

EGOCENTRISM AND PERSPECTIVE TAKING IN DILEMMAS OF TRUST

BY

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Chapter 1

An egocentric model of trust and reciprocity

“If there is any one secret of success, it lies in the ability to get to other person's point of view and see things from that person's angle as well as from your own”
(Henry Ford as cited in Carnegie, 1936, p. 37).

Acts of trust appear in many forms: managers trust that their employees will complete assignments thoroughly; consumers trust that goods purchased online will work as promised; and negotiators trust that their counterparts will work towards resolution in good faith. Trust has important roles in collaboration, commerce, and conflict resolution. As the breadth of these examples illustrates, knowing when to trust others is a pervasive problem in social decision making. Not surprisingly, influential scholars in psychology and economics have recognized trust as an important topic. The noted developmental psychologist Erik Erikson (1950) called trust “the first task of the ego” (p. 221) and Nobel Laureate Kenneth Arrow (1974) called it “a lubricant of social systems” (p. 23).

Trust is important, but that is not to say that it is always wise to trust others (Kohn, 2009). Trust can benefit societies by increasing investments and encouraging social exchanges (Arrow, 1974; Zak, 2000), but these benefits do not carry over to every individual trustor. Showing trust is only profitable if the recipient proves trustworthy. Trust involves the possibility of disappointment. Some employees shirk their responsibilities; some retailers sell defective products; and some negotiators bend facts to

their advantage. The problem for the trustor is to determine when it is worthwhile to accept the possibility of these disappointments.

The present report introduces a model of trust and reciprocity based on the idea that social decision making involves two conflicting tasks: evaluating potential outcomes and understanding the other party's point of view. The critical feature of this model is that decision makers do not treat these considerations equally. In a dilemma of trust, the decision maker focuses primarily on self-relevant information; perspective taking plays a limited or secondary role. For trustors, the consequence of egocentrism is that they may fail to properly attend to the probability of reciprocity. An egocentric trustor may fail to identify times when trust is lucrative and safe. Trustees, in turn, may fail to fully realize how their decision will affect the trustor. The implication of this model is that unchecked egocentrism leads to unnecessary inefficiency and inequality.

Trust and reciprocity

A seminal, interdisciplinary review defined trust as “a psychological state comprising the intention to accept vulnerability based upon an expectation of reciprocity” (Rousseau, Sitkin, Burt, & Camerer, 1998, p. 395).¹ An important aspect of this definition is that it suggests two necessary conditions for trust, vulnerability and the expectation of reciprocity. The condition of *vulnerability* requires that trusting someone entails accepting the possibility of a negative outcome; *the expectation of reciprocity* states that people trust because they believe that the potential negative outcome can be avoided. A person who accepts vulnerability as an act of self-sacrifice is not showing trust. Together,

¹ According to Google scholar, this definition has been cited over 3,100 times in the past 14 years.

these conditions suggest that trust involves two decision-theoretic questions: What are the possible outcomes of trust, and what are the probabilities that these outcomes will occur?

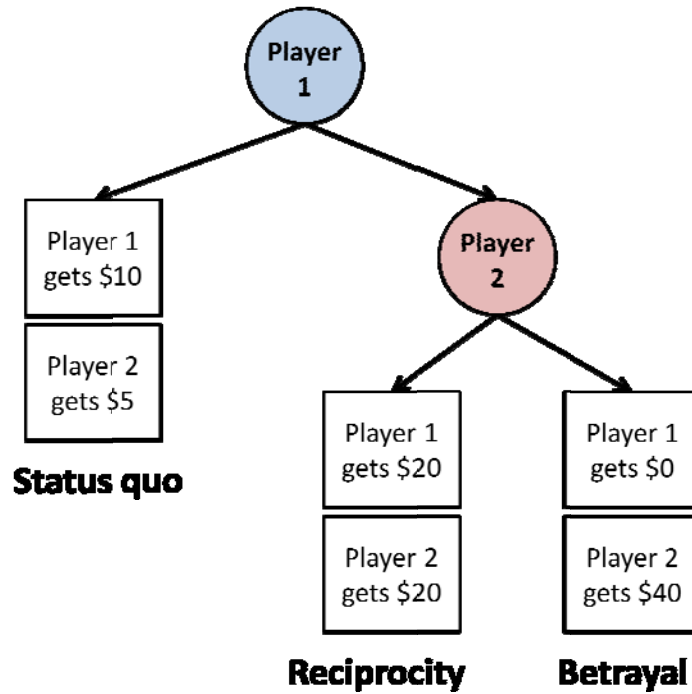
For every trustor, there is a corresponding trustee who decides whether to reciprocate. One of the features distinguishing dilemmas of trust from other social conflicts is that the trustor and trustee have asymmetric roles. The trustor has a dilemma of social risk taking, choosing between a modest, but guaranteed amount (the status quo) and an uncertain, but potentially larger outcome (trust). In contrast, there is no risk in the trustee's decision. When trust occurs, the trustee enters a position of relative power and chooses how to distribute wealth. In the simple case, there is a choice between an equitable distribution (reciprocity) and an unfair, but personally advantageous outcome (betrayal).

In the following chapters, I employ the economic trust game as a behavioral test of trust and reciprocity (Camerer, 2003; Dasgupta, 1988). There are two players whose decisions occur in two stages. See Figure 1-1 for an illustration. The first mover, or trustor, has a choice between the status quo (the game ends, the first mover gets P_1 and the second gets P_2) and trust. If the game continues, the second mover, or trustee, has a choice between reciprocity (the first mover gets R_1 and the second gets R_2) and betrayal (the first mover receives S and the second receives T). The two players face asymmetric dilemmas: The trustee has a choice between two allocations of wealth. She can reciprocate and distribute the money equally (the players receive R_1 and R_2 , $R_1 \approx R_2$) or betray trust by taking a greater share of money for herself (the trustor gets S and the trustee gets T , $S < T$). In comparison, the trustor has a strategic dilemma that is not solvable without predicting how the trustee will respond. The trustor knows that

reciprocity is better than the status quo ($R_1 > P_1$), but there is no guarantee that reciprocity will occur. There is a possibility of betrayal, an outcome worse than the status quo ($S < P_1$). The trustor must decide if this possibility is worth accepting.

Figure 1-1

The Trust Game



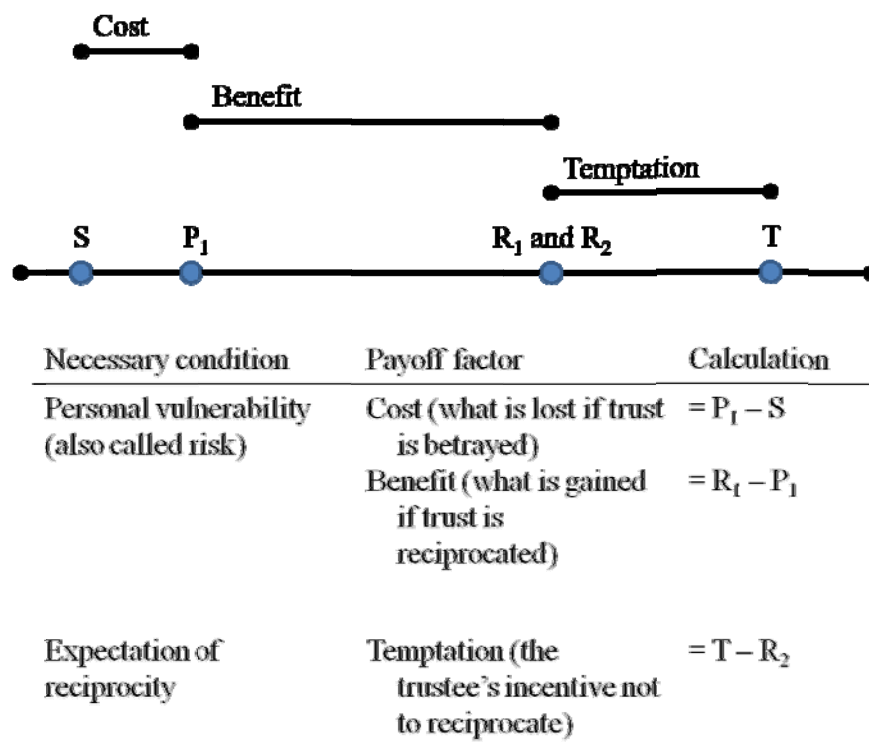
The trust game is an appealing tool for the present research because the definition of trust is embedded in its structure. There are two necessary conditions for trust, vulnerability and a positive expectation. Vulnerability is directly associated with the trustor's payoffs (P_1 , R_1 , and S). Vulnerability can be quantified as the potential costs and benefits of trust, relative to the status quo. The ratio of costs and benefits is defined as the *risk* of trust (Snijders & Keren, 1999).² Risk is low when the potential cost is low and the

² For the sake of parsimony, the present research defines risk as the ratio of cost over benefit. The question of how people weigh costs and benefits is beyond the scope of the present work. Here, I only assume that trust increases with benefits and decreases with costs, a claim with substantial empirical support.

potential benefit is high. The expectation of reciprocity is expressed in the trustee's payoffs. As the difference reciprocity and betrayal increases ($T - R_2$), the trustee has a greater *temptation* to betray trust. From the trustor's point of view, higher levels of temptation should be associated with lower expectations of reciprocity. Indeed, temptation is the best predictor of reciprocity among strangers (Snijders & Keren, 1999). Figure 1-2 illustrates the numerical relationships among cost, benefit, and temptation. By manipulating these factors, we can understand how trustors and trustees make decisions.

Figure 1-2

Cost, Benefit, and Temptation



The elements of trust

By definition, trust is related to potential outcomes (risk) and the probabilities of those outcomes occurring (expectation of reciprocity). The predominant view in

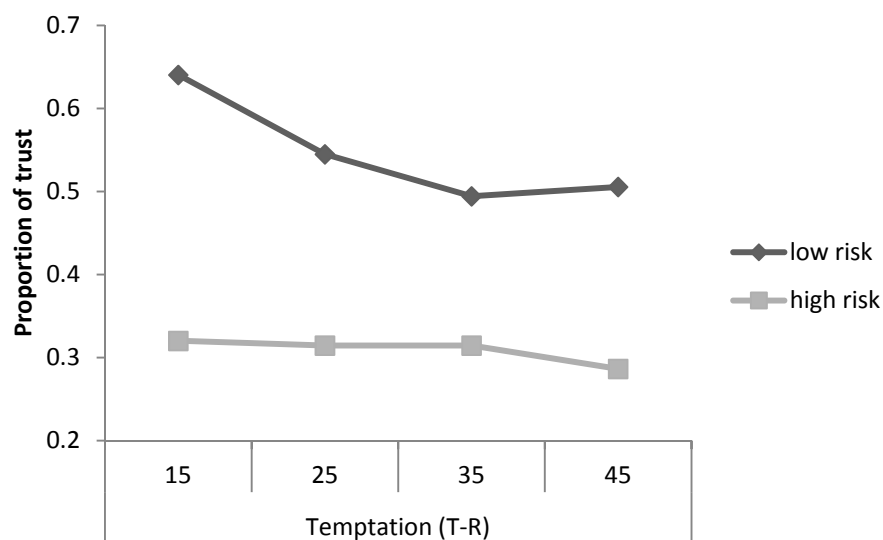
psychology is that trust is primarily driven by expectations of reciprocity (Dunning, Fetchenhauer, & Schlösser, 2012). Consider, for example, the Integrative Model of Trust (IMT), one of the most influential models of trust in organizations. According to the IMT, trust begins with the formation of an expectation of reciprocity (Mayer, Davis, and Schoorman, 1995). This expectation is influenced by the perceived characteristics of the trustee and the trustor's underlying propensity (Rotter, 1967). Risk is only considered after the trustor has evaluated the expectation of reciprocity. In fact, a positive expectation of the trustee is a precondition for the evaluation of risk. The IMT acknowledges that both expectations and risk are important, but it assumes that expectations are the most important consideration.

Other models partition trust into cognitive and emotional components (Johnson-George & Swap, 1982; McAllister, 1995). As with the IMT, this approach assumes that the expectation of reciprocity is the most critical factor. The components describe different aspects of the trustor's expectations: emotional trust is based on feelings of warmth and affiliation, an expectation of the trustee's benevolence; cognitive trust is based on beliefs about the trustee's abilities, an expectation of reliability and competence. Contextual factors moderate the relative importance of the two components (Chua et al., 2008). Trusting your significant other to keep a secret is based on emotion; trusting your accountant to correctly file your taxes is based on cognition. The distinction between emotion and cognition is appealing because it can potentially explain trust in a range of contexts. Recently, the componential view has been adapted to a dual process framework, with cognition and emotion replaced by reflection and impulse (Murray et al., 2011).

The present work draws much-needed attention to the importance of vulnerability in dilemmas of trust. In fact, I postulate that vulnerability, not the expectation of reciprocity, is the primary determinant of trust. Consider the trust game: Both risk and expectations are represented in the structure of the game's payoffs (Figure 1-2). An expectation-based model of trust would assume that trustors' decisions are primarily based on temptation ($T - R_2$). As temptation increases, the expectation of reciprocity weakens. However, our previous research found that trustors' decisions were primarily based on risk, not temptation (Evans & Krueger, 2011). Orthogonally manipulating the levels of risk and temptation, we found no main effect of temptation. Rather, the effect of temptation on trust was contingent upon the level of risk (see Figure 1-3). When risk was high, temptation had no effect on the rate of trust. Trustors only accounted for the size of temptation when risk was low. This interaction suggests that perspective taking occurred, but it was a secondary process in decision making.

Figure 1-3

The Effects of Risk and Temptation on Trust



The elements of reciprocity

When an act of trust occurs, the trustee chooses reciprocity or betrayal. In a long term relationship, reciprocity may be in both parties' best interests; reciprocating an act of trust is likely to encourage greater trust in the future (Engle-Warnick & Slonim, 2004; Yamagishi, Kanazawa, Mashima, & Terai, 2005). However, there are many situations where reciprocating yields no obvious benefits. For example, when there is no possibility that the trustor and trustee will meet again. Removing the possibility of future interactions diminishes reciprocity, but does not extinguish it. People consistently reciprocate, even in anonymous interactions with partners whom they will never hear from again (Johnson & Mislin, 2011).

The decision to reciprocate depends, in part, on how trustee perceives the original act of trust. A trustee is more willing to share money with another person when she believes that person has trusted her (Cox, 2004). Moreover, larger acts of trust beget greater reciprocity. Trustees exhibit the highest levels of reciprocity when they believe that they have been trusted fully (Pillutla, Malhotra, & Murnighan, 2003). These findings suggest that reciprocity is based on perspective taking – trustees evaluate the risk taken by the trustor, and reward the action accordingly.

Few studies have examined how trustees respond to the structure of the trust game. Two previous experiments reported that the rate of reciprocity is sensitive to temptation, but not risk (Malhotra, 2004; Snijders & Keren, 1999). This finding apparently contradicts the evidence that trustees reward larger acts of trust. A perspective taking trustee should be more likely to reciprocate when the trustor's risk is large, as the

act of trust was more significant. However, these studies did not test for the possibility of a risk by temptation interaction, nor did they systematically vary the factors of risk and temptation. If trustees mirror the behavior of their counterparts, there may be an unobserved, conditional effect of risk on reciprocity. Figure 1-3 shows that trustors only account for temptation when risk is low; a corresponding hypothesis for trustees is that they only account for risk when temptation is low.

Egocentric trust and reciprocity

The majority of research assumes that trustors and trustees employ different approaches to decision making. For example, the players in a trust game make decisions based on different aspects of the game's structure (Malhotra, 2004; Snijders & Keren, 1999). Trustors primarily focus on risk; trustees focus on temptation. Yet, the trustor and trustee are similar in that they both prioritize *self-relevant* information. Each experiences a conflict between egocentric concerns and perspective taking: For the trustor, there is a dilemma between focusing on outcomes and the probabilities of those outcomes occurring. For the trustee, there is a conflict between pursuing self-interest and rewarding the act of trust. The present research tests whether these decision problems can be accounted for by a common process model.

Egocentrism has many effects on social judgment and decision making, but few studies have examined its role in dilemmas of trust (Evans & Krueger, 2011). The following section reviews the effects of egocentrism in social decision making, citing well-known examples of how decision makers consistently fail to properly consider other perspectives. This neglect of perspective taking occurs, in part, because decision makers have limited cognitive resources. As a result, people tend to focus on highly accessible

information. Egocentrism is rampant, in part, because of the preference for salient information. Building upon this theoretical framework, I propose a process-model of social decision making in dilemmas of trust.

Bounded rationality and egocentrism

Egocentrism and social behavior

The tendency to overemphasize the self in social judgment (egocentrism) is a common tendency in social cognition (Alicke and Sedikides, 2010). People rely on self-knowledge because it is salient and easily accessible (Jackson, Brunet, Meltzoff, & Decety, 2006; Krueger, 2003). Thinking about the self requires less time and effort than thinking about someone else. Egocentrism would not be much of a concern if every person shared the same point of view. Unfortunately, this is rarely the case. In social dilemmas, decision makers usually have conflicting motives, as well as differing perspectives and beliefs.

Egocentrism becomes problematic when people fail to properly account for the differences between the self and others. For example, people exhibit *the curse of knowledge* when they fail to realize that others lack information that they possess (Camerer, Loewenstein, and Weber, 1999). In addition to the fact that people frequently error in considering other points of view, it is also common for them to have inaccurate beliefs about how others perceive them. Gilovich, Medvec, and Savinsky (2000) found that people overestimate the social attention observers pay them, a tendency labeled the *spotlight effect*. People are highly interested in their own behavior, and so they fail to properly account for the fact that others often do not share this enthusiasm. As a result, people overestimate the visibility of their appearances and actions.

A related form of egocentrism occurs when a decision maker prioritizes the perspective of the current self over those of past and future selves. These multiple-self problems (Schelling, 1984) illustrate that perspective taking is difficult even when it is self-referential. For example, people are said to exhibit the *hindsight bias* when they evaluate their past decisions in light of information they couldn't have known at the time (Christensen-Szalanski & Willham, 1991). Decisions that were ambiguous at the time seem obvious in retrospect. Similarly, people make inaccurate predictions about how they will feel in the future because they overemphasize how they feel in the present (Gilbert, 2007). The *impact bias*, defined as the tendency to overestimate the long term impact of positive or negative events, is a common error of this nature (Wilson & Gilbert, 2003). Given that people are prone to such errors in self-judgment; it is not surprising that they have difficulty understanding other people.

The tendency to over emphasize self-relevant information has myriad consequences for social behavior. When egocentric individuals come into conflict, it is likely they will perceive the dilemma differently. In conflict resolution, Thompson and Loewenstein (1992) identified egocentrism as a major barrier to successful negotiations. Egocentrism leads to costly delays in negotiations, even when reaching a timely settlement is mutually advantageous. Such delays occur because egocentric processes lead negotiators to hold self-serving perceptions of a fair outcome. These divergent perceptions of fairness can lead to costly delays in conflict resolution (i.e., civil litigation and labor strikes). Thompson and Loewenstein found that the effects of egocentrism were particularly salient in asymmetric negotiations: it is more difficult for negotiators to agree

upon a fair settlement when they have different costs and priorities. This finding may be relevant to dilemmas of trust, where the trustor and trustee have asymmetric roles.

Egocentric biases are particularly strong at the start of negotiations, but they can be reduced with communication and the exchange of information (Thompson & Loewenstein, 1992). However, even though communication can foster common understanding, egocentrism is a persistent obstacle. When communicating, people often overestimate their ability to express their emotions to others, a finding consistent with the aforementioned spotlight effect (Kruger, Epley, Parker, & Zhi-Web Ng, 2005). Comments that are meant to be funny or friendly may be interpreted as hostile and serious, and people consistently fail to underestimate this gap in understanding. Moreover, the distance between intention and others' perceptions is strongest when face-to-face communication is not possible; errors are even more common over e-mail. It is not enough for decision makers to have good intentions; they also have to successfully communicate those intentions.

The tendency to perceive situations from a self-serving point of view has consequences outside of negotiations; egocentrism also influences gift-giving behavior (Zhang & Epley, 2009). In social situations where one person performs a favor for another, a non-monetary reward is often expected (Heyman & Ariely, 2004). However, when such a favor is performed, the giver and receiver of the favor have different expectations of an appropriate gift. The person who receives the favor believes that the size of the gift should be related to the benefits yielded by the favor (the more helpful the favor, the larger the gift). On the other hand, the person who actually performs the favor believes that the gift should be based on how costly it was to perform (the greater the

inconvenience, the larger the gift). This discrepancy can lead to gifts that are either needlessly large or insultingly small.

Even if parties agree on the appropriate value of a gift, there is still the matter of selecting the perfect gift. Choosing a gift that the recipient will enjoy can be a difficult exercise in perspective taking. A rational choice perspective suggests that any gift other than cash is inefficient, leading to a deadweight loss in value. Waldfogel (2005) estimated that non-cash gifts generate, on average, 10-18% less value than egocentric purchases; and even gift cards are considered to be significantly less efficient than cash (Principe & Eisenhauer, 2009). Still, there are some cases where gift-giving creates more psychological value than cash; for example, gifts can strengthen long term relationships or create positive emotions, such as gratitude and surprise (Camerer, 1998; Desteno, Bartlett, Williams, & Dickens, 2010). Although there is still disagreement about whether gift giving, on the whole, is a rational enterprise, few would disagree with the claim that egocentrism can lead to some poorly chosen gifts.

Bounded rationality and egocentrism

Egocentric decision making occurs, in part, because people lack the time and mental resources to fully engage in perspective taking. The principle of bounded rationality suggests that normative models set an unrealistic standard for decision making because they do not account for the constraints of human minds, such as limited computational skills and working memory capacity (Gigerenzer & Todd, 1999; Simon 1955). Rather than attempting to make the best decisions at any cost, people employ heuristic strategies that balance response optimization with cognitive efficiency. The boundedly rational view of egocentrism suggests that self-relevant information weighs

heavily on decision making because it is salient and highly accessible (Tversky & Kahneman, 1974; Ross & Sicoly, 1979). Perspective taking, on the other hand, is used sparingly because it is a relatively slow and effortful process.

In social perception, egocentric processes occur immediately and are (sometimes) corrected by perspective taking. Epley and colleagues (2004) use the metaphor of anchoring-and-adjustment to explain the tension between egocentric processes and perspective taking: When making judgments about others, people begin by using their own perspective as an anchor, and proceed to adjust away from that response until a suitable alternative is reached. Here, egocentrism is caused by insufficient adjustment away from the self. This is consistent with the related finding that judgments about others require more time than comparable self-judgments (Krueger, 2003).

The metaphor of egocentric anchoring-and-adjustment is also supported by eye-tracking data from a visual theory of mind task. In this task, participants received instructions from a director to move various objects. Critically, there were some objects which were visible to the participant, but concealed from the director. On critical trials, participants had to choose between moving an object that the director could see (and presumably wanted the participant to move) and similar objects that only the participant could see. In this scenario, identifying the correct object depends upon the participant's ability to take the director's visual perspective. Eye tracking data reveal that people initially focus on the self-visible, but inaccurate objects, and then correct the error, presumably after the delayed realization that the director cannot see the same object (Epley, Morewedge, & Keysar, 2004). In the same task, children also begin by focusing

their visual attention on the self-relevant target; however, they are less likely than adults to correct the mistake.

A boundedly rational theory of decision making predicts that the use of effortful processes should be sensitive to the reward for a correct response and the scarcity of cognitive resources; perspective taking should increase when the cost-benefit ratio is favorable. Indeed, accuracy incentives reduce egocentrism, while cognitive load increases it (Epley et al., 2004). Offering further support, Lin, Keysar, and Epley (2011) found that working memory capacity was negatively correlated with egocentrism. Together, these findings are consistent with a boundedly rational explanation of egocentrism.

Process tracing trust

In the present research I employ a *process oriented* approach to explain behavior in dilemmas of trust. In the following chapters, I will propose and test a model describing how people seek out and integrate information in dilemmas of trust. To the best of my knowledge, this research is the first to examine trust using process tracing methods. The MouseLab software package is used to measure the process of information search (Payne, Bettman, & Johnson, 1993). In the MouseLab paradigm, decision problems are presented with the outcomes of potential choices concealed inside of boxes. In order to learn about the potential outcomes of choices, participants must actively search for information by dragging the mouse over boxes. MouseLab, in turn, records a sequential log of how participants search for data. These MouseLab data are useful in testing specific predictions about the processes of decision making and the relationship between processes and behavior. Here, the ultimate goal of adapting a process-oriented approach is to motivate interventions that improve the quality of decision making.

One advantage of process tracing methods is that they make it possible to distinguish between under emphasized and neglected information. Heuristic processes sometimes assume that people make decisions based on minimal information (Gigerenzer & Todd, 1999). For example, the *take-the-best* heuristic predicts that people approach choices by focusing on the single most important factor (Gigerenzer & Goldstein, 1996). The cognitive advantage of this rule is that it excludes a large amount of irrelevant information. Process tracing methods allow for an empirical test of this prediction.

An egocentric model of trust and reciprocity

The following section introduces an egocentric model of decision making consisting of six propositions. The first three propositions address *how* egocentrism influences decision making in dilemmas of trust. They outline a process where decision makers spend the majority of their time evaluating self-relevant information (Proposition 1, focus). In this process, self-relevant information is evaluated first (Proposition 2, primacy) and, when possible, decision makers rely on it as their only criterion for choices (Proposition 3, contingency). Perspective taking is avoided when possible. Propositions 4 and 5 forecast the negative consequences of egocentrism. Insufficient perspective taking makes trustors miss profitable opportunities (Proposition 4, inefficiency) and egocentric trustees are less likely to reciprocate (Proposition 5, inequality). The final proposition of the model invokes the concept of bounded rationality to explain egocentrism (Proposition 6, impulsivity). The proposition makes three assumptions about social cognition:

- 1) Egocentric processes are fast and effortless.
- 2) Perspective taking is slow and effortful.

- 3) Decision making possess a limited capacity to inhibit egocentrism and engage in perspective taking.

In this framework, egocentric decision making reflects the conservation of limited mental resources, and cognitive reflection is negatively associated with egocentrism. The following section outlines the model's six proposition (See Table 1-1 for a summary).

Proposition 1 (egocentric focus)

The first proposition of the egocentric model proposes that decision makers spend the majority of their time attending to self-relevant information. This hypothesis is based on the idea that information about the self is more salient and accessible than information about others (Jackson, Brunet, Meltzoff, & Decety, 2006; Krueger, 2003). The claim of egocentric focus is supported by a litany of examples from social cognition. For example, negotiators tend to interpret conflicts egocentrically and focus on the self-relevant aspects of dilemmas (Thompson & Loewenstein, 1992). In the case of the trust game, it is well-established that trust and reciprocity decisions are strongly influenced by egocentric considerations (Evans & Krueger, 2011; Snijders & Keren, 1999). The egocentric model goes a step further in predicting that the preference for self-relevant information can be traced to the earliest stages of decision making. I predict that egocentrism affects the process of information search by influencing the types of information decision makers seek out.

Proposition 2 (egocentric primacy)

Proposition 3 (egocentric contingency)

Propositions 2 and 3 address the sequential aspects of decision making. They predict that trust is evaluated in two stages: Egocentric outcomes (cost and benefit) are

interpreted during the first stage. If the subjective risk is sufficiently low, then players engage in perspective-taking to estimate the probability of reciprocity. Under these conditions (high benefit and low cost), the process integrates outcomes and probabilities. But when the risk is high (low benefit and high cost), outcomes are evaluated without regard for the probabilities with which they will occur.

Proposition 2, egocentric primacy, is based upon the notion that self-relevant information can be evaluated quickly and without much effort (Lin, Keysar, & Epley, 2010). Taking another person's point of view, on the other hand, is contrasted as a relatively slow, deliberative process (Epley et al., 2004). This process is consistent with the metaphor of perspective taking as anchoring-and-adjustment, which assumes that decision processes begin with self-relevant information.

Proposition 3, egocentric contingency, is motivated by the notion of bounded rationality (Simon, 1955). In real life, many decisions are constrained by the availability of time and effort. A descriptive model of decision making should account for the fact that people try to conserve mental resources. One means of conservation is *satisficing* – rather than searching for the best possible outcome, people tend to accept the first option that is good enough (Gigerenzer, 1999). The proposition of egocentric contingency assumes that when possible, people will avoid difficult problems (i.e., perspective taking). In the context of the trust game, this means that people will sometimes make decisions based solely on self-relevant information.

Behavioral and response latency data lend support to the claim of a sequential process. As shown in Figure 1-3, the effect of temptation on trust is contingent upon the level of risk. When response times were analyzed, we found that decisions in the low risk

condition took significantly longer. This difference in response times was robust after controlling for round order, the level of temptation, and decision outcome (trust versus distrust). Presumably, the additional time consumed was used to evaluate the second player's temptation. Still, process data are needed to directly test the claim of a temporal sequence. Proposition 2 (Egocentric Primacy) predicts that self-relevant information is evaluated before perspective-taking occurs. In an information search paradigm, players should access their own payoff information (evaluating cost and benefit) before viewing the trustee's payoffs. Proposition 3 (Egocentric Contingency) anticipates that the level of perspective-taking depends upon the evaluation of egocentric information. Players should spend more time looking at the trustee's payoffs when their own risk is low. Experiment 1 will test these propositions by examining search behavior under variable payoff conditions.

Proposition 4 (egocentric inefficiency)

Proposition 5 (egocentric inequality)

The fourth and fifth propositions of the egocentric model address the relationship between information search and decision making. The previous propositions outline the ways in which decision making is egocentric; here, the model addresses the consequences of egocentrism. Specifically, the model predicts that egocentrism will lead to lower levels of trust and reciprocity. The consequence of decreased trust is inefficiency, lower combined wealth for groups; the consequence of decreased reciprocity is inequality, an inequitable distribution of resources. These propositions do not imply that people *should* trust and reciprocate more; rather, they identify objective consequences of distrust and betrayal, lower total wealth and less egalitarian outcomes.

Trust and inefficiency. The first three propositions of the model outline the ways in which the trustor underemphasizes, and in some cases fully neglects, the trustee's perspective. A potential consequence of this inattention is that trustors may fail to identify situations where the probability of reciprocity is extremely small (games where the trustee's temptation is low). Under this condition, showing trust is both relatively safe and profitable. However, if trustors focus primarily on outcomes, rather than probabilities, they will fail to recognize these opportunities and choose the status quo. The neglect of temptation should lead to *lower* levels of trust, an inefficient outcome.

