the ability to do so. For instance, individuals higher in psychopathy are capable of understanding what others will judge as morally appropriate and inappropriate, but simply do not care to bring their own behavior in line with others' concerns (Cima, Tonnaer, & Hauser, 2010). Together, these lines of research suggest that individuals higher in psychopathy may be able to overcome their lack of concern for others if they are given sufficient motivation to do so.

The Present Research. In two studies, the role of shared group membership in increasing motivation to care about others in those with psychopathy was tested by having participants make decisions under uncertainty for themselves and for others.

Because psychopathy is thought to be dimensional rather than categorical (e.g., Edens et al., 2006), as suggested by correlations between self-report measures of psychopathy and antisocial behavior in non-incarcerated populations (e.g. Lynam et al., 1999), individual differences in psychopathy using an undergraduate sample was used to allow for an understanding of the processes of everyday psychopathy.

To examine the effects of motivated concern for others for those higher or lower in psychopathy, participants took a version of the dual gamble task in which the identity of the others were varied. Half of the participants made choices for people with whom they shared an arbitrary group identity, and half of the participants made choices for unknown others – that is, strangers. Prior research has found that shared group membership leads to greater liking for (Brewer, 1979), cooperation with (Kramer & Brewer, 1984), and helping of other ingroup members (Brewer & Schneider, 1990; Dovidio, et al., 1997), even when the ingroup is arbitrary (Tajfel, Billig, Bundy, & Flament, 1971). Additionally, research has demonstrated that the increased cooperation that comes from sharing a group membership with others is due to an increase in concern for the ingroup and its members (De Cremer & Van Vugt, 1999). This manipulation is well-suited for the present question because the motivation is directly about interpersonal relationships where self/other tradeoffs can be examined.

In the present studies, participants made decisions to take or pass pairs of gambles, with one gamble for the self and one gamble for others. In the *groups* condition, those others for whom one was making decisions were other members of an explicitly arbitrary ingroup, and in the *strangers* condition, those others were other people from the

study. In the *strangers* condition, the others were not outgroup members, but rather, unknown others – essentially strangers. In the *groups* condition, the others were also strangers, but strangers with whom one shares a (meaningless) group identity. In neither condition was any participant interacting with someone who might be described as an outgroup member. Thus, although research on the minimal group paradigm (Tajfel et al., 1971) has informed the present research, this is not a minimal group paradigm, as that involves tradeoffs between ingroup and outgroup, whereas the present research involves tradeoffs between self and ingroup (groups condition) or self and strangers (strangers condition). Importantly, the interdependence between self and others did not vary across conditions, so any difference between conditions is due solely to differences in how one perceives the others with whom they are playing.

In line with prior research on shared group membership, it was hypothesized that providing participants with an arbitrary ingroup would lead to greater concern for ingroup others in the form of making better decisions for those others. Furthermore, if the lack of concern seen in those higher in psychopathy is due to a lack of ability, then this manipulation of shared group membership should have no effect for these individuals. However, if this lack of concern is due to a lack of motivation, then those individuals higher in psychopathy should demonstrate increased concern for others when those others are described as ingroup members.

Study 2

The second study tested the hypothesis that individuals higher in psychopathy can show increased concern for others, if they are provided with sufficient motivation.

Motivation to be concerned for others was pr ovided by manipulating how these others were described: either as members of an arbitrary ingroup, or as subset of other people who were also participating in the study – in essence, total strangers. To assess concern for others, participants made decisions that impacted both self and others simultaneously.

Methods

Participants and Design. Participants were 79 Ohio State University undergraduates (43 females) who successfully completed the study for partial course credit. Participants were randomly assigned to one of two between-participants conditions (identity of others: ingroup members or strangers)

Decision-making task. Participants were given approximately 10 minutes of verbal instruction on the nature of the decision task, which included two practice trials that were directed by the experimenter. Specifically, participants were informed that they would be making decisions under uncertainty for themselves and for others. In the *groups* condition, they were informed that these others were other ingroup members, and that they would be assigned to a group, either the "lions" or the "tigers," after receiving instructions but before doing the task. In the *strangers* condition, the word "group" was never used, and participants were informed that the others they were making decisions for were a subset of the other people taking part in the study. Because the focus of this study is in increasing rather than decreasing concern for others, no outgroups were used in any condition. All participants were informed that they would not know who the others were that they were matched up with, nor would they know how many people they were matched up with. After describing the identity of the others, all participants were

informed that they would take or pass pairs of gambles, with one gamble for others, and one gamble for the self.

Following the instructions, participants in the *groups* condition were assigned to a group and were reminded that their decisions impacted other members of their ingroup, and that other members of their ingroup impacted their final outcomes. Participants in the *strangers* condition were reminded that their decisions impacted other people that they were matched with, and that the other people they were matched with impacted their final outcomes. Participants then made decisions to take or pass pairs of gambles. As in study 1, each participant was presented with 80 pairs of gambles, presented in 4 blocks of 20 pairs of gambles each. Unlike study 1, participants were not matched with a single other individual, but rather, a collection of individuals that was either described as a group or not.

Psychopathy assessment. All participants filled out a questionnaire packet, which included a question about concern for the others that one was matched with, as well as the Levenson Self-Report Psychopathy scale (LSRP; Levenson et al., 1995). The scale is scored by averaging the 26 items[9] ($M = 2.34$, $SD = 0.56$). The reliability of the scale was reasonably high ($\alpha = .79$).

Results

[9] The LSRP can also be split into primary and secondary psychopathy, with primary psychopathy reflecting a lack of empathy, and secondary psychopathy reflecting an inability to control one's impulses (Levenson et al., 1995). All patterns of significance are identical in both studies when analyzing the data using primary psychopathy rather than overall psychopathy as the primary measure of psychopathy. When using secondary psychopathy, some of the same patterns of significance emerge, but others do not. This suggests that these effects are driven by primary psychopathy, which is to be expected given that this dimension captures the lack of empathy for others.

Manipulation Check. To ensure that the manipulation of group membership increased motivation to care about the others with whom people were matched, this was measured with a single item, "I care about what happens to those that I was matched with," rated from 1 (strongly disagree) to 7 (strongly agree). Those in the *groups* condition ($M = 4.65$, $SD = 1.61$) reported higher levels of caring for those they were matched with than those in the *strangers* condition ($M = 3.15$, $SD = 1.84$), $t\ (77) = 3.85$, $p < .001$, providing evidence that this is a successful manipulation of motivation to care about others.[10]

Primary results. Of primary importance for this study were the factors that led participants to choose to select or reject a pair of gambles. Specifically, participants could base their decisions on the value of the self gamble, the value of the others' gamble, or some interaction of the two. Of course, it was expected that not all participants would use this information in the same way. For example, it was expected that participants high in psychopathy would be less likely to consider the value of the gamble for others. To examine these questions, choice behavior (take or pass) was modeled using multilevel logistic regression (PROC GLIMMIX; Schabenberger, 2005). Choice behavior was modeled at the 1st level as a function of (a) the expected value for self (b) the expected value for others, and (c) the interaction of self and other expected values. To model how group membership and psychopathy moderated these effects, these variables were modeled at the 2nd level (standardized psychopathy scores were used for all analyses). All

[10] This measure of caring about others was collected at the end of the session, so it is inappropriate to use as a mediator.

interactions effects between 1st and 2nd level variables were explicitly modeled. All estimates are provided in Table 2.

	Stranger			Group			Difference	
Effect	Estimate	t	p	Estimate	t	p	F	p
Intercept	-0.3843	-2.26	<.05	-0.2451	-1.64	ns	0.37	ns
SelfEV	0.5139	18.2	<.001	0.4289	17.93	<.001	4.96	<.05
OtherEV	0.2542	11.5	<.001	0.2531	12.98	<.001	0	ns
SEV*OEV	-0.0001	-0.01	ns	0.0020	0.31	ns	0.05	ns
Psycho	0.0531	0.31	ns	0.0583	0.39	ns	0	ns
SEV*Psy	0.0821	2.58	<.01	0.0018	0.08	ns	4.12	<.05
OEV*Psy	-0.0732	-3.38	<.001	-0.0076	-0.39	ns	5.05	<.05
SEV*OEV*Psy	0.0049	0.57	ns	0.0005	0.08	ns	0.16	ns

Table 2: Estimates and p values, study 2

Participants were 7.7% more likely to take a gamble for each 1 point increase in expected value for the self (as seen in the significant main effect of SelfEV, $F_{1,75}$ = 649.56, $p < .001$; see table 2 for all estimates and p values)[11]. Providing support for the hypothesis that people, on average, consider the consequences for others as well as the self, participants were also 3.7% more likely to take a gamble for each 1 point increase in the expected value for the other (as seen in the significant main effect of OtherEV $F_{1,75}$ = 296.39, $p < .0001$). Consistent with previous work demonstrating that those high in psychopathy do not care about others in the context of economic games (e.g., Mokros et al., 2008), participants higher in psychopathy were more likely than those lower in psychopathy to base decisions about whether to accept or reject a pair of gambles on information about potential gains and losses for the self ($\beta_{highPsycho}$ = 8.3%, $\beta_{lowPsycho}$ =

[11] Again, PROC GLIMMIX was used for all analyses, but for increased interpretability parameter estimates were calculated in PROC MIXED.

6.9%; significant interaction between SelfEV X Psychopathy, $F_{1,75} = 4.38$, $p < .05$), and less likely to base these decisions on information about potential gains and losses for others ($\beta_{highPsycho} = 2.0\%$, $\beta_{lowPsycho} = 3.7\%$; significant interaction between OtherEV X Psychopathy, $F_{1,75} = 7.75$, $p < .01$).

