Please Take a Minute:
How Prosocial Preferences Change with Deliberation

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People often make decisions somewhat quickly when presented with a choice. Are their instinctive answers a good approximation of what they would choose if they took more time to decide? We explore how individuals' choices change with deliberation and find that later choices systematically differ from early ones. We focus on prosocial decisions and find that individuals care more about social efficiency as they deliberate over the course of a minute. Our results call into question the use of revealed preference for welfare when prosocial choices are made quickly and provide guidance to policy makers and charities.

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I. Introduction

Individuals face many opportunities to benefit others at a cost to themselves. Some opportunities—high-value public goods and transfers to those with large welfare weights—are efficient, providing extensive benefits at a modest cost. Others are less efficient or inefficient (e.g., a low-value public good that is not worth funding). The prosocial behavior we observe in practice—including individuals giving to wasteful charities while well-deserving ones go unfunded—might lead us to worry that individuals do not sufficiently care about the efficacy of their gifts.

To what extent do individuals respond to the efficiency of giving opportunities and what can make them care more about efficiency? In this paper, we bring a new experimental method to the study of prosocial behavior and explore whether something as simple as deliberation impacts prosocial preferences. In a laboratory experiment, we show that over the course of a minute, subjects' prosocial choices change systematically. With deliberation, subjects respond more to the efficacy of giving opportunities. Our method—adopted from work on rational inattention (Caplin, Dean and Martin, 2011)—allows us to observe the choices of the same individual over the minute. Additional treatments allow us to rule out the hypothesis that choices change because initial choices are more random than later choices. Instead, we show that individual preferences towards giving opportunities change over time. With deliberation, individuals care more about the efficiency of their generosity.

Our experimental subjects play 10 prisoner's dilemmas and 10 dictator games. In each game, subjects decide whether to transfer \$1 to give \$$X$ to another subject, where the exchange rate (i.e., the efficiency of giving), \$$X$, ranges from \$0 to \$10 across games. In our main treatments, subjects have 60 seconds during

which they can record an initial answer and then subsequently change their answer if they would like to do so. We incentivize choices using a technique introduced by Caplin, Dean, and Martin (2011). For the specific game that is chosen for payment, one of the 60 seconds is randomly selected, and the choice recorded by the subject at that second is the choice implemented for payment. If no choice is made at the randomly chosen second, both the decision-maker and the other subject earn nothing. The subject is therefore incentivized to make an (instinctive) initial choice as soon as they have one and to change to a subsequent (deliberate) choice whenever they consider a different choice to be optimal.

We find that most subjects change their choices over the minute in at least some of the decisions they face. Our main result is that subjects increasingly value social efficiency as they deliberate more. That is, when X is low (i.e., when it is more expensive to turn your dollar into a dollar for another subject), subjects on average become less generous over the minute. In contrast, when X is high (i.e., when it is cheaper to turn your dollar into a dollar for another subject) subjects become more generous over the minute. Several robustness tests and control treatments confirm that our results are not due to subjects providing random first choices and later correcting them. We also can rule out the alternative hypothesis that instinctive choices are imperfect implementations of fixed underlying preferences. We conclude that subjects reliably change their mind, responding more to social efficiency over time when deciding whether to be generous.

We therefore provide direct evidence that decisions involving generosity predictably change when comparing instinctive choices to deliberate ones. Our results imply that welfare considerations based on revealed preference may be complicated when analyzing decisions—particularly those involving

generosity—that are made without deliberation. Our results also speak to how to encourage individuals to privately provide public goods and to donate to charities. The findings of our experiments suggest that less efficient charities should encourage fast donation decisions (e.g., by asking for donations in time-sensitive situations like when checking out at a store) while efficient charities should encourage potential donors to deliberate about giving.