In economic games, trust is almost always socially efficient. In the trust game, the combined payoffs for reciprocity or betrayal are greater than the combined payoffs of the status quo. This is not necessarily true by definition, but the efficiency of trust is usually built into the structure of such games (Ert, Erev, & Roth, 2011; Evans & Krueger, 2009). In the investment game, trusting a dollar to another person causes it to *triple* in value (Berg, Dickhaut, & McCabe, 1995). This aspect of trust reflects the fact that real-life investments and social exchanges tend to create wealth. In the present experiment, trust is always a socially efficient response. Again, it is important to note that even though trust is efficient, it may not always lead to a desirable outcome for both players. If betrayal occurs, trust is good for the group as a collective, but bad for the betrayed trustor.

Reciprocity and inequality. Efficiency is an important consequence of the trustor's decision, but it has little bearing on the trustee. In most cases, the efficiencies of betrayal and reciprocity are roughly equivalent (Camerer, 2003). Instead, the trustee's options are primarily contrasted by a difference in the *equality* of outcomes. In this case, it is a tautology to say that reciprocity is more egalitarian than betrayal. When we

consider the trustee's perspective, there is good reason to expect that egocentrism will lead to lower levels of reciprocity and, as a result, greater inequality. A rational trustee who ignores the other player's point of view will undoubtedly betray the trustor. Choosing betrayal always leads to a higher outcome for the trustee; the only reason not to choose betrayal is out of consideration for the other person.

Proposition 6 (egocentric impulsivity)

The final proposition addresses the underlying factors that lead to egocentric decision making. The formulation of the present research is based upon two robust findings from social cognition: The first is that thinking about the self is simpler than thinking about others (Alicke & Sedikides, 2011), and the second is that people tend to employ simple strategies when they make decisions (Gigerenzer & Todd, 1999). In dilemmas of trust, people focus on self-relevant information because doing so is faster and easier than engaging in perspective taking. This view of decision making suggests that egocentrism is impulsive, while perspective taking is an effortful, reflective process. In the first experiment, I measured individual differences in impulsivity and cognitive reflection to test this hypothesis. The sixth proposition predicts that reflective individuals will be more likely to engage in other-relevant information search and their decisions will show greater consideration for the other player's point of view.

Summary

The egocentric model is a process-oriented account of decision making in dilemmas of trust (See Table 1-1 for a summary). The model predicts that decisions in dilemmas of trust occur in two stages: In the first stage, the decision maker evaluates self-relevant information. If the individual cannot make a decision based purely on self-

relevant information, a second stage occurs. In this second stage, perspective taking occurs. This neglect of perspective taking has a negative impact on trust and reciprocity, leading to outcomes that are socially inefficient and inequitable. These predictions are based upon the assumption that decision makers conserve cognitive resources when possible. People focus on egocentric information because it is (relatively) easier than engaging in perspective taking.

Table 1-1

The Egocentric Model

Proposition	Hypothesis	Approach
Focus	The majority of time is spent evaluating self-relevant information	Compare the time spent viewing different outcomes
Primacy	Self-relevant information is evaluated before perspective taking occurs	Measure the temporal sequence of information search
Contingency	The degree of perspective taking depends upon the evaluation of self-relevant information	Test for contingency in behavior, response times, and information search
Inefficiency	Egocentrism is negatively associated with trust	Examine how information search influences behavior (trust and reciprocity)
Inequality	Egocentrism is negatively associated with reciprocity	
Impulsivity	Egocentrism occurs due to a lack of cognitive reflection	Test individual differences in reflection as predictors of information search and behavior

Research overview

Two experimental studies of process tracing are reported in the following chapters. Experiment 1 is a laboratory study of the trust game conducted using MouseLab

(Chapter 2-4).³ Chapter 2 reports the experimental methods and investigates how the MouseLab interface changes the process of decision making compared to a control condition. Chapter 3 examines the first three propositions of the egocentric model, evaluating the process of information search (focus, primacy, and contingency). Chapter 4 investigates the latter three propositions, testing the consequences and antecedents of information search (inefficiency, inequality, and impulsivity). Experiment 2 develops the relationship between perspective taking and behavior by implementing an experimental manipulation of perspective taking. Chapter 5 tests the hypothesis that encouraging perspective taking facilitates greater trust and reciprocity. Chapter 6 summarizes the results of the present research, reevaluates the propositions of the egocentric model, and discusses future directions in the development of the egocentric model.

³ A Web-based pilot study of the first experiment was also conducted, but not reported here.

Chapter 2

Process tracing trust: Using MouseLab to measure information search

The egocentric model of trust predicts that decision making is influenced by the way people prioritize and retrieve information. The overarching objectives of the model are to describe the process of social decision making, and to identify how said processes shape behavior. The first three propositions of the model amount to a two stage process of reasoning: The decision maker begins by evaluating self-relevant outcomes, *risk* for the trustor and *temptation* for the trustee. Self-relevant outcomes are accessed first because they are the most salient and easily interpretable. Then, after considering her own outcomes, the decision maker may engage in a conditional stage of perspective taking, where she investigates other-relevant outcomes; here, the trustor and trustee consider temptation and risk, respectively. During the second stage, the trustor uses temptation to evaluate the probability of reciprocity; the trustee evaluates the size of the risk taken by the trustor. However, this second stage only occurs when the decision maker cannot make a choice based on only self- relevant information.

Trust decisions and response time data are consistent with the model's predictions for information search (Evans & Krueger, 2011; Snijders & Keren, 1999). For trustors, the correlation of trust and temptation depends upon the level of risk; trust and temptation are only associated when risk is sufficiently low. Response times for trust decisions also depend upon risk, decisions take longer when risk is low. Presumably, these longer response times reflect the extra time trustors need to evaluate temptation. Yet, process models demand process data, and there is little evidence that *directly* supports the proposed sequence (Johnson, Shulte-Mecklenbeck, & Willemsen, 2008). The present

research applies process tracing methods to test the egocentric model, and extends the model to look at reciprocity decisions. To the best of my knowledge, there is minimal evidence of the trustee's decision process (Snijders & Keren, 1999).

A process-oriented is critical for testing the hypothesis of conditional perspective taking. The egocentric model's interpretation of the risk by temptation interaction is that trustors *neglect* relevant information, an explanation which implies that people might change their decisions if they were made aware of the ignored information. It also assumes that decisions are constrained by the availability of cognitive resources (Gigerenzer & Todd, 1999; Simon, 1955). However, alternative explanations could account for the given data without making these assumptions. For example, the conditional effect of temptation on trust could be explained by a change in how trustors assign relative importance to it. At extreme values of risk, temptation becomes less relevant. Alternatively, the level of risk could influence how temptation is interpreted (if risk is high, on average trustors may estimate lower probabilities of reciprocity).

The change in response times could also be explained without assuming a change in the degree of perspective taking. For example, decisions in high risk games could occur more quickly because risk is easier for trustors to evaluate when it is extreme. Understanding the actual process of decision making is important to our understanding of trust and reciprocity, especially if the goal is to prescribe changes to how people approach decision making. Therefore, the purpose of the first laboratory experiment was to provide a rigorous test of the hypothesized process.

To accomplish this goal, I employed process tracing, an experimental methodology that records the sequence of information acquisition during decision

making. In a process tracing experiment, participants are presented with a decision problem, such as the trust game. The possible outcomes of the game are concealed inside of boxes. In order to learn the values of the possible outcomes, participants must actively search for the concealed information (by dragging the mouse over each box). Participants can access the concealed information as many times as they wish and at no cost, but they can only access one piece of information at a time. The sequence and timing of the search process are recorded, providing insight into how decision makers use information. This methodology is implemented using the MouseLab software (Willemsen & Johnson, 2011).

In the past, process tracing methods have been used to measure cognitive processes in bargaining games (Johnson, Camerer, Sen, & Rymon, 2002) and simultaneous, normal form games, such as the prisoners' dilemma (Costa-Gomes, Crawford, & Broseta, 2001). The methodology has also been employed to challenge the validity of heuristic processes (Johnson, Schulte-Mecklenbeck, & Willemsen, 2008).

The present research extends the process tracing literature in two important ways: First, the present studies are the first to implement process tracing in extensive form games.⁴ In extensive form games, the logic of backward induction suggests that decision makers should begin by evaluating future outcomes, then reasoning *backward* to optimize their present choice. Using a sequential bargaining task, Johnson and colleagues (2002) found that people reason *forward*, they make decisions primarily based on their immediate outcomes. A potential limitation of this research is that it used normal form games, where outcomes were presented as a matrix, a form which de-emphasizes the

⁴ In an extensive form game, the potential outcomes are represented as a tree of possible consequences (rather than a matrix, as in normal form games).

sequential aspect of decision making (McCabe, Smith, & Lepore, 2000). Studies using extensive-form games, where perspective taking and “mind reading” are more intuitive to participants, may provide a fairer test of backward induction.

The second major contribution of this work is that it is the first project to investigate how individual differences in personality moderate information search. To date, process tracing research has given very little attention to the motives of information search, focusing instead on the relationship between search and outcomes. Chapters 4 and 5 reports analyses of how individual differences in cognitive reflection and perspective taking affect information search. Process tracing methods are particularly useful in the study of individual differences in decision making, as many constructs have predicted effects on the process of information search (Appelt, Milch, Handgraaf, & Weber, 2011). For example, individuals who have a prosocial orientation should spend more time significantly viewing the payoffs of other players (Liebrand & McClintock, 1988). In Chapter 4, individual differences in impulsivity are the primary area of investigation.

The present chapter consists of two sections: The first reports the methodological details of the initial laboratory experiment, with a particular emphasis on the implementation of the trust game and the MouseLab software. The second section of the chapter investigates whether implementing the MouseLab software altered the process of decision making. Readers may be concerned that using the software encouraged (or discouraged) deliberation. To address this issue, the participants who used MouseLab were compared against an Open Boxes control condition. In the Open Boxes condition, participants in both roles responded to the same set of trust games, but all of the games’

possible outcomes were visible during decision making. These analyses are an important precursor to the following chapters, where I report the testing of the egocentric model.

Method

Participants

114 undergraduates from Brown University were recruited from the economics department's subject pool. There were 61 men (53.5%), 51 women (44.7%), and two participants who did not report their genders. Although the experiment was conducted using an economics subject pool, there was considerable diversity in participants' academic interest. Table 2-1 summarizes participants' academic concentrations, and compares these participants with the demographics of Brown's 2011 graduating class (Office of Institutional Research, 2011). Compared to university wide levels, economics students were marginally overrepresented, $z = 1.73$, $p = .078$.

Table 2-1

Academic Concentrations of Participants

Concentration	n	Percentage of sample	Percentage of 2011 students
Natural and physical sciences <i>Biology, Chemistry, Physics</i>	44	38.5	31.5
Economics	31	27.2	19.3
Social sciences <i>Psychology, Sociology, International Relations (not including Economics)</i>	22	19.3	21.3
Humanities <i>History, English, Classics</i>	20	17.5	20.2

The experiment was conducted in seven sessions over the course of two weeks, with 12-19 participants per session. Each participant received a \$10 show up payment

and additional earnings based on his or her choices in the experiment (another \$5-15).

The experiment took less than one hour to complete.

Materials

The trust game. Participants completed 24 rounds of a one-shot trust game without feedback; participants were randomly paired for each decision and the outcomes of decisions were not revealed until the end of the experiment. At the start of the experiment, each individual was randomly assigned to the role of Player 1 or 2 (trustor or trustee, respectively) and retained that role through the experiment. In each round of the game, those in the role of Player 1 chose IN or OUT (trust or status quo), and those in the role of Player 2 chose SHARE or KEEP (reciprocity or betrayal). Players were randomly partnered and made decisions without learning their partners' identities. Although the trust game has a sequential structure, the players made their decisions simultaneously. Player 2 always chose between SHARE and KEEP, and understood that this decision would only be relevant in the event that Player 1 chose IN.⁵

Game payoffs. I manipulated two orthogonal factors in the trust game's structure, risk and temptation. *Risk* was defined as a ratio of Player 1's cost over benefit (low = 1 unit cost to 3 units benefit; high = 3 units cost to 1 benefit) and *temptation* was Player 2's incentive to betray trust (low = 0.5 * the value of P₁, the trustor's status quo payoff; medium = 1.5 * the status quo; high = 4.5 * the status quo). These two factors yielded a baseline set of six payoff conditions (shown in Table 2-2). Next, I took additional steps to randomize the values of each condition to require participants' active engagement throughout the experiment. Each of the six conditions was adjusted four times by random

⁵ This approach is an example of the strategy method, where players indicate every possible response in a game without knowing the actual choices of other players. This method is preferable because it generates more data per participant and does not significantly alter reciprocity (Johnson & Mislin, in press).

multipliers ranging from 0.5 to 1.5. Finally, the six individual values in each of the adjusted payoff conditions were randomized by a jitter factor of up to +/- 5%. At the end of this process, there were 24 unique conditions.

Table 2-2

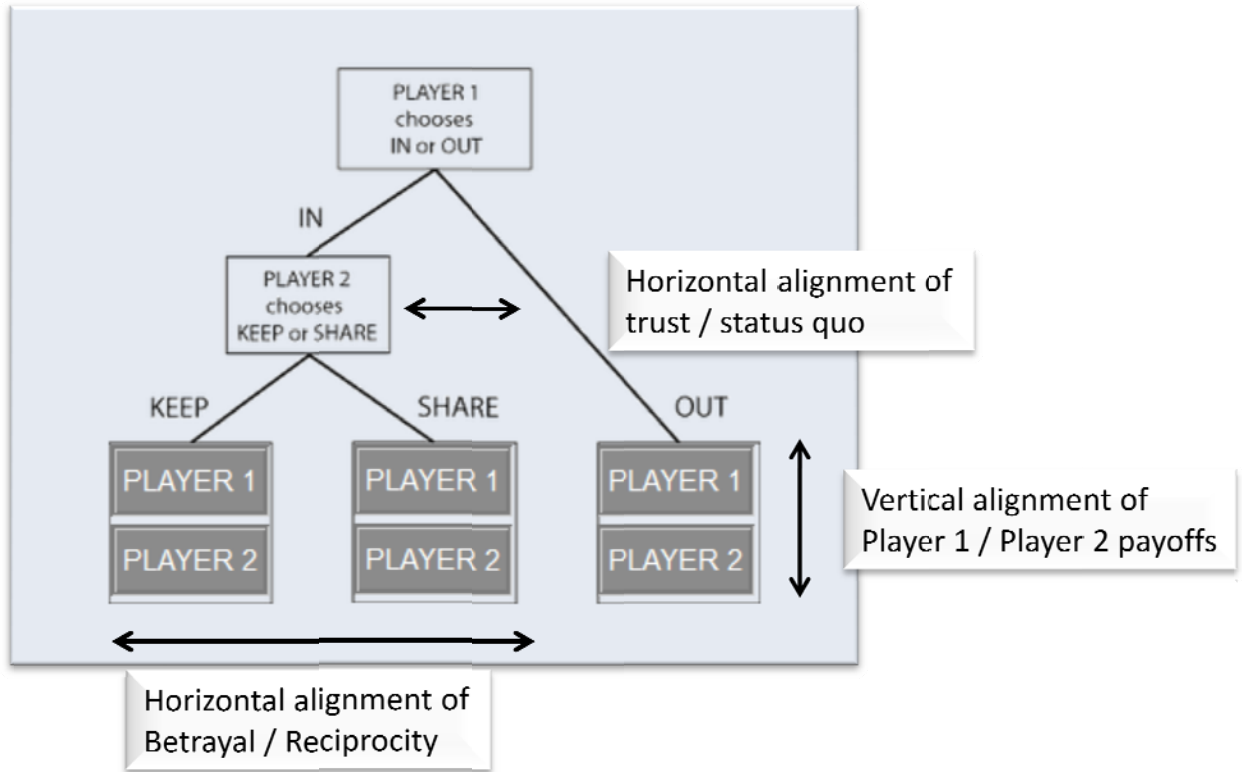
Baseline Payoffs for the Trust Game

Risk	Temptation	P1	P2	R1	R2	S	T
Low	Low (10)	40	20	70	70	30	80
10 cost	Med (30)	40	20	70	70	30	100
30 benefit	High (90)	40	20	70	70	30	160
High	Low (10)	40	20	50	50	10	60
30 cost	Med (30)	40	20	50	50	10	80
10 benefit	High (90)	40	20	50	50	10	140

Visual presentation. The trust game was presented to participants as an extended decision tree. In order to accurately measure the process of information search, it was important to control for directional search biases (i.e., top to bottom or left to right). For this reason, three factors were randomly manipulated in the game's presentation: The horizontal alignment of Player 1's choices (IN versus OUT); the horizontal alignment of Player 2's choices (KEEP versus SHARE); and the vertical alignment of the Players' payoffs. These randomizations were assigned to the 24 payoff cells prior to the experimental sessions. Figure 2-1 presents a screenshot of the trust game with labels of the randomized elements.

Figure 2-1

Visual Presentation of the Trust Game



Information search. Of the seven sessions, four were assigned to the MouseLab condition, where the payoffs of the trust game were concealed inside boxes. In order to learn the value of an outcome, participants dragged the mouse over a labeled box. Participants could only access one value at a time, though they could access the boxes as many times as they wished. The MouseLab software recorded the order and duration of each payoff viewing. During the experiment, participants were prohibited from taking notes or recording information about the payoffs.

The remaining three sessions were assigned to the Open Boxes condition. A fourth Open Boxes session was planned, but canceled due to a relatively high turnout for the initial three sessions. The Open Boxes condition was included to test whether the

process of information search significantly altered behavior in the trust game. The rules, visual structure, and payoff values were identical to the MouseLab condition. The only difference was that participants in the Open Boxes condition did not need to engage in active information search. Instead, all of the payoffs were simultaneously visible.

Additional measures. After finishing the trust game, participants completed a battery of psychological instruments. These instruments were always presented after the trust game, in order to prevent incidental priming effects.⁶ This battery included the Brief Self Control Scale (SCS; Tangney, Baumeister, & Boone, 2004), the Interpersonal Reactivity Index (IRI; Davis 1980), and the Cognitive Reflection Test (CRT; Frederick, 2005). The SCS and IRI items, which shared a common format, were combined with 60 filler items to form a single inventory. The combined inventory and the CRT were presented to participants in a counterbalanced order. Table 2-3 summarizes the content and reliability of the assorted measures.

⁶ Given the expense of data collection, the primary concern was ensuring the integrity of the behavioral data from the trust game.

Table 2-3

Summary of Additional Measures

Scale	# items	α	Mean IIC	Sample item
Brief Self-Control Scale	13	.82	.27	I am good at resisting temptation.
Perspective taking (IRI)	7	.77	.33	I sometimes try to understand my friends better by imagining how things look from their perspective.
Personal Distress (IRI)	7	.70	.25	Being in a tense emotional situation scares me.
Empathic Concern (IRI)	7	.70	.25	I often have tender, concerned feelings for people less fortunate than me.
Fantasy (IRI)	7	.81	.38	I really get involved with the feelings of the characters in a novel.
Cognitive Reflection Test	3			A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?

Brief Self-Control Scale. The SCS consists of 13 items that measure trait-level self-control. The scale correlates with academic achievement, social adjustment, and general well-being. Maloney and colleagues (in press) identified two correlated sub components, impulsivity and restraint. Here, the scale was scored as a one-dimensional construct. The SCS had adequate internal consistency with $\alpha = .82$ and mean inter-item correlation = .27.

Interpersonal Reactivity Index. The IRI is a 28-item measure of the cognitive and emotional aspects of perspective taking (Davis, 1980). The index consists of four, 7-item subscales: Perspective Taking, Personal Distress, Empathic Concern, and Fantasy. All four subscales were reliable with α 's $\geq .70$. The Personal Distress, Fantasy, and Empathic Concern subscales are relevant to emotional perspective taking, caring about others'

emotions and well-being. The Perspective Taking subscale, in contrast, is more cognitive in nature, dealing with the tendency to evaluate and consider other points of view.

Cognitive Reflection Test. The CRT is a 3-item test of the tendency to respond impulsively or reflectively (Frederick, 2005). Each item on the test had an incorrect, impulsive response. For example, the impulsive answer to the sample item is ten cents, whereas the correct answer is five cents.

Procedure

Experiment sessions were conducted on campus in a computer lab. At the beginning of the experiment, each participant was randomly assigned an ID number. This number determined the player's role in the trust game. The experiment consisted of two stages. In the first stage, participants completed the trust game. In the second stage, participants completed the inventory of personality instruments. Participants learned the outcomes of their trust game decisions and were paid after completing the second stage of the study. No deception was employed and participants were paid based on their decisions.

All participants read the same set of rules explaining the trust game. After viewing these instructions, they completed a series of practice exercises where they were presented with examples of the game. The participant's task was to answer questions about the game examples' structures and payoffs (For example: How many points will Player 2 receive if Player 1 chooses OUT?). After completing these exercises, participants learned their assigned roles. Finally, before beginning the game, participants were required to successfully complete a quiz about the rules of the game, indicating that they fully understood the scenario. Participants made a series of 24 consecutive decisions.

In each round, they were paired with a random partner. Participants were paid one cent for every point they earned, earnings ranged from \$5 to 15 per participant.

After completing the trust game, participants were presented with a battery of psychological instruments, including the SCS, IRI, and CRT measures. The ordering of the instruments was counterbalanced across participants. After the battery of tests, participants completed a final questionnaire with several open-ended prompts about the experiment. After responding to these questions, participants received their payments and learned the outcomes of their decisions.

MouseLab and Open Boxes conditions

Before testing the propositions of the egocentric model, it was important to determine whether using MouseLab had any unexpected effects on decision processes or behavior. My analyses began with the comparison of the MouseLab and Open Boxes conditions. In the MouseLab condition, the payoffs of the trust game were initially concealed from players. In order to learn about the game's payoffs, participants had to actively search by dragging the mouse over each payoff box. Participants could access the boxes as many times as they wished, but they could only view one payoff at a time. This interface may have had unforeseen effects on the process of decision making. In a recent comparison of process tracing methods, Glöckner and Betsch (2008) found that MouseLab inhibits intuitive decision processes, but only when participants make decisions under time pressure. However, this finding is an exception; predominantly, other experimenters have found that MouseLab has no major effects on behavior and produces results that are comparable to both Open Boxes and eye-tracking conditions (Costa-Gomes & Crawford, 2004; Reisen, Hoffrage, & Mast, 2008).

I identified two plausible hypotheses about the effects of MouseLab on decision making: First, there was the possibility that MouseLab placed additional cognitive load on participants (the cognitive load hypothesis). During decision making, participants were expected to store payoff information in working memory, potentially constraining the availability of cognitive resources. In turn, this additional cognitive load could have increased reliance on heuristic processes (Stanovich, West, & Toplak, 2011)). The cognitive load hypothesis predicts that responses should be quicker in the MouseLab condition, and that MouseLab participants should show amplified egocentrism (greater interest to self-relevant payoffs).

Alternatively, it is also possible that MouseLab encouraged participants to engage in additional reasoning (the deliberation hypothesis). MouseLab participants could only view one piece of information at a time, encouraging deliberate, serial processing of the game payoffs. This constraint may have caused participants to engage in additional reflection (Wilson, Lisle, Schooler, Hodges, Klaaren, & LaFleur, 1993). If the MouseLab interface increases deliberation, there should be evidence in the form of longer reaction times and greater perspective taking (sensitivity to the other player's payoffs) in the MouseLab condition. With these possibilities in mind, the Open Boxes condition was used as an experimental control.

Aggregate analyses

My first tests compared the aggregate responses (trust and reciprocity) and aggregate response times (total time elapsed during the trust game) between the MouseLab and Open Boxes conditions. Table 2-4 reports the aggregate levels of behavior and response times across conditions.

Trust. Aggregate rates of each participant's trust decisions were measured on a scale from 0 (never trusted) to 1 (always trusted). The rates of trust were similar across the MouseLab ($M = .34$, $SE = .043$) and Open Boxes ($M = .30$, $SE = .058$) conditions, $t(56) = .68$, $p = .50$. Similarly, response times for trust decisions did not significantly vary by condition, $t(56) = 1.5$, $p = .13$.

Reciprocity. As with the trustor's behavior, levels of reciprocity were aggregated for each participant. Overall, the levels of reciprocity were also similar across the MouseLab ($M = .33$, $SE = .06$) and Open Boxes ($M = .375$, $SE = .073$) conditions, $t(56) = .53$, $p = .60$. Furthermore, I found no evidence of a difference in response times, $t(56) = .64$, $p = .52$.

Table 2-4

Aggregate Rates of Behavior and Total Response Times (RT)

	Trust	Trust RT (seconds)	Reciprocity	Reciprocity RT (seconds)
MouseLab	.34 (.043)	349.48 (22.76)	.33 (.060)	242.6 (18.1)
Open Boxes	.30 (.58)	298.16 (28.67)	.375 (.073)	281.9 (23.5)

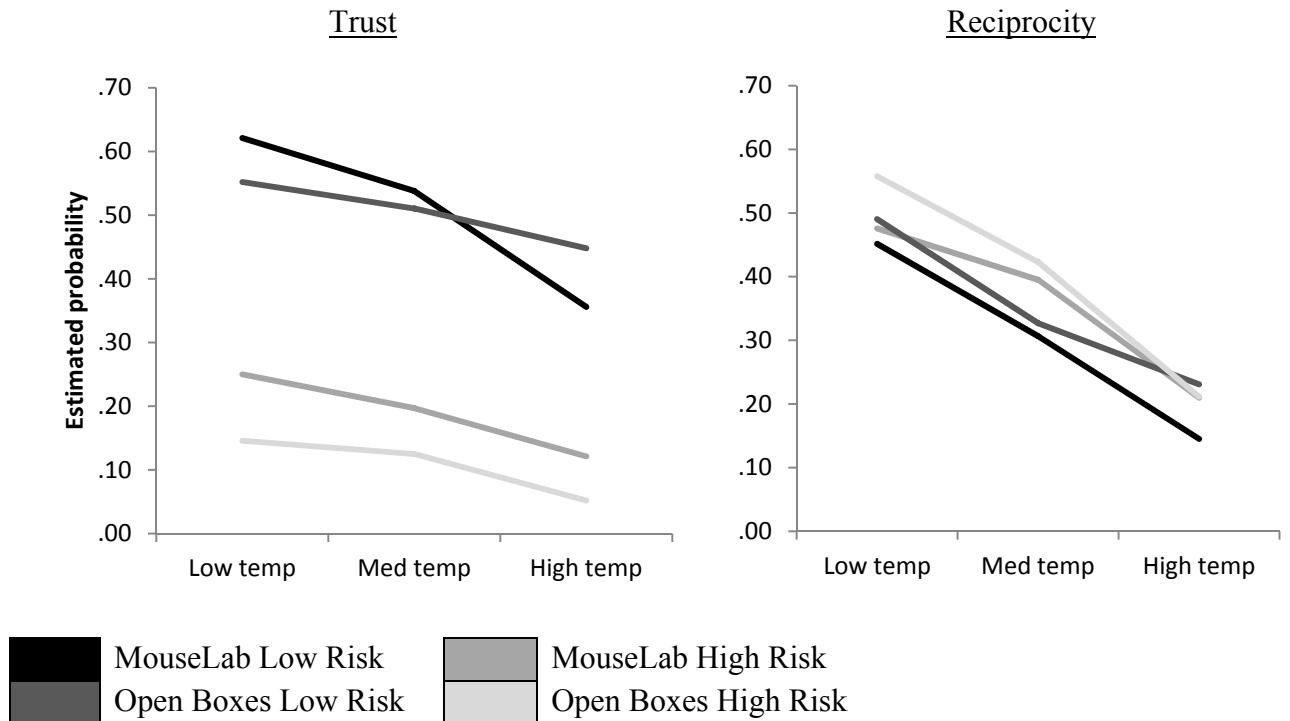
Standard errors in parentheses

The aggregate analyses suggest that the MouseLab interface had no significant effects on decision making. Across experimental conditions, participants consistently exhibited low rates of trust and reciprocity, at or near 30%. However, these tests may have concealed interactions of the MouseLab interface and the two payoff conditions (risk and temptation). MouseLab may have affected the way that participants responded to the payoffs of the trust game: the cognitive load hypothesis predicts an interaction between the MouseLab condition and self-relevant payoffs (risk for the trustor and temptation for the trustee); the deliberation hypothesis predicts greater weighting of

other-relevant payoffs (temptation for the trustor, risk for the trustee). Aggregate analyses were unable to test these hypotheses. Figure 2-2 displays the rates of trust and reciprocity across the information search and payoff conditions.

Figure 2-2

Rates of Trust and Reciprocity by Condition



Multilevel analyses

Logistic multilevel models were used to test for possible interactions between MouseLab and the payoff conditions.⁷ Trust and reciprocity were coded as binary variables (1 = trust / reciprocity) and each participant was treated as a cluster, providing 24 observations. Three independent variables were tested as fixed effects: information search condition (1 = MouseLab; 0 = Open Boxes), level of risk (1 = high; 0 = low), and level of temptation (entered as a standardized linear contrast with three levels). A higher

⁷ In order to allow for model testing, multilevel models were always estimated using the maximum likelihood method.

value of temptation indicates a greater incentive for the trustee to betray trust; a higher value of risk indicates high cost and low benefit for the trustor.

My approach for testing the effects of MouseLab was to compare the fit of two random-intercept models: The first model consisted of the payoff variables (risk, temptation, and the risk by temptation interaction) and participant ID, which was treated as a random effect. The second model consisted of the terms of the first model, as well as a dummy variable for the main effect of MouseLab and three parameters for the MouseLab by payoff interactions (MouseLab by risk, MouseLab by temptation, and MouseLab by risk and temptation). Table 2-5 reports the relevant equations for the model testing procedure. Note that the payoff variables (risk, temptation, and the risk by temptation interaction) were level 1 variables, as they varied within each cluster. The main effect of MouseLab was a level 2 variable and the MouseLab by payoff interaction terms were cross-level effects. Table 2-6 reports the parameters of the estimated models.