Central to this dissertation is the question of how those higher in psychopathy would respond to an increase in motivation to care about others. If participants higher in psychopathy are unable to take others into consideration, then the way that those others are described (ingroup members or strangers) should not influence how these individuals make decisions that impact others. That is, people higher in psychopathy should take the others into consideration less than those lower in psychopathy regardless of the identity of those others. However, if the lack of concern for others produced by psychopathy is motivational in nature, then increasing the motivation to care about others by describing them as ingroup members should lead those high in psychopathy to make better decisions for those others. Consistent with the motivational hypothesis, participants higher in psychopathy took worse gambles for themselves (as seen in the significant interaction of SelfEV X Condition X Psychopathy, $F_{1,75} = 4.12$, $p < .05$), and better gambles for others (OtherEV X Condition X Psychopathy, $F_{1,75} = 5.05$, $p < .05$), when the others were described as other ingroup members. In contrast to participants lower in psychopathy, who considered the others equally (or even slightly with a preference toward considering the strangers' outcomes more so than the ingroup members') whether described as an ingroup member or stranger, participants higher in psychopathy demonstrated greater

concern for those described as ingroup members than those described as strangers (see Figure 2).

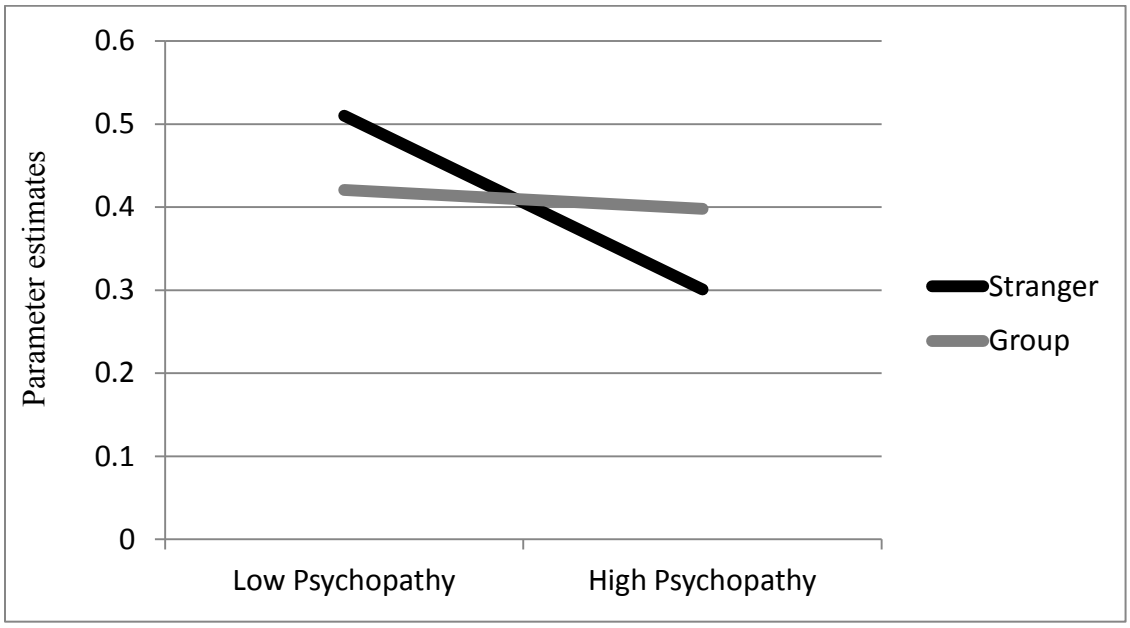

Figure 2: Interaction of psychopathy with concern for others, study 2

The inability to control one's impulses is a key component of most conceptualizations of psychopathy (e.g. Cleckley, 1976; Hare, 1993; Levenson et al., 1995). This feature plays a central role in the response modulation theory of psychopathy, which argues that the deficits produced by psychopathy are due to the inability to direct one's attention to peripheral information when goal-relevant information is present (e.g., Newman & Lorenz, 2003). If this is the case, then people should be less able to consider what happens to others as the expected value for the self increases. Alternatively, if the lack of concern for others is due to a lack of motivation to care about other people, then

the value for the self gambles should be unrelated to how they evaluate the value of the others gambles. Consistent with the latter hypothesis, neither the three way interaction between SelfEV X OtherEV X Psychopathy ($F_{1,75} = 0.24$, $p = 0.62$) nor the four way interaction between SelfEV X OtherEV X Condition X Psychopathy ($F_{1,75} = 0.16$, $p = 0.69$) were significant. In other words, participants were equally likely to consider (or not consider) the outcomes for the other player when the potential outcomes for the self were high or low.

Discussion

As predicted, individuals higher in psychopathy showed increased concern for others when those others were described as other ingroup members. This occurred even though the level of interdependence did not differ between conditions. Furthermore, there is some evidence that this is due to increased motivation to care about others, rather than increased ability to do so, since the significant three way interaction between OtherEV, condition, and psychopathy did not further interact with SelfEV. That is, an impulse control or response modulation explanation of psychopathy would suggest that participants higher in psychopathy would be better able to control their impulses and attend to others' outcomes when there was no distraction from a good gamble for oneself. However, the self gambles and others' gambles were independently evaluated, suggesting that those higher in psychopathy focus primarily on the self gambles and give little weight to others' gambles when they are unmotivated to care about the others they are matched with, but that they take both into account (independently) when they are motivated to care about the others.

Study 3

Although study 2 examined the extent to which individuals higher in psychopathy are capable of showing increased concern for others if given sufficient motivation to do so, it may be the case that some participants expected to get some share of their group's money (since they are part of the group). That is, participants were instructed that they would receive money based on the outcomes of the self gambles, and that those they were matched with would receive an equal portion of money based on the outcomes of the others gambles. Because of ambiguous instructions, some participants may have believed that they would get an equal share of the outcomes from their others' gamble. If this was the case, it may be that study 2 only demonstrates increased cooperation with others, rather than increased concern for others. To fully separate concern for the self from concern for others, in study 3 the task instructions were modified to make salient to the participants that the others' gamble was shared equally amongst all others *except the self.*

Methods

Participants and design. Participants were 67 Ohio State University undergraduates (28 females) who successfully completed the study for partial course credit. Participants were randomly assigned to one of two between-participants conditions (identity of others: ingroup members or strangers)

Procedure. Study 3 was identical to study 2, with two exceptions. First, the instructions were changed such that participants were explicitly told that self outcomes and others outcomes were completely separate. Second, in study 2 participants were paid out immediately, so they were only affected by those who had previously completed the

study, and only affected those who would be in the study in the future. In study 3, all participants were paid approximately one week after completing the study in order to allow everyone to finish. This way, each participant would affect or be affected by all others with whom they were matched.

Psychopathy assessment. As in study 2, all participants filled out a questionnaire packet, which included a question about concern for others, as well as the LSRP (Levenson et al., 1995). As before, this measure was scored by averaging the 26 items (M = 1.99, SD = 0.40). The reliability of the scale was high (α = .84).

Results

Manipulation check. Those in the *groups* condition (M = 4.41, SD = 1.97) again reported higher levels of caring about those they were matched with than those in the *strangers* condition (M = 3.24, SD = 1.73), t (65) = 2.58, p = .01, providing further evidence that the manipulation was successful.

Primary analyses. As in study 2, choice behavior (take or pass) was modeled using multilevel logistic regression (PROC GLIMMIX; Schabenberger, 2005). Choice behavior was modeled at the 1st level as a function of (a) the expected value for the self (b) the expected value for others, and (c) the interaction of self and other EVs. To model how group membership and psychopathy (standardized psychopathy scores were used for all analyses) moderated these effects, these variables were modeled at the 2nd level. All interaction effects between 1st and 2nd level variables were explicitly modeled. All parameter estimates are reported in table 3.

	Stranger			Group			Difference	
Effect	Estimate	t	p	Estimate	t	p	F	p
Intercept	-0.1289	-1.38	ns	-0.3166	-2.83	<.01	1.63	ns
SelfEV	0.4341	21.46	<.001	0.4709	22.82	<.001	1.32	ns
OtherEV	0.1521	10.07	<.001	0.1703	11.17	<.001	0.63	ns
SEV*OEV	-0.0065	-1.18	ns	-0.0078	-1.38	ns	0.02	ns
Psycho	0.0733	0.83	ns	0.1793	1.53	ns	0.49	ns
SEV*Psy	0.0238	1.21	ns	-0.1028	-5.05	<.001	19.85	<.001
OEV*Psy	-0.0486	-3.24	<.01	-0.0046	-0.29	ns	3.99	<.05
SEV*OEV*Psy	0.0017	0.3	ns	-0.0047	-0.8	ns	0.59	ns

Table 3: Estimates and p values, study 3

The results of study 3 replicated the results of study 2. Participants were 7.5% more likely to take a gamble for each 1 point increase in expected value for the self (significant main effect of SelfEV, $F_{1,64} = 980.53$, $p < .001$; see table 3 for all estimates and p values), and were 2.7% more likely to take a gamble for each 1 point increase in the expected value for the other (significant main effect of OtherEV, $F_{1,64} = 225.56$, $p < .001$). Again, when making decisions to take or pass the paired gambles, participants higher in psychopathy used information about potential gains and losses for the self more so ($\beta_{highPsycho} = 7.1\%$, $\beta_{lowPsycho} = 5.9\%$; significant interaction between SelfEV X Psychopathy, $F_{1,64} = 7.69$, $p < .01$), and potential gains and losses for others less so than those lower in psychopathy ($\beta_{highPsycho} = 2.1\%$, $\beta_{lowPsycho} = 3.2\%$; significant interaction between OtherEV X Psychopathy, $F_{1,64} = 6.03$, $p < .05$).

Critically, again participants higher in psychopathy took worse gambles for themselves (significant interaction of SelfEV X Condition X Psychopathy, $F_{1,64} = 19.85$, $p < .001$), and better gambles for others (significant interaction of OtherEV X Condition

X Psychopathy, $F_{1,64} = 3.99$, $p < .05$). In contrast to participants lower in psychopathy, who considered the others equally whether they were described as ingroup members or as strangers, participants higher in psychopathy demonstrated greater concern for those described as ingroup members than those described as strangers (see Figure 3). Again, the three way interaction of SelfEV X OtherEV X Psychopathy was not significant ($F_{1,64} = 0.16$, $p = 0.69$), nor was the four way interaction of SelfEV X OtherEV X Condition X Psychopathy ($F_{1,64} = 0.55$, $p = 0.46$). These results again indicate that individuals higher in psychopathy show less concern for themselves and increased concern for others when those others are described as other ingroup members, and that this increase in concern for others is independent from concerns for oneself.