In addition, our results contribute to two related literatures. First, prior research has considered whether individuals show more generosity when choices are made quickly and yielded ambiguous results.[1] The Social Heuristics Hypothesis (SHH), introduced by Rand, Greene and Nowak (2012), argues that fast, intuitive responses are shaped by past experiences in repeated interactions where cooperative behavior may be optimal.[2] It suggests that the intuitive system has a prosocial tendency, but deliberation allows a decision-maker to adjust to the specific social situation (e.g., allowing them to be selfish in an anonymous, one-shot giving opportunity). However, other work suggests that this binary classification may be an oversimplification.[3] Our results suggest

[1]A related literature explores the relationship between decision speed and behavior more broadly. For example, several papers study the effect of decision speed on honesty (Capraro, 2017; Capraro, Schulz and Rand, 2019; Lohse, Goeschl and Diederich, 2017), cooperation (Alós-Ferrer and Garagnani, 2020; Goeschl and Lohse, 2018; Kvarven et al., 2018), and decision quality (Imas, Kuhn and Mironova, 2022; Lawson, Larrick and Soll, 2020; Sunde, Zegners and Strittmatter, 2022).

[2]The fast and intuitive system was initially thought to be more selfish (see, e.g., Dewall et al., 2008), as a common view was that this system is shared with animals that are generally considered to be selfish and aggressive (Dawkins, 1976). More recently, the view that the intuitive system is more generous has become more popular. For a discussion on this change, see Zaki and Mitchell (2013).

[3]For example, Chen and Krajbich (2018) and Yamagishi et al. (2017) find that prosocial individuals become more selfish with deliberation while selfish individuals become more prosocial, suggesting that fast decisions are not inherently more generous than slow decisions. Rand et al. (2016) finds that women make altruistic intuitive decisions, but not men. Additionally, Gartner (2018) and Mrkva (2017) provide evidence in direct contrast to the SHH—that quick decisions are more selfish than slow decisions. Mrkva (2017) finds that deliberation increases costly giving, but has no impact on giving that is not costly. Gartner (2018) also examines generosity when a status quo allocation is in place and finds no relationship between decision speed and generosity. Similarly, Fromell et al. (2020) finds

that social efficiency is an additional parameter that plays an important role in determining how decision speed affects generous behavior.

Related to our main findings, Capraro et al. (2017) compares individuals based on cognitive reflection task performance, varying whether subjects have only 5 seconds or must wait 15 seconds to respond. It finds that the intuitive system values relative shares while the deliberate system values social efficiency. In addition, Merkel and Lohse (2019) compares choices under time pressure and time delay and provides evidence that choice difficulty plays an important role in determining the relationship between decision speed and generosity. Unlike this prior work, we use a different experimental paradigm to explore how choices change over time within a person and, in particular, whether intuitive choices differ systematically from deliberate ones. Related to our method, Dyrkacz and Krawczyk (2018) uses a similar technique, asking subjects to answer the questions from Charness and Rabin (2002) and allowing them to change their choice at most once within 60 seconds. They conclude that more deliberation leads to less pronounced disadvantageous inequality aversion, but their results include data consistent with more deliberation leading to more efficient outcomes.

Second, we add to the literature attempting to explain why an individual might make different choices at different times. Such models include projection bias (Loewenstein, O'Donoghue and Rabin, 2003), theories of consumption that depend on cues or emotions (Laibson, 2001), and hyperbolic discounting (Strotz, 1956; Laibson, 1997; O'Donoghue and Rabin, 1999, 2001).[4] Many

no systematic relationship between intuition and altruism.

[4]For empirical validation of these models, see e.g. Conlin et al. (2007); Simonsohn (2010); Schwarz and Clore (1983); Lerner, Small and Loewenstein (2004); Kirchsteiger, Rigotti and Rustichini (2006); Frederick, Loewenstein, and O'Donoghue (2002); Augenblick, Niederle and Sprenger (2015). Additional very recent models and evidence include work on attribution bias (Haggag et al., 2019) and learning with misattribution of preferences (Bushong and Gagnon-Bartsch, 2022, forthcoming).

of these models rely on differences in the environment or mental state (e.g., making choices about bundles today compared to tomorrow; making choices while happy or angry), even as the set of choices remains the same.[5]