Table 2-5

Estimated Models of Trust and Reciprocity

Null model	Level 1	$y_{ij} = \beta_{0j} + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$
Model 1	Level 1	$y_{ij} = \beta_{0j} + \beta_{risk}(RISK) + \beta_{temp}(temp) + \beta_{r*t}(risk * temp) + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$
Model 2	Level 1	$y_{ij} = \beta_{0j} + \beta_{risk}(RISK) + \beta_{temp}(temp) + \beta_{r*t}(risk * temp) +$ $\beta_{M*R}(Mouse * Risk) + \beta_{M*T}(Mouse * Temp) +$ $\beta_{M*R*T}(Mouse * Risk * Temp) + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \gamma_{Mouse}(Mouse) + \mu_{0j}$

Trust. The null model of trust, which consisted of only a random-intercept for each participant, revealed that there was significant variation in the estimates of random intercepts, $\sigma^2 = 1.74$ ($SE = .45$), an indication of between-subject variation in the rates of trust. The first model, which added the payoff conditions, fit the data significantly better than the null model, $X^2(3) = 216, p < .001$. There were significant main effects of risk ($b = -2.53, SE = .40, p < .001$) and temptation ($b = -.61, SE = .12, p < 0.001$). The two way interaction of risk by temptation was not significant, $b = .05, SE = .19, p = .79$. The likelihood of trust decreased at higher levels of risk and temptation.

The next step was to compare Model 1 with the full model, which included a dummy variable for the MouseLab condition, two additional two-way interaction terms (MouseLab by risk and MouseLab by temptation), and a three-way interaction term (MouseLab by risk and temptation). The full model fit the data significantly better than the payoffs only model, $X^2(4) = 11.98, p < .01$. There was no main effect of MouseLab on trust. Of the four additional terms, only the MouseLab by temptation interaction was significant, $b = -.54, SE = .24, p = .025$. The direction of the interaction indicates that the (negative) effect of temptation on trust was *amplified* in the MouseLab condition, a finding in support of the deliberation hypothesis, because it is evidence of greater perspective taking. In other words, participants in the MouseLab condition were more sensitive to changes in temptation.

Simple effects tests were conducted *within* the MouseLab and Open Boxes conditions to clarify the interpretation of the interaction: In the Open Boxes condition, there was a negative, marginally significant effect of temptation on trust ($b = -.30, SE = .17, p = .08$). Trust decreased at higher levels of temptation, but the negative association

was only marginally significant. As suggested by the negative interaction term, the effect of temptation within the MouseLab condition was significantly negative ($b = -.85$, $SE = .16$, $p < .001$). Figure 2-2 (left) shows the observed responses of trustors in the MouseLab and Open Boxes conditions. Each line represents the probability of trust within a level of risk. In this figure, the effects of temptation on trust are represented by the slopes of the lines (hence, a steeper slope indicates a larger effect). The significant MouseLab by temptation interaction indicates that the slopes for participants in the MouseLab condition were steeper (greater in magnitude) than those for Open Boxes participants.

Reciprocity. The null model of reciprocity revealed that there was significant variation in the estimation of random intercepts, $\sigma^2 = 2.73$ ($SE = .36$). The first model, which included only the payoff conditions, fit the data significantly better than the null model, $X^2(3) = 127.65$, $p < .001$. There was no significant main effect of risk on reciprocity, $b = .53$, $SE = .42$, $p = .18$. However, reciprocity and temptation were negatively related, $b = -1.17$, $SE = .14$, $p < .001$. The risk by temptation interaction was not significant ($b = -.34$, $SE = .33$, $p = .79$). Reciprocity was significantly less likely to occur at higher levels of temptation, but did not vary with the level of risk.

The final step was to test whether the full model (including the MouseLab main effects and interaction terms) fit the data better than the payoffs only model. A comparison of the two models revealed no significant improvement in fit, $X^2(4) = 4.02$, $p = .40$. Furthermore, none of the individual model parameters associated with the MouseLab condition was significant. There was no main effect of MouseLab on reciprocity, nor were there any meaningful MouseLab by payoff condition interactions.

In summary, the MouseLab interface had no significant effect on reciprocity decisions, even when accounting for possible interactions with the trust game payoffs.

Table 2-6

Multilevel Models of Trust and Reciprocity

	Trust		Reciprocity	
	Payoffs Only	MouseLab	Payoffs Only	MouseLab
Participants	57	57	57	57
Observations	1368	1368	1368	1368
Risk	-2.53 (.41)**	-2.31 (.66)**	.56 (.42)	1.23 (.62)
Temptation	-.61 (.12)**	-.30 (.17)	-1.17 (.14)**	-1.16 (.22)**
Risk x Temptation	.05 (.19)	-.34 (.33)	-.05 (.19)	-.40 (.30)
MouseLab		1.00 (.71)		-.32(.96)
MouseLab x Risk		-.44 (.84)		-1.14(.85)
MouseLab x Temptation		-.54 (.24)*		-.02 (.29)
Risk x Temptation x MouseLab		.065 (.41)		.59 (.40)
σ^2 (random intercept variance)	1.73 (.22)**	1.75 (.22)**	2.73 (.37)**	2.76 (.36)**
Log likelihood	-619.77	-613.78	-574.83	-572.82

Bold indicates $p < .10$; * indicates $p < .05$; ** indicates $p < .01$

Summary and discussion

Aggregate and multilevel analyses were conducted to test whether the MouseLab interface altered decision making in the trust game. When behavior and response times were aggregated over 24 trials, there were no significant differences between the MouseLab and Open Boxes conditions. However, these analyses could not account for potential MouseLab by payoff interactions. MouseLab may have changed the way that participants responded to the trust game payoffs, risk and temptation. For a more nuanced approach, I employed multilevel logistic models of trust and reciprocity. Multilevel analyses provided evidence that MouseLab significantly changed the behavior of trustors.

Specifically, the MouseLab interface caused trustors to become more sensitive to the temptation payoff factor when making decisions, a finding which suggests that using MouseLab *increases* the level of perspective taking in dilemmas of trust. This interaction was the only significant effect observed. In the case of the trustee, there were no significant changes related to the MouseLab interface.

Overall, there was modest support for the hypothesis that the MouseLab interface increases deliberation. The only significant finding was that MouseLab magnified the effect of temptation on trust; however, it is worth noting that the association between trust and temptation was negative for both the MouseLab and Open Boxes conditions. The following chapter evaluates the process of information search in the trust game. When considering the following data, it may be worthwhile to note that MouseLab may have inflated the level of perspective taking in trustors.

Chapter 3

Information search in the trust game: Focus, primacy, and contingency

Compared with the predominant psychological models of trust and reciprocity, the egocentric model is unique in focusing on trust and reciprocity as informational processes. The model is based on the notion that behavior in dilemmas of trust is shaped by the manner in which people seek out and integrate information. Such informational processes are frequently invoked in judgment and decision making research, but they are rarely applied to explain *social* decisions (Gigerenzer & Todd, 1999; Weber & Johnson, 2009). By adopting an informational perspective, the present studies fill an important gap in social dilemmas research. Process tracing data may have important applications for conflict resolution and marketing – understanding the cognitive processes involved in dilemmas of trust is potentially useful to organizational theorists and policy makers (Thaler & Sunstein, 2008).

In the previous chapter, I introduced MouseLab, a software program that allowed me to record the process of information search during decision making. The present chapter focuses exclusively on the search data generated within the Mouselab condition. I investigated how participants allocated their attention (Proposition 1, Focus), the sequential nature of the search process (Proposition 2, Primacy), and the conditional nature of perspective taking (Proposition 3, Contingency). Each proposition makes specific predictions about the process of information search, and these predictions were tested using multiple measures of search behavior. Propositions 4, 5, and 6 (inefficiency, inequality, and impulsivity) address how information search is related to decisions and

the consequence of those decisions, as well as the underlying individual differences that motivate information search; these propositions are addressed in Chapter 4.

Data preparation

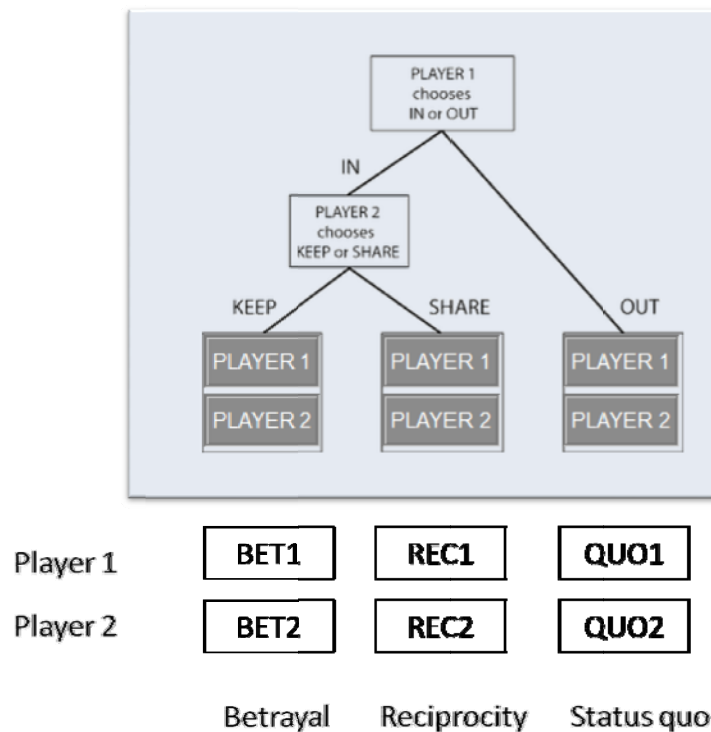
The MouseLab software recorded a sequential log of individual search events for each participant. These records were parsed for relevant information (the time spent viewing each payoff, the order in which payoffs were accessed). Following convention, search events of duration < 100 milliseconds were discarded (Willemssen & Johnson, 2011). For each variable, both absolute (number of times a payoff was accessed in a given trial) and relative (the percentage of times a payoff was accessed in a given trial) variables were created. Many of the following analyses were based on relative variables, as my interest was to make comparisons of search behavior across trials of varying lengths. In the context of these analyses, egocentrism referred to the *relative* preference for self-relevant information.

Out of 64 participants assigned to the MouseLab condition, three (4.8%) did not engage in any information search throughout the entire 24 trials. For each of these participants, response times and open-ended responses indicated that this behavior was intentional, and not due to a technical error. Two admitted they were responding randomly, and one said that he didn't care about his responses in the experiment. These participants were not included in the following analyses, though they were included in later chapters, where I report analyses related to personality variables and trust game behavior. After removing these participants, there were 31 trustors and 30 trustees, who each provided 24 trials of search data.

When convenient, abbreviations were used to refer to the six payoff boxes. The three outcomes of the game, status quo, betrayal, and reciprocity, were abbreviated as QUO, BET, and REC. These terms were followed by a number, 1 or 2, referring to whether the box contained a payoff for the trustor (Player 1) or trustee (Player 2). For example, QUO2 refers to the trustee's status quo payoff and REC1 refers to the trustor's reciprocity payoff. Figure 3-1 identifies the labels of the six outcomes.

Figure 3-1

Outcomes of the Trust Game



Proposition 1: Egocentric focus

The first prediction of the egocentric model is that participants spend the majority of their time attending to self-relevant information; understanding the other person's point of view is a less important consideration. To test this proposition, I investigated four aspects of search behavior: search omissions (trials where participants did not access

a given payoff value), search time (the percentage of time spent viewing each payoff), search counts (the number of times payoffs were accessed, relative to total search length), and transitions (consecutive search events).

Search omissions. The first test of egocentric focus was to look at whether participants consistently ignored any payoffs in the trust game. A trial contained a search omission if a participant did not access a given payoff *at least once* during information search. Given that the payoff values varied considerably over the 24 trials (and participants were explicitly informed of this fact), it was in each person's best interest to continue accessing each value. It is also important to reiterate that searching was costless; players could access the payoffs as many times as they wished. Under these conditions, a large number of omissions for a given payoff would indicate that the payoff was unimportant to the decision maker.

Surprisingly, there were nontrivial rates of search omissions for both players: the total percentages of omitted payoffs were 13.3% for trustors and 26.8% for trustees. To test egocentric focus, search omissions were categorized as either self-relevant (failing to access one of the participant's own payoffs) or other-relevant (omitting one of the other player's payoffs). Here, the egocentric model predicts that there should be a greater number of other-relevant omissions (compared to self-relevant omission).

Trustors showed relatively few self-relevant omissions, ranging from 4-9% per payoff, while other-relevant omissions were more common, 18-24% per payoff. Although trustors' omissions were fairly consistent across outcomes, there was considerable variability in how trustees attended to the self-relevant payoffs: Trustees' self-relevant omissions for the betrayal and reciprocity payoffs were relatively infrequent,

8 and 9% respectively. Notably, the trustees ignored the self-relevant status quo payoff 34% of the time. Trustees also consistently omitted the other-relevant payoffs (30-48% of the time).

To test egocentric focus, I conducted a dependent sample t-test on each participant's total numbers of self-relevant and other-relevant omissions. For trustors, the average number of other-relevant omissions ($M = 14.78$ out of 144 possible omissions, $SE = 3.09$) was significantly greater than the number of self-relevant omissions ($M = 4.58$, $SE = 1.66$), $t(30) = 4.2$, $p < .001$. This egocentric tendency was evident in 30 out of 31 participants. Similarly, trustees showed more other-relevant ($M = 26.2$, $SE = 3.71$) than self-relevant ($M = 12.4$, $SE = 2.51$) omissions, $t(29) = 4.82$, $p < .001$. For trustees, the pattern of egocentrism was present in 27 out of 30 participants. Participants in both roles showed a significant tendency to ignore other-relevant information.

Search time. The second indicator of focus was the proportion of search time participants allocated to each payoff; presumably, looking times indicate which payoffs were most important to decisions. Overall, trustors allocated more time to self-relevant payoffs (18-22% per payoff) than other-relevant payoffs (10-14% each); on average, the trustors allocated 60.4% of their total viewing time ($SE = 1.92\%$) to self payoffs. This rate was significantly more than 50%, the search percentage expected by chance, $t(30) = 5.34$, $p < .001$. Of the 31 participants assigned to the role of trustor, 28 allocated more time to self-relevant payoffs.

Trustees also spent significantly more time viewing self payoffs. However, as with the omission data, the focus was primarily on the payoffs for betrayal (27.4%) and reciprocity (23.1%). The average viewing time for the trustee's status quo payoff was

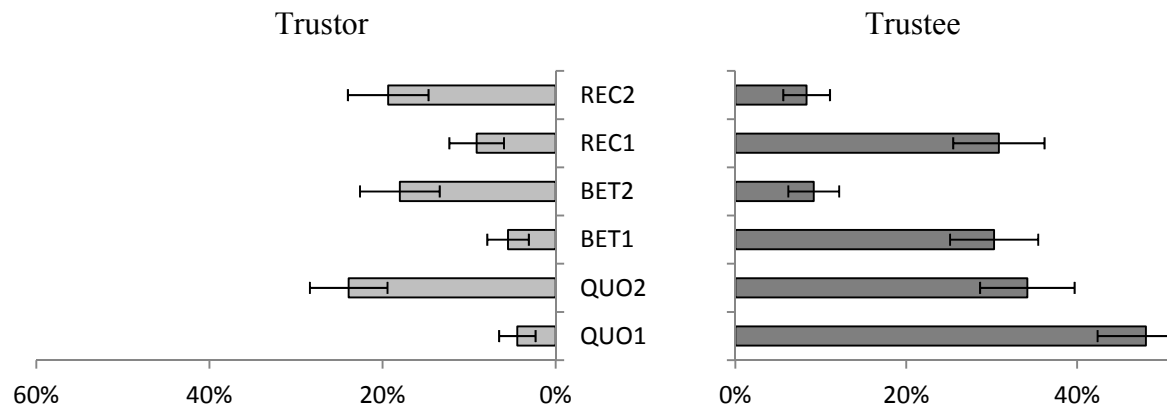
10.5%, which was significantly less than 16.6%, the chance rate for a single payoff, $t(29) = 5.3$, $p < .001$. Still, trustees allocated the majority of their total search time to self-relevant payoffs ($M = 61.1\%$, $SE = 2.68\%$), again more than the chance rate, $t(29) = 4.13$, $p < .001$. Most participants in the role of the trustee (25 out of 30) showed this egocentric preference in viewing times.

Event counts. I also investigated the (relative) number of times that participants accessed each payoff. Viewing times and event counts were highly correlated within each payoff; r 's ranging from .71 to .86. Generally, the pattern of event counts closely mirrored the previous results: The majority of the trustor's search events were self-relevant, $M = 59.58\%$, $SE = 1.98\%$, this percentage was significantly greater than 50%, $t(30) = 5.1$, $p < .001$. Nearly all trustors, 30 out of 31, were egocentric. The trustee's event counts mirrored those of the trustor, on average, 59.7% of events were self-relevant ($SE = 2.6\%$), significantly more than the chance rate, $t(29) = 3.68$, $p < .001$.

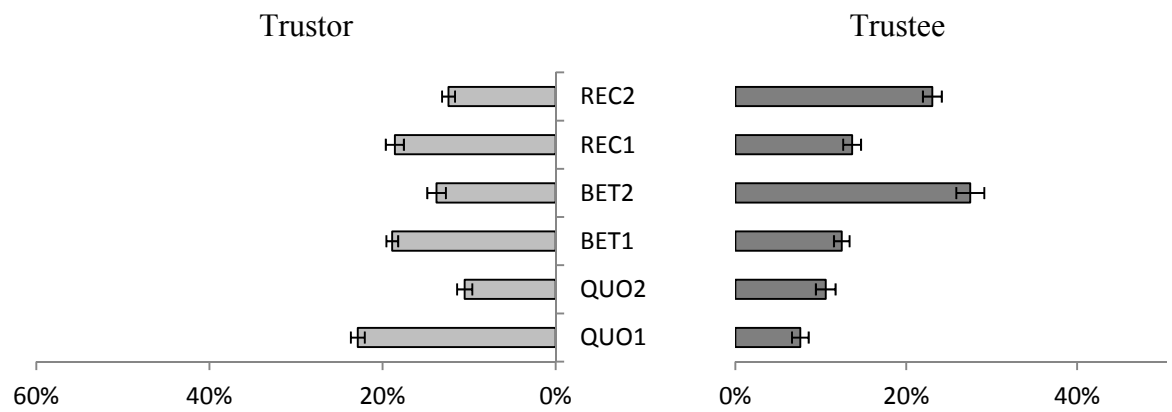
Rates of search omissions, viewing times, and event counts revealed how both players allocated attention to the trust game payoffs (Figure 3-2): Trustors primarily focused on the three self-relevant payoffs (QUO1, BET1, and REC1). The potential consequences of trust for the other player, BET2 and REC2, were of secondary interest. Trustors showed the least interest in QUO2, the trustee's payoff for the status quo. Trustees focused primarily on only two self-relevant payoffs, BET2 and REC2, these values were the trustee's potential outcomes if trust occurred. Mirroring the other player's search behavior, the other-relevant outcomes of trust, BET1 and REC1, were of secondary concern. The two status quo payoffs, QUO1 and QUO2, were the least important to the trustee.

Figure 3-2

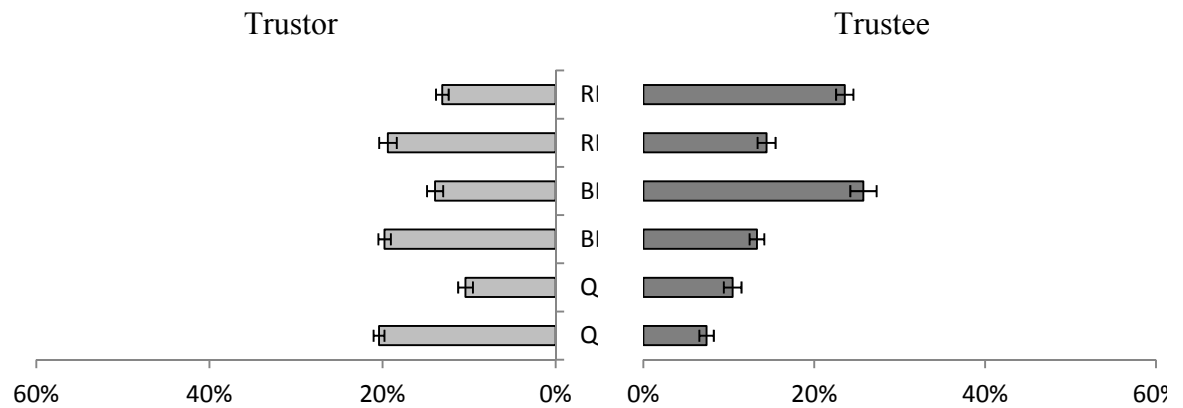
Search Omissions (A)



Relative Viewing Times (B)



Relative Event Counts (C)



Search transitions. The previous measures of focus were aggregates of individual search events. However, one of the benefits of MouseLab is that it enabled me to look at sequences of events. If two randomly positioned payoffs were frequently viewed in succession, it is reasonable to infer that the decision maker was comparing those two values. Thus, my final test of focus examined consecutive transitions. The egocentric model predicts that participants should frequently transition between self-relevant payoffs; transitions between other-relevant payoffs (evidence of perspective taking) should be less common. An alternative hypothesis is that participants evaluated the trust game by outcome (status quo, betrayal, and reciprocity). An outcome-based approach to the trust game would result in a high number of transitions within each of the outcomes (for example, frequently viewing the two status quo payoffs in succession).

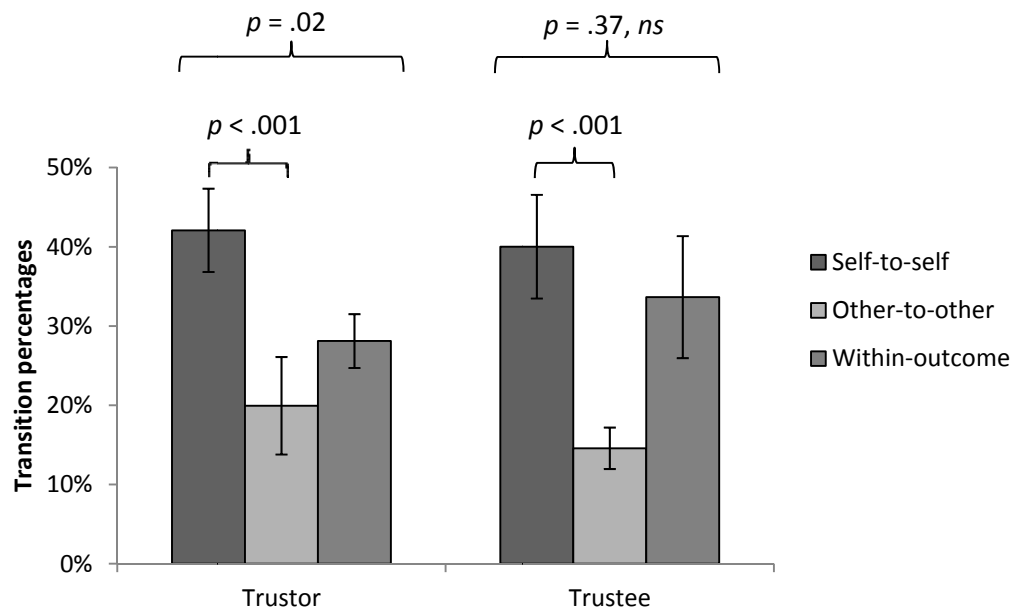
During data preparation, I calculated the percentages of three types of transitions: within-outcome, self-to-self, and other-to-other. *Within-outcome transitions* occurred when players sequentially viewed both of the payoffs for a given outcome – for example, viewing both status quo payoffs consecutively. High percentages of within-outcome transitions would be evidence of an outcome-based strategy. *Self-to-self* transitions occurred when players consecutively viewed two of their own payoffs; high proportions of these transitions would be evidence of egocentrism. *Other-to-other transitions* were defined as consecutive viewings of the other player's payoffs, evidence of perspective taking.⁸ Because the egocentric model makes no predictions about the directionality of transitions, each was treated as bidirectional; it did not matter which of the two payoffs was viewed first in a given transition.

⁸ These three classes of transitions account for 9 of the 15 possible transitions. The remaining transitions accounted for a negligible fraction of search behavior and were excluded.

The egocentric model predicts that self-to-self transitions should be more common than within-outcome and other-to-other transitions. To test this prediction, I compared the aggregated percentages of each transition type. The a priori prediction was that self-to-self transitions would be more common than either of the other types. The following figure illustrates the results of these comparisons:

Figure 3-3

Aggregated Transition Frequencies



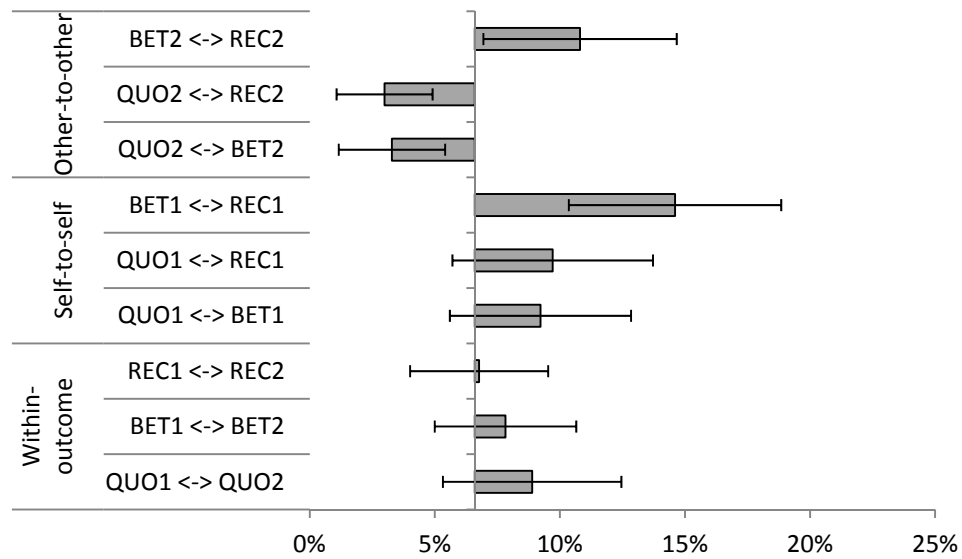
Error bars denote 95% confidence intervals

Trustors' behavior was fully consistent with the prediction of the egocentric model: self-to-self transitions were significantly more frequent than both other-to-other and within-outcome transitions. In the case of the trustee, self-to-self transitions were again more frequent than other-to-other transitions. However, the rates of Player 2's within-outcome and self-to-self transitions did not significantly differ. This non significant difference should be evaluated with two considerations in mind: First, the visual presentation of the

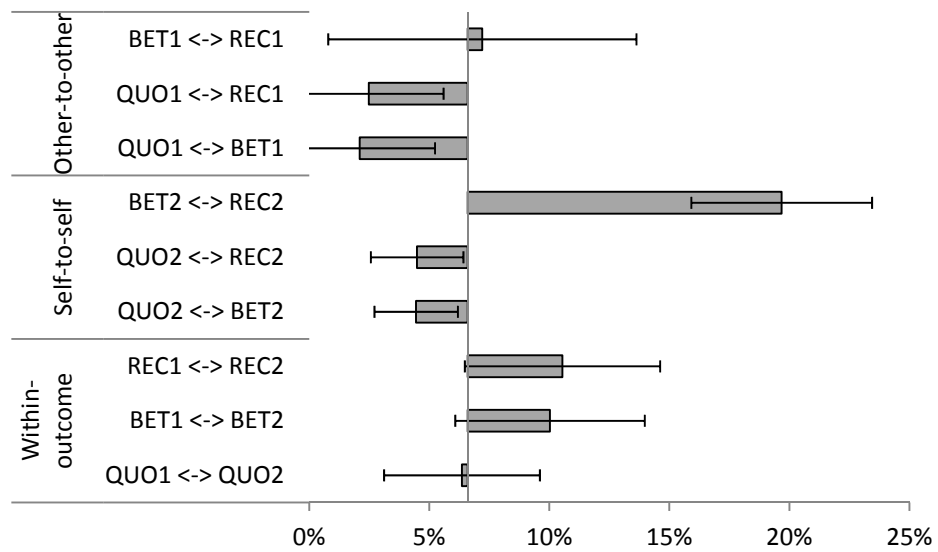
trust game was biased in favor of within-outcome transitions. Payoffs for the same outcome were always adjacent, and there was always a distance of 100 pixels or more between outcomes. Therefore, within-outcome transitions required less effort from the participant. Second, all of the analyses thus far suggest that Player 2 primarily focused on only two self-relevant outcomes (the self payoffs for betrayal and reciprocity, BET2 and REC2). There is only one possible transition between these payoffs, $BET2 \leftrightarrow REC2$, while there are three possible within-outcome transitions, one for each outcome. With this in mind, the next step was to analyze the nine relevant transitions individually.

Figure 3-4

Trustor Transitions (Compared to Chance)



Trustee Transition (Compared to Chance)



Error bars denote 95% confidence interval

Each of the nine transitions was compared against the chance rate of occurrence, 1/15 or 6.66%.⁹ In the case of the trustor, two transitions occurred at frequencies significantly greater than chance: The most common, $BET1 \leftrightarrow REC1$, was an example of a self-to-self transition, $M = 14.6\%$, $SE = 2.17\%$. The second most frequent transition, $BET2 \leftrightarrow REC2$, was an other-to-other transition, $M = 10.8\%$, $SE = 1.97\%$. As egocentric focus predicts, the $BET1 \leftrightarrow REC1$ (self-to-self) transition was significantly more common than the $BET2 \leftrightarrow REC2$ (other-to-other) transition, $t(30) = 2.19$, $p = .03$. The prevalence of the $BET1 \leftrightarrow REC1$ transition is further support of the egocentric model, yet there is also evidence that trustors engaged in some perspective taking. The second most common transition, $BET2 \leftrightarrow REC2$, corresponded directly to the trustee's temptation to betray trust. Presumably, the trustor was comparing these values in order to estimate the probability of reciprocity.

The trustee's search data provided unambiguous support for the egocentric model. The only transition to occur at a rate greater than chance was $BET2 \leftrightarrow REC2$, a self-to-self transition ($M = 19.7\%$, $SE = 3.3\%$). The low rates of other-to-other transitions (2.1 to 7.2%) are evidence that trustees engaged in little perspective taking. The aggregated transition data suggested that trustees frequently selected within-outcome transitions, as there was no significant difference in the rates of within-outcome and self-to-self transitions. However, when individual transitions were analyzed, within-outcome transitions were less important than the aggregate data suggested. The most common transition for the trustee was self-to-self ($BET2 \leftrightarrow REC2$). Yet, the other two self-to-self transitions were relatively infrequent, with each occurring only 4.5% of the time,

⁹ The 6.6% threshold is the rate at which each transition would occur, given completely random search behavior. Using this value as a threshold for intentional search is liberal, given that out of the 15 possible transitions, the 6 unanalyzed transitions occurred with negligible frequency.

rates below chance occurrence. Aggregating these three transitions underemphasized the importance of the BET2 $\leftrightarrow$ REC2 transition. Overall, transition data show that both players focus on self-relevant information.