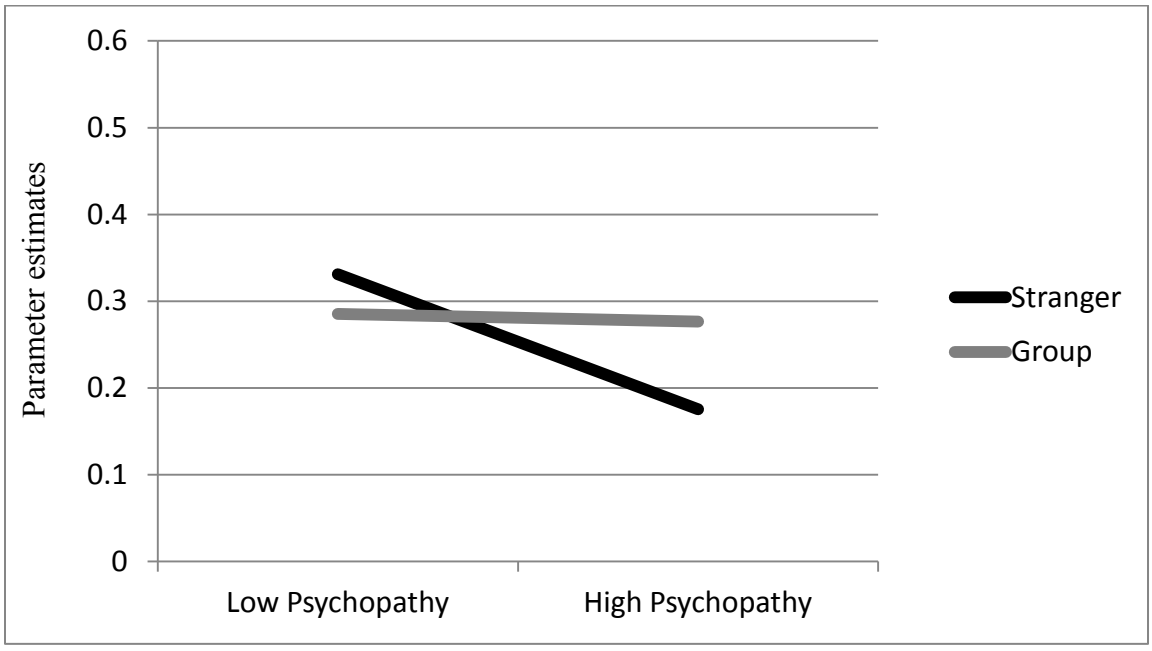

Figure 3: Interaction of psychopathy and other-identity on concern for others, study 3.

Discussion

As predicted, individuals higher in psychopathy show less concerns for themselves and more concern for others when others that they were making decisions for were described as other ingroup members. Furthermore, this occurred even though it was made salient to the participants that there was no material benefit to them for showing concern for others.

General Discussion

Previous research has shown dramatic deficits in certain individuals to feel empathy for others (e.g., Blair, 2005). In the case of individuals higher in psychopathy, there is a lack of concern for others coupled with unmitigated self-interest. Even those higher in psychopathy in non-incarcerated populations show a variety of antisocial behaviors consistent with a lack of concern for others, such as violence, cheating, and selfishness. Studies 2 and 3 demonstrate that the lack of concern produced by psychopathy may result from people being unmotivated to help others rather than a cognitive inability to do so, at least in non-incarcerated populations. This is consistent with theory on corporate psychopathy, which has suggested that individuals higher in psychopathy can be successful in some settings, although this research has typically been descriptive rather than experimental in nature (Babiak, 2007).

Although the conclusions that can be drawn from these two studies are limited to people with everyday forms of psychopathy, the results are suggestive of the underlying structure of psychopathy in general. Many of the same social, cognitive, and neural deficits have been found in both incarcerated and non-incarcerated populations (although

these tend to be stronger in the incarcerated populations; see LeBreton et al., 2006; Gao & Raine, 2010). On the other hand, it could be the case that incarcerated psychopaths are different from those higher in psychopathy in non-incarcerated populations in meaningful ways, and the very fact that these individuals have been caught and incarcerated does suggest an inability to behave in line with societal norms. Nonetheless, the present research at least suggests that conclusions should not be drawn about the ability of incarcerated psychopaths to care about others on the basis of performance on cognitive and neurological tasks, and that this needs to be directly tested by giving these individuals sufficient motivation to care about others.

These two studies also provide some insight into the relationship between negative aspects of personality and ingroup attachment. In the present studies, those higher in psychopathy did show increased concern for other ingroup members, and this is consistent with prior research demonstrating that dispositionally selfish people (i.e., "proselfs" as measured by SVO) do care about others if those others are ingroup members (De Cremer & Van Vugt, 1999). This is also consistent with evidence that aggression in narcissists is reduced if others share some characteristics with the narcissist (Konrath, Bushman, & Campbell, 2006). Together, these studies suggest that personality traits that might seem antithetical to group cooperation, such as selfishness or lack of concern for others, do not necessarily disrupt social identity.

The present results do raise an interesting question about ingroup attachment and positive aspects of personality: in the present studies, those lower in psychopathy did *not* show increased concern for ingroup members, and there was even some indication that

they preferred strangers to ingroup members. This may initially seem puzzling, given that ingroup biases in the minimal group paradigm are the default (Tajfel et al., 1971; Brewer, 1979), and this might seem to suggest that only those high in psychopathy show minimal group effects. However, this conclusion is unwarranted for a number of reasons. First, study 1 found high negative correlations between psychopathy and trait compassion. Thus, those low in psychopathy may be high in concern for any others, regardless of identity. It is interesting to consider that those high in compassion may be resistant to the idea of tribalism or teams, although future research is needed to explore whether those high in positive aspects of personality (such as trait compassion) are resistant to group attachment. Second, it is important to point out that although the current task manipulates mere group membership, it is very different from the classic minimal group paradigm. The present task uses explicitly arbitrary ingroups, and although prior research has found ingroup bias in the minimal group paradigm with explicitly arbitrary ingroups (e.g., Billig & Tajfel, 1973), that is not part of the typical design. Further, minimal group paradigm studies typically involve making tradeoffs between allocations to ingroup members and outgroup members, rather than between ingroup members and the self, thus demonstrating that discrimination can arise for arbitrary reasons (Tajfel et al., 1971). The current studies explore the willingness of people to engage in self-sacrifice, rather than the willingness to discriminate against others, which is why the minimal group paradigm was not used. Although future studies may explore discrimination in those higher in psychopathy by providing an outgroup condition to this paradigm, it would not be surprising if those higher in psychopathy show less concern for outgroup members

relative to ingroup members, since psychopathy produces antisocial behavior. It is more surprising that those high in psychopathy can show prosocial behavior in the form of greater concern for other ingroup members relative to the self, which was the focus of the current studies.

The present studies add to the growing body of literature demonstrating that psychopathy-related deficits can be overcome. Past research has found this for peripheral aspects of psychopathy, such as recognizing emotions in others, but this research is the first to demonstrate this with concern for others, which is one of the central components of psychopathy. Furthermore, that individuals higher in psychopathy were sufficiently motivated to show greater concern for members of an explicitly arbitrary ingroup demonstrates the power of group membership, and it would be interesting to determine if this effect would hold for more extreme forms of psychopathy, such as for those in institutionalized settings. Overall, these studies demonstrate that those higher in everyday forms of psychopathy can care about others if they are sufficiently motivated to do so, and highlight the variability in human motivation.

Chapter 4: Understanding the Neural Correlates of Concern for Others

As described in the introduction and seen throughout this dissertation, people do tend to care about one another and under certain circumstances respond to others' outcomes as if they were their own. For example, people across cultures tend to give unknown others some money in the dictator game (as opposed to none), violating narrow conceptualizations of self-interest (Henrich et al., 2001). The results of studies 1 – 3 further demonstrate that at least some people will demonstrate concern for others in this way even when potentially external reasons (such as experimental norms) are ruled out. Prior research has also demonstrated conceptually similar effects in a number of different areas, such as the fact that people share the emotions of others (i.e., emotional contagion; Hatfield, Cacioppo, & Rapson, 1993; Wild, Erb, & Bartels, 2001). Though great deal of information about how and why people care for others can be gleaned from behavioral and self-report data, neuroimaging is a powerful tool that can provide a more complete picture of concern for others.

Research on how individuals empathize with suffering others has also found a general tendency for people to show increased activity in regions related to emotional aspects of oneself being in pain when viewing others in pain. For example, when participants view photographs of another person in pain (e.g., a needle sticking into a

hand) and are asked to judge the amount of pain the person in the photograph is feeling, they show increased activity in the 'pain matrix' relative to instances when they view similar photographs that do not depict pain (e.g., a needle laying next to a hand; Jackson et al., 2005). The pain matrix is a region of the brain that includes the anterior insula and anterior cingulate cortex (ACC) that is involved in the processing of one's own pain (see Ianetti & Mouraux, 2010). This type of empathetic response to others is limited to the emotional (but not sensory) regions of pain processing in oneself (Singer et al., 2004), but it is a fairly general result that has been found in a number of other similar studies (Morrison et al., 2004), and just viewing the face of another in pain is sufficient to cause it (Botvinick et al., 2005).

Although this research on similarities between perceptions of pain in self and others provides critical insights into the neural processes of empathy, it does not involve the resolution of the critical self-other conflict discussed throughout this dissertation. That is, seeing another person's pain is sufficient to activate the neural systems involved with the processing of one's own pain, but it is unclear whether this would occur to the same degree if the other person's pain was associated with the avoidance of one's own unpleasant experience, since participants pay no cost to demonstrate concern for others in this instance. Although attention to others in pain is in a sense a cost (especially since it leads to negative emotions for the self), participants have no real alternatives – typically they are explicitly asked to imagine the extent to which others are in pain, and the person in pain is presented on the screen for a fixed amount of time (e.g., Jackson et al., 2005).