A more recent literature in psychology and behavioral economics has posited that even if there are no extraneous changes in environments or mental states, individuals may make predictably different choices when they take more time to make a decision. These dual-system or dual-process models suggest that a fast and intuitive system (or hot, instinctive, or automatic system) may make systematically different choices than a slower and more calculating system (or a cold, reflective, or controlled system), see Kahneman (2003*a*; 2003*b*; 2011).[6] In economics, dual-self models operate under a similar premise, although they often incorporate a strategic interaction between the two selves, as in Bernheim and Rangel (2004), Benhabib and Bisin (2005), and Fudenberg and Levine (2006). On dual-system or dual-process models, our findings lend credence to a model like the one proposed in Loewenstein and Small (2007), which posits one immature and irrational process, called "sympathy," and another rational but more uncaring process, called "deliberate."[7]

The rest of the paper proceeds as follows. Section II describes the experimental design. Section III presents our main results showing that later choices

[5]For example, Grimm and Mengel (2011) shows that rejections in the ultimatum game are reduced if the responder has a few minutes to "cool down" before deciding whether to accept or reject an offer. Additionally, Kessler et al. (2022) finds that short-term fluctuations in happiness have important consequences for economic decision-making. Namely, when individuals are made happier by an event unrelated to their choice set, they are more likely to donate to charity and to trust others.

[6]In psychology, dual-process theories have their origins in the 1970's (Wason and Evans, 1975; Posner and Snyder, 1975; Schneider and Shiffrin, 1977). For more recent work, see Sloman (1996); Gilovich, Griffin and Kahneman (2002); and Sanfey et al. (2006) as well as overviews by Evans (2008), Weber and Johnson (2009), Evans and Stanovich (2015), and Capraro (2019).

[7]Note that our experiment is not designed to address whether there is an inherent strategic conflict between the two systems (as in most dual-self models) or whether different systems simply differ in their preferred choices.

systematically differ from early ones. Section IV provides a series of robustness tests, providing evidence that early choices are intuitive rather than random. Section V explores why choices differ with deliberation. Section VI concludes.

II. Experimental Design

A. Games

Our main set of experimental subjects play 10 dictator games and 10 prisoner's dilemmas. In each of these 20 games, subjects face a binary decision: either transfer \$1 to give \$$X$ to another subject or keep the \$1 and give \$0. For each game type (dictator game and prisoner's dilemma) each subject is asked about 10 different X values: 0, $\frac{1}{2}$, 1, 2, 3, 4, 5, 6, 8, and 10, in a random order. In what follows, we refer to the X value as the exchange rate.

In each prisoner's dilemma (denoted "PD X", where X is the exchange rate), the subject is endowed with \$1. Her payoff depends on her decision and the decision of another subject who has the same opportunity to transfer \$1 to give her \$$X$. Each prisoner's dilemma has a corresponding dictator game (denoted "DG X", where X is the exchange rate) in which the dictator is endowed with \$$X + 1$, which is the amount of money the subject would have if she were playing in the corresponding PD X and the other player decided to transfer \$1 to give her \$$X$. For a given exchange rate X, the payoffs PD X and DG X are shown in Table 1. In all treatments, subjects were paid based on their choices for one randomly selected game.[8] We describe the subject

[8]The instructions for all treatments are available in Appendix C. After playing the dictator and prisoner's dilemma games, most subjects also answered a timed "sanity check" question that asked whether they wanted to earn -\$1, \$0, or \$1 for the question. Of the 466 subjects asked this question, 464 (99.6%) answered \$1 as their last recorded choice (the other 2 selected \$0 as their last recorded choice), suggesting that subjects understood how the timed questions worked. In addition, after making all choices for this study, some subjects were asked additional, unrelated pilot questions for other studies.

pool in Section III.

Table 1—Summary of Payoffs (for a given exchange rate X)

Dictator Game X			**Prisoner's Dilemma X**			
		Other Subject			Other Subject	
					Transfer	*No Transfer*
Subject	*Transfer*	(X, X)	Subject	*Transfer*	(X, X)	$(0, X+1)$
	No Transfer	$(X+1, 0)$		*No Transfer*	$(X+1, 0)$	$(1, 1)$

Note: Payoffs shown are in dollars. $X \in \{0, \frac{1}{2}, 1, 2, 3, 4, 5, 6, 8, 10\}$ and varies across questions.