Proposition 2: Egocentric primacy

The second proposition of the egocentric model addresses the sequential nature of information search. Specifically, the model predicts that players begin information search by focusing on self-relevant payoffs, and perspective taking occurs at a later stage. To test this claim, I analyzed search data using three techniques: the first was to measure when participants first accessed each payoff during each trial (rank); the second method was to measure the first search event of each trial; and the third strategy was to use multilevel growth curves to measure how search behavior changed over the first several search events of each trial.

Rank. The first approach to measuring primacy was to observe when participants first accessed each payoff in a given trial. For example, a rank of one would indicate that a given payoff was the first value accessed. Therefore, a low rank was an indicator of primacy. A potential issue with measuring rank was that participants often declined to access one or more payoffs (see the previous analyses on search omissions). The overall rate of trials with at least one omitted payoff was 43.5% (627 out of 1440). Furthermore, both players were significantly more likely to omit viewing one of the other player's payoffs; therefore, the estimates of rank for other-relevant payoffs may be less reliable than estimates for self-relevant values (because estimates of rank for other-relevant payoffs were based on fewer trials). Given the high rate of omissions, it was not practical

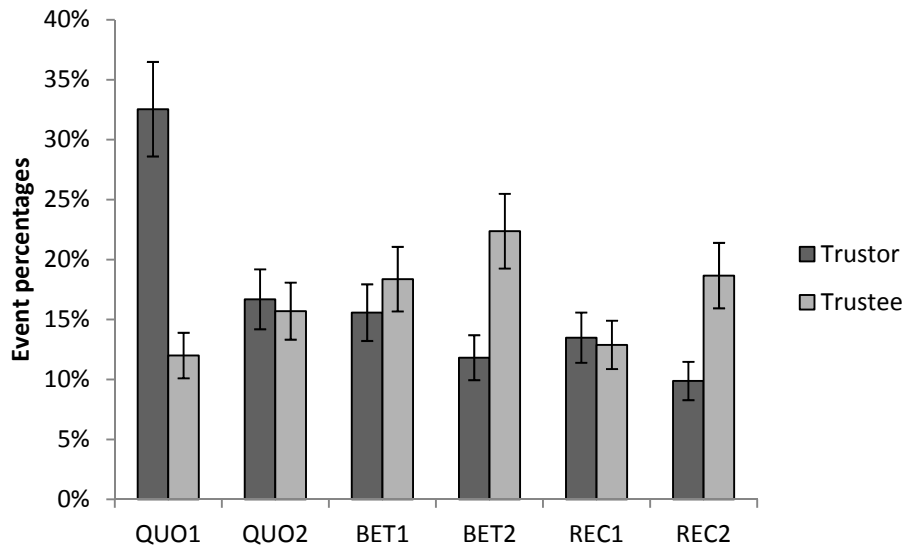
to completely exclude the trials with missing values. Instead, the missing values were replaced with the average rank of the given payoff for the given subject.

Consistent with the proposition of egocentric primacy, both players tended to seek self-relevant information earlier in the decision process. The trustor's average rank for self-relevant payoffs was 3.8 ($SE = .16$), a value significantly lower than the average rank of other-relevant payoffs ($M = 5.57$, $SE = .25$), $t(30) = 5.2$, $p < .001$. Trustee data trended in the same direction: The aggregated rank of the trustee's self-relevant payoffs ($M = 3.64$, $SE = .17$) was marginally lower than the rank of other-relevant payoffs ($M = 4.06$, $SE = .19$), $t(29) = 1.93$, $p = .06$.

First search events. Given the bias rank estimates, it was important to consider other measurements of search order. The second approach was to analyze the first payoff viewed during each trial. To this end, I measured the percentage of trials where each player began by accessing a self-relevant payoff. On averages, trustors initially searched for a self-relevant payoff 59.5% ($SE = 3.0\%$) of the time, a percentage significantly greater than chance, $t(30) = 3.09$, $p = 0.004$. Notably, Figure 3-5 shows trustors' high levels of interest in both of the status quo payoffs, QUO1 and QUO2. The trustee, on the other hand, showed a trend in the direction of egocentrism, but did not demonstrate a significant primacy effect; only 53% ($SE = 2.9\%$) of trustees' initial search events were self-relevant, $t(29) = 1.0$, $p = 0.29$. As Figure 3-5 illustrates, only trustors showed clear evidence of egocentric primacy.

Figure 3-5

First Search Events



Error bars denote standard error of the mean

The analyses of rank and initial search events provided partial support in favor of egocentric primacy. Trustors demonstrated a consistent and significant tendency to search for self-relevant information early in the decision process. Trustees' behavior trended in the same direction, but at rates that were not significantly different from chance levels. However, these approaches to measuring search order only reflected small cross-sections of participants' behavior. They revealed little about the dynamic nature of information search.

Growth curve analyses. My final approach in testing primacy was to estimate longitudinal growth curves to model shifts in the search process as they occurred over time. To execute this approach, I calculated the probabilities of the different search events (for each participant) *across trials*. As in the first section of the results, multilevel models were estimated with data clustered by participant. However, the previous analyses

used clustering to measure behavior over 24 different trials (each trial was a unique observation). In the present analyses, probabilities were aggregated across trials, and the individual observations for each participant denoted six different points of time (the first six search events were treated as unique time points). Table 3-1 is an example of the data generated for these growth curve analyses. A separate curve was estimated for each payoff, as well as a curve estimating the overall probability of perspective taking (searching for any one of the other player's payoffs). Egocentric primacy predicts that the probability of accessing self-relevant payoffs decreases over the course of the first six events, and that the probability of viewing other-relevant payoffs increases.

Table 3-1

Longitudinal Probabilities of Search Behavior

	Participant 4003 (Role = Trustee)					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
QUO1	.458	.083	.125	.208	.125	.125
QUO2	.083	.25	.208	.041	.00	.125
BET1	.041	.166	.166	.25	.2916	.125
BET2	.125	.166	.166	.0833	.166	.125
REC1	.083	.208	.25	.208	.25	.18
REC2	.208	.125	.083	.166	.125	.32

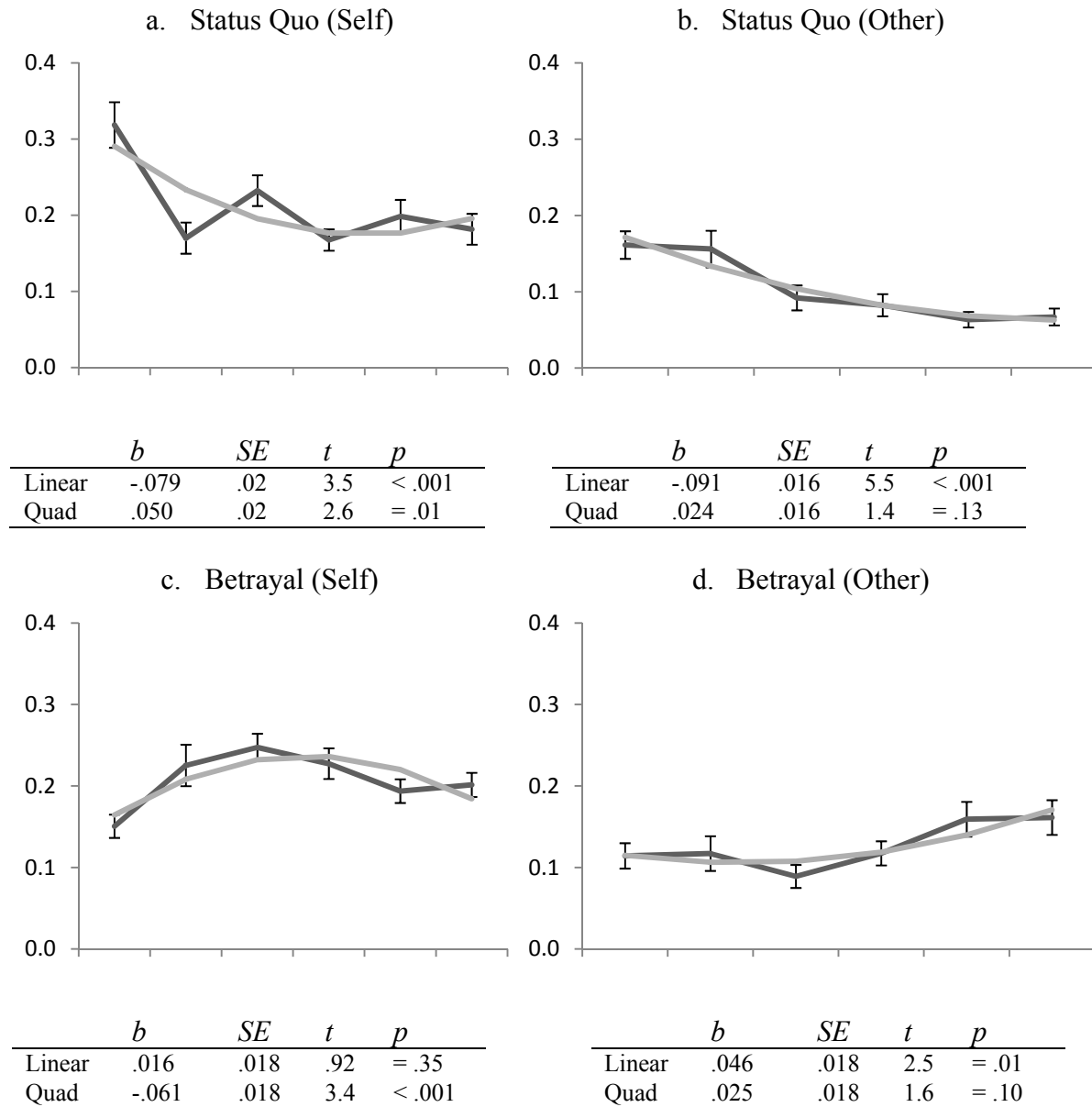
It is important to note that participants could search for payoffs as many (or few) times as they wished. As a result, there were fewer valid observations for the later time points. For this reason, I limited my analyses to the first six events of the search process. In a six event sequence, a participant could potentially access each payoff once (though they did not necessarily do so). In total, 78.5% of the trials (1150 observations in total) were of lengths six or greater, and the average number of valid-length trials per

participant was 18.5 ($SD = 6.5$). There were four participants who provided fewer than eight valid trials. Excluding these participants had no significant effects on the estimated models; therefore, they were included in the following analyses. Figure 3-6 reports the observed data and fitted models of search behavior over time. Separate multilevel models were constructed to estimate the probabilities of viewing each payoff, as well as models of aggregated perspective taking (the probability of searching for *any* of the other player's payoffs).¹⁰

¹⁰ These models were constructed using autoregressive AR(1) correlation structures.

Figure 3-6

Trustor



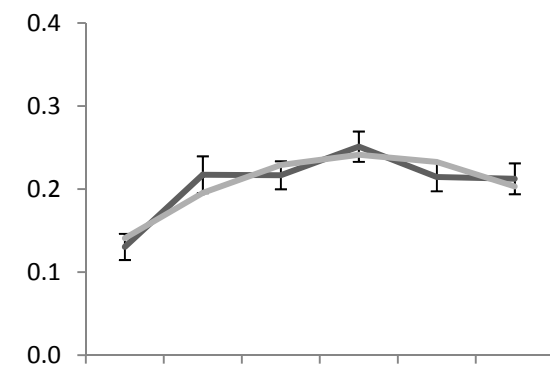
*Horizontal axis indicates search event number
(first search event, second search event, etc.)*

■ Observed Pr(event), error bars indicate standard error

■ Model estimate (Linear + Quadratic contrasts)

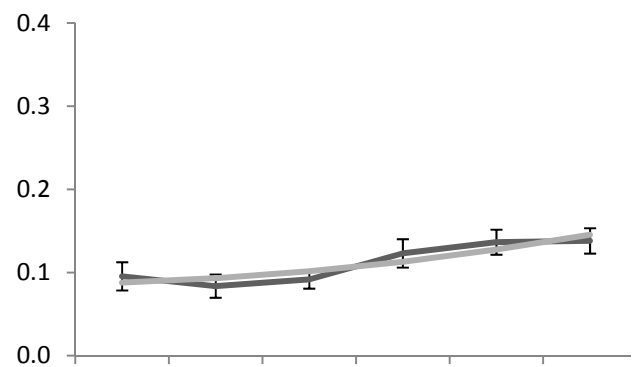
Trustor (Continued)

e. Reciprocity (Self)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	.052	.18	2.8	= .005
Quad	-.064	.18	3.5	< .001

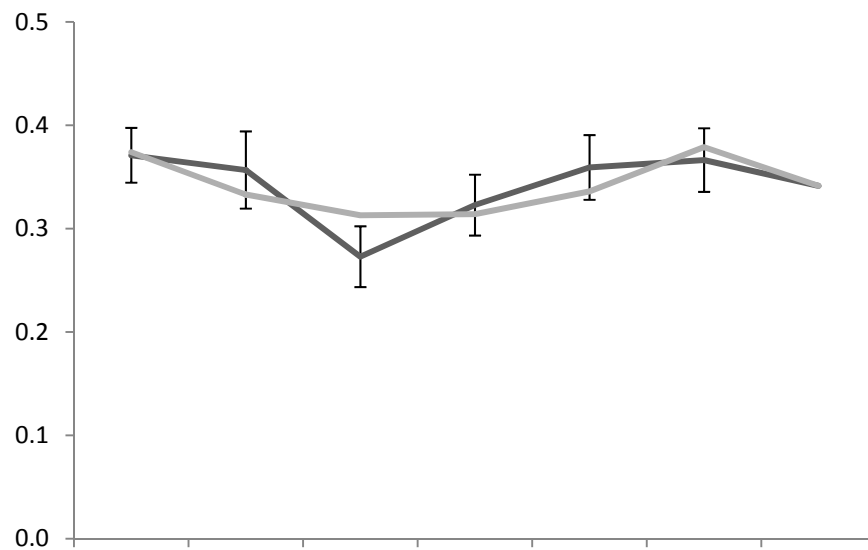
f. Reciprocity (Other)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	.052	.018	2.89	= .005
Quad	-.06	.018	3.52	< .001

g. Total perspective taking

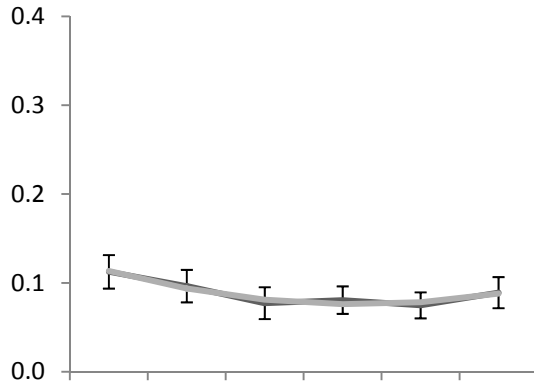
(The probability of the trustor viewing any other-relevant payoff)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	.004	.02	.19	= .84
Quad	.064	.02	3.00	= .003

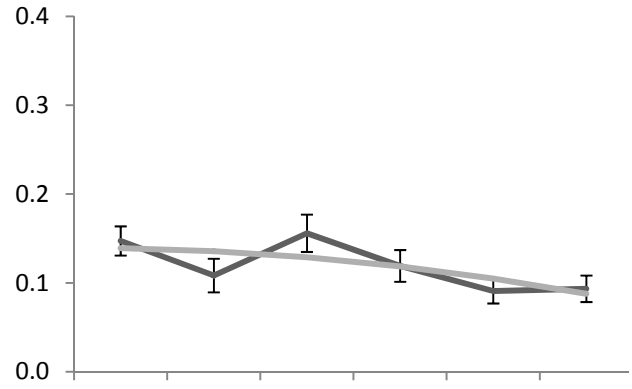
Trustee

h. Status Quo (Other)



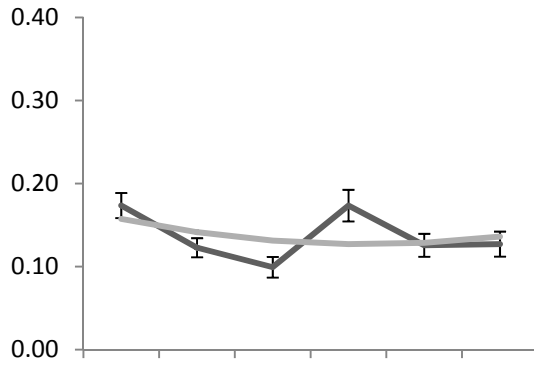
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	-.021	.017	1.2	= .21
Quad	.022	.017	1.3	= .19

i. Status Quo (Self)



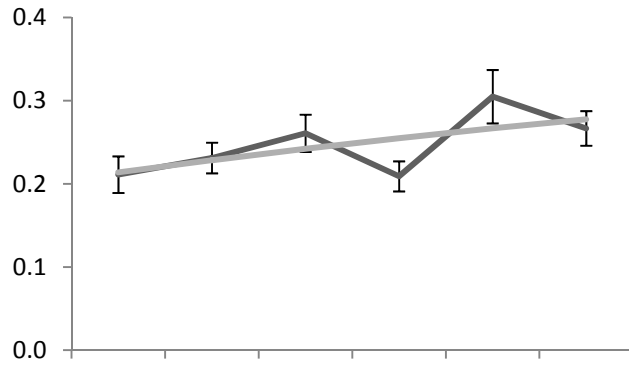
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	-.040	.017	2.44	= .01
Quad	-.01	.017	.60	= .55

j. Betrayal (Other)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	-.017	.015	1.17	= .24
Quad	.017	.015	1.17	= .24

k. Betrayal (Self)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	.053	.023	2.3	= .02
Quad	-.002	.023	.13	= .90

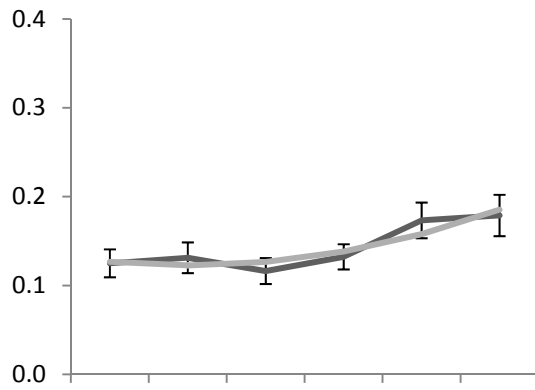
Estimated equations

Level 1	$y_{ij} = \beta_{0j} + \beta_{linear}(LIN) + \beta_{quadratic}(QUAD) + \varepsilon_{ij}$
---------	--

Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$
---------	---------------------------------------

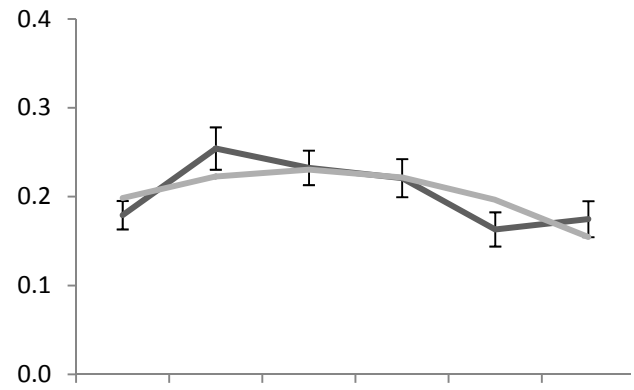
Trustee (Continued)

l. Reciprocity (Other)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	.049	.017	2.7	= .006
Quad	.024	.017	1.3	= .17

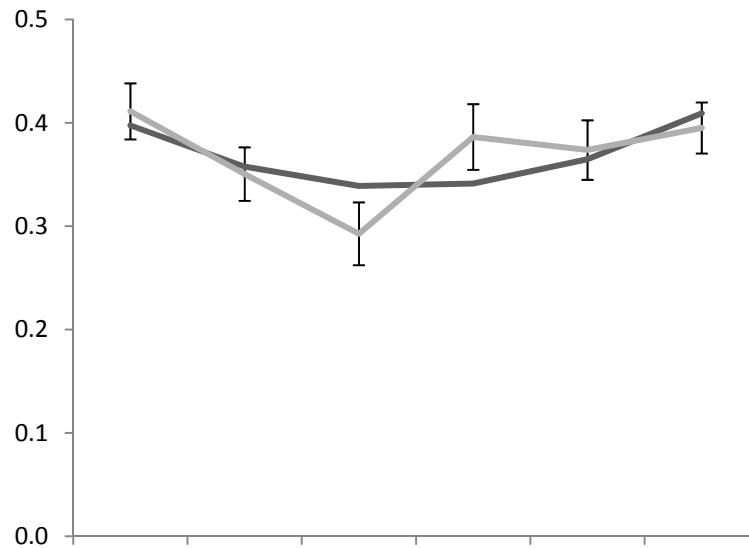
m. Reciprocity (Self)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	-.036	.02	1.8	= .07
Quad	-.050	.02	2.4	= .01

n. Total perspective taking

(The probability of the trustor viewing any other-relevant payoff)



	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Linear	.01	.018	.54	= .59
Quad	.064	.018	3.51	= .003

Trustors. Three patterns were evident in the trustor's growth curves: First, interest in the status quo payoffs (panels a and b) peaked at the beginning of the search process. The negative effect of time on the trustor's interest in the status quo outcomes was primarily linear, though there was also a significant quadratic trend fit to the probability of searching for the self payoff. Second, the trustor's interest in the self-relevant outcomes of betrayal and reciprocity (panels c and e), peaked during the first few search events (the third and fourth events, respectively) and then slightly declined. The probabilities of searching for the self outcomes for betrayal and reciprocity were best fit to quadratic contrasts, in each case suggesting an initial increase, a relative maximum, and a subsequent decline. Third, trustors' interest in the trustee's outcomes of betrayal and reciprocity, featured in panels d and f, significantly increased over time. The effects of time on these outcomes were fit to a combination of linear and quadratic contrasts. Trustors expressed delayed interest in the other player's outcomes for betrayal and reciprocity, most notably during the fifth and sixth events.

The model of the trustor's *total* perspective taking (the probability of searching for any of the trustee's payoffs) outlines a three-stage sequence (panel g). The probability of perspective taking followed a quadratic trend: there was an initial decline, followed by a relative minimum and a delayed increase. The individual growth curves suggest that the first stage of the process was to evaluate the payoffs of the status quo (both the self and other payoffs). The second stage was to evaluate the self-relevant outcomes of betrayal and reciprocity. After evaluating the potential outcomes of trust, the trustor was then more likely to consider the other-relevant outcomes of betrayal and reciprocity. These results were mostly consistent with egocentric primacy; perspective taking (the

evaluation of BET2 and REC2) was more likely to occur after the trustor had already evaluated self-relevant information. Notably, the egocentric model does not anticipate the initial importance of the status quo payoffs. Instead, the model predicts that the probability of searching for the other player's status quo payoff should peak *after the trustor has already considered self-relevant outcomes*, whereas the data showed that participants were more likely to access QUO2 early in the search process. Aside from this inconsistency, the trustor's temporal search patterns were consistent with egocentric primacy.

Trustees. While the trustor's search behavior revealed several significant temporal trends, the trustee's data was less consistent with primacy. Egocentric primacy predicts that the probability of viewing self-relevant payoffs should decrease over time, while the probability of viewing other-relevant payoffs should increase. The probabilities of searching for self-relevant payoffs changed with time, but not in a manner fully consistent with egocentric primacy. The trustee's interest in the self status quo payoff decreased linearly (panel i), while the probability of searching for the self-relevant outcome of reciprocity followed a quadratic pattern (an increase, a relative peak, and a decline, panel m). The probability of viewing the self-relevant betrayal payoff *increased* linearly over the first six search events. This delayed increase in probability is the opposite of the egocentric model's prediction.

Of the three other-relevant payoffs the probabilities of viewing the first player's status quo and betrayal payoffs (panels h and j) did not significantly change over time. The probability of viewing the first player's reciprocity payoff (panel l) linearly increased with time, peaking during the fifth and sixth search events. Of the six payoffs, three

showed temporal changes consistent with egocentric primacy (the self payoffs for status quo and reciprocity, and the other payoff for reciprocity); two payoffs showed no significant temporal changes (the other-relevant payoffs for status quo and betrayal); and one changed in a manner contrary to the egocentric prediction (the self payoff for betrayal increased with time). In spite of these inconsistencies, the trustee's temporal pattern of total perspective taking was very similar to the trustor's three stage process (panel n). The overall probability of perspective taking followed a quadratic trend (an initial decrease, followed by a relative minimum and an increase).

Summary. The second proposition of the model, egocentric primacy, claims that self-relevant information is evaluated before perspective taking occurs. To test this hypothesis, I examined three aspects of information search: the sequence in which payoffs were accessed, the first search event of each trial, and the longitudinal probabilities of search events. Trustors showed consistent evidence of egocentric primacy, viewing self payoffs earlier in the process. On the other hand, trustees' search patterns only partially followed the model's predictions.

Proposition 3: Egocentric contingency

The third proposition of the egocentric model posits that the level of perspective taking depends upon the initial evaluation of self-relevant information. When possible, the search process is truncated and decisions are made based on purely egocentric concerns. This proposition is supported by two pieces of prior evidence: First, we found that trust decisions only varied with temptation when risk was low. In the high risk condition, trust and temptation were independent. Second, trust decisions required more time when risk was low. We inferred that this additional time was spent evaluating the

trustee's point of view (Evans & Krueger, 2011). A successful replication of this effect would consist of three findings:

1. Contingent behavior: Trust and reciprocity should be *sensitive to a risk by temptation interaction*.
2. Contingent response time: Response times should be *longer when self-relevant payoffs are favorable* (low risk for Player 1 and low temptation for Player 2).
3. Contingent perspective taking: The level of perspective taking, measured as time spent viewing the other player's payoffs, should be *greater when self-relevant payoffs are favorable*.

Contingent behavior. Multilevel logistic models of trust and reciprocity revealed that neither player's behavior was sensitive to a risk by temptation interaction.¹¹ These models included data from both the Mouselab and Open Boxes conditions, though models using only the Mouselab data yielded similar results. The likelihood of trust varied significantly with both risk ($b_{risk} = -2.53, SE = .40, p < .001$) and temptation ($b_{temp} = -.61, SE = .12, p < .001$), but the effect of temptation was not contingent upon the level of risk, $b_{risk*temp} = .05, SE = .19, p = .79$. Reciprocity decreased at higher levels of temptation, $b_{temp} = -1.17, SE = .14, p < .001$, and there was no main effect of risk on the trustee's behavior ($b_{risk} = .53, SE = .42, p = .18$). There was no risk by temptation interaction, $b_{risk*temp} = -.34, SE = .33, p = .79$. Overall, neither player showed behavioral evidence of egocentric contingency.

Contingent response time. Next, I tested the effects of self-relevant payoff conditions on response times. For each player, I estimated a linear multilevel model with log-transformed response times as the dependent variables. Risk and temptation were

¹¹ These are the same models (payoffs-only) reported in Chapter 2.

entered into the model as fixed effects; and a random intercept was estimated for each participant. Again, data from both the MouseLab and Open Boxes conditions were analyzed. Egocentric contingency predicts that trustors' reaction times should decrease at higher levels of risk, and trustees' reaction times should decrease at higher levels of temptation. Table 3-2 reports the parameters of the estimated models.

Table 3-2

Multilevel Models of Response Times

	Trust RT	Reciprocity RT
Participants	57	57
Observations	1368	1368
Intercept	13.0 (.95)**	10.60 (.60)**
Risk	-1.79 (.44)**	-.63 (.32)*
Temptation	.011 (.27)	-.47 (.19)*
σ^2	29.52 (6.18)**	16.8 (3.4)**
(random intercept variance)		
Residual variance	66.9 (2.6)**	35.54 (1.39)**

Trust response times. There was a significant amount of between-subject variability in the estimates of random intercepts, justifying the multilevel approach, $\sigma^2 = 29.52 (6.18)$. As predicted by egocentric contingency, the trustor's response times were significantly shorter at high levels of risk, $b_{risk} = -1.79$, $SE = .44$, $t = 4.0$, $p < .001$. Temptation had no discernible effect on the trustor's reaction times.

Reciprocity response times. I observed significant between-subject variance in the trustee's response times, $\sigma^2 = 16.8 (3.4)$. Trustees' response times were affected by both temptation and risk. Responses were faster at higher levels of temptation ($b_{temp} = -.47$, SE

= .19, $t = 2.36$, $p = .018$) and at higher levels of risk ($b_{risk} = .63$, $SE = .323$, $t = 1.95$, $p = .051$).

Both players showed evidence of contingent response times. Trustors made quicker decisions as risk increased, and trustees spent less time as temptation increased. Unexpectedly, trustee responses were also quicker at higher levels of risk.

Contingent perspective taking. The data thus far show mixed support for the claim of egocentric contingency. Neither player's behavior was sensitive to the temptation by risk interaction predicted by contingency. Still, the multilevel analyses of response times show that both players had latencies varying with self-relevant payoffs. The trustor responded more quickly when risk was high, and the trustee was faster at higher levels of temptation. The proposition of egocentric contingency claims that these decreases in response times occurred because players did not engage in (as much) perspective taking. Information search data enabled me to directly test that prediction.

The previous tests of information search used relative variables where, for example, the time spent viewing a given payoff was scaled as a percentage of the total search time. Here, using relative variables would not allow me to distinguish between decreases in perspective taking and increases in egocentrism. To address this ambiguity, I tested contingency using absolute measures of perspective taking. The critical test of conditional perspective taking was to compare how self-relevant payoff factors (risk for the trustor and temptation for the trustee) influenced the total time spent viewing the other player's outcomes.¹² Using the approach outlined in the previous section, I estimated linear multilevel models with other-relevant search times (log transformed) as

¹² Equivalent tests were run using event counts and search transitions, results were similar.

the dependent variables. Table 3-3 reports the estimated models of conditional perspective taking.