Studies utilitizing fMRI methodology to investigate economic interactions with others more directly address self-other tradeoffs in concern for others. These studies have found that behaving prosocially in economic games is related to increased activity in reward-related regions of the brain. For instance, Rilling and colleagues (2002) scanned participants as they took part in an iterated prisoner's dilemma, in which two players decides to cooperate or defect with no knowledge of the others' action; after both have chosen, each receives feedback about what the other did, and then another trial (in which each again choose to cooperate or defect) begins. When participants cooperated and found out that the other person did as well, they had increased activation in striatum and OFC, two regions of the brain related to receiving rewards (see Rolls, 2006; Delgado, 2007; Haber & Knutson, 2010). A number of other studies have found similar results, with increased activation in reward-related regions of the brain being linked to having one's trust reciprocated in an iterated trust game (Phan et al., 2010), decisions to give to charity (Moll et al., 2006), merely viewing another person receiving rewards (Mobbs, Yu, Meyer, Passamonti, Seymour, Calder, et al., 2009), and viewing monetary transfers reducing inequality between self and others (Tricomi et al., 2010). Additionally, unreciprocated cooperation in economic games leads to increased activation in the pain matrix (Sanfey et al., 2003; Singer, 2006; Rilling et al., 2008), and punishing those who defect in economic games leads to increased activation in reward-related regions of the brain (de Quervain et al., 2004), as does acquiring a good reputation for oneself in economic games (Izuma, Saito, & Sadato, 2008). Further, differences in personality have been found to moderate these effects. Prosocials (as measured by social value orientation)

show the typical increase in reward-related activity to reciprocating trust (in a trust game) and an increase in the pain matrix to defecting, but proselfs show the opposite, with reward-related activity to defecting and pain-related processing to reciprocating trust (van den Bos, van Dijk, Westenberg, Rombouts, & Crone, 2009).

These studies have greatly contributed to our understanding of the neural correlates of prosocial behavior, but they do not necessarily examine concern for others because of limitations with the tasks that are used. For example, in the iterated prisoners' dilemma game, decisions to cooperate or defect (and thus neural activity generated to those decisions) could be based on concern for the others; however, trust, reciprocation, and the desire for a good reputation also come into play. Similarly, emotional reactions to outcomes in this type of game could be due to feeling good about the other's gains, but could also be due to happiness over one's own gains, satisfaction over the other knowing (or believing) that one can be trusted, anger over a breach of trust, regret over cooperating when the other competes, etc. Some of these counterexplanations can be ruled out based on either the measure or the instructions given, but thus far nothing has ruled out all of these types of explanations (perhaps because none have had the goal of examining only concern for others). Additionally, Moll et al. (2006) examine charitable giving, which rules out trust as a counterexplanation, but introduces an explicit norm for giving (as with the dictator game) that may be responsible for both behavior and neural activity in this situation.

To better examine the neural correlates of concern for others in absence of egoistic or external incentives, participants in this study made decisions in the dual

gamble task while undergoing fMRI scanning. The goal of this study is twofold. First, as psychology becomes more interdisciplinary, an understanding of how complex social cognition is represented and processed in the brain has become an important line of scientific inquiry. Despite increased attention to the neural correlates of social cognition and empathetic decision-making, our understanding of the brain systems that underlie these important processes is still in its infancy. Although some may argue that the utility of brain imaging has not yet been fully realized for social psychology, a more accurate model of brain function will allow for better theoretical development (see Cunningham, 2010). Thus, this is an important aspect of social cognition that yet to be understood. Second, this particular study has an opportunity to unpack aspects of processing that is not possible from behavioral studies alone and provide immediate theoretical leverage. As noted earlier, making decisions that are advantageous to others could arise for a number of reasons rather than concern for others *per se*. The present fMRI study is critical to determine the reward value of the particular outcome (in others words, is more reward related activity seen to rewards or punishments of the other). To the extent that outcomes for others can be represented using the same neural systems as outcomes for the self, the potential outcomes for the other can influence one's sense of overall value (while considering the self and other simultaneously). This may allow for a form of *neural interdependence*, where one responds to another's rewards and punishments as if they were one's own.

Method

Participants

Participants were fifty-one right-handed participants (27 females, mean age = 22.67) with no reported abnormal neurological history and normal or corrected-to-normal vision.

Procedure

During six runs of fMRI scanning, participants made decisions for themselves and others using the dual gamble task described in study 1. There were two differences between that study and the present one. First, in study 1 participants had as much time as they wanted to respond, whereas in the present study participants had 5 seconds to make a decision. If participants did not respond in time, the gambles would be randomly taken or passed. The purpose of the time limit was to equate, as much as possible, the perceptual and cognitive activity at each trial. Second, in order to ensure that participants would be ready to respond to the decisions immediately upon seeing them, they first did 20 practice trials before going into the scanner. The first ten practice trials did not have a time limit, and the next ten did require that participants respond within 5 seconds, making it equivalent to the study in the scanner. Participants were informed that their outcomes in the practice trials would not affect their final outcomes in any way. The orientation of the practice trials (i.e., self gamble on left side or right side of the screen) matched the orientation of the real decision task. Practice trials were completed immediately prior to scanning.

In the scanner, participants completed 18 decisions per run, for a total of 108 decisions. Participants would see a gamble screen depicting a pair of gambles (this was identical to those used in study 1), and were instructed to press one button to take the pair

of gambles, or another button to pass on the pair of gambles. Gambles stayed on the screen for 5 seconds (even after participants made a response), were followed by a fixation cross that appeared for 2 seconds, followed by feedback presented for 5 seconds showing them the outcomes of the gambles that were taken or passed, followed by another fixation cross presented for 2 seconds. After the final fixation cross left the screen, the next trial sequence would automatically begin. Personality and demographics questionnaires were randomly given either before scanning (before the practice trials) or after scanning. At the end of the session, participants were paid $20 and dismissed. Participants were then contacted within two weeks and notified of whether or not they made any additional money, and came back in to receive any additional money they won.

Scanning parameters and analysis

Scanning was conducted using a Siemens 3T Trio functional magnetic resonance imaging (TIM) system at The Center for Cognitive and Behavioral Brain Imaging (CCBBI) at The Ohio State University. Functional images were acquired in 34 axial slices parallel to the AC-PC line, and nearly isotropic functional images were acquired from inferior to superior using a single-shot gradient echo planar pulse sequence (3.33 mm thick; TE = 25 ms; TR = 2000 ms; in-plane resolution = 3 mm x 3 mm; matrix size = 64 x 64; FOV = 260 mm). The first five volumes of each run were discarded to allow for T1 equilibration effects. Following functional imaging, a high resolution T1-weighted anatomical image (MPRAGE; 60 sagittal slices; TE = 4.73 ms, TR = 1900 ms; resolution = 0.9×0.9×1.2 mm) was collected for normalization.

Data were prepared for analysis using SPM8 (Wellcome Department of Cognitive Neurology, London, UK; www.fil.ion.ucl.ac.uk/spm). Data were motion-corrected using SPM's Realign and Unwarp procedure, which helps to correct for movement artifacts at the preprocessing stage. For each participant, functional EPI scans were then co-registered to their corresponding high-resolution MPRAGE anatomical image. The unsegmented anatomical images were then spatially normalized to the MNI template using the default settings. The normalizations from the co-registration and normalization steps were applied to the EPI functional scans and new images were created that were interpolated to have voxel dimensions of 3 mm x 3 mm x 3 mm. To enhance signal-to-noise ratios, these images were smoothed using an 8 mm FWHM (full-width-half-maximum) kernel. The BOLD signal was modeled as a function of a canonical hemodynamic response function and its temporal derivative with a 128 s high-pass filter.

Results

Overall effects

Analysis strategy. Data were analyzed using the general linear model as implemented by SPM8. Participant level (1st level) effects were modeled by convolving an event related hemodynamic response function and its temporal derivative against the preprocessed data for each of the four conditions (decision-self, decision-other, outcome-self, outcome-other). Whole brain analyses revealed increased activity in two clusters during decision, and a different two during outcome ($p < .001$ uncorrected, $k = 20$). Volumes of interest (VOIs) were extracted for these areas based on significant voxels within a cluster, and parameter estimates for each participant (i.e., beta weights) were

generated for each of the four within subject conditions (take-self, pass-self, take-other, pass-other). Higher numbers mean greater blood oxygenated level dependence (BOLD) activity with increasing expected value. MRIcron (www.sph.sc.edu/comd/rorden/mricron/) was used to determine Brodmann's Areas for regions of interest.

Neural activity at decision. At decision, increased activity was found in regions identified as anterior cingulate cortex (ACC; mni coordinates = 3, 35, 28; BA = 32; F (3, 150) = 11.52, p <.05 FWE; see figure 4) and insula (mni coordinates = 36, 23, -8; BA = 47; F (3, 150) = 11.01, p <.05 FWE; see figure 5). Increased activation in these regions has been found when people experience pain (Peyron, Laurent, & García-Larrea, 2000), when people view others in pain (Jackson et al., 2005), and when people are treated unfairly by others (Sanfey et al., 2002; Rilling et al., 2004). The general function of the ACC is thought to be involved in the detection of conflict and signaling the need for top-down control (see Botvinick , Cohen, & Carter, 2004), although the exact nature of the ACC is still being debated (O'Reilly, Herd, & Pauli, 2010). The general function of the insula is thought to be related to integrating visceral information with current representations to generate a current subjective feeling state (Craig, 2009), and in addition to being related to pain and unfairness, it has also been linked to the processing of disgust (Wright, He, Shapira, Goodman, Liu, 2004).

A within subjects analysis of variance using parameter estimates generated from ACC activity at decision revealed significant main effects of decision type (i.e., take or pass), F (1, 50) = 18.69, p < .01, and target (i.e., self or other), F (1, 50) = 4.32, p < .05.

These main effects are qualified by a significant decision type x target interaction, F (1, 50) = 6.79, p = .01. A one-sample t-test revealed pass-self to be significantly different from zero, t (50) = 4.96, p < .01, and take-self to be marginally significantly different than zero, t (50) = -1.82, p = .07. No other conditions were significantly different than zero (both p's > .20).