B. Timed Treatment

We employ an experimental technique introduced by Caplin, Dean, and Martin (2011) that incentivizes choices over time.[9] Before each question, subjects are shown a screen for 10 seconds that describes the question they are about to answer but withholds information about the exchange rate X. Subjects are then shown the relevant parameter (i.e., the exchange rate X) and have 60 seconds on the decision screen.[10] At each point during those 60 seconds, subjects can record an initial answer or change their answer. As shown in Figure 1, the decision screen reminds subjects of their current choice, lists their previous choices, and has a timer indicating how many of the 60 seconds remain. For the question that is chosen for payment, one of the 60 seconds is randomly selected, and the choice recorded by the subject at that second is implemented for payment. If subjects have not yet made an initial decision at the randomly chosen second, they receive no payment for that question (and neither does

[9]For other applications of this technique, see e.g., Agranov, Caplin, and Tergiman (2015), Altmann, Grunewald, and Radbruch (2022), Oprea (2020).

[10]To ensure subjects are ready for a question to begin, subjects see a waiting screen that required them to press a button to advance to the next question. Only after they press this button do they see the instructions for 10 seconds, followed by the decision screen for 60 seconds.

the other subject). We call these "timed" questions to distinguish them from questions answered in the standard way (i.e., in which a subject takes as much time as she wants to record one answer), which we call "untimed" questions.

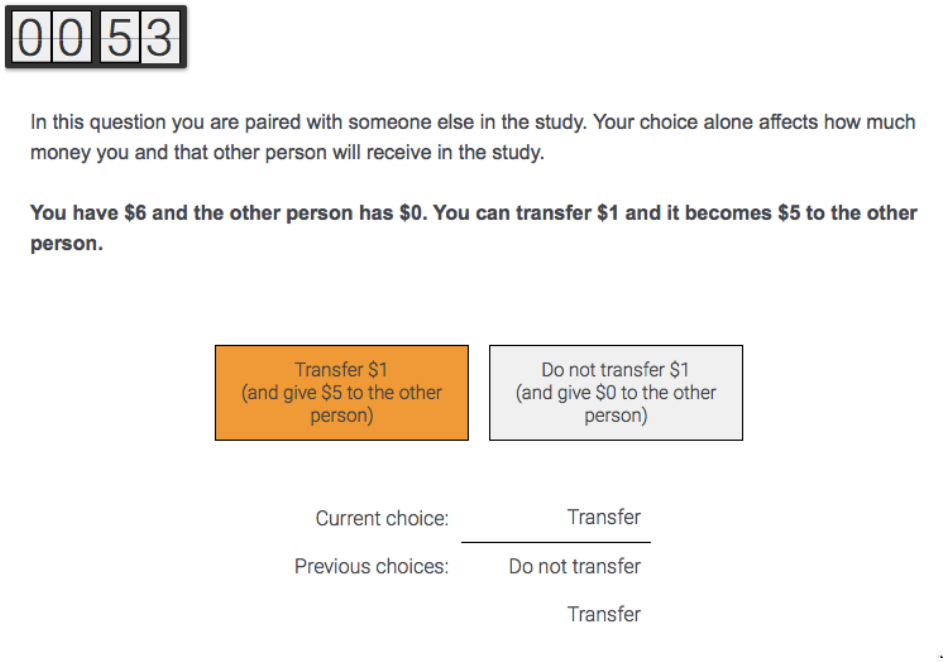


Figure 1. The decision screen for timed questions.

Notes: Figure 1 shows how the decision screen would look in the DG 5 question if a subject first made a choice of "Do not transfer $1" and then switched to "Transfer $1" at some point in the first 7 seconds of the minute. A subject who has not yet made a choice would see both buttons in light gray, just like the "Do not transfer $1" button appears here.