Table 3-3

<i>Multilevel Models of Total Perspective Taking (Log Transformed)</i>		
	Trustors	Trustees
Participants	31	30
Observations	744	720
Intercept	7.8 (.20)**	5.69 (.39)**
Risk	-.34 (.15)*	-.09 (.19)
Temptation	-.10 (.09)	.003 (.11)
σ^2 (random intercept variance)	3.15 (.86)**	4.19 (.36)**
Residual variance	4.56 (.24)**	4.19 (1.17)**

As predicted by contingency, trustors spent significantly more time viewing the other player's outcomes in low risk trials ($M = 3,690.4$ milliseconds, $SE = 320.6ms$) compared to high risk trials ($M = 3,582.2$, $SE = 422.7$) trials, $b_{risk} = -.34$, $p = .026$. Trustees, on the other hand, did not show the pattern predicted by contingency; temptation did not have a meaningful effect on trustees' perspective taking $b_{temp} = .003$, $p = .97$.

Summary and discussion

The egocentric model makes three predictions about how players search for information in the trust game. The first prediction, egocentric focus, is that players allocate the majority of their attention to self-relevant information. Comparisons of search omissions, viewing times, event counts, and search transitions all revealed that both players were consistently focused on self-relevant information. The overall tendency

was to allocate about 60% of attention to self-relevant payoffs. The second prediction, egocentric primacy, is that players begin by searching for self-relevant information and perspective taking occurs at a later stage. I tested primacy by comparing the order in which payoffs were viewed, and which payoffs were viewed as the first search event. I also used multilevel growth curves to examine how search probabilities changed over time. The trustor's search behavior was highly consistent with egocentric primacy. Self-relevant information was accessed first and likelihood of perspective increased with time. In the case of the trustee, the results were mixed: the measures of the first payoffs viewed in each trial and the average ranks of payoffs trended towards egocentrism. Moreover, the trustee's growth curves were only partially consistent with egocentrism. The third prediction, egocentric contingency, is that the level of perspective taking is contingent upon the evaluation of self-relevant information. Total response times and information search data indicated that the trustor, but not the trustee, engaged in conditional perspective taking. The trustor's level of perspective taking was conditional on the level of risk, perspective taking decreased in high risk trials, but the trustee's perspective taking did not vary with temptation. Table 3-4 summarizes the tests of focus, primacy, and contingency.

Table 3-4

Summary of Analyses

Proposition	Measure	Description	Trustor	Trustee
Focus	Omissions	Percentage of times payoffs were never viewed	More other-relevant	More other-relevant
	Relative search time	Percentage of time spent viewing self outcomes	More self-relevant	More self-relevant
	Transitions	Consecutive search events	More self-to-self	More self-to-self
Primacy	Rank	The order in which payoffs were accessed	Self first	Self first (marginal)
	First event	The first payoff viewed at the start of each trial	Self first	No self preference
	Growth curves	Longitudinal probabilities of search events	Self first, other later	Mixed results (self first at the aggregate level)
Contingency	Behavior	Decisions were sensitive to a risk by temptation interaction	No interaction	No interaction
	Response times	Response time depends on self payoffs	Times varied with risk	Times varied with temptation
	Information search times	Viewing times for other-payoffs vary with levels of self-payoffs	Perspective taking varied with risk	No change

Focus. The proposition of egocentric focus predicts that players will devote most of their attention to self-relevant information. I found consistent evidence of this tendency in the form of fewer self-relevant omissions and greater percentages of self-relevant viewing times, event counts, and self-to-self transitions. The result was significant for both players – participants tended to allocate about 60% of their search time to self-relevant information. There were individual differences in the degree of egocentrism, but 80-90% of participants (both trustors and trustees) showed an overall

preference for self-relevant information. In addition to the support of the egocentric model, there were several unexpected trends.

An important feature of the egocentric model is that it distinguishes between self- and other-relevant information, but it does not make predictions about the relative importance of the possible outcomes (status quo, betrayal, and reciprocity). The model assumes that decision makers make a primary distinction between self- and other-relevant information, and that the three possible outcomes are equally important. In the case of the trustor, there were few within category differences in focus; the status quo, reciprocity, and betrayal payoffs received similar levels of consideration.

In contrast, there were significant within category differences in the trustee's behavior. Trustees focused primarily on two self-relevant payoffs, BET2 and REC2, showing substantially less interest in QUO2 (the status quo payoff). Trustee search behavior is consistent with a three level hierarchy (rather than the egocentric model's proposal of two levels): the most important payoffs were the self-relevant outcomes of trust (BET2 and REC2); the second most important payoffs were the trustor's outcomes of trust (BET1 and REC1); finally, the least relevant payoffs were the two outcomes of the status quo (QUO1 and QUO2).

Although it was not anticipated by the model, the trustee's disinterest in the status quo is consistent with the idea that participants focus on the most salient information. The status quo is an outcome with no immediate strategic value for the trustee. A likely reason why she would consider the status quo is if she has the desire to reward (or punish) an act of trust (Cox, 2004). The status quo is a reference point in evaluating the risk that the trustor accepts by trusting and the benefit that trust conveys for trustees. The

egocentric model anticipates that such considerations are secondary in reciprocity decisions.

Primacy. The second proposition of the egocentric model is that people evaluate self-relevant information before they engage in perspective taking. To test this claim, I examined three aspects of information search: the rank of payoff viewings, the first events viewed during each trial, and the longitudinal probabilities of search events. In the case of the trustor, there was strong support for primacy, with one important exception. Trustors showed a strong tendency to begin trials by evaluating QUO1 and QUO2, the status quo payoffs. Trust decisions appeared to follow a three part sequence: 1. Evaluate the status quo; 2. Evaluate the self-relevant outcomes of trust; 3. Evaluate the other-relevant outcomes of trust. Again, the model did not anticipate that trustors would show *within* category differences (evaluating the status quo first).

Trustee behavior was partially consistent with egocentric primacy, but there were fewer significant patterns in the trustee's search behavior. The trustee's rank data showed marginally significant evidence of egocentric primacy. However, unlike the trustor, the trustee did not tend to access a self-relevant payoff at the start of each trial. I also investigated longitudinal changes in the trustees' search patterns. Egocentric primacy predicts that the probability of searching for self-relevant should decrease over time, while the probability of perspective taking should increase. The estimated probability of perspective taking (searching for any one of the other player's payoffs) followed a quadratic trend, showing an initial decline followed by a relative minimum and a delayed increase. However, of the six growth curves estimated for individual payoffs, only three were consistent with this pattern. The trustee's interest in two self-relevant payoffs

(REC2 and QUO2) decreased over time, and her interest in one other-relevant payoff (REC1) increased over time. Of the three remaining payoffs, two showed no significant changes over time (QUO1 and BET1). The last curve (BET2) revealed a temporal pattern contrary to egocentric primacy; over time, trustees became significantly *more* likely to view a self-relevant payoff.

Investigation of the trustee's growth curves revealed two unexpected findings. First, I noted that trustees were slightly more likely to view status quo payoffs at the start of information search; the probability of searching for QUO2 decreased linearly during the first six events. This mirrored the behavior of trustors, who showed a stronger initial interest in the status quo payoffs. However, in interpreting this trend, it is important to note that the status quo payoffs were relatively unimportant to the trustee - they were the most frequently ignored payoffs and were attended to for the least time. Second, I observed that there was a tendency for trustees to view the outcomes of reciprocity before the outcomes of betrayal. The search probability for REC1, the self-reciprocity payoff, followed a quadratic trend (an increase, relative peak, and then a decrease). In contrast, the probability of viewing BET1 increased linearly. These two trajectories suggest that trustees evaluated reciprocity before betrayal.

One limitation of these analyses is that the estimated growth curves assumed that participants followed the same temporal patterns; in each model, the linear and quadratic effects of time were treated as fixed effects. In other words, time had the same effects on search behavior for each person (whether the effects were linear, quadratic, or neither). However, it is plausible there were significant individual differences in how participants prioritized the search process. There could be differences in when participants searched

for a given outcome (such as the status quo) or when they engaged in perspective taking (perhaps altruists would be quicker to consider the other player). Random intercept models would fail to detect these differences. In order to test for variable effects of time, it would be necessary to estimate random slope models.

Another potential limitation of the growth curve analyses is that they focused on a segment of the search process. In the growth curve analyses, it is likely that changing the number of measured time points would lead to different interpretations of the search process. For example, reducing the number of time points from six to four would cause some quadratic effects to appear linear. Similarly, including the seventh and eighth time points could reveal unexpected shifts. However, there was good reason to limit the number of measured events. The duration of information search significantly varied both within and between participants. At later time points, probability estimates were based on fewer trials, making them less reliable. Moreover, it becomes difficult to interpret the *relative* positions of these later events. The tenth search event could represent a midpoint in the sequence or the terminal event. These considerations motivated my conservative focus on the first six events.

Contingency. The third proposition of the egocentric model is that perspective taking depends upon the evaluation of self-relevant information. This prediction assumes that perspective taking is effortful, and that people will avoid it when possible. Two previous findings supported the idea of contingency: First, the effect of temptation in dilemmas of trust is contingent upon the level of risk; temptation only affects behavior when risk is low. Second, response times are longer when risk is low. Contingency predicts that this additional time is spent engaging in perspective taking. Critically, this

hypothesis was confirmed in trustors – the time spent viewing the other player's outcomes significantly decreased in high risk trials. In the case of the trustee, there was no corresponding evidence of contingency in search behavior. There was no support for the prediction that the trustee's perspective taking was conditional on temptation.

It is important to note that the present experiment failed to replicate the interactive effects of risk and temptation on trust.¹³ The payoff only models of trust and reciprocity report that risk and temptation have main effects on behavior, in neither case was the risk by temptation interaction significant. There were several methodological factors in the current experiment that could have affected the changed pattern of behavior. In constructing the trust game payoffs for this experiment, I used levels of temptation that were more extreme than previous studies. For example, in this study the difference between the low and medium levels of temptation was equal to the difference between the lowest and highest levels in our previous work (Evans & Krueger, 2011). The interactive pattern may not apply to extreme levels of temptation, or it may be that the greater variability caused participants to give temptation more consideration. It is also conceivable that the large number of decisions participants made (24 per participant) lead to a more sophisticated understanding of the game's structure.

Concluding remarks

In the present chapter, I investigated several aspects of players' information search. These analyses provided strong support for the propositions of egocentric focus and primacy, and evidence of egocentric contingency in trustors, but not trustees. The next set of analyses will look at the consequences and antecedents of information search.

¹³ Trustees did not show evidence of the interaction either, but it is not a failed replication as there is no previous evidence of such an effect.

I will test how egocentrism in the trust game influences each player's decisions, and investigate the underlying personality differences associated with egocentric information search.

Chapter 4

The consequences and antecedents of egocentrism: Inefficiency, inequality, and impulsivity

In the previous chapter, I used process tracing data to learn about how participants searched for information. Both trustors and trustees focused on self-relevant information, and the evaluation of other-relevant information was generally delayed and less intensive. The next objective in my analyses was to investigate how information search influenced decisions and subsequent outcomes. In the present research, one of my basic assumptions is that the process of information search is relevant to the resulting decision. In Chapter 3, I tested which pieces of information were viewed earliest and most often because these search tendencies potentially revealed something about the decision maker's priorities. The present chapter investigates how information search influences trust and reciprocity. Following these analyses, I look at how individual differences in personality shape information search.

The fourth proposition of the egocentric model (inefficiency) addresses the relationship between information search and the trustor's behavior. The model's hypothesis is that trustors who engage in greater perspective taking will be more likely to trust because they are better able to identify situations where the probability of reciprocity is high (i.e., low temptation situations). Higher levels of trust lead to greater social efficiency, defined as the combined wealth of the trustor and trustee, because the act of trust creates wealth.¹⁴ Note that this proposition focuses on the trustor's perspective; it makes no predictions about the trustee's behavior, as her responses (betrayal and reciprocity) are equally efficient.

¹⁴ This is true in laboratory experiments, though not necessarily so in real life.

The fifth proposition, egocentric inequality, is relevant to how perspective taking affects reciprocity. The trustee faces a choice between a relatively fair outcome (reciprocity) and an unfair, but personally advantageous outcome (betrayal). In this case, it is clear that a fully egocentric trustee is unlikely to reciprocate; regardless of the potential motives for reciprocity (social preferences, a desire to maintain a positive reputation, or guilt), the trustee will only reciprocate if she first realizes how her choice will affect the trustor. Here, egocentrism is associated with greater inequality between trustors and trustees, and the model predicts that greater perspective taking is associated with reciprocity. In addition, perspective taking should be associated with greater sensitivity to *risk*, as one of the motives for reciprocating is to reward the trustor for accepting risk. Note that the model predicts perspective taking leads to higher levels of trust and reciprocity, but there are different rationales for the two predictions.

The final proposition, egocentric impulsivity, addresses the foundation of the process model. Impulsivity postulates that self-focus in the trust game is a form of automatic, impulsive decision making. Thinking about another person's point of view, by comparison, is an effortful and reflective process. Decision making is egocentric, in part, because of the limited availability of cognitive resources. To test this proposition, I investigated how individual differences in cognitive reflection were related to information search and behavior.

Information search and behavior

In the following analyses, I investigated the relationship between information search and decision making, testing Propositions 4 and 5 of the egocentric model. I took two approaches to measuring egocentrism and perspective taking. The first was to define

perspective taking as the percentage of time spent viewing the other player's payoffs in a given trial ($M = 36.6\%$, $SD = 11.9\%$). This percentage was the *relative* interest in the other player's payoffs, not the absolute amount of time a participant was engaged in perspective taking. Given the formulation of the egocentric model, a relative measure of perspective taking is appropriate to test its propositions. However, there is good reason to try to unpack the effects of difference scores (Krueger & Wright, 2011). For example, a relative measure of perspective taking cannot distinguish between high interest in self-relevant payoffs and low interest in other-relevant payoffs. To unpack the effects of relative egocentrism, I also report analyses which look at the independent effects of *absolute* (log transformed) self- and other- payoff viewing times.

Proposition 4: Egocentric inefficiency

The fourth proposition of the egocentric model predicts that perspective taking facilitates trust, a socially efficient behavior. More specifically, the model makes two predictions about how perspective taking influences trust: First, it predicts a positive main effect of perspective taking on trust. Second, it predicts a perspective taking by temptation interaction. Perspective taking does not encourage blind trust. Rather, the positive effect of perspective taking on trust should be greatest when temptation is low. A rational perspective taker who observes a high level of temptation (and thus a high probability of betrayal) would be unlikely to show trust. Rather, perspective taking enables trustors to identify and take advantage of low temptation situations.

Multilevel logistic models were used to test the effects of perspective taking on trust. Two models were compared: A payoffs-only model was used as a baseline. This model consisted of main effects of risk and temptation, a risk by temptation interaction,

and a random intercept for each participant. The full model contained two additional terms, a main effect of perspective taking and a perspective taking by temptation interaction. The estimated equations are presented in Table 4-1.

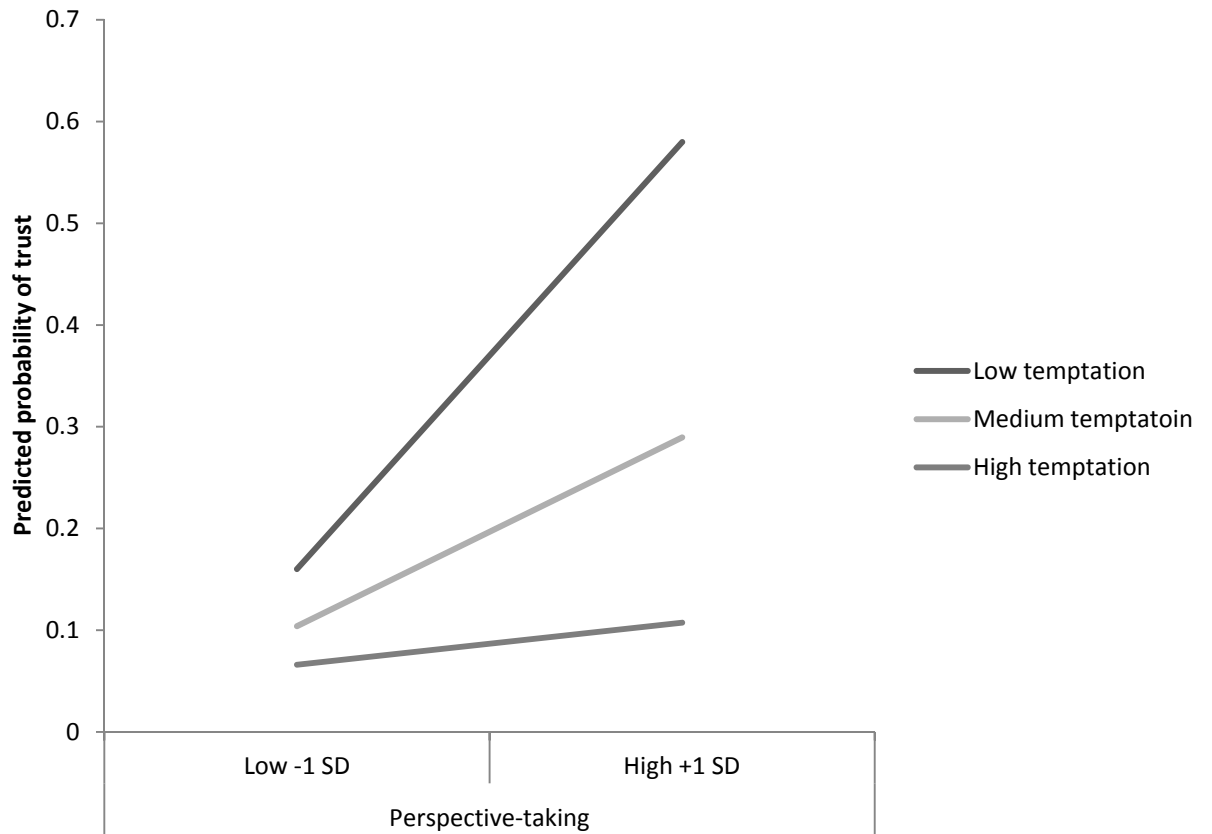
Table 4-1

Model 1	Level 1	$y_{ij} = \beta_{0j} + \beta_{risk}(RISK) + \beta_{temp}(temp) + \beta_{r*t}(risk * temp) + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$
Model 2	Level 1	$y_{ij} = \beta_{0j} + \beta_{risk}(RISK) + \beta_{temp}(temp) + \beta_{r*t}(risk * temp) + \beta_{per}(perspective) + \beta_{per*t}(perspective * Temp) + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$

The full model of trust, which included perspective taking as a predictor, fit the data significantly better than the payoffs-only baseline, $X^2(2) = 28, p < .001$. As predicted, there was a significant, positive main effect of perspective taking on trust ($b = 2.9, p < .001$) and a significant perspective taking by temptation interaction ($b = -2.44, p = .01$). Perspective taking was associated with higher levels of trust, and the effect of perspective taking was moderated by the level of temptation. As temptation increased, the probability of reciprocity declined and the positive relationship between trust and perspective taking attenuated. To clarify the practical meaning of this interaction, I used the full model to calculate point estimates of trust for high and low perspective takers (participants who were one standard deviation above and below the mean, respectively) at the three levels of temptation.

Figure 4-1

Trust by Temptation and Perspective Taking



As Figure 4-1 shows, the positive link between trust and perspective taking was only evident when the level of temptation was favorable.

The next step in my investigation of inefficiency was to unpack the effects of perspective taking on trust. A significant perspective taking by temptation interaction was found, but it is not clear whether the effects of perspective taking were due to greater interest in other-relevant payoffs or decreased interest in self-relevant payoffs. Put another way, a perspective taker could be someone who thinks a lot about other people or someone who doesn't spend much time thinking about herself. To unpack perspective taking, I compared the previous model (Model 2) with one that contained absolute, log

transformed measures of self- and other-payoff viewing times (Model 3). Table 4-2 reports the estimated equations of Models 2 and 3. The new model contained main effect terms for self- and other-viewing times, and two temptation by search time (both self and other) interaction terms.

Table 4-2

Model 2	Level 1	$y_{ij} = \beta_{0j} + \beta_{risk}(RISK) + \beta_{temp}(temp) + \beta_{r*t}(risk * temp) +$ $\beta_{per}(perspective) + \beta_{per*T}(perspective * Temp) + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$
Model 3	Level 1	$y_{ij} = \beta_{0j} + \beta_{risk}(RISK) + \beta_{temp}(temp) + \beta_{r*t}(risk * temp) +$ $\beta_{self}(Log\ self\ time) + \beta_{other}(Log\ other\ time) +$ $\beta_{self*T}(Log\ self\ time * Temp) + \beta_{other*T}(Log\ other\ time * Temp) + \varepsilon_{ij}$
	Level 2	$\beta_{0j} = \gamma_{00} + \mu_{0j}$

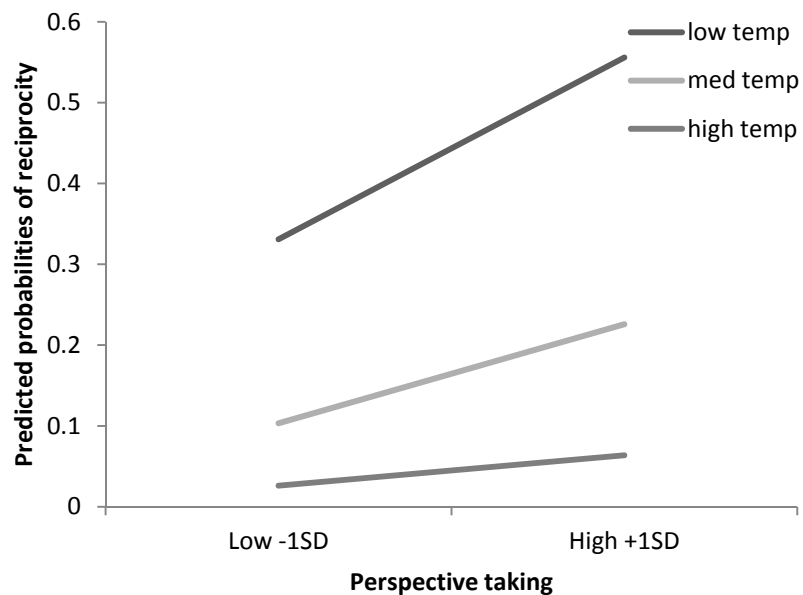
The parameter estimates of Model 3 suggest that both self- and other- payoff viewing times independently influenced trust. Participants who spent less time looking at their own payoffs ($b = -.27, p < .001$) and more time looking at the other player's payoffs ($b = .16, p < .001$) were more likely to trust the other player. As in Model 2, there was a significant temptation by other-viewing time interaction ($b = -.20, p < .01$). Notably, there was no significant interaction between self-viewing time and temptation ($b = .02, p < .80$). Surprisingly, Model 3 had a significantly *worse* fit to the data than Model 2, $X^2(2) = 18, p < .001$. The unpacking of perspective taking suggests that both self and other viewing times influence trust, but that the effect of perspective taking on behavior is best captured by the *relative* measure of search behavior.

Proposition 5: Egocentric inequality

The fifth proposition of the egocentric model addresses how information search will affect the trustee's behavior. The proposition predicts that perspective taking is positively associated with reciprocity. As in the test of inefficiency, two multilevel logistic models of reciprocity were constructed: A baseline, which contained a random intercept term and payoff variables, and a full model, including a main effect of perspective taking and a risk by perspective taking interaction. I found that the full model was a significant improvement over the baseline, $X^2(2) = 59, p < .001$. Perspective taking was positively associated with reciprocity, $b = 4.2, SE = .66, p < .001$. However, risk did not moderate the effect of perspective taking on reciprocity; perspective takers did not reward trustors for accepting greater risks. Figure 4-2 reports point estimates of reciprocity taken from the full model; here, there were main effects of perspective taking and temptation on reciprocity, but no interaction.

Figure 4-2

Reciprocity by Temptation and Perspective Taking



I compared the previous model with one containing absolute measures of search behavior. In this case, I constructed a logistic model with main effects terms for self- and other-viewing times (log transformed), but no time by payoff interaction terms. As in the analysis of the trustor data, both self and other-viewing times independently influenced reciprocity. Trustees who spent more time viewing the other player's payoffs ($b = .42, p < .001$) and less time viewing their own payoffs ($b = -.45, p < .001$) were more likely to reciprocate. Here, the model with measures of absolute viewing times fit the data better than the relative egocentrism model, $X^2(1) = 14, p < .001$.

Personality, information search, and behavior

The sixth proposition of the proposed model, egocentric impulsivity, postulates that egocentrism in trust is related to a lack of cognitive self-control. The model proposes that the impulsive response in a dilemma of trust is to focus on self-relevant information, presumably because perspective taking is a relatively slow and effortful process. Those who fail to engage in perspective taking do so because they wish to conserve the necessary cognitive resources. To test this proposition, I measured individual differences in reflection and perspective taking in two domains (summarized in Table 4-3). My first approach was to measure the constructs using survey instruments (completed by participants after they played the trust game); the second was to operationalize cognitive reflection and perspective taking using the information search data generated by MouseLab. I employed multiple measurement methods with the expectation that results would be consistent within each domain and across domains.

Table 4-3

Individual Differences in Reflection and Perspective Taking

	Reflection	Perspective Taking
Survey measures	Cognitive Reflection Test (CRT)	Interpersonal Reactivity Index (IRI)
		Perspective Taking (PT)
	Brief Self-Control Scale (SCS)	Empathic Concern (EC)
		Fantasizing (FS)
		Personal Distress (PD)
Information search	Log transformation of total search time	Percentage of time viewing other-relevant payoffs

Measurement approaches

Recall that participants completed a series of survey instruments as part of Experiment 1. Two of these instruments were associated with cognitive reflection: the Brief Self Control Scale (SCS) and the Cognitive Reflection Test (CRT). The CRT was measured on a scale of 0 to 3, indicating the total number of reflective (correct) responses. Of the 114 participants from Experiment 1, 54 (47%) correctly answered all three questions and the remaining participants had scores uniformly distributed between 0 and 2. SCS scores, based on the aggregation of 13 items, were standardized ($M = 0$, $SD = 1$). Although the SCS and CRT were selected to measure the same underlying construct (cognitive reflection), the two measures were uncorrelated, $r(113) = -.08$, ns .¹⁵ Perspective taking was measured using the 28-item Interpersonal Reactivity Index (IRI). The IRI consists of four correlated subscales: Perspective Taking (PT), Empathic Concern (EC), Fantasizing (FS), and Personal Distress (PD). I considered aggregating the four measures for the sake of parsimony, but found that they were weakly correlated

¹⁵ When possible, I conducted personality analyses using the full data set, which included both the MouseLab and Open Boxes conditions ($N = 114$).

(average $r = .18$) and therefore decided to treat each subscale individually. Scores for each of the IRI subscales were standardized.

I also selected behavioral measures of reflection and perspective taking using information search data. These measures were chosen with the assumption that they would be correlated with corresponding survey measures. As in the previous sections, I defined perspective taking as the percentage of time spent viewing the other player's payoffs. Contrary to my expectations, the behavioral measure of perspective taking was *not* significantly correlated with any of the IRI subscales; r 's ranging from $-.08$ to $.12$. Reflection was defined as the log transformation of the total time spent during decision making. Again, I anticipated that the behavioral measure of reflection would be positively associated with both of the survey measures of reflection; unexpectedly, neither the CRT nor the SCS was significantly correlated with total search time, $r_{\text{CRT}} = .05$ and $r_{\text{SCS}} = -.04$. Table 4-4 reports the zero-order correlations among the survey and behavioral measures.

Table 4-4

Zero-order Correlations

	SCS	Total time	IRI PT	IRI EC	IRI FS	IRI PD	Percent other
CRT	-.18	.05	.12	-.02	-.08	-.07	.10
SCS		-.04	.13	.23	.07	-.15	-.18
Total time			.19	.12	-.07	-.01	.49**
IRI PT				.35	.05	-.08	.12
IRI EC					.31**	.28*	-.02
IRI FS						.24	-.08
IRI PD							-.07

My correlational analyses suggest that there was little convergent validity across measurement methods. The survey measures of reflection and perspective taking were

not significantly correlated with the corresponding behavioral measures. In evaluating these correlations, I considered that the results may have been obscured by differences between trustors and trustees. For example, trustors may have spent more time on decision making or engaged in greater perspective taking. To account for this possibility, I separately examined the data of trustors and trustees, but this had no effect on the pattern of results.

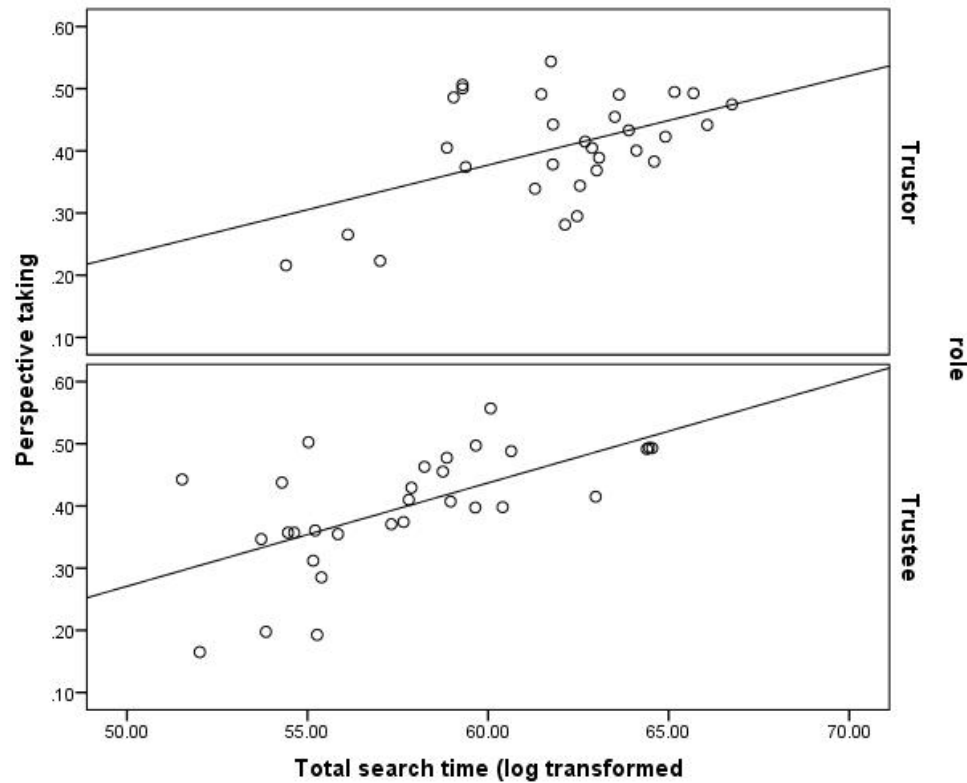
Reflection and perspective taking

I began investigating impulsivity with a correlational analysis of the relationship between measures of reflection and perspective taking. The behavioral measure of reflection (total search time) was positively correlated with behavioral perspective taking (the percentage of time viewing the other person's payoffs), $r(60) = .49, p < .01$. Figure 4-3 illustrates the relationship between viewing time and perspective taking for both trustors and trustees (top and bottom); best fit linear equations were estimated for each group of participants. These findings are strong evidence of egocentric impulsivity.