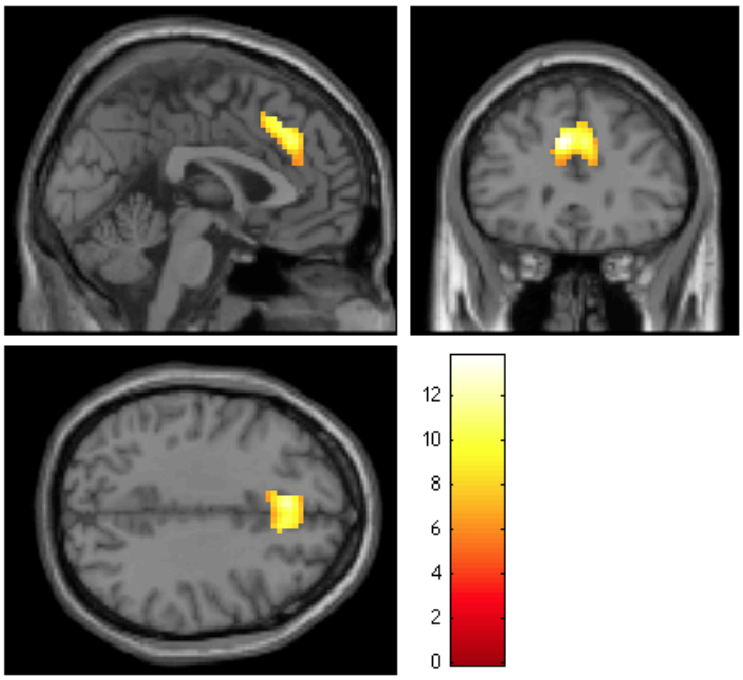

Figure 4: Neural activity in ACC at decision

A within subjects analysis of variance using parameter estimates generated from insula activity at decision revealed a similar pattern of results, with a significant main effect of decision type, F (1, 50) = 7.35, p < .01, but no significant main effect of target, F (1, 50) = 2.69, p = .11. This significant main effect is qualified by a significant decision type x target interaction, F (1, 50) = 10.87, p < .01. A one-sample t-test revealed pass-

self to be significantly different from zero, t (50) = 3.39, p < .01. No other conditions were significantly different than zero (all p's > .30). Together, these results suggest that activity at decision is driven by negativity towards making bad decisions. Specifically, on average participants show increased activation consistent with negative affect when passing on good gambles for themselves, but do not show a similar pattern when passing on good gambles for others.

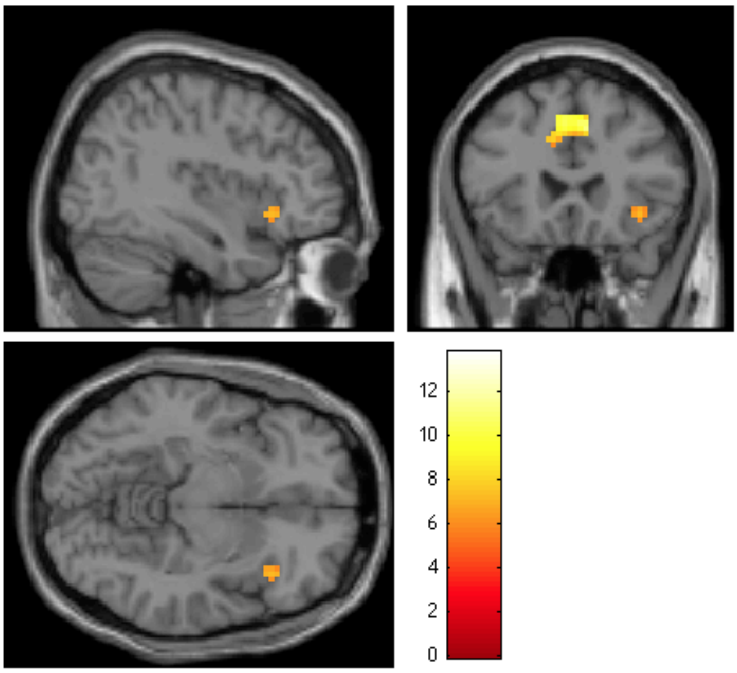

Figure 5: Neural activity in insula at decision

Neural activity at outcome. The clusters of significant activity at outcome were identified as orbitofrontal cortex (OFC; mni coordinates = 0, 47, -5; BA = 10; F (3, 150) = 13.77, p <.05 FWE; see figure 6) and nucleus accumbens (NAc; coordinates = 18, 14, -5; BA = 11; F (3, 150) = 10.48, p <.05 FWE; see figure 7). Increased activation in these

regions has been related to the representation of reward for the self (O'Doherty et al., 2001; Grabenhorst, D'Souza, Parris, Rolls, & Passingham, 2010; Knutson, Adams, Fong, & Hommer, 2001), as well as cooperation in economic games (Rilling et al., 2002). The OFC is generally thought to be involved in representing information about different rewards into a 'common currency' that allows for the valuation of stimuli across domains (Montague & Berns, 2002; Chib, Rangel, Shimojo, & O'Doherty, 2009), while the general function of the NAc is thought be related to anticipation of reward (Knutson et al., 2001).

A within subjects analysis of variance using parameter estimates generated from OFC activity at outcome revealed a significant main effect of decision type, F (1, 50) = 12.53, $p < .01$, but no significant main effect of target, F (1, 50) = 1.66, $p > .20$. This significant main effect is qualified by a significant decision type x target interaction, F (1, 50) = 16.63, $p < .01$. A one-sample t-test revealed take-self to be significantly different from zero, t (50) = 5.37, $p < .01$, and pass-self to be marginally significantly different than zero, t (50) = -1.72 $p = .07$. No other conditions were significantly different than zero (both p's > .70).

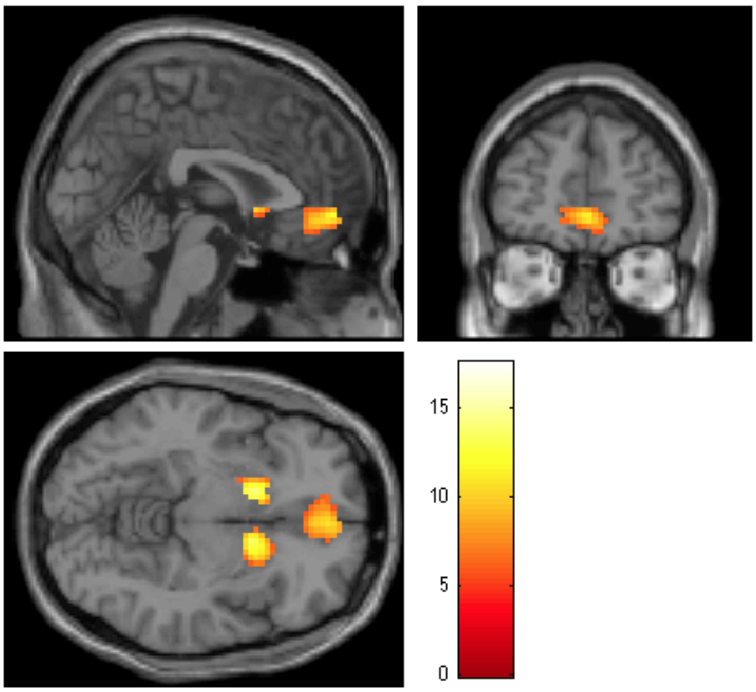

Figure 6: Neural activity in OFC at outcome.

A within subjects analysis of variance using parameter estimates generated from NAc activity at outcome revealed significant main effects of decision type, F (1, 50) = 20.00, $p < .01$, and target, F (1, 50) = 10.62, $p < .01$. These main effects are qualified by a significant decision type x target interaction, F (1, 50) = 13.33, $p < .01$. A one-sample t-test revealed take-self to be significantly different from zero, t (50) = 5.93, $p < .01$. No other conditions were significantly different than zero (all p's > .15). The results at outcome suggest that this increased activity is driven by positivity towards getting good outcomes. Specifically, participants (on average) show increased activation consistent with reward when getting on good outcomes for themselves, but do not show a similar pattern when passing on good gambles for others.

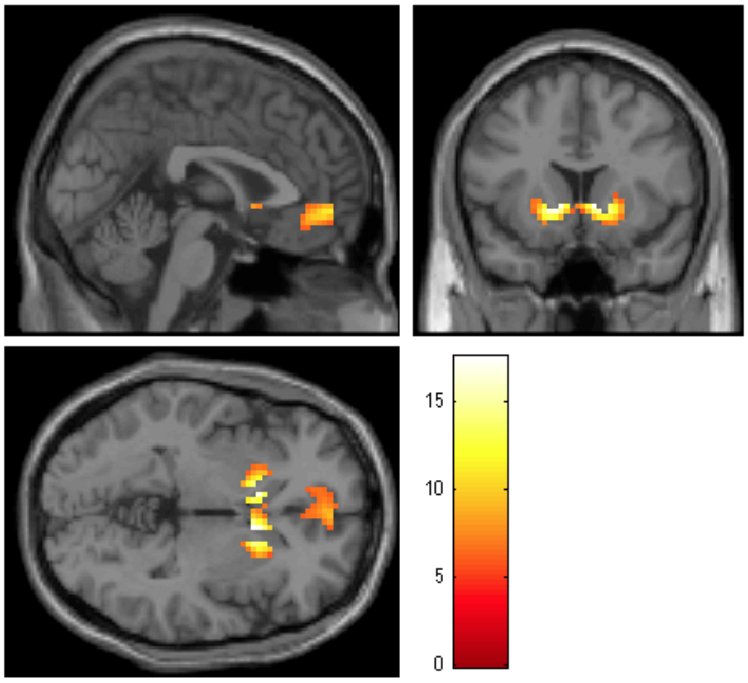

Figure 7: Neural activity in NAc at outcome.