While the payments in the dictator game are straightforward, the payment of a subject in the prisoner's dilemma also depends on the choice of the other subject. Specifically, we tell subjects that their earnings will depend on what the other subject chooses at second 15 (or 45).[11] The number 15 or 45 was

[11]Before each of the 10 dictator games, the instructions read: "In this question you are paired with someone else in the study. Your choice alone affects how much money you and

randomly selected at the subject level, and the same number was used for all the prisoner's dilemma questions that subject answered. Even though our decision-maker of interest is being given the opportunity to potentially change her choice over time, we fix the second for the other subject's choice to rule out changes in behavior arising from decision-makers who want to match the choice of the other subject and believe that the other subject is becoming more selfish or more generous over time. Our design guarantees that over the course of the 60 seconds, each decision-maker is facing a static choice from the other subject.

This experimental paradigm allows us to observe choices of subjects over time. That is, we have the potential to observe an early "intuitive" choice and a potentially different, later "deliberate" choice. Because subjects receive no payment if there is no answer recorded at the randomly chosen second, subjects have an incentive to report an instinctive first choice. This feature makes us optimistic that initial answers recorded by subjects will be intuitive rather than deliberate choices. The structure of the incentives in timed questions also guarantees that as soon as a subject would like to make a different choice, she should implement the new choice, thereby increasing the probability it will be recorded at the second randomly selected for payment. Specifically, at each moment, a subject should have recorded the choice that she considers optimal. Consequently, later answers should reflect deliberate choices.

One concern with this method, however, is that subjects may be encouraged to record a random initial choice (e.g., a choice made before the subject has

that other person will receive in the study." Before each of the 10 prisoner's dilemmas the instructions read: "In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you. Your earnings will depend on what they choose at second [15/45]."

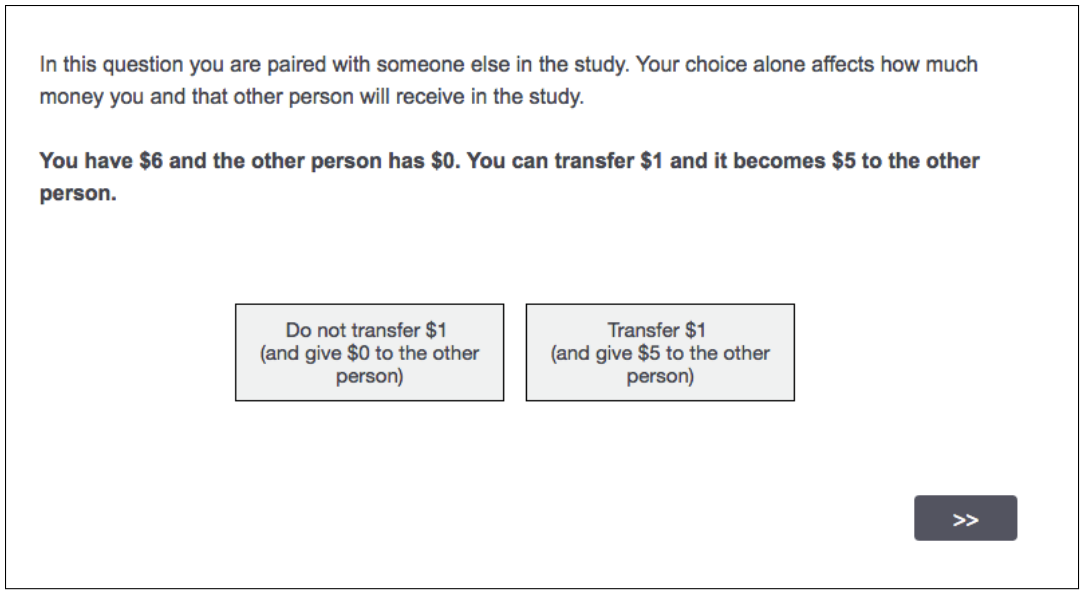


Figure 2. Decision Screen for "Last Choice" Untimed Questions

Notes: The decision screen for the "single choice" untimed questions looked identical except that the decision button ">>" was removed.

even read the question or had time to generate an intuitive answer). Recording a random answer may in fact be rational depending on a subject's beliefs about the likelihood that some answers are associated with negative payoffs and/or the extent to which recording a random choice slows down a potentially preferred instinctive choice. In Sections II.C and II.D, we describe additional treatments used to rule out the hypothesis that subjects are recording random initial choices. Results from these treatments are presented in Section IV.