In contrast, the survey measures of reflection (the SCS and CRT) were not significantly correlated with the survey measures of perspective taking (the four IRI subscales; see Table 4-4 for correlations). Finally, I examined the correlations between perspective taking and reflection across domains: the SCS and CRT were uncorrelated with behavioral perspective taking, and the IRI subscales were not significantly correlated with behavioral reflection. Again, note that the preceding correlations were nonsignificant when trustor and trustee data were analyzed separately. Although there was a significant relationship between behavioral reflection and perspective taking, this finding did not replicate in tests using survey measures.

Figure 4-3

Reflection and Perspective Taking in Information Search



In the interest of thoroughness, I conducted exploratory analyses to look for potential links between the SCS, CRT, and information search behavior. For each of the six payoffs (QUO1, QUO2, etc.), I examined whether either of the survey measures of reflection was associated with absolute (total viewing time) and relative (percentage viewing times) search times. These results yielded some marginally significant findings, but there were no interpretable or consistent patterns present in the data. Given that there were few meaningful relationships between survey measures of individual differences and behavior, the remainder of this section focuses on the behavioral measures of reflection and perspective taking (total search time and percentage of time viewing other-relevant payoffs, respectively).

Reflection and decision making

Correlational analyses revealed that the participants who spent more time searching for information were engaged in relatively more perspective taking. The next step in my analyses was to look at whether individual differences in reflection were also related to differences in participants' behavior. Here, the model anticipates that cognitive reflection should be associated with higher levels of trust and reciprocity, as well as greater sensitivity to the other player's payoffs. For reflective trustors (trustees), the other-relevant factor of temptation (risk) should be more important to trust (reciprocity) decisions. To test these predictions, I calculated three dependent variables at the participant level: total trust / reciprocity (the total numbers of times the participant chose trust / reciprocity); the temptation correlation (the within-participant correlation between trust / reciprocity decision and temptation); and the risk correlation (the within-participant correlation between trust / reciprocity and risk).

Reflection and aggregate behavior. The egocentric model hypothesizes that reflection is positively associated with overall levels of trust and reciprocity. As predicted, a combined analysis of trust and reciprocity found that there was an overall positive relationship between reflection and trust / reciprocity $r(60) = .26, p < .05$. Analyzing trustors and trustees separately, I found that reflection was significantly associated with greater reciprocity ($r = .38, p < .05$), but not with greater trust ($r = .20, p = .30$), though the association was in the predicted direction.

Reflection, temptation, and risk. In addition to predicting a main effect of reflection on trust and reciprocity, the egocentric model also anticipates that reflective decision makers are more sensitive to the other player's payoffs. Reflective trustor should

be more sensitive to the trustee's temptation (trust should decrease more steeply at higher levels of temptation), and the reflective trustee should be more sensitive to the trustor's risk (reciprocity should increase at higher levels of risk). To test these claims, I calculated participant-level correlations between behavior (trust or reciprocity) and the two payoff factors (risk and temptation). A correlation of 0.0 would indicate that trust or reciprocity decisions were independent of the payoff factor, and a negative correlation would indicate that behavior (trust or reciprocity) decreased at higher levels of the factor. Trust decisions, on average, were negatively correlated with risk ($M = -.39$, $SE = .05$) and temptation ($M = -.18$, $SE = .05$). Trust was less likely to occur at higher levels of risk and temptation. Reciprocity decisions were positively correlated with risk ($M = .058$, $SE = .03$) and negatively correlated with temptation ($M = -.28$, $SE = .05$). Reciprocity was more likely when risk was high and when temptation was low. Table 4-4 reports the correlations between search time and payoff sensitivities.

Table 4-5

	N	Risk correlation	Temptation correlation
Log search time (trustor)	31	-.065	-.49**
Log search time (trustee)	30	.04	-.49**

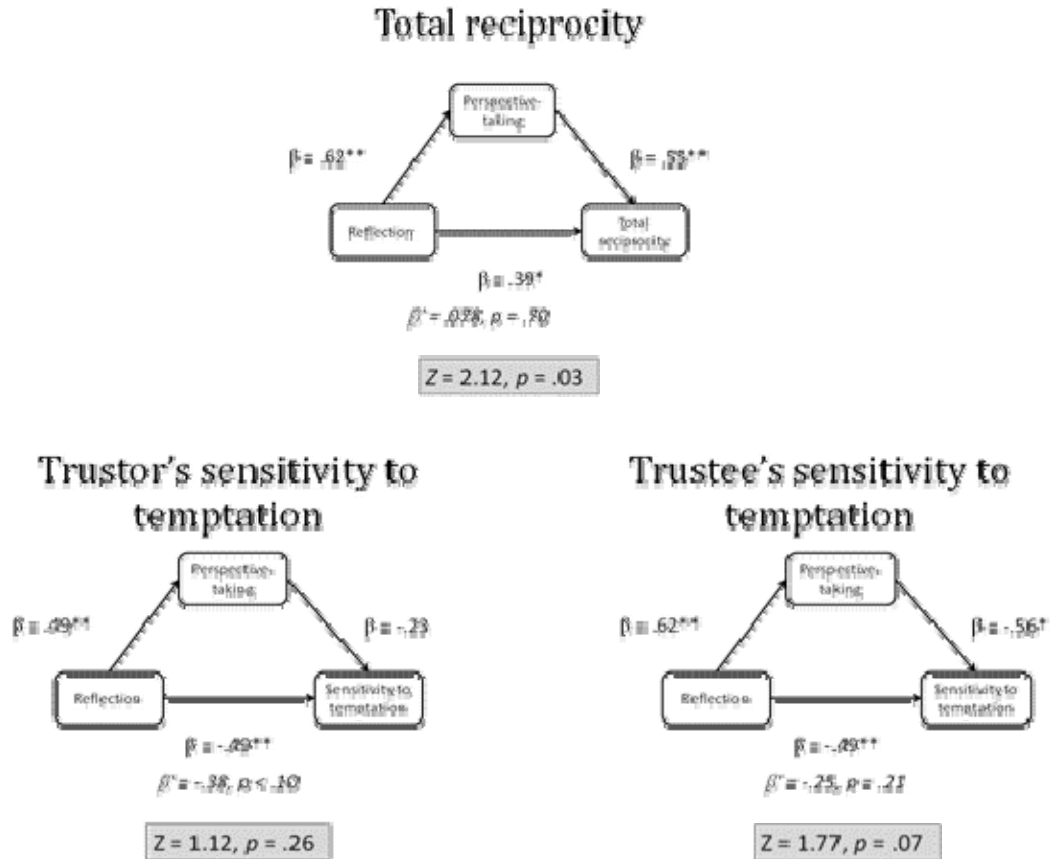
Correlational data partially confirmed the egocentric model's predictions. As expected, reflective trustors were more sensitive to the trustee's temptation (as shown by the significant negative correlation). However, there was no equivalent finding for trustees; risk sensitivity and reflection were not significantly correlated. Surprisingly, trustees also showed a negative correlation between reflection and temptation sensitivity, and in this case temptation is a self-relevant consideration.

Perspective taking as a mediator. The previous analyses revealed that reflection (total search time) was significantly associated with greater perspective taking, higher levels of reciprocity (but not higher levels of trust), and greater sensitivity to temptation (for both trustors and trustees). My final analyses examined whether the effects of reflection on behavior (higher levels of reciprocity and greater sensitivity to temptation) were mediated by increased perspective taking. Therefore, I tested three models where perspective taking was treated as a mediator for the effects of reflection on behavior (See Figure 4-4 for the results of these analyses).

The Sobel Test was used to test each of the three mediational models (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Here, the Sobel Test estimated the *indirect effects* of reflection on behavior (to what extent were the effects of reflection on behavior accounted for by reflection's relationship to perspective taking). In analyzing the three models, I found that perspective taking partially mediated the effects of reflection on reciprocity and the trustee's sensitivity to temptation. There was no significant evidence that perspective taking mediated the relationship between reflection and the trustor's sensitivity to temptation.

Figure 4-4

Mediational Models of Reciprocity and Sensitivity to Temptation



Summary

The final proposition of the egocentric model is that egocentric information search and behavior is a form of impulsive, low-effort decision making. In the present section, I investigated this claim with correlational analyses of survey instruments and search behavior. In support of the egocentric model, the behavioral measure of reflection was associated with greater perspective taking, higher levels of reciprocity, and greater sensitivity to temptation (for both trustors and trustees). Furthermore, the effects of reflection on reciprocity and the trustee's sensitivity to temptation were mediated by perspective taking. Notably, the main findings from these analyses did not replicate when

tested with survey measures. Surprisingly, the survey measures of reflection and perspective taking (the CRT, SCS, and IRI) were uncorrelated with the corresponding behavioral measures. Furthermore, survey measurements of reflection were uncorrelated with survey measurements of perspective taking, and no survey measurements were correlated with behavioral measurements.

Summary and discussion

I investigated the consequences and antecedents of information search in the trust game. Individual differences in egocentrism and perspective taking were significantly associated with trust and reciprocity. High levels of perspective taking (less time spent viewing self-payoffs and more time viewing other-payoffs) were positively associated with trust, and this effect was greatest when the level of temptation was low. Perspective takers did not trust blindly; rather, they were able to identify trials where trusting was profitable. Similarly, perspective taking trustees were more likely to reciprocate, though the effect of perspective taking was not contingent on the game's payoffs. Overall, there was strong support for the claims that egocentrism is associated with inefficiency (lack of trust) and inequality (lack of reciprocity).

The final proposition of the model postulates egocentrism is associated with impulsive decision making. I investigated this hypothesis by testing the relationships between individual differences in cognitive reflection and perspective taking. I measured reflection and perspective taking using survey instruments and information search data. There was a significant positive correlation between the behavioral measurement of reflection (total search time) and the behavioral measurement of perspective taking (the percentage of time spent viewing other-relevant payoffs). Further analyses showed that

behavioral reflection was associated with higher levels of reciprocity and greater sensitivity to temptation (for both trustors and trustees). However, none of these findings was replicated when I conducted corresponding tests with survey measurements of reflection and perspective taking. Ultimately, there was limited evidence in support of egocentric impulsivity.

The consequences of egocentrism

As predicted by the egocentric model, self-focus in information search was associated with lower levels of trust and reciprocity. In other words, egocentrism was associated with both inefficiency and inequality. In the case of the trustor, perspective taking was positively related to trust, but it did not lead to indiscriminate trust. The effect of perspective taking was moderated by the level of temptation, the positive relationship between trust and perspective taking was strongest when the trustee's temptation was low. The moderating effect of temptation suggests that perspective takers were better able to identify situations where the probability of reciprocity was high. A comparison of models employing relative and absolute viewing times showed that self-relevant and other-relevant searching had independent effects on trust. Those who spent less time viewing their own payoffs *and* more time viewing the other player's payoffs were more likely to trust. However, only the other-relevant viewing time was moderated by the level of temptation.

For the trustee, perspective taking was positively related to reciprocity. Trustees who spent a greater percentage of time viewing the trustor's payoffs were significantly more likely to reciprocate. Here, there was a significant main effect of perspective taking on behavior, and the payoff factors in the game did not moderate the effects of

information search. Notably, the reciprocity of perspective takers was not contingent upon the level of risk. I also estimated a model of reciprocity with absolute measures of self- and other-relevant viewing times as predictors. Participants who spent less time viewing their own payoffs and more time viewing the other person's payoffs were more likely to reciprocate.

Although these findings are promising, it is important to note that they are based on correlational data. Participants who engaged in more other-oriented information searching were more likely to trust and reciprocate, but we cannot conclude whether this effect is due to the actual process of information search or an unobserved variable that motivates both information search and behavior. Therefore, it is imperative that the next stage of this research employs an experimental manipulation of perspective taking.

Egocentric impulsivity

The sixth proposition of the egocentric model proposes that egocentric processes in dilemmas of trust are impulsive, while perspective taking is reflective. According to this framework, the overemphasis of self-relevant information is related to the conservation of mental effort. The low-effort approach to the trust game is to focus on self-relevant information. Therefore, the model predicts that reflection should be positively associated with perspective taking. In turn, focusing on other-relevant information should lead to higher levels of trust (Proposition 4) and reciprocity (Proposition 5).

I defined reflection in information search as the total time spent during decision making (log transformed). The primary finding in support of egocentric impulsivity was that reflective individuals engaged in greater perspective taking (measured as the

percentage of other-relevant search time). Furthermore, individual differences in reflection were also related to differences in decision making: Reflective individuals were more likely to trust and reciprocate, though the correlation was only significant for reciprocity, and reflective players in both roles made decisions that were more sensitive to the level of temptation. In the case of the trustee, the behavioral consequences of reflection were partially mediated by higher levels of perspective taking.

I conducted corresponding tests with survey measurements of reflection (the Cognitive Reflection Test and Brief Self-Control Scale) and perspective taking (the four subscales of the Interpersonal Reactivity Index). These tests failed to replicate any of the previous findings. The two measures of reflection were uncorrelated, and neither measure was significantly correlated with *any* measure of perspective taking. In fact, a series of correlational and regression analyses found that there were no significant associations between the survey measures and information search. These null results may be explained, in part, by limitations of the SCS and CRT, and potential order effects (recall that survey measures were always collected *after* the trust game):

The Brief Self-Control Scale. I used the SCS as a measure of self-control because there is high SCS scores are associated with greater reflection in decision making, and I was primarily interested in self-control as an aspect of cognitive reflection (Evans, Dillon, Krueger, & Goldin, 2011; Mascicampo & Baumeister, 2008). However, a recent meta-analysis of self-control studies found that self-report measures were only weakly correlated with self-control measures in other domains, such as informant reports, intertemporal choice problems, and executive control tasks (Duckworth & Kern, 2011). Given this finding, it is less surprising that I found no correlation between the survey

measures of reflection and search behavior. However, this account would not explain why there was no correlation between the survey measures of self-control and the IRI subscales.

The Cognitive Reflection Test. In the case of the CRT, there is a possibility that the participants were already familiar with the test questions. In the seven years since its publication, the CRT has received significant exposure. It has been cited over four hundred times in peer review publications, newspaper articles, and pop psychology books. At Brown University, the CRT has been referenced by courses in the areas of cognitive science, judgment and decision making, and behavioral economics. Given that there are objectively correct answers to the test, this level of exposure is problematic. In the present study, of the 64 participants in the MouseLab condition, 52.4% received perfect scores (providing reflective answers to all three questions), and there were relatively few participants who had no correct answers (8.2%). This level of performance is similar to MIT students, but it is a marked improvement over students at Princeton and Carnegie Mellon, more appropriate benchmarks for Brown undergraduates, where 26% of students at these universities answered all three questions correctly (Frederick, 2005). Given these data, there is good reason to suspect that the validity of the CRT was compromised.

Order effects. Another relevant design element of the present study is that all participants completed the inventory of measures *after* having played the trust game. There are several plausible ways that an order effect could have influenced survey responses: For example, the responses to the personality measures could have been influenced by a desire to appear consistent with past behavior, or to compensate for it.

Moreover, playing the trust game could have had incidental effects on participants' moods and self-perceptions. Reciprocating could cause a participant to feel self-satisfied; while repeatedly betraying someone might lead to feelings of guilt. Alternatively, it is also possible that participants were cognitively depleted or felt rushed to complete the experiment (so that they could receive their payments and learn the outcomes of their decisions).¹⁶

Given these limitations, there is good reason to discount the survey instruments employed in Experiment 1. Still, we should be reluctant to accept the proposition of egocentric impulsivity based upon the present findings. Again, the primary evidence for the proposition is based on correlational data; an experimental manipulation of cognitive load, time pressure, or deliberation would offer a more direct test of the relationship between reflection and perspective taking.

Concluding remarks

In the present chapter, I tested propositions 4-6 of the egocentric model (inefficiency, inequality, and impulsivity). As predicted, perspective taking during information search was positively associated with both trust and reciprocity. Individuals who spent more time viewing the other player's payoffs and less time viewing their own were more likely to trust and reciprocate. I also investigated how individual differences in cognitive reflection were associated with information search and behavior. Cognitive reflection was associated with greater perspective taking (for both trustors and trustees) and higher levels of reciprocity (but not trust). Moreover, reflection was associated with greater sensitivity to temptation (for both trustors and trustees). These findings provided limited support for the proposition of egocentric impulsivity.

¹⁶ This final explanation is unlikely, given the unusually high scores on the CRT.

Chapter 5

The experimental manipulation of perspective taking

In Experiment 1, I reported extensive tests of the six propositions of the egocentric model. The present chapter introduces a second laboratory experiment designed to build upon the previous study and address two critical findings: the inconsistent evidence for conditional perspective taking (contingency) and the effects of perspective taking on behavior (inefficiency and inequality). The first objective of Experiment 2 was to conduct further tests of egocentric contingency (the hypothesis that decision makers engage in conditional perspective taking). The second objective was to further develop the relationship between perspective taking and behavior: In Experiment 1, I found that perspective taking was associated with higher levels of trust and reciprocity – a finding which suggests that it may be possible to facilitate trust and reciprocity by encouraging greater perspective taking. To test this claim, I implemented an experimental manipulation of perspective taking in the trust game.

Egocentric contingency

In the previous chapters, I proposed and tested a process of social decision making defined by three propositions: focus, primacy, and contingency. According to this process, decision makers begin by focusing on self-relevant information. Then, if they cannot reach an adequate decision based on this information, they engage in a secondary stage of perspective taking. An important aspect of this process is that decision makers will avoid perspective taking when egocentric information is sufficient. Experiment 1 provided strong evidence for the first two aspects of the proposed process, verifying the relative importance and primacy of egocentric information. However, information search

only partially supported the hypothesis of conditional perspective taking. The most direct prediction of contingency was that the time spent viewing the other player's outcomes (an indication of perspective taking) would vary with self-relevant outcomes. In the trust game, changes in risk and temptation should affect the degree of perspective taking in trustors and trustees, respectively. Trustors would only engage in perspective taking when risk was low, trustees when temptation was low. Trustors' perspective taking significantly increased at low levels of risk, evidence of conditional perspective, but trustees' perspective taking did not follow a corresponding pattern.

One of my objectives in running a second experiment was to test the predictions of contingency using a different array of trust game payoffs. This was particularly important, given that some of the findings from Experiment 1 contradicted the results my previous research (Evans & Krueger, 2011). To the best of my knowledge, there were no previous studies testing the existence of conditional perspective taking in reciprocity decisions, but I have reported behavioral evidence of contingency in trust decisions. In the past, I found that the effect of temptation on trust was contingent on the level of risk; temptation only influenced trust when the level of risk was low. Trust and temptation were independent when risk was high. In fact, this finding was the motivation for the notion of contingency. However, this risk by temptation interaction was not replicated in Experiment 1. Neither player's behavior was sensitive to the risk by temptation interaction. Given this inconsistency, it was critical to conduct further tests.

The experimental manipulation of perspective taking

In addition to specifying a process of decision making, the egocentric model also addresses the relationship between decision processes and behavior. Propositions 4 and 5

predict that egocentric decision making results in lower levels of trust (inefficiency) and reciprocity (inequality): The model hypothesizes that the egocentric trustor will fail to identify situations where the probability of reciprocity is very high, an omission that results in needless distrust. Indeed, perspective taking in Experiment 1 was significantly associated with higher levels of trust. In addition to the positive main effect of perspective taking, trust was also sensitive to a significant perspective taking-by-temptation interaction; perspective takers did not show blind trust. Rather, their levels of trust only increased when temptation was sufficiently low. The egocentric model also predicts that perspective taking leads to greater reciprocity, a hypothesis consistent with my analyses of the trustee's behavior. In the case of the trustee, there was a significant main effect of perspective taking on reciprocity, but there were no interactions with the game's payoffs.

A notable limitation of these results is that the analyses of perspective taking and behavior were correlational. The egocentric model goes beyond the data in assuming that these associations are indicative of causal relationships. An important implication of the model is that encouraging decision makers to engage in perspective taking facilitates greater trust and reciprocity. Although the correlational data are consistent with this claim, an experimental induction of perspective taking would provide stronger evidence. It is possible that the association between perspective taking and behavior were due to unobserved variables independently affecting perspective taking, trust, and reciprocity. For example, extremely altruistic individuals would be more likely to engage in high levels of perspective taking and trust (Balliet, Parks, & Joireman, 2009). Thus, the second

objective of Experiment 2 was to test whether inducing greater perspective taking would increase trust and reciprocity.

Method

Participants

112 participants were recruited through the subject pool managed by the economics department at Brown University. Six sessions were conducted and participants completed the study in groups of 14 to 24. Each participant received \$10 for showing up and additional earnings based on his or her decisions.

Materials

The trust game. Participants were randomly assigned to the role of trustor or trustee, and completed 20 trials of the trust game. The rules and structure of the game replicated the previous experiment, with two notable differences: First, a set of new payoff conditions was generated. Second, participants in three of the six sessions completed a perspective taking manipulation before playing the trust game.

Game payoffs. I used the randomization procedure outlined in Experiment 1 (Chapter 2) to generate a set of 20 novel payoff conditions. I began with a set of four conditions, crossing two levels of risk and two levels of temptation (using only the high and low levels of temptation from the previous study). As in the previous experiment, the set of 20 unique trials was presented to participants in a randomized order, with the visual placement of the game elements counterbalanced across trials.

Perspective taking. Participants in three of the six experimental sessions were presented with a manipulation designed to induce perspective taking. This manipulation was administered as part of the trust game instructions, before participants learned their

assigned roles. Four distinct examples of the trust game were presented to participants, ostensibly to familiarize them with the MouseLab interface. With each example, participants were asked a question that required them to consider the other player's point of view (although they did not yet know their assigned roles in the game). Two of the questions asked for probability estimates of the other player's behavior. For example, trustors were asked to estimate the probability that the trustee would reciprocate. The two remaining questions asked participants to 1) explain how they would behave if they had been assigned to the other player's role and 2) to rank how important the six payoffs would be to the other player's decisions. Table 5-1 reports the exact text of these questions.

Table 5-1

The Perspective Taking Manipulation

	Trustor	Trustee
1.	On a scale from 0 to 100, what is the probability that Player 2 will choose SHARE?	On a scale from 0 to 100, what is the probability that Player 1 will choose IN?
2.	Imagine that you have assigned to the role of Player 2. Given these outcomes, would you choose SHARE or KEEP? Briefly explain your answer.	Imagine that you have assigned to the role of Player 1. Given these outcomes, would you choose IN or OUT? Briefly explain your answer.
3.	On a scale from 0 to 100, what is the probability that Player 2 will choose KEEP?	On a scale from 0 to 100, what is the probability that Player 1 will choose OUT?
4.	Imagine that you have been assigned to the role of Player 2. In this scenario there are three possible outcomes and six payoffs. Rank how important each of these values are to your decision.	Imagine that you have been assigned to the role of Player 1. In this scenario there are three possible outcomes and six payoffs. Rank how important each of these values are to your decision.

Participants in the remaining three experimental sessions completed a series of neutral control questions in lieu of the perspective taking manipulation. They were asked to identify the numeric values of potential outcomes for both players. Example question: “How many points will Player 2 receive if Player 1 chooses OUT?” These questions were identical to the training questions used in Experiment 1.

Procedure

Six experimental sessions were scheduled, three of which were randomly assigned to the perspective taking condition. As in the previous experiment, participants always began with the trust game, followed by a series of open ended questions and the self-control test. There was no Open Boxes condition in the present study. Participants were paid based on their decisions and no deception was employed.

Results

Data preparation

I identified and removed three participants who intentionally engaged in no information search (2.6%) and one participant who had also been recruited for Experiment 1. One participant experienced a technical error and was only able to complete 15 out of 20 trials in the trust game; the five missing trials were excluded, but I retained the rest of the participant’s data after verifying that there were no other abnormalities. I also identified six trials with abnormally long response times (several standard deviations above the mean). These trials were removed from the data set, leaving two participants with 18 remaining trials and two participants with 19 trials.

Egocentric contingency

The egocentric model predicts that the degree of perspective taking depends upon the evaluation of self-relevant information; when possible, decision makers avoid the task of perspective taking. Experiment 1 provided mixed data in support of egocentric contingency. As expected, response times varied with self-relevant payoffs; trustors and trustees spent less time on decision making at high levels of risk and temptation, respectively. The egocentric model assumes that these differences in response times are caused by the neglect of perspective taking.

As predictors, trustors spent less time perspective taking when risk was high, but no corresponding effect was found in trustees. The level of temptation did not influence trustees' perspective taking. The first objective of Experiment 2 was to replicate these analyses using a new set of trust game payoffs. To test contingency, I focused exclusively on the data generated in the control condition (30 trustors and 26 trustees). Mirroring the analyses presented in Chapter 3, I searched for evidence of contingency using behavior, total response times, and information search data.

Behavior. Egocentric contingency predicts that trust and reciprocity are sensitive to a risk by temptation interaction. The effect of temptation on trust should depend on the level of risk, and the effect of risk on reciprocity should depend on the level of temptation. To test these hypotheses, I used the same multilevel modeling procedure outlined in Experiment 1 (estimating random intercept models for trustors and trustees). The risk by temptation interactions were not significant for trustors ($b = .45, p = .25$) or trustees ($b = .09, p = .84$). There was no significant behavioral evidence of contingency.

Response times. Egocentric contingency predicts that responses should take less time when self-relevant payoffs are unfavorable. Trustors should respond more quickly

when risk is high, and trustees should respond more quickly when temptation is high. The results of Experiment 1 supported these hypotheses, but the effects were only partially replicated in the present study: On average, trustors took significantly more time making decisions in low risk trials ($M = 15.7s$, $SE = .62$) compared to high risk trials ($M = 14.49s$, $SE = .49$): $t(29) = 2.0$, $p = .05$. Trustees showed a trend in the same direction, but responding did not take significantly longer in low temptation trials ($M = 11.9s$, $SE = 1.10$) compared to high temptation trials ($M = 11.05s$, $SE = .83$): $t(25) = 1.03$, $p = .30$.

Information search data. Data generated by MouseLab made it possible for me to directly test the predictions of egocentric contingency. Recall that the model anticipates that perspective taking will increase when self-relevant payoffs are favorable. Specifically, trustors (trustees) should spend more time viewing temptation (risk) when risk (temptation) is low. To test this prediction, I compared participants' payoff viewing times across levels of risk and temptation.¹⁷ I also conducted similar tests using transitions, event counts, and omissions, but found no significant differences.

To test egocentric contingency in trustors, I calculated average search times for low and high risk trials (Table 5-2). The model hypothesizes that trustors spend less time viewing the other-relevant payoffs during high risk trials. I tested this prediction with a series of dependent-sample t-tests and found evidence of contingency: of the three other-relevant payoffs, trustors spent significantly less time viewing betrayal (BET2) in high risk trials. I also found that trustors spent less time viewing two of their own payoffs (QUO1 and BET1) when risk was high. Next, I conducted the corresponding analyses on trustee's behavior; contingency predicts that temptation, rather than risk, should affect

¹⁷ The aggregate analyses excluded the zero-temptation trials; they were based on data from the remaining 20 trials.

trustees' level of perspective taking. None of the trustees viewing times significantly decreased at high levels of temptation. The only apparent trend was that trustees spent marginally less time viewing the self-relevant betrayal payoff (BET2) in high temptation trials.

Table 5-2

Search Behavior by Risk and Temptation

<i>Trustors, N =</i> 30		Low risk	High risk	Comparison
Self	Status quo	1,933.63 (127.66)	1,735.45 (96.3)	$t = 2.15, p = .04^*$
	Betrayal	1,709.49 (113.18)	1,376.26 (66.8)	$t = 3.10, p = .004^{**}$
	Reciprocity	1,880.38 (103.04)	1,732.78 (116.14)	$t = 1.16, p = .254$
Other	Status quo	998.11 (94.70)	875.29 (87.32)	$t = 1.25, p = .223$
	Betrayal	1,357.48 (99.38)	1,142.1 (87.86)	$t = 2.20, p = .036^*$
	Reciprocity	1,331.81 (125.25)	1,288.86 (115.98)	$t = .41, p = .86$
<i>Trustees, N =</i> 26		Low temptation	High temptation	Comparison
Self	Status quo	562.97 (136.12)	457.93 (95.52)	$t = .79, p = .43$
	Betrayal	1,450.83 (162.76)	1,387.71 (149.69)	$t = .54, p = .58$
	Reciprocity	1,220.04 (131.71)	1,018.80 (119.82)	$t = 1.78, p = .08$
Other	Status quo	520.03 (148.10)	507.58 (126.99)	$t = .08, p = .94$
	Betrayal	886.82 (124.43)	869.47 (111.25)	$t = .18, p = .86$
	Reciprocity	907.56 (149.88)	790.77 (96.49)	$t = 1.01, p = .32$

Summary. Using a new set of experimental data, I tested for evidence of egocentric contingency in behavior, response times, and information search. Replicating the analytical approaches employed in Experiment 1, I found mixed evidence in support of contingency. As predicted, trustors in high risk games took less time to make decisions and spent less time viewing one of one of the other player's payoffs (BET2). Yet, this effect did not replicate for trustees, and none of the other analyses of information search or behavior supported contingency.

The experimental manipulation of perspective taking

The second objective of Experiment 2 was to test the efficacy of an experimental manipulation of perspective taking. Participants in the perspective taking condition answered a series of questions about the other player's point-of-view. This manipulation included probability estimates of trust and reciprocity, and an open-ended prompt about how they would act if they were assigned to the other player's role. The purpose of these questions was to increase the salience of other-relevant information; according to the framework of the egocentric model, this manipulation should attenuate participants' egocentric focus and encourage higher levels of trust and reciprocity.