Altogether, significant effects were consistently found for self gambles, with passing on good gambles at the time of decision being related to increased activation in the ACC and insula, two regions of the brain associated with the negative emotions that accompany pain, as well as conflict detection (ACC) and disgust (insula). Additionally, increased activation in reward-related regions of the brain (OFC and NAc) was related to receiving rewards for the self, but not for the other person. These results seem to indicate that on average, people do not react with concern for others, in the form of feeling bad when making bad decisions for them or feeling good when they get good outcomes.

Individual differences

Although there was not a general tendency for people to demonstrate concern for others in their neural reactions to decisions and outcomes for others, variation in these responses is to be expected. As such, correlations were computed between neural activity in the four different conditions (Decision-Take, Decision-Pass, Outcome-Take, and Outcome-Pass) for the other gambles and personality scores on the Toronto Empathy Questionnaire (TEQ; Spreng et al., 2009) and the Levenson Self-Report Measure of Psychopathy (LSRP; Levenson et al., 1995). In order to ensure that personality measures were not affected by the task, the order of measures and task/scanning was counterbalanced. Neither of these measures were significantly affected by order (TEQ: F (1, 50) = 0.61, p = .43; LSRP: F (1, 50) = 0.04, p = .85). Additionally, empathy and psychopathy were significantly correlated, r = -.54, p < .01.

Analysis strategy. To examine the relationships between personality variables and neural activity to others' gambles and outcomes, region of interest masks were created for theoretically relevant areas of interest. Correlations were then computed between neural activity in these regions (p < .01, k = 10) in each of the different conditions. Again, activity in the different regions was determined by generating parameter estimates from VOI analysis, and Brodmann's Areas were determined using MRIcron (www.sph.sc.edu/comd/rorden/mricron/).

Decision-Take. When deciding to take a pair of gambles that was good for the other person, neural activity in the anterior cingulate cortex (mni coordinates = 9, 32, 31; BA = 32) was negatively correlated with empathy scores, r = -.38, p < .01 (see figure 8). ACC (mni coordinates = 0, 35, 37; BA = 32) activity to taking good gambles for others

was also positively correlated with psychopathy amongst taken gambles at the time of decision, $r = .39$, $p < .01$ (see figure 9). Finally, activity in both right amygdala (mni coordinates = 24, -7, -11), and left amygdala (mni coordinates = -21, -7, -11) was positively correlated with empathy, (right amygdala; see figure 10) $r = .38$, $p < .01$, (left amygdala) $r = .36$, $p = .01$. These results (with the ACC) suggest that increasing empathy leads to an increase in negative affect when taking a bad gamble for someone else, whereas increasing psychopathy leads to a decrease in this response. Additionally, the amygdala, once thought of as processing fear or threat, is now conceived of as a relevance detector (Cunningham et al., 2008; Sander et al., 2003). Thus, one interpretation of these amygdala results is that those higher in empathy are more likely to see good gambles for others as relevant.

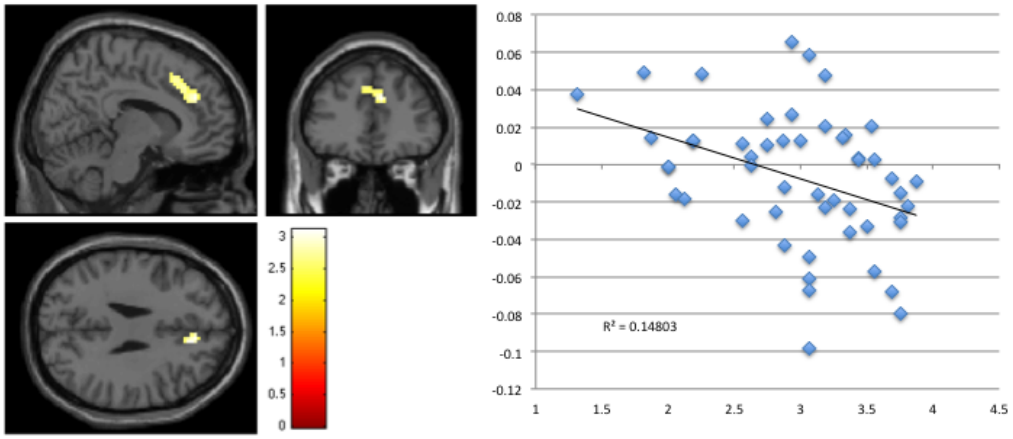

Figure 8: Correlation between ACC activity to taken (higher EV) gambles for others and empathy scores

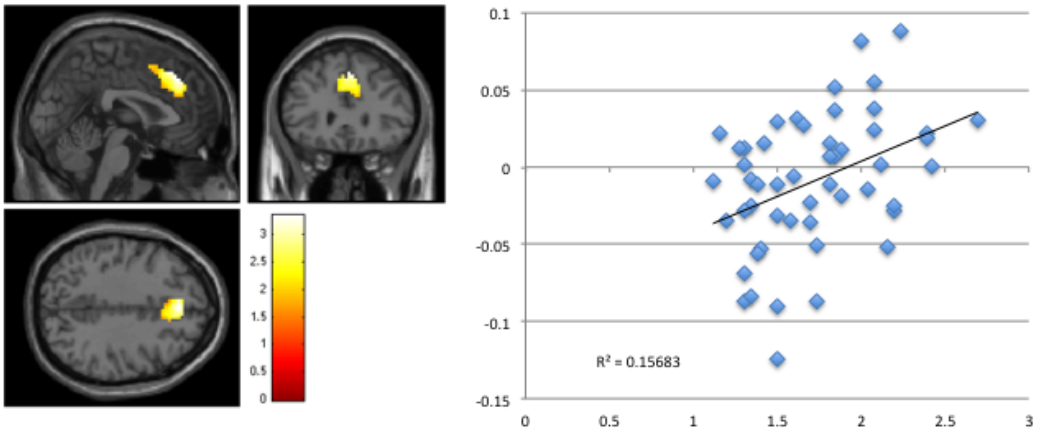

Figure 9: Correlation between ACC activity to taken (higher EV) gambles for others and psychopathy scores

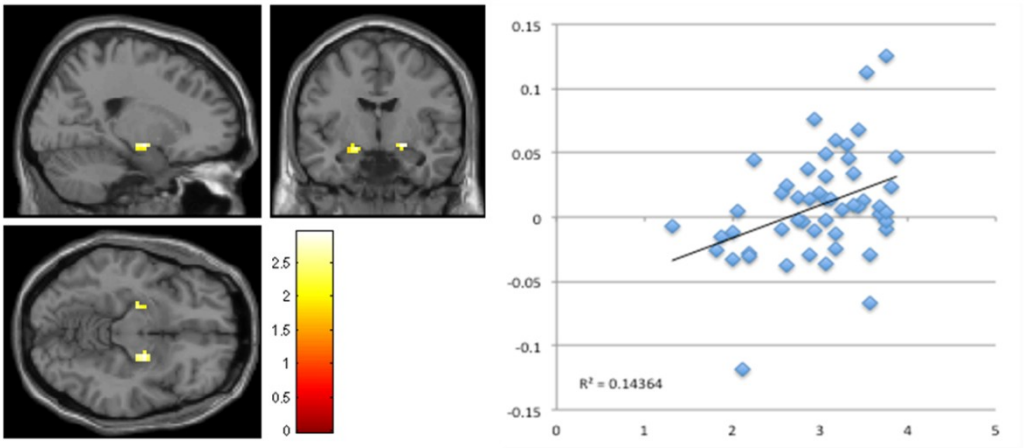

Figure 10: Correlation between Right amygdala activity to taken (higher EV) gambles for others and empathy scores

Outcome-Take. When viewing outcomes from taken gambles, neural activity in both the right orbitofrontal cortex (mni coordinates = 30, 35, -17; BA = 47) and left orbitofrontal cortex (mni coordinates = -35, 35, -17; BA = 47) was positively correlated

with empathy scores, (right OFC) $r = .49$, $p < .01$ (see figure 11), (left OFC) $r = .44$, $p = .01$. Additionally, activity in left putamen (mni coordinates = -27, -7, 10) was positively correlated with empathy scores, $r = .46$, $p < .01$ (see figure 12). The putamen is part of the striatum, which also includes the nucleus accumbens and the caudate nucleus. The striatum in general has been related to reward-related processing in general (see Delgado, 2007) as well as cooperation with others (Rilling et al., 2002).Together, these results suggest that those higher in empathy are more likely to represent rewards for others in the same way that they do for themselves.

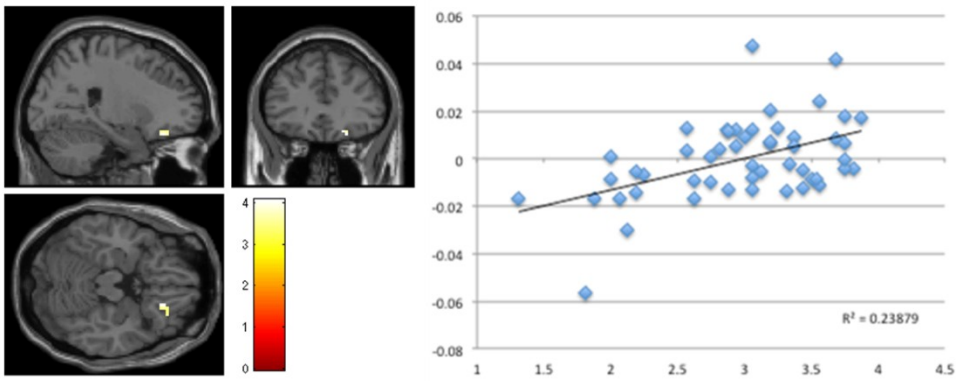

Figure 11: Correlation between Right OFC activity to taken (higher EV) gambles for others and empathy scores

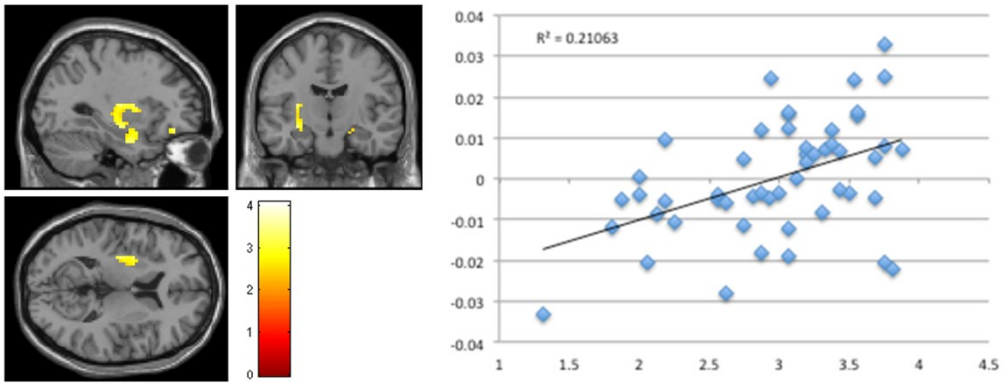

Figure 12: Correlation between Left Putamen activity to taken (higher EV) gambles for others and empathy scores

Outcome-Pass. When viewing outcomes from passed gambles, neural activity in the left orbitofrontal cortex (mni coordinates = -3, 47, -11; BA = 47) was negatively correlated with empathy scores, $r = -.39$, $p < .01$ (see figure 13). This suggests that those high in empathy receive a reduced reward response when seeing missed opportunities for others.