Egocentric focus. The egocentric model postulates that people focus on the most salient and accessible information. This preference for salience causes decision makers to overemphasize self-relevant information. Based on this explanation, I expected the perspective taking intervention (which was designed to increase the salience of the other player's point of view) to reduce egocentrism in information search. To test this prediction, I looked at how the perspective taking manipulation affected search omissions, viewing times, and transitions. The egocentric model predicts that the

intervention should cause fewer other-relevant search omissions, greater other-relevant search times, and greater other-to-other search transitions.

In Experiment 1, I found that trustors and trustees were significantly more likely to omit viewing the other player's payoffs. To test the effect of the perspective taking intervention, I examined each participant's percentage of other-relevant omissions. Independent sample t-tests suggested that the intervention had no apparent effects on rates of omission: Trustors in the control and perspective taking conditions showed similar levels of other-relevant omissions, $t(55) = .28, p = .77$; similarly, trustees' rates of other-relevant omissions were consistent across conditions, $t(55) = .42, p = .67$. Table 5-3 (a) shows the average rates of other-relevant omissions by condition.

Table 5-3

<i>Other-relevant Omissions (a)</i>		
	Control	Perspective taking
Trustors	16.3 (3.4)	17.95 (4.5)
Trustees	36.6 (4.5)	33.67 (5.6)
<i>Other-relevant Search Times in Milliseconds (b)</i>		
	Control	Perspective taking
Trustors	3,314.8 (214.1)	3,571.6 (364.6)
Trustees	2,435.8 (277.6)	2,714.29 (446.6)
<i>Other-to-other Transitions (c)</i>		
	Control	Perspective taking
Trustors	3.04 (.41)	2.63 (.34)
Trustees	1.74 (.22)	2.53 (.70)

The second step in evaluating changes due to perspective taking was to look at the times spent viewing self- and other-relevant payoffs. In Experiment 1, I found that participants spent significantly more time viewing self-relevant payoffs, about 60%, on average. Here, I expected that the perspective taking intervention would increase the time spent viewing other-relevant payoffs. The intervention had no significant effect on information search times. Nudging participants to consider the other player's point of view did not increase other-relevant information search, t 's < 1. Table 5-3 (b) reports the average levels of other-relevant search times by condition.

My final test of changes in egocentric focus looked at search transitions. Recall that MouseLab generated a sequential log of search events, making it possible to examine transitions between payoffs viewings. If a participant frequently transitioned between the same two boxes, we may infer that she was comparing the two values. In Experiment 1, I

found that transitions were primarily egocentric, participants infrequently transitioned between two of the other player's payoffs. Self-to-self transitions were significantly more common than other-to-other transitions. In the present experiment, I tested whether the perspective taking manipulation increased the frequency of other-relevant transitions. See Table 5-3 (c) for descriptive statistics of transition behavior. As with the previous tests, the intervention had no significant effects on either player's search transitions, t 's < 1 .

The egocentric model assumes that making other-relevant information more accessible should reduce egocentrism during information search. Thus, I expected that the perspective taking manipulation would decrease the number of other-relevant omissions, and increase other-relevant viewing times and other-relevant transitions. Contrary to my expectations, the intervention had no significant effects on information search.

Egocentric primacy. The second proposition of the egocentric model is that decision making occurs in two stages, self-relevant information is evaluated before perspective taking occurs. The theoretical motivation for this claim is that decision makers are immediately attracted to self-relevant information. If this attraction is due to the relative salience of egocentric information, then interventions to increase perspective taking should reduce the temporal preference for egocentric information. I tested this prediction by examining two temporal aspects of information search, rank (the order in which payoffs were first accessed) and the first search events (the payoffs that were accessed at the beginning of each trial).

My first set of analyses tested the effects of the perspective taking manipulation on the order in which participants first searched for different payoffs (rank). Recall that a

low rank indicates that a payoff was accessed early in the search sequence. For example, the second payoff viewed during a trial has rank two. As in Chapter 3, I calculated the average rank of the six payoffs. Before examining the effects of the manipulation, I tested for a replication of egocentric primacy: In Experiment 1, there was significant evidence of egocentric primacy in trustors' rank data, but the evidence of primacy in trustees was only marginally significant. Trustors in Experiment 2 viewed self payoffs ($M = 4.05$, $SE = .14$) before searching for other payoffs ($M = 5.2$, $SE = .15$), $t(56) = 5.0$, $p < .001$. Trustees also had a primary interest in self-relevant payoffs ($M_{self} = 4.0$ $SE_{self} = .15$ versus $M_{other} = 4.4$ $SE_{other} = .17$): $t(46) = 2.0$, $p = .05$. Rank data from both players provided significant evidence of egocentric primacy.

Next, I tested the between subjects effects of the perspective taking manipulation on rank. I expected that the manipulation would decrease the ranks of other-relevant payoffs. Failing to support my hypothesis, the perspective taking manipulation did not significantly change either player's rank values, t 's < 1 . Table 5-4 reports the average rank values of each payoff value by role and condition; there were no apparent differences in search behavior caused by the perspective taking manipulation.

I also examined whether perspective taking influenced the payoffs that were accessed at the beginning of each trial. Here, I calculated the probability that each participant would begin a trial by searching for an other-relevant payoff. Again, the intervention had no effect on the initial search preferences of trustors: $t(55) = .35$, $p = .35$. In contrast, trustees who received perspective taking instructions were marginally more likely than control participants to begin trials by searching for an other-relevant payoff, $t(50) = -1.24$, $p = .10$.

Table 5-4

Search Rank by Role and Condition

		Trustors		Trustees	
		Control	Perspective taking	Control	Perspective taking
Self	Status quo	4.24 (.33)	4.11 (.35)	4.74 (.39)	5.34 (.50)
	Betrayal	3.62 (.20)	4.13 (.24)	3.04 (.22)	3.39 (.38)
	Reciprocity	3.96 (.21)	4.28 (.21)	3.55 (.21)	3.94 (.34)
Other	Status quo	5.46 (.29)	5.11 (.36)	5.45 (.54)	5.11 (.49)
	Betrayal	5.29 (.27)	5.09 (.31)	3.38 (.15)	3.50 (.49)
	Reciprocity	5.16 (.19)	5.09 (.24)	4.21 (.21)	4.08 (.26)

Egocentric inefficiency. The egocentric model predicts that the preference for self-relevant information leads to lower levels of trust, a socially inefficient outcome; in turn, encouraging perspective taking should facilitate trust. Two correlational findings from Experiment 1 supported this claim: I found that higher levels of perspective taking were associated with greater trust, and that the positive effects of perspective taking were moderated by temptation. Perspective taking was associated with greater trust when temptation was low, presumably because perspective takers were more sensitive to the probability of reciprocity. Based on these findings, I anticipated that the perspective taking manipulation would increase overall trust and sensitivity to temptation, resulting in a main effect of perspective taking and a perspective taking-by-temptation interaction.

I tested the effects of the perspective taking manipulation on trust with multilevel logistic models, using the same model testing strategy I employed to test inefficiency in Experiment 1 (Chapter 4). My approach was to compare two models: a baseline model consisting of a random intercept estimated for each participant and fixed effects terms to estimate the effects of risk and temptation on trust; this baseline was compared against a

full model that included a main effect for perspective taking and three perspective taking-by-payoff interaction terms. The critical difference between Experiments 1 and 2 was that the latter used an experimental, rather than correlational, measure of perspective taking. Table 5-5 reports the estimations of both models. Model comparison revealed that the perspective taking manipulation had no significant effects on trust. There was no significant main effect of perspective taking, nor were there significant perspective taking-by-payoff interactions terms. Overall, adding the perspective taking terms did not improve the model fit over the baseline.

Egocentric inequality. I tested the effects of the perspective taking manipulation on reciprocity. The egocentric model suggests that perspective taking should lead to higher levels of reciprocity. Confirming this hypothesis with correlational results, I found in Experiment 1 that perspective taking had a positive main effect on perspective taking. The effect of perspective taking on reciprocity was not moderated by the game payoffs, marking an important difference between trustors and trustees.

As in the previous experiment, I compared two multilevel models of reciprocity: a baseline, payoffs only model and a full model with terms to estimate the effects of perspective taking (a main effect and three interaction terms). Table 5-5 shows the estimations of these models. In the present experiment, the perspective taking manipulation had no evident effects on reciprocity. There was no main effect of perspective taking, and there were no significant perspective taking-by-payoff interactions.

Table 5-5

The Perspective Taking Manipulation, Trust, and Reciprocity

	Trust		Reciprocity	
	Payoffs Only	Perspective	Payoffs Only	Perspective
Participants	57	57	51	51
Observations	1133	1133	1017	1017
Risk	-1.15 (.20)**	-1.22 (.28)**	.21 (.22)	.18 (.29)
Temptation	-.73 (.19)**	-.81 (.27)**	-1.48 (.27)**	-1.39 (.34)**
Risk x Temptation	.15 (.29)	.49 (.41)	-.04 (.37)	.09 (.47)
Perspective		.31 (.48)		-.62 (.63)
Perspective x Risk		.16 (.41)		.08 (.46)
Perspective x Temptation		.17 (.40)		-.22 (.57)
Perspective x Risk x Temptation		-.73 (.59)		-.38 (.78)
σ^2 (random intercept variance)	2.21 (1.49)**	2.21 (1.49)**	3.44 (1.86)**	3.43 (1.85)**
Log likelihood	--597	-595.7	-425.5	-424.1

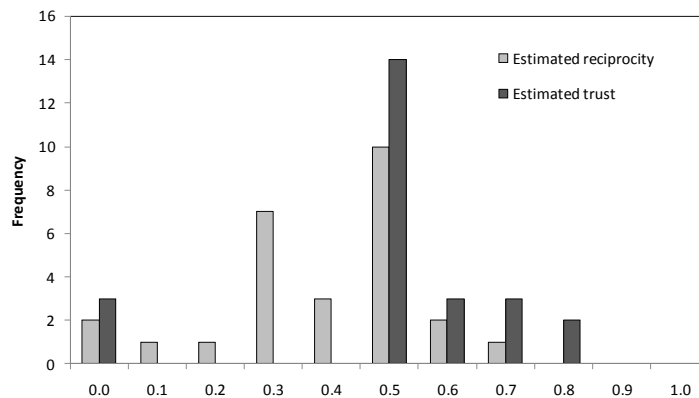
The heterogeneous effects of perspective taking

In the previous section, I found that the experimental manipulation of perspective taking was apparently ineffective in changing information search and behavior. After reviewing these results, I inspected the raw data generated by the sequence of perspective taking questions. The manipulation asked participants several questions, including two probability estimates of the other person's point of view and an open ended prompt about how they would behave in the other person's role (See Table 5-1 for the full

manipulation). In my review, I found that there was considerable variability in how participants responded to these questions. Some participants were extremely optimistic about others' intentions, expecting high levels of trust and reciprocity. Others, however, were deeply cynical about the motives of other participants. Specifically, there was nontrivial variance in the estimated probabilities of trust ($M = .47$, $SD = .17$) and reciprocity ($M = .47$, $SD = .19$).¹⁸ The distributions of response are reported in Figure 5-1. For trustors, the most common probability estimates of reciprocity were .5 (8 out of 27 trustors) and .25 (4 out of 27). The trustee's modal response (10 out of 25 trustees) was a .5 probability of trust. Notably, several participants provided pessimistic responses, estimating little or no trust / reciprocity from other players.

Figure 5-1

Histogram of Probability Estimates



This variance was unexpected. The egocentric model anticipates that the induction of perspective taking would have a consistent, mean-level effect on decision making. According to the model, an experimental manipulation of perspective taking should increase other-relevant information search, resulting in higher levels of trust and

¹⁸ Each participant provided estimates of the probability of trust / reciprocity for two separate trials. These estimates were averaged in the following analyses.

reciprocity. However, it is plausible to expect that the effects of perspective taking *depend on the conclusions drawn by the perspective taker*. For example, a trustor who estimates a low rate of reciprocity becomes less likely to trust others (Kugler, Connolley, & Kausel, 2009). If a trustor is generally cynical about others' motives, then encouraging perspective taking may induce reactive egoism (Epley, Caruso, & Bazerman, 2006): a state of heightened self-interest that could result in amplified egocentrism and lower levels of trust. Conversely, the induction of perspective taking will reduce egocentrism and encourage trust (as the model predicts) when the perspective taker is optimistic about her partner. There is also a corresponding hypothesis for how the conclusions drawn from perspective taking influence reciprocity. Trustees show greater reciprocity when they feel they have been trusted fully (Pillutla, Malhotra, & Murnighan, 2003); therefore, a trustee who anticipates low levels of trust is unlikely to show much reciprocity, whereas the trustees who anticipate higher levels of trust should express greater concern for the trustor's well-being, resulting in decreased egocentrism and higher levels of reciprocity.

In the following section, I investigated the hypothesis that the perspective taking manipulation had heterogeneous effects on information search and behavior. Rather than having a main effect on behavior, encouraging perspective taking may have had oppositional effects on optimists and pessimists (those who estimated high and low levels of trust / reciprocity, respectively). My original predictions about the induction of perspective taking, that it would lead to greater other-relevant searching and higher levels of trust and reciprocity, may apply only to optimists. Encouraging perspective taking in pessimists may lead to reactive egoism, resulting in decreased concern for the other

player's welfare, and lower levels of trust and reciprocity. This hypothesis would account for the null results reports in the previous section.

Perspective taking and variance. My first step in testing this explanation of the previous null results was to compare the variances of the control and perspective taking conditions. If the intervention had divergent effects on participants, simultaneously amplifying and attenuating egocentrism, then there should be greater between subjects variability in the perspective taking condition. As a preliminary test, I used Levene's test of equal variances to compare variability across three measures of information search: rates of omission, search times, and transitions. Table 5-6 reports the standard errors of these measures across the control and perspective taking conditions.

The overall effect of the perspective taking manipulation was to increase variability in information search: First, note that of the twelve reported comparisons, the standard error in the perspective taking condition was greater in every instance. In five of the twelve cases, the differences in variances were statistically significant. Specifically, the perspective taking manipulation increased variability in trustors' omissions and search times, in addition to the trustees' search transitions. Although the manipulation did not affect the average levels of information search, it increased the extremity of responses.

Table 5-6

Variability in Search Behavior

		Omissions (Percentages)		Search time (Milliseconds)		Transitions (Counts)	
		Self	Other	Self	Other	Self	Other
Trustor	Control	1.46	3.44	237.90	214.11	.40	.30
	Perspective	2.85	4.54	374.20	364.62	.41	.34
	Levene's test	6.5*	1.4	4.7*	5.3*	.35	.007
Trustee	Control	2.65	4.50	266.23	277.66	.20	.22
	Perspective	3.59	5.60	286.70	446.63	.43	.70
	Levene's test	2.4	.003	2.56	.52	7.4**	8.0**

Encouraged by these preliminary findings, I employed a multilevel approach to compare variances across the experimental and control conditions. In a multilevel dataset, variance exists at two levels, within and between subjects.¹⁹ Here, within subject variance represents the extent to which participants varied their responses across trials, and between subjects variance is the measure of how much participants differed from one another. The Intra Class Correlation (ICC) is the percentage of the total variance accounted for by between subjects differences. Here, the ICC allowed me to measure how the perspective taking manipulation affected participants' variability. If the induction of perspective taking has divergent effects, then the experimental intervention should result in larger ICCs (because there is greater variability between participants).

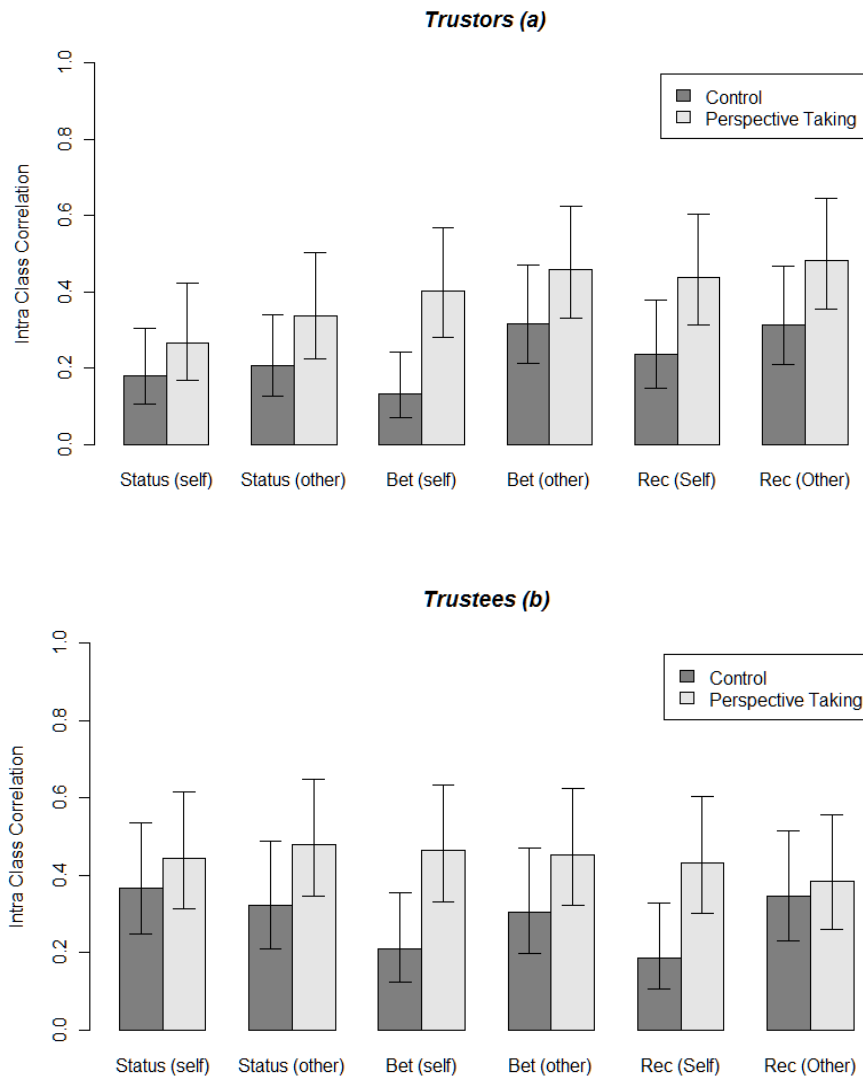
I examined the ICCs of the times participants spent viewing each of the six payoffs (log transformed). Comparing the ICCs of the control and intervention conditions showed that the manipulation resulted in greater variability between subjects (Figure 5-2

¹⁹ The previous analyses ignored within-subject variance by aggregating within-subject responses.

reports ICCs with 95% confidence intervals). In every case, there was a larger percentage of between subject variance in the perspective taking condition (compared to the control condition). For trustors, the differences in variances were significant for three of the six viewing times (BET1, REC1, and REC2). With trustees, between subjects variability significantly increased for two of the six trustee's viewing times (BET2 and REC2). Interestingly, the perspective taking manipulation affected how participants searched for both self- and other-relevant payoffs. Overall, these results were strong evidence that the experimental manipulation created greater between subjects variability.

Figure 5-2

Intra Class Correlations by Condition



Error bars denote 95% confidence intervals

Optimists and pessimists. Having established that the intervention increased between subjects variability, my next step was to identify relevant subgroups within the perspective taking condition. Hence, I used the responses to the perspective taking questions to classify participants as either optimists or pessimists. To create these groups, I partitioned subjects based on their probability estimates of trust and reciprocity. Using a

median split, trustors who estimated that the probability of reciprocity was .4 or greater were classified as optimists (14 out of 27). Classifying trustees proved to be problematic: a median split of trustees estimates' created unbalanced groups (18 optimists and 7 pessimists), as 10 out of 25 participants reported the median response, a .5 probability estimate of trust.²⁰ To address this imbalance, I excluded the trustees who provided median responses, leaving 8 optimists and 7 pessimists. Table 5-7 reports illustrative examples of how so-called optimists and pessimists responded to the perspective taking manipulation's open-ended prompt.

Table 5-7

Sample Responses to the Perspective Taking Manipulation

Prompt		Optimistic	Pessimistic
Trustor	Imagine that you have assigned to the role of Player 2. Given these outcomes, would you choose SHARE or KEEP?	<i>"Share, since if both participants choose share over many rounds, trust will be built and Player 1 will be more likely to choose IN, which will maximize the profit for both participants."</i>	<i>"Keep, so my points value will increase"</i>
Trustee	Imagine that you have assigned to the role of Player 1. Given these outcomes, would you choose IN or OUT? Briefly explain your answer.	<i>"In this case, if I were player 1 I would likely choose in, hoping that player I would choose to share so the distribution would be equitable."</i>	<i>"Out. The chances of getting a higher value for in are very low."</i>

Having classified participants as optimists or pessimists, my next objective was to test whether the perspective taking manipulation had divergent effects on the two groups. My exploratory hypothesis was that optimists (those who anticipated higher rates of trust

²⁰ Objectively, an estimate of .5 was optimistic, given the relatively low probabilities of trust in both of my experiments (around .3).

and reciprocity) would respond to the perspective taking manipulation in a manner consistent with the egocentric model: optimistic perspective takers would give greater consideration to the other player's point of view, and, as a result, would show higher levels of trust and reciprocity (relative to the control condition). Pessimists, on the other hand, would respond to perspective taking with reactive egoism: the combination of perspective taking and pessimisms would lead to less interest in the other player, and lower levels of trust and reciprocity.

Information search. I conducted analyses of egocentrism in information search to investigate the potential differences between optimists and pessimists. I predicted that perspective taking would reduce egocentrism in optimists (as the model predicts), but *increase* it in pessimists. I tested this hypothesis with measures of other-relevant omissions, log-transformed search times, and transitions. For my analyses, I estimated linear regressions of aggregate behavior with a linear contrast to compare participants from the control condition with the two groups of perspective takers, using the following coding scheme: pessimists = -1; control condition = 0; optimists = 1. This contrast represents the prediction that the perspective taking intervention had opposing effects on optimists and pessimists, causing the subgroups to diverge from participants in the control condition.

The first measures of focus I examined were the percentages of other-relevant search omissions. I predicted that optimists would exhibit lower percentages of other-relevant omissions, while pessimists would show a reversal of this effect. Figure 5-3 (a) shows the rates of other-relevant omissions for optimists, pessimists, and control condition participants. In trustors, there was a significant difference in other-relevant

omissions, indicating that optimists / pessimists were significantly less / more likely to ignore the trustee's payoffs ($\beta = -.30, p = .02$).²¹ However, there was no comparable trend in trustees, $\beta = .004, p = .97$.

The second measures of focus were the times spent viewing self- and other-relevant information (log transformed). Here, it was predicted that optimists would spend more time viewing other-relevant payoffs than the control participants, while pessimists would spend less time. As with the other-relevant omissions, perspective taking trustors showed evidence of significant divergence from the control group: $\beta = .27, p = .04$ (See Figure 5-3, panel b). For trustees, the intervention had no apparent effects on search times (p 's > .4).

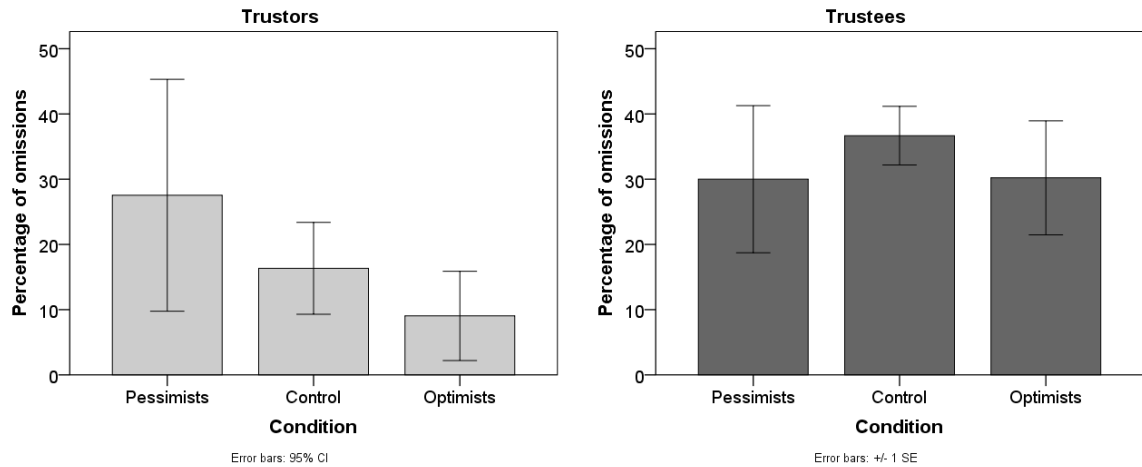
My final test of focus looked at the perspective taking intervention's effects on other-to-other search transitions. As in the previous examples, perspective taking had the predicted effect on trustors. Optimistic and pessimistic trustors showed greater divergence in other-to-other omissions from the control group, $\beta = .28, p = .03$. I found that the intervention had unexpected effects on trustees: Pessimistic (optimistic) trustees showed marginally higher (lower) levels of other-to-other ($\beta = -.29, p = .06$) transitions. Figure 5-3 (c) suggests that the trend in trustees' transitions were primarily driven by pessimists, who showed high levels of other-relevant transitions.

²¹ All of the regression analyses in the following section are based on robust standard errors.

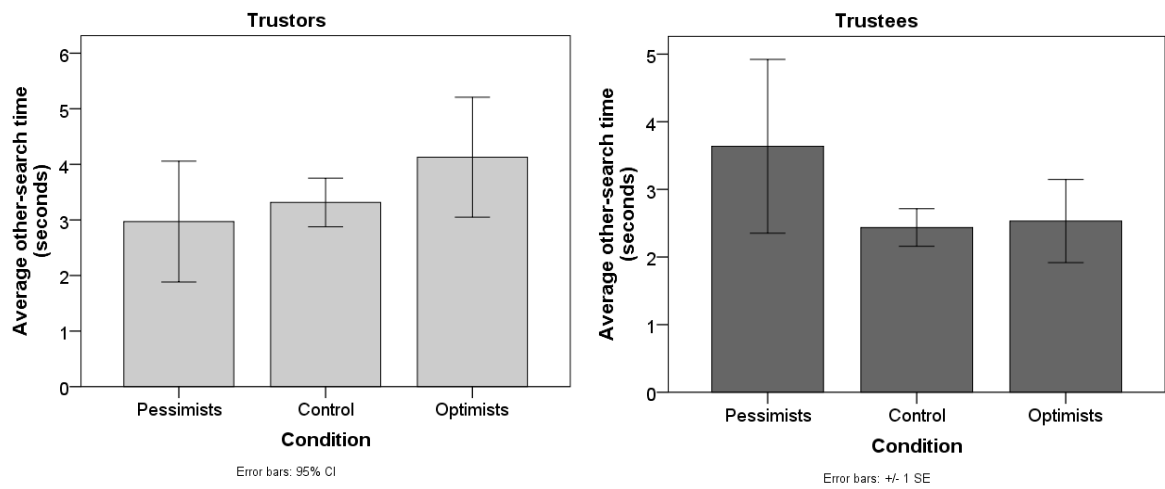
Figure 5-3

The Divergent Effects of Perspective Taking

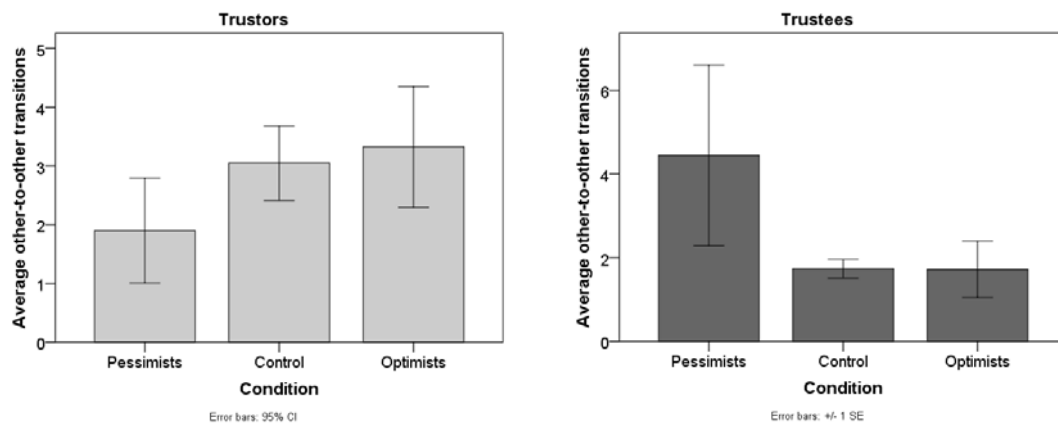
Other-relevant omissions (a)



Other-relevant search times (b)



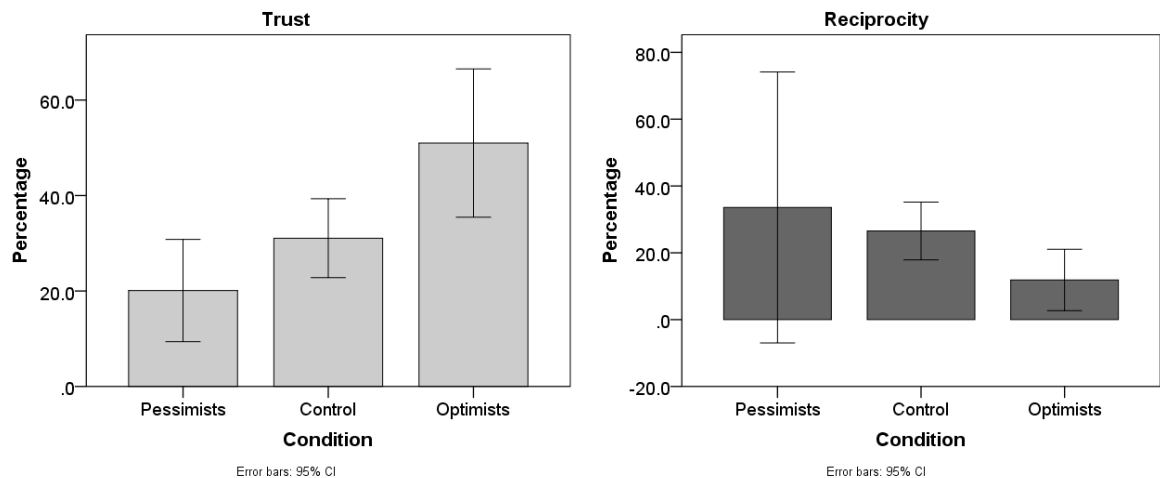
Other-to-other transitions (c)



Trust and reciprocity. After investigating differences in information search, I was interested in whether optimists and pessimists exhibited differing levels of trust and reciprocity. Figure 5-4 reports the rates of trust and reciprocity for optimists and pessimists. I hypothesized that optimists would be more likely to trust and reciprocate, with pessimists showing a reversal of this effect. Rates of trust followed the predicted pattern ($\beta = .47, p = .001$), but trustees exhibited a marginally significant trend in the *opposite* direction, with optimists showing relatively less reciprocity and pessimists showing more, ($\beta = -.26, p = .07$). Given this surprising finding, I examined the data of pessimistic trustees more closely. The apparently high rate of reciprocity among pessimists (.34) was driven by two pessimists who *always* reciprocated. The average rate of reciprocity among the remaining five pessimists was extremely low (.09).