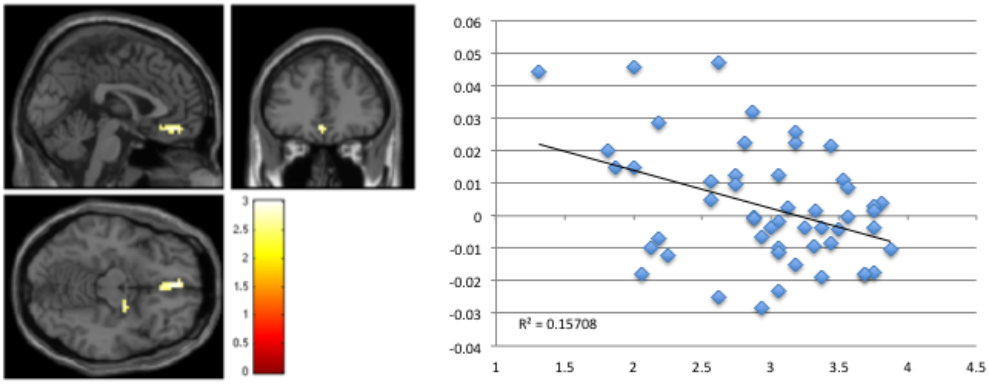

Figure 13: Correlation between OFC activity to passed (higher EV) gambles for others and empathy scores

Together, the personality results indicate that there are some people who show concern for others in their neural reactions to decisions and outcomes. Specifically, those high in empathy show a greater negativity when making bad decisions for others, and greater reward when others are rewarded. On the other hand, those high in psychopathy show less negativity for others when making bad decisions for them.

Discussion

The present study provides evidence that some people neurally respond to what happens to others as they do themselves – that is, those dispositionally high in empathy show activity in brain regions consistent with negative affect when making a bad decision for someone else, and activity in reward-related regions when others get good outcomes. By using the dual gamble task, which separates decision and outcome and minimizes egoistic or other external incentives for behaving prosocially, this study goes beyond prior research in this area by isolating concern for others as the cause of the presently seen neural activity. That only a subset of those showed this activity also highlights the importance of taking variation due to personality into consideration. At the mean level, it appeared that people were only concerned about themselves, and were non-responsive to others' gambles and outcomes. Thus, if personality was not measured in this study, one might conclude that people are not concerned with others when egoistic incentives are removed. However, this apparent lack of concern for others at the mean level masks meaningful variation due to individual differences in empathy and psychopathy.

The present study also speaks to one common egoistic explanation of prosocial behavior – that doing good things for others makes one feel good (e.g. Andreoni, 1989,

1990). On the one hand, it is true that this study demonstrates that those high in empathy are more likely to feel good when others are rewarded (insofar as activity in reward-related regions can be interpreted as feeling good). However, there is no evidence for this at the time of decision; that is, just the act of making a good decision for others does not in and of itself seem to make people feel good. Thus, a narrow version of this explanation, in which people feel good about doing something good for another person (regardless of how it turns out), is not supported. However, there could be other versions of this explanation that the present study cannot address. For instance, people could be making good decisions for others with the expectation that it will make them feel good (if the decision does turn out as expected). Without knowing what participants were thinking when they made their decisions, it is impossible to draw conclusions about this more general type of explanation.

Nonetheless, the present study goes beyond previous work in this area by isolating the neural signature of concern for others, and by demonstrating that some people represent rewards and punishments in the same way for others as for themselves. This illustrates the fact that concern for others is not a (completely) separate process realized in different brain systems, but rather an extension of the same processes to events that happen to others. Thus, the psychological state of interdependence is reflected in the brain as neural interdependence, linking reactions to events that are relevant to others to one's own responses.

Chapter 5: General Discussion

"For the laws of nature (as justice, equity, modesty, mercy, and, in sum, doing to others as we would be done to) of themselves, without the terror of some power to cause them to be observed, are contrary to our natural passions, that carry us to partiality, pride, revenge, and the like."

Thomas Hobbes, *Leviathan*, 1651

The primary contribution of the current dissertation is that people are not solely self-interested – at least some people are concerned for others. Clearly self-interest is powerful, and that can be seen in the present research by the tendency for people to make better decisions for themselves than for others. However, the purpose of these studies is not to demonstrate that people are not self-interested, but rather to determine if this is the only motivation that individuals possess. The present research reveals that it is not, and this is consistent with a great deal of prior research and theory suggesting that people are inherently social and quick to show concern for others. However, the current research goes beyond this by introducing a new measure of concern that minimizes egoistic counter-explanations, and thus allows for stronger inferences to be drawn about concern for others. Study 1 introduced this new measure, the dual gamble task, and found that

people do care about others. Additionally, there was variation due to personality in this concern, as this was correlated with empathy and psychopathy. Studies 2 and 3 examined how personality interacts with situational manipulations to affect concern for others. Study 4 explored the neural correlates of concern by scanning subjects as they took part in the dual gamble task. Together, these results further question the widespread notion that people are solely self-interested, and introduce a powerful new measure of concern for others.

Comparison to other measures

Again, the present set of studies is hardly the first to challenge the notion that people are solely self-interested, and it takes a good deal of mental acrobatics to believe that the only psychologically ultimate motive is self-interest (Caporael et al., 1989; Mansbridge, 1990). However, this belief is widespread, in part because prior measures of concern for others allow for egoistic interpretations of the data. The dual gamble task minimizes these egoistic interpretations in a number of ways. First, it does (potentially) involve a clear material cost to demonstrate concern for others. Early research on helping behavior included measures of concern such as a willingness to get an experimenter's attention when someone was in need of help (Darley & Latane, 1968). Although this may approximate situations of real-world helping behavior, the lack of a real cost might allow people to demonstrate what looks like concern for others despite not having that underlying motive. Second, self and other outcomes are orthogonalized in the dual gamble task. Making these separate is beneficial because it allows participants to adopt the strategy of 'every man for himself,' whereby a person decides that he or she will

neither help nor hurt the other person. By contrast, in most other games, others cannot gain without the assistance of the person making the decisions. Third, decision and outcome are also separate in the dual gamble task. This is important because it allows for uncertain outcomes that can provide cover for participants who might want to behave selfishly. For example, when participants' scores are tallied by the experimenter, a low score for others could be due to selfish choices, or it could be due to bad luck. This also allows for a separate examination of these components with physiological or neuroscientific measures, such as fMRI. Fourth, the presence of both good and bad gambles avoids the creation of experimental norms to behave prosocially that occur the standard dictator game (List, 2007; Bardsley, 2008). Finally, the dual gamble task has multiple trials, but in a way that does not change the nature of one's interaction or expectations. The fact that it has multiple trials is useful for increasing reliability, and although a number of other economic games also have multiple trials, they do so in a way that may change a person's natural reactions. For instance, in an iterated prisoner's dilemma game players take turns making decisions, and typically see how the other person played before making another decision, which would clearly change someone's orientation toward that other person. Even solutions to this may still change general expectations, if not expectations toward that specific person. For instance, one solution to this with the prisoner's dilemma is through random rematching, in which participants play multiple rounds, but get resorted with new partners at some point during the game (Andreoni, 1988; see Andreoni & Croson, 2008). Although this removes any beliefs about the other person that may have developed through interaction, it could still create

expectations about how people should behave in that situation. The dual gamble task does not have this issue, since participants do not know anything about how others make decisions until they are done making decisions.

Despite the clear advances in measuring concern for others that the dual gamble task provides, there are some drawbacks. The length and complexity of the instructions may prevent some from understanding the task, although the fact that participants are paid for doing well should minimize this to some extent. Also, a determined egoist might find counterexplanations for this task as well. First, the fact that any information is presented about others may imply that this information should be used. Although this might be the case, this hardly seems problematic since there is no cue given as to *how* the information should be used. That is, participants are free to construe this as a competitive game (although those words are never used in the instructions) in which their goal is to beat the other person (i.e., maximize the difference between one's own outcomes and the other's outcomes). If this is happening, so few people are doing it that it is not evident in the results. Further, even those high in (subclinical) psychopathy are not trying to 'beat' the others, but rather are simply ignoring them. Another egoistic explanation for these results might be that people demonstrate concern for others because someone – either the experimenters or the participants themselves – know when someone behaves selfishly. This is true, but again, this is likely not too problematic because of the uncertainty between decision and outcome. Further, the number of trials and lack of a running tally should allow participants to convince themselves that they are making good decisions for the other person.

Variability in concern for others

In addition to demonstrating that people are not solely self-interested, the present studies also highlight the importance of variability in concern for others. That is, those dispositionally high in empathy are more likely to show concern on this measure, and those high on psychopathy are likely to be unconcerned for others on this measure. Although it may seem obvious that those who say that they do (or do not) chronically care about what happens to others demonstrate this on a behavioral measure of concern, early research on the personality of prosocial behavior was so unsuccessful that some questioned if the concept of traits should be abandoned (Lehmann & Witty, 1934; see Bem & Allen, 1974 for a review). Further, assessing personality not only increases the variance accounted for, but actually allowed for different conclusions to be drawn in study 4. That is, if personality had not been measured, then one might have concluded that people do *not* show any concern for others in their neural reactions. Finally, although personality is important, it is not immutable, as can be seen in studies 2 and 3. Clinical psychopathy is often discussed in terms of a lack of ability to care about others (even though this has not been directly tested), and those high in subclinical psychopathy show many of the same deficits as those with clinical levels (LeBreton, et al., 2006). Thus, if there is any personality type who would be resistant to showing concern for others (short of clinical psychopaths), it would be those high in psychopathy. Despite this, these individuals were just as likely to care about others if they were given a motivation to do so, in the form of providing them with a shared group identity.

Why are people concerned for others?

One important question that the present studies do not address is why people care about others. This is best addressed by evolutionary theories, which have grappled with the problem since Darwin (1859/1985). Complicating the issue is the fact that evolutionary altruism need not necessarily relate to psychological altruism (Wilson, 1992). Evolutionary altruism is said to occur when one organism reduces its genetic fitness for the sake of increasing the fitness of another (Wilson, 1975), whereas psychological altruism is based on a person's behavioral motives. Thus, concern for one's offspring might be psychologically but not evolutionarily altruistic, since they share one's genes. Despite this, many have suggested that evolutionary pressures lead people to be inherently selfish, as the Ghiselin (1974) quote at the beginning of this dissertation shows. Dawkins (1976) also forwarded this view, as he explicitly said that selfish genes give rise to selfish behavior, and that people should "…try to teach generosity and altruism, because we are born selfish." According to this view, called 'veneer theory' by de Waal (2006), evolution has led people to be solely self-interested, and any behavior to the contrary is at best a learned response, and at worst an attempt to manipulate others in the service of self-interest. The present research speaks to this theory in that it casts further doubt on the notion that people are solely self-interested, although the possibility exists that this is learned, rather than innate. However, research and theory in a number of different domains suggests that there may be an evolved tendency for people to care for others.

Seemingly every theory of basic human values and motivations includes concern for others. Self-transcendent values (Schwartz, 1992), communal sharing and equality matching in social relations (Fiske, 1992), ecosystem goals (Crocker, 2008), and reciprocity as a moral foundation (Haidt & Joseph, 2004) are just a few examples of such other-focused constructs. The cross-cultural literature, on which some of these theories have been based, supports the notion that concern for others is a basic part of human nature. For example, dictator game giving has been found across cultures, and no culture has yet been found in which people behave in a solely self-interested manner in this game (Henrich et al., 2001). Further, research on the Ache, an indigenous hunter-gatherer tribe in Paraguay, has revealed that they not only cooperate in public goods games (Hill & Gurven, 2004), but also engage in a great deal of real-world cooperation. For instance, the Ache take part in a great deal of food sharing, and engage in cooperative foraging, which is assistance in food gathering that is not directed toward kin (Hill, 2002).

In addition to research demonstrating concern for others across cultures, developmental research has found that children demonstrate concern for others at an early age, although the nature and developmental trajectory of that concern is still unclear. Children as young as 6 give as much as adults in a public goods game (using tokens redeemable for toys; Harbaugh & Krause, 2000), and children as young as 4 years old give non-zero allocations in the dictator game (using stickers; Benenson, Pascoe, & Radmore, 2007; Lucas, Wagner, & Chow, 2008). Younger children do seem to be more selfish than older children, as 8 years olds reject unfair distributions of rewards (candy) that are in their favor, but children younger than 8 (ages 4-7) do not (Blake &

McCauliffe, 2011). Also, 3-4 year olds are mostly (though not entirely) selfish when allocating candy to others, and become much less so by the age of 7-8 (Fehr, Bernhard, & Rockenbach, 2008). However, young children (3 year olds) share rewards (candy or stickers) after working with others to get them (Warneken, Lohse, Melis, & Tomasello, 2011), and very young children (as young as 18 months) exhibit spontaneous helping of strangers (with neither a cost nor a reward for the self; Warneken & Tomasello, 2006). This combined literature indicates that humans are quick to demonstrate concern for others (even strangers) early in development, although again, the exact nature of when this occurs and the cognitive machinery necessary for it to occur is still up for debate.

Concern for others and 'true altruism'

One question that the present studies have sidestepped is whether or not concern for others as presently operationalized represents 'true altruism,' or behavior with the ultimate[12] goal of benefitting someone else with no possibility of selfish gain. Although great pains have been taken to minimize egoistic alternatives for concern in this task, it is impossible to rule these out, in part because there could always be egoistic motivations lurking behind doors that scientists have not yet looked. As such, the 'true altruism' question would seem to be unfalsifiable, and thus outside the bounds of scientific inquiry (Popper, 1959/2002). Nonetheless, it is worth considering what self-interest looks like if it really is the only motivation that people have, as egoistic theorists put forth. Self-interest is apparently so fragile that some people cannot bear the thought of stranger knowing that they behaved in a way that could be characterized as self-interested. This

[12] The use of 'ultimate' here denotes psychologically ultimate, not evolutionarily ultimate.

would occur despite the fact that there is a widespread belief in the power and prevalence of self-interest (Miller, 1999). Also, self-interest is apparently stealthy, preventing people from knowing that they are self-interested, which would be unbearable for some. This would occur despite the fact that people are more likely to behave in prosocial ways if they have the cover of self-interest (Miller et al., 2002). Finally, self-interest is also needy, relying on positive and negative emotions to motivate behavior. In Hobbes' *Leviathan* (1651/1998) self-interest is thought to be so powerful that only a strong central authority (the titular Leviathan) can prevent a war of all against all. Clearly, the current depiction of self-interest represents quite a departure from this earlier image.

Conclusion

Perhaps the most fundamental question about human nature is whether or not people care about others, or if everyone is just out for themselves. This matters in part because it carries with it implications about how best to structure society – again, Hobbes' (1651/1998) belief in self-interest led him to advocate for an all-powerful central government. Further, what we believe about others will necessarily determine how we treat them. Most people, it seems, will do unto others what they believe will be done to them. Thus, having an accurate depiction of human nature is necessary, and this is particularly important given the fact that laypeople and scientists tend to have a distorted view in favor of self-interest (Miller, 1999; Dawes, 2004). The present research demonstrates that people will show concern for others even when egoistic reasons for doing so are stripped away, and reveals the personality, situational, and neural correlates

of this concern. Furthermore, this research contributes to the growing literature on cooperation aimed at demonstrating that people are not solely self-interested.

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Appendix A: Dual Gamble Task Instructions

In this study, we want to see how people make decisions. Specifically, you will decide whether to take or pass gambles.

The gambles are presented in amounts that will be converted to dollars when you are paid out; the conversion will be explained when you are paid out, but the basic idea is that the more points you get, the more you will be paid, between zero and ten dollars. If you end up with zero or negative total points, you will not make any extra money for this study. Please note that you receive REP credit for coming in today that will not be affected by anything that happens in the study; what I am referring to right now is an extra amount of money you can make, between $0 - $10, based on outcomes of the task.

On the screen is an example of a gamble that you can take or pass. There are two important aspects of gambles – value (how much you can win or lose) and probability (the likelihood of winning or losing). Positive values have a plus sign in front of them, while negative values have a minus sign in front of them. The values are represented by the colors blue and red, with blue being positive values and red being negative values.

For this gamble, you have a xx% chance of winning x points, and a xx% chance of losing x points. If you take this gamble, then you get an outcome that matches the probabilities and values. So x out of x times you would win x points, and x out of x times you will lose x points. If you pass, then you win or lose nothing. Go ahead and press the spacebar to go to the next screen

There is an additional aspect to the study that I want to tell you about. We also want to know how people make decisions for both themselves and for others, so you will decide to take or pass a series of two paired gambles, with one marked “SELF” that is just for you, and one marked “OTHER” that is for another person. You are NOT picking between the two gambles, but instead are deciding whether or not to take both or pass on both gambles simultaneously.

So you are paired with another person, and just as you play for that person, he or she also plays for you. The final amount you are paid is based on your outcomes for the self gambles, plus or minus the outcomes from the Other gambles for the person that you are paired with. So what you do for the self gamble affects you and only you, and what you do for the other gamble affects the person you are paired with, but doesn't affect you. Similarly, the person that you are paired with has a Self gamble that affects only him or her, and an Other gamble that affects you. So just to be clear, the other person's point total does not affect you at all.

While you will be randomly paired with another person, you will not know who you've been paired with. Also, you will not be able to communicate with this person, since it will be someone who has previously been in the study or someone who will be in the study in the future.

We do have to wait until we have run everyone before we pay anyone out, so at the end of the study we will tell you some times that you can come back to pick up any winnings you have, but it should be in about two weeks.

Now let me again direct your attention to the screen. This is a typical decision screen:
-on the left is the "self gamble", and on the right is the "other gamble."
(or, on the right is the "self gamble", and on the left is the "other gamble"
-You can see that you have a xx% probability of winning xx for yourself, and a xx% probability of losing xx for yourself. Additionally, you have an xx% probability of winning xx for the other person, and a xx% probability of losing xx for the other person.
-So you are not picking between the two gambles, but instead deciding whether or not to take both, or pass on both. Again, taking means that what happens with the gambles matters, and passing means that what happens doesn't matter. Do you understand this slide and see where I'm getting the different numbers from?

Next I'm going to have you make a response so you see what that looks like. Go ahead and press the "take" button. You see that you get feedback telling you what happened with the gambles. When you pass you also get feedback telling you what would have happened if you had taken the gambles. So you always get feedback, but it only gets added to or subtracted from the totals if you take the gambles.

So again, you will always have two gambles; and you will always make a take or pass decision. The values and probabilities will change with each set of gambles.
Also, the buttons are as follows: 1 is take and 0 is pass (with corresponding stickers).