Figure 5-4

Trust and Reciprocity



Summary. The experimental manipulation of perspective had no significant mean-level effects on information search, trust, or reciprocity. However, the manipulation unexpectedly caused participants to respond with greater variability. There was

significantly greater between subjects variance in the perspective taking condition. This suggests that the effects of perspective taking may depend, in part, upon the conclusions drawn by the perspective taker. I tested the hypothesis that inducing perspective taking had divergent effects on optimists and pessimists. Exploratory analyses suggested that perspective taking had heterogeneous effects on trustors: Optimistic perspective takers showed greater interest in the other player and higher levels of trust, while pessimists responded with reactive egoism (less interest in the other player and decreased trust). However, the manipulation's effects on trustees remain ambiguous.

Discussion

In the present chapter, I reported a second laboratory study of trust and reciprocity, testing the effects of an experimental manipulation of perspective taking. The primary objectives of Experiment 2 were to investigate conditional perspective taking and to further examine the relationship between perspective taking and behavior. Conditional perspective taking was evident in trustors' information search data, but not in their behavior. As in Experiment 1, there was no evidence of egocentric contingency in trustees' behavior or information search. The experimental manipulation of perspective taking had no mean-level effects on information search and behavior, failing to reduce egocentrism or increase trust and reciprocity. Unexpectedly, the perspective taking manipulation caused participants to respond to the trust game with greater variability, suggesting that there were heterogeneous effects of perspective taking.

Egocentric contingency

Egocentric contingency proposes that perspective taking is conditional; when possible, decision makers rely exclusively on egocentric information. In two laboratory

experiments, behavioral data provided no significant evidence for this proposition. The behavioral prediction of contingency is a significant risk-by-temptation interaction; the trustor / trustee only considers temptation / risk when risk / temptation is low. Neither player's behavior was consistent with the predicted interaction. Yet, contingency was evident in trustors' information search data. The model predicts that self-relevant payoffs affect the time spent viewing the other player's outcomes. Indeed, trustors spent significantly more time viewing one of the other player's payoffs (BET2) in low risk trials. However, the corresponding test was not significant for trustees.

To the best of my knowledge, no previous experiment has tested contingency (or a similar hypothesis) in the context of reciprocity. However, the presents results fail to replicate findings from some of my previous work on trust (Evans & Krueger, 2011). Specifically, I found evidence of a behavioral risk-by-temptation interaction, reporting that trust and temptation were only correlated under low risk conditions. Several nontrivial experimental differences may have contributed to the discrepancy between the present experiments and my previous results:

Statistical power. It is important to note that the present experiments may have lacked sufficient statistical power to reliably produce the interaction. When estimating logistic multilevel models, Moineddin, Matheson, & Glazier (2007) recommended samples of fifty or more clusters, with fifty or more observations per cluster. In Experiment 1, I used over fifty clusters (of both trustors and trustees), but each cluster consisted of only 24 observation. By comparison, the study where I originally reported evidence of conditional perspective taking was based on the data of over 180 participants.

MouseLab. In Chapter 2, I found that the MouseLab interface had some unexpected effects on decision making. Trustors using MouseLab were more sensitive to the other player's payoffs (temptation) than the control participants who played the trust game under normal conditions. Given that MouseLab had some effect on perspective taking, it is plausible that it changed the contingent nature of perspective taking. However, if this were the case, then one would expect behavioral evidence of egocentric contingency in the Open Boxes condition of Experiment 1. The models of trust and reciprocity reported in Chapters 2 and 3 do not support this prediction.

Incentives. The data reported in my previous work were based on hypothetical decisions, whereas participants in the present experiments were paid for their decisions. Each decision in the present experiment was worth \$.50-1.50; incentives may have motivated participants to exert greater effort and greater perspective taking. Epley and colleagues (2004) reported similar evidence of financial incentives reducing egocentrism in anchoring-and-adjustment.

Training and experience. Before playing the trust game, participants were engaged in a rigorous period of instruction, including several practice rounds and a multiple choice quiz. The purpose of this training was to familiarize participants with the MouseLab interface, hopefully reducing random noise in information search. An unintended consequence of this training is that it may have improved participants' strategic understanding of the game, making them more aware of the other player's point of view. Not only did participants undergo a significant training period, the experiments themselves consisted of 20 or more trials. Both laboratory experiments were more than double the length of the studies reported in my previous publication. By the end of the

experiment, it is likely that subjects developed a relatively sophisticated understanding of the game.

It is likely that one or more of these factors influenced decision making, potentially eliminating contingent perspective taking. Note that I have previously replicated the risk-by-temptation interaction in an unreported pilot study conducted in the fall of 2011. Trustors and trustees ($N = 63$) recruited online showed behavioral evidence of contingency: the effect of temptation on trust depended on risk, and the effect of risk on reciprocity depended on temptation. Still, the present findings suggest that the behavioral effect of contingency, if it exists, is not particularly robust.

The experimental manipulation of perspective taking

The egocentric model predicts that inducing greater perspective taking should lead to higher levels of trust and reciprocity. This finding was supported by correlational data in Experiment 1 (Chapter 4) and is consistent with recent research showing the benefits of perspective taking in negotiations (e.g., Trötschel et al., 2011). In Experiment 2, I tested the effects of perspective taking on trust and reciprocity using an experimental intervention. I induced perspective taking by asking participants a series of questions, including two probability estimates and an open-ended response that required them to consider the other player's point-of-view. Surprisingly, this manipulation had no apparent effects on participants in either role. My attempt to induce perspective taking did not seem to influence information search or behavior.

The induction of perspective taking had no effects on the mean-level responses of trustors and trustees, but the manipulation unexpectedly increased the variance of responses. Compared to control participants, trustors and trustees in the perspective

taking condition showed significantly more variability in their search omissions, search times, and transitions. A possible explanation for this increase in variance is that the manipulation had divergent effects on participants, *simultaneously attenuating and amplifying egocentrism*. Specifically, I hypothesized that individual reactions to the induction of perspective taking would depend upon the conclusions drawn by the perspective takers. Optimists, the participants who anticipated higher levels of trust and reciprocity from others, would be positively affected by a perspective taking manipulation, showing greater interest in the other player's outcomes, as well as higher levels of trust and reciprocity. Pessimists, the individuals with low estimates of others' trust and reciprocity, would respond to induced perspective taking with reactive egoism, a state of heightened egocentrism that leads to decreased trust and reciprocity.

To test this hypothesis, I classified participants as optimists or pessimists using their probability estimates taken as part of the manipulation. Trustors were partitioned into two groups using a median split of the estimated probability of reciprocity (those with high estimates of reciprocity, .4 or greater, were identified as optimists). The use of a median split proved to be problematic with trustees, of whom a large number (10 out of 25) provided the median response, a .5 probability of trust. Rather than compare unequal groups, I excluded the trustees who provided median responses, leaving eight optimists and seven pessimists.

Next, I tested the hypothesis that the perspective taking manipulation had opposing effects on optimists and pessimists. Evidence in the analyses of trustors unambiguously supported this prediction: optimistic trustors responded to the perspective taking manipulation in a manner consistent with the egocentric model's original

predictions, showing greater interest in the other player's outcomes and higher levels of trust. In comparison, pessimistic trustors responded to perspective taking with reactive egoism, showing less interest in the other player's outcomes and lower levels of trust. These results suggest that perspective taking is not a panacea. Depending on the perspective taker, it could do more harm than good. The pattern of diverging effects was not found among trustees. Optimists did not appear to differ from control participants and pessimists did not show evidence of reactive egoism. Instead, pessimistic trustees responded with *greater* interest in the trustor (though not at statistically significant levels) and marginally higher levels of reciprocity.

It is important to note that these analyses were conducted post hoc and were subject to some notable limitations. First, the task of classifying trustees as optimists and pessimists proved to be problematic. A large number of the trustees' probability estimates were clustered around the median, making it difficult to split the sample into two groups of equal size. My solution was to exclude the participants with median responses, but this approach led to a large loss of data. Moreover, responses in the resulting subgroup of pessimistic trustees were extremely inconsistent. Of the seven pessimistic trustees, five exhibited behavior consistent with reactive egoism (little or no reciprocity, little interest in the trustor's payoffs), while the other two were extremely trustworthy and interested in the trustor's outcomes.²² Given the small sample size and inconsistency within the subgroups, the analyses comparing optimistic and pessimistic trustees should be heavily discounted.

Second, although I have made the claim that the perspective taking manipulation caused divergence in trustors' responses, the nature of the data did not allow me to

²² The subgroup was too small ($n = 7$) to reliably state whether these individuals were outliers.

distinguish between the effects of the experimental manipulation and preexisting individual differences. My analyses compared optimists and pessimists with the entire sample of control participants (because I lacked the data to classify control participants into equivalent subgroups). The preferred test would be to compare optimists (or pessimists) with similarly optimistic participants who weren't exposed to the perspective taking manipulation. Finally, although the purpose of the second experiment was to test an experimental induction of perspective taking, the tests of perspective taking's divergent effects on optimists and pessimists were correlational.

Chapter 6

General discussion: The egocentric model reconsidered

In the previous chapters, I developed and tested an egocentric process model of social decision making. The central tenet of this model was that decision makers prioritize self-relevant information and underutilize perspective taking. Two laboratory experiments tested the model's predictions using information search data and behavior in dilemmas of trust. Table 6-1 summarizes the propositions of the egocentric model and the corresponding results. There were three overarching goals in the present report: to evaluate the egocentric model as a description of decision processes; to test the predicted relationships between decision processes and behavior; and to identify how individual differences in impulsivity and reflection shape decision processes and behavior. The following section reviews the progress made towards these goals.

Table 6-1

The Egocentric Model Reconsidered

Proposition	Hypothesis	Results
Focus	The majority of time is spent evaluating self-relevant information	Strong support: participants spent 60% of time attending to self-relevant information
Primacy	Self-relevant information is evaluated before perspective taking occurs	Moderate support: evident in trustors, mixed evidence for trustees
Contingency	The degree of perspective taking depends upon the evaluation of self-relevant information	Mixed results: trustors showed conditional perspective taking, but trustees did not
Inefficiency	Egocentrism is negatively associated with trust	Supported by correlational analyses, but experimentally inducing perspective taking
Inequality	Egocentrism is negatively associated with reciprocity	experimentally did not increase trust or reciprocity
Impulsivity	Egocentrism occurs due to a lack of cognitive reflection	Limited support: behavioral measures of reflection and perspective taking were correlated

Process (focus, primacy, and contingency)

In developing the egocentric model, my first objective was to describe the process of social decision making in dilemmas of trust. The model outlined a two-stage process where decision makers begin by focusing on self-relevant information, then engage in a second stage of perspective taking. The egocentric model predicted that the use of perspective taking in this process was conditional. When possible, decision makers would rely exclusively on self-relevant information. Information search data partially supported the model's predictions, but participants diverged from the proposed process in several important ways:

Focus. As predicted, participants spent the majority of their time attending to self-relevant information. There were nontrivial individual differences in how participants allocated their attention, but nearly all participants spent more time (60%, on average) evaluating self-relevant information. The model predicted that people would prioritize self-relevant information, but there were no predictions about the relative importance of specific outcomes in the trust game (status quo, betrayal, and reciprocity). In fact, there were patterns in information search beyond the distinction of self- and other-relevant information.

The most pressing concern for the trustor was the evaluation of the three self-relevant payoffs. The trustor's second most important objective was to evaluate the other player's potential payoffs for betrayal and reciprocity. The trustor had two good reasons for viewing these payoffs: to consider the trustee's well-being and to estimate the probability of reciprocity. The trustor's least important consideration was the trustee's status quo payoff, a value with no strategic significance. The only reason for the trustor to

view the trustee's status quo payoff was concern for the trustee's well-being. The relative unimportance of the trustee's status quo payoff suggests that the trustor was more interested in predicting the trustee's response to trust than ensuring the trustee's well-being.

Information search data suggests that trustors had a hierarchy of three goals: 1) evaluate potential outcomes for the self; 2) predict the behavior of the other player; and 3) consider how decisions will affect the other player. Of course, with information search data it is difficult to cleanly distinguish between the second and third goals. The relative insignificance of the trustee's well-being is not completely surprising, given that the participants in my experiments were near-strangers. One would hope that a trustor interacting with a friend or colleague would spend more time thinking about her counterpart's well-being.

The trustee, like the trustor, was primarily interested in evaluating self-relevant information. However, compared to the trustor, there were greater between outcomes differences. Note that the trustee only gave significant attention to two of the three self-relevant outcomes, the payoffs for betrayal and reciprocity. The trustee's second most important consideration was how betrayal and reciprocity would affect the trustor. The least important factor in the trustee's search process was the status quo.

Primacy. The second proposition of the egocentric model is that decision makers evaluate self-relevant information before they engage in perspective taking. I used three approaches to measure the temporal aspects of information search: the order in which payoffs were first accessed; the first search event of each trial; and changes in the probabilities of search events over time. The first test of primacy compared the average

ranks of self- and other-relevant payoffs. As expected, the ranks of self-relevant payoffs were consistently lower than those of other-relevant payoffs. Perspective taking tended to occur after the evaluation of self-relevant information. This finding was present for trustors and trustees across both experiments.

The second measure of primacy, the first search event of each trial, showed that there were unanticipated differences between trustors and trustees. As primacy predicted, Trustors tended to search for self-relevant payoffs at the start of each trial. Unexpectedly, trustors also showed a strong initial attraction to the status quo, especially the self-relevant outcome, QUO1. Trustors began over 50% of trials by searching for one of the status quo payoffs. Note that as with the first proposition, the egocentric model was indifferent towards the three outcomes; only the distinction between self- and other-relevant information was relevant.

To conduct a more nuanced analysis of the temporal process, I analyzed the probabilities of different search events over time. Multilevel growth curve analyses suggested that trustors followed a three stage sequence: 1) evaluate the status quo; 2) evaluate the self-relevant outcomes of trust; and 3) evaluate the other-relevant outcomes of trust. With the exception of the trustor's initial interest in the status quo, temporal analyses of behavior supported egocentric primacy.

When analyzing the first search events of trustees, I did not find significant evidence of egocentric primacy; nor did I find that trustees showed a particularly strong initial attraction to any one payoff. I turned to growth curve analyses in hopes of getting better insight into the trustee's process. The longitudinal growth curves estimated for trustees were partially consistent with primacy: three out of six probability curves

resembled the predicted patterns. Of the three remaining curves, the probabilities of two search events did not significantly change over time, and one changed in a manner opposing the egocentric model's prediction. Interestingly, the estimated model of the total probability of perspective taking mirrored the trustor's perspective taking and suggested a three stage process: 1) an initial stage of apparently random searching; 2) the evaluation of the self-relevant outcomes of trust; and 3) the evaluation of the other-relevant outcomes of trust.

Contingency. The model's third proposition was that the secondary stage of decision making, perspective taking, was contingent upon the evaluation of self-relevant information. When possible, decision makers would rely exclusively on self-relevant information and forego perspective taking. More specifically, contingency predicted that trustors would engage in greater perspective taking when risk was low and trustees when temptation was low. Trust and reciprocity become fully egocentric with risk (for the trustor) and temptation (for the trustee) are high. I tested for evidence of contingency in behavior, total response times, and information search.

Contingency predicted that behavior (trust and reciprocity) would depend on the interaction of self- and other-relevant considerations. Trust would only vary with temptation when risk was low, and risk would only affect reciprocity when temptation was low. When risk was high, temptation and trust would be independent; and when temptation was high, risk and reciprocity would be independent. Across two experiments, there was no significant evidence of contingency in either player's behavior. Although neither player showed behavioral evidence of contingency, trustors and trustees differed in how they responded to each other's payoffs. Trust decisions were *always* sensitive to

temptation, and reciprocity was *never* sensitive to risk. In Chapter 5, I discussed these results in greater detail.

In addition to running behavioral analyses, I also investigated contingency using response times and information search data. Here, contingency predicted that self-relevant payoffs should influence total response times and the time spent viewing the other player's payoffs. Both of these hypotheses were confirmed in trustors. In high risk trials, trustors responded more quickly and spent less time viewing the other player's payoffs. In Experiment 1, trustees' total responses times followed a corresponding pattern; trustees responded more quickly when temptation was high. However, information search data from both experiments showed that trustees' perspective taking did not change with temptation.

Summary. Many of the egocentric model's predictions about the trustor were confirmed: trustors spent the majority of their time attending to self-relevant information; they evaluated self-relevant information before engaging in perspective taking; and the degree of trustors' perspective taking was contingent on the level of risk. Thus, I found evidence of focus, primacy, and contingency. Notably, the model underestimated trustors' awareness of temptation. Egocentric contingency predicted that temptation and trust would only be associated in low risk trials, but trustors were sensitive of temptation even when risk was high.

In describing the trustee's process, the primary error of the egocentric model was that it *overestimated* the degree of perspective taking. When making reciprocity decisions, trustees considered their own incentives and little else. High rates of search omissions revealed stark evidence of trustees' self-focus: In spite of the fact that the

payoffs of the trust game changed with each new trial, trustees often made decisions without checking to see how their responses would affect the other player. Trustees failed to search for the other player's payoffs over 30% of the time, and there were no other-relevant transitions occurring at rates greater than chance. Moreover, the temporal analysis of the trustee's search process did not provide clear evidence of a multistage process, though there was a general preference to search for self-relevant information earlier in the process. The inconsistent temporal results may reflect the fact that trustees often avoided perspective taking altogether; as a result, in many cases there was no second stage to decision making.

The strongest evidence of the trustees' neglect of perspective taking is in their behavior: As expected, the rate of reciprocity varied with temptation, but reciprocity did not significantly vary with risk (Chapter 2). In other words, trustees did not reward trustors for accepting larger risks. Moreover, there was no significant perspective taking by risk interaction (Chapter 4); even the perspective taking trustees did not account for risk in their decisions. That is not to say that trustees were entirely selfish; rather, reciprocity depended primarily on the personal cost, and not the risk taken by the trustor.

Consequences of egocentrism (inefficiency and inequality)

In addition to describing a process of social decision making, the egocentric model predicted relationships between decision processes and social behavior. Propositions 4 and 5 (inefficiency and inequality) postulated that egocentrism inhibits trust and reciprocity. Initial results provided correlational support for these hypotheses: In Experiment 1, perspective taking was positively associated with trust and reciprocity. Participants who spent more time viewing the other player's outcomes and less time

viewing their own were significantly more likely to trust and reciprocate. However, the results of Experiment 2 showed that the effects of perspective taking are not always straightforward: I administered an experimental induction of perspective taking, expecting it to reduce egocentrism, inefficiency, and inequality. Surprisingly, the manipulation had no significant effects on the average levels of information search or behavior. Instead, the effect of perspective taking was to increase variability in search behavior. The participants who completed the perspective taking manipulation showed greater between subjects variance (in information search) than those in the control condition.

In light of these unexpected findings, I conducted exploratory analyses to investigate the heterogeneous effects of the perspective taking manipulation. Preliminary results suggested that perspective taking had divergent effects on optimists and pessimists. In the case of trustors, optimists responded to the perspective taking manipulation in accordance with the model's original predictions, exhibiting decreased egocentrism and greater trust. Pessimists, on the other hand, appeared to respond in a contradictory manner, with amplified egocentrism and reduced trust. Apparently, the effects of perspective taking depend on the conclusions drawn by the perspective taker.

Perspective taking has many positive effects on social judgment and behavior (Lamm, Batson, & Decety, 2007; Thompson & Loewenstein, 1992; Todd, Bodenhausen, Richeson, & Galinsky, 2011), but the present research revealed a situation where inducing perspective taking did not always produce desirable results. In Experiment 2, the effects of perspective taking were moderated by the dispositions of the perspective taker. These findings are an important contribution to research on perspective taking and

social behavior, and they suggest that future studies need to adopt a more nuanced view of perspective taking.

Antecedents (impulsivity)

In developing the egocentric model, I began with the assumption that the neglect of perspective taking was due to the conservation of limited mental resources (Gigerenzer, 1999). I contrasted egocentrism and perspective taking as impulsive and reflective processes, respectively. In Experiment 1, perspective takers were more reflective in that they spent more time making decisions. Disappointingly, perspective taking in information search was not correlated with other individual difference measures of reflection, the Cognitive Reflection Test and Brief Self-Control Scale; nor were survey measures of perspective taking correlated with reflective information search (longer search times). The observed link between reflection and perspective was correlational and limited to the domain of information search. Given the surprising effects of the induction of perspective taking, it is clear that an experimental approach would provide greater insight into the link between egocentrism and impulsivity.

Limitations

The present experiments make several contributions to the interdisciplinary trust literature, but they are subject to some limitations. Most notably, both experiments relied on the experimental trust game as a measure of behavior. The trust game measured behavior in an abstract, decontextualized environment, and the MouseLab software enforced an artificial constraint on decision makers. The experimental games used here may have failed to capture important aspects of real life dilemmas. Outside of the laboratory, social norms and subtle environmental cues can have far reaching effects on

strategic decision making (Kay & Ross, 2003; Liberman, Samuels, & Ross, 2004). In order to better understand the applications and external validity of this research, future studies will need to employ measures of behavior that more closely resemble real world dilemmas of trust (i.e., purchasing goods and services online).

A second shortcoming of the previous results is that both experiments were conducted using undergraduates from an elite university. Compared to the general population, these participants may have been unusually well-prepared to make complex economic decisions. Furthermore, the participants may have had atypical reactions to the MouseLab interface. It is reasonable to expect that individuals with less computer training would respond differently to MouseLab, presumably with greater difficulty. Future studies will address this limitation by collecting data from community and web-based samples.

Finally, it is important to note that the present findings are relevant to a specific type of social interaction – relatively anonymous exchanges where there is little or no prior contact. The question of how strangers interact in dilemmas of trust is important, as technology continues to make it easier for individuals to interact across great distances (Hardy, 1995). However, trust among strangers is a special case, and the present work does not attempt to explain how trust develops in long term relationships. Still, the results of the present studies can provide a useful benchmark when studying the degree of perspective taking in established relationships.

Future directions

Facilitating trust and reciprocity

In continuing this program of research, my primary goal is to develop and test interventions that will facilitate the development of trust and reciprocity among strangers. The results of the present experiments suggest that there are two necessary conditions for trust and reciprocity: perspective taking and strong expectations of reciprocity. In Experiment 1, perspective taking was correlated with trust and reciprocity. Critically, the positive effect of perspective taking was moderated by temptation, presumably because perspective takers only trusted when they estimated a high probability of reciprocity. Recall that perspective taking did not enhance trust in high temptation situations. In Experiment 2, the induction of perspective taking only enhanced trust among the participants who were optimistic about the overall probability of reciprocity. Pessimistic perspective takers were less likely to trust than participants in a control condition. Together, these experiments illustrate that perspective taking by itself is not sufficient to ensure trust and reciprocity. My future work will investigate three avenues to enhancing trust and reciprocity: social information, communication, and emotion.

Social information. A common approach to encouraging trust and reciprocity among strangers is to provide decision makers with information about their counterparts. Social information may enhance trust by reducing the ambiguity of anonymous interactions (Schmeidler, 1989) and encourage reciprocity by evoking feelings of sympathy (Small, Loewenstein, & Slovic, 2007). But what type of information should be shared? One view is that any information reducing the social distance between the trustor and trustee will encourage other-regarding behavior (Jones & Rachlin, 2009). However, not all forms of information will necessarily increase trust and reciprocity.

In trust research, a common recommendation is to emphasize that the trustor and trustees are members of a common social group (Foddy, Platow, & Yamagishi, 2009). Presumably, people are more willing to trust ingroup members (Brewer, 2008). Yet, several recent experiments have reported that ingroup favoritism has little or no effect on economic trust and reciprocity (Bornhorst, Ichino, Kirchkamp, Schlag, & Winter, 2010; Lei & Veseley, 2010; Wang & Yamagishi, 2005). Even in experiments conducted on Israelis and West Bank Palestinians, there is little evidence of ingroup preferences affecting trust and reciprocity (Binur, 2011).²³ Appealing to ingroup favoritism may not be an effective means to change behavior. The present experiments were conducted on members of a fairly cohesive group, Brown undergraduates, and despite this fact, the observed rates of trust and reciprocity were relatively low (30-35%).

A more effective strategy could be to use information that emphasizes individual characteristics. For example, giving users in an online environment the ability to upload profile pictures or share personal details could encourage positive interactions. Wilson and Eckel (2006) reported that being able to see a trustee's face encourages trust, but only if the trustee appears attractive and friendly. This suggests that the positive effects of individuating information depend upon the attractiveness of the information. Indeed, much is inferred from physical appearances and superficial details (Gosling, 2008; Naumann, Viziore, Rentfrow, & Gosling, 2011). Again, consider that the assumption of more-is-better with social information is not always valid; sometimes, the more you know about a person, the easier it is to find faults (Norton, Frost, & Ariely, 2007). In some cases, familiarity breeds contempt.

²³ An optimistic interpretation of this finding is that there is robust evidence of out-group trust.

Records of past behavior may be the optimal form of social information.

Providing logs of past interactions have proven to be an effective means to encourage trust and cooperation among strangers (Bolton, Katok, & Ockenfels, 2004; Resnick, Zeckhauser, Swanson, & Lockwood, 2006). Not surprisingly, reputation systems have become an important feature in online marketplaces, though some have flourished without them (e.g., Craigslist). Giving decision makers access to reputation data could affect the dynamics observed in the present experiments. Here, participants could only make indirect inferences about the probability of reciprocity using the game payoffs. Giving the trustor a more direct way to estimate this probability could increase its relative importance.

Communication. A more time-intensive approach to encouraging trust and reciprocity is to allow decision makers to directly communicate before they interact. In a classic study on the effects of communication, Dawes, McTavish, and Shacklee (1977) found that ten minutes of conversation can significantly increase rates of cooperation among strangers. However, in order for communication to be effective, it must be task-relevant. Idle conversation is not sufficient to create cooperation, even if it does create familiarity and liking (Reis et al., 2011). Task-relevant communication creates cooperation by activating norms of reciprocity and fairness (Cohen, Wildschut, & Insko, 2009). Impressively, the benefits of communication are not limited to face-to-face exchanges; being able to chat online with a potential interaction partner increases trust (Fiedler & Haruvy, 2009).

The downside of communication interventions is that they are relatively costly (in terms of time spent). Communication is clearly useful and efficient in face-to-face

interactions, but in electronic environments it may be impractical for trustees and trustees to have direct communication before an interaction takes place. For example, it would be impractical for an experimenter on Mechanical Turk to personally brief each worker. Moreover, on the internet, we can no longer assume that both parties in a social exchange will be fluent in the same language, or that they will be conducting business at the same time.

Emotions. A third approach for developing perspective taking and other-regarding behavior is to induce positive social emotions, such as gratitude (Bartlett & Desteno, 2006). Recently, researchers have begun to examine the effects of emotions in social dilemmas. Surprisingly, inducing a positive mood can have negative effects on trust (Lount, 2010). Trustors in a positive mood pay closer attention to cues about others' trustworthiness, perhaps an indicator of greater perspective taking. This increased attention only leads to greater trust when the cues support the decision; sometimes, positive emotions can decrease trust. This finding is consistent with the idea that both perspective taking and the expectation of reciprocity are necessary for trust.

Process tracing individual differences

In the present report, I introduced and tested a model of social decision making. My analyses were primarily focused on decision makers as a homogenous group. I assumed, for example, that the payoffs of the trust game had the same effects on every trustor, and that time had a consistent effect on trustees' information search. By making these assumptions, it is likely that my analyses overlooked meaningful individual differences. And, as Chapter 5 illustrates, testing for mean-level effects sometimes conceals important patterns. In my future analyses, I plan to test the hypotheses of the

egocentric model using random slope models, which allow for factors such as time, risk, and temptation to have varying effects across participants. Such analyses may reveal the existence of multiple prominent decision processes. For example, exploratory analyses suggested that some decision makers in the present studies were purely egocentric, and responded without ever considering the other person's potential outcomes.

Empathy and perspective taking

Researchers commonly differentiate the concepts of empathy (emotional concern for others) and cognitive perspective taking (understanding another person's point of view). Davis (1983) proposed four correlated aspects of perspective taking, one primarily cognitive and three based on emotions (empathic concern, personal distress, and fantasizing). More recently, Galinsky and colleagues (2008) made the dichotomous distinction between focusing on another person's feelings (empathy) versus focusing on a person's thoughts (perspective taking).

Anecdotally, it is obvious that there are problems in attempting to cleanly differentiate empathy and perspective taking. In real life, empathy and perspective taking are likely to co-occur. One may expect that empathy encourages perspective taking; if we care about someone's well-being, we have greater motivation to understand their point of view. But the relationship may also work in the opposite direction. The classic saying, "don't judge someone until you've walked a mile in their shoes", suggests that the act of cognitive perspective taking generates empathy. It is easier to care about someone if we understand their goals and hardships. Over the course of a relationship, there may be a reciprocal relationship between empathy and perspective taking. Mapping the temporal

dynamics of empathy and perspective taking may provide greater insight into the differences (or lack thereof) between the processes.

Concluding remarks

Deciding to trust someone involves the evaluation of potential outcomes, as well as the probabilities of those outcomes occurring. The present research shows that decision makers do not give these considerations equal weight. Trust, like many social decisions, is primarily egocentric. Trustors focused primarily on the magnitudes of outcomes; perspective taking was a conditional, secondary stage in the process of decision making. Potential trustors are well-advised to give the other person's point of view due consideration, as trustees were even more egocentric than trustors. Trustees frequently made decisions without viewing the trustor's potential payoffs, and neglected to reward trustors for accepting greater risks. In the present experiments, egocentrism lead to outcomes that were inefficient and inequitable. These findings emphasize the value in understanding the mental processes underlying perspective taking.

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