C. Untimed Treatments

To provide a baseline measure of how long subjects take to make a choice in dictator games and prisoner's dilemmas without time pressure, we ran two untimed treatments. Subjects answering untimed questions saw the same decision screen as subjects in the timed treatment but without the timer or table

of current and previous choices. An example of an untimed decision screen is provided in Figure 2. Subjects had as many seconds as they wanted before making a decision.[12]

We ran two versions of the untimed treatments to observe speed of choices and choice behavior in two different settings that are representative of the ways choice data are typically collected. In the "last choice" treatment, after subjects made a choice, they had to click a decision button to advance to the next screen for the choice to be implemented (the decision button is labeled ">>" in Figure 2). In particular, they could click either of the two choice buttons (i.e., "Transfer $1" or "Do not transfer $1") as often as they wished, but only their last choice was implemented as their answer to the question. In this "last choice" untimed treatment, the time of choice is recorded as the last time at which the subject clicked one of the two choice buttons—"Transfer $1" or "Do not transfer $1"—before clicking the decision button to implement their choice.

While having the option to change their choice before submitting a final answer resembles the timed treatments, it could be that subjects still thought about their answer between the time they last clicked one of the two choice buttons and the time at which they clicked the decision button to implement their choice. We therefore ran a second version of the untimed treatment that, while depriving subjects of the ability to click multiple buttons, measures precisely how long a subject takes to submit a final answer. In the "single choice" untimed treatment, subjects faced the same screen as in Figure 2 but without the ">>" decision button. Subjects could take as much time as they wanted to make a choice, but as soon as a subject clicked on either the

[12]Subjects answered 10 timed questions of one game type and then answered 10 untimed questions of the other game type. For example, if a subject's timed questions were dictator games, then their untimed questions were prisoner's dilemmas.

"Transfer $1" or "Do not transfer $1" button, that choice was implemented as their answer to the question. The time of the choice for the "single choice" control treatment was simply the time at which the subject clicked one of the two choice buttons.

D. Accounts Treatment

We ran a final timed treatment to investigate the extent to which subjects have difficulty processing information about the exchange rate X, which we introduce here and analyze in Section V. In the "accounts" treatment, subjects make the same choices about whether to transfer $1 to give $\$X$ as in dictator games, but the subject receives the $\$X$ generated from the transfer (i.e., the dictator is also the recipient). Put differently, we eliminate the other subject and thus eliminate generosity as a motive for making the transfer.

Subjects in the accounts treatment are told that: they have two accounts, they receive the money in both accounts, and transferring $1 from one account gives $\$X$ to the other account. A subject who wants to maximize their payoffs, just like a subject who wants to maximize the sum of payoffs in the dictator game, should transfer $1 whenever the exchange rate X is 2 or higher and should not transfer $1 when the exchange rate X is 0.5 or 0. To ensure that we can compare choices and decision times across arms, the interface of the accounts treatment closely mirrors that of the dictator game (see Figure A1 in the Appendix).[13]

[13]Subjects who answered the 10 account questions then answered 10 dictator games or 10 prisoner's dilemmas in the single choice untimed treatment.

III. Results

A total of 734 subjects participated in our experiment; 367 subjects were University of Pennsylvania students who participated in the Wharton Behavioral Lab (WBL) and 367 subjects participated on Amazon's Mechanical Turk (MTurk) platform.[14]

In this paper, we restrict analysis to the 647 subjects who satisfy two conditions. First, subjects must have recorded at least one answer for each of the 20 questions they faced. This criterion eliminates subjects who got distracted or who switched out of the web browser in the middle of the study and let a question go by without recording an answer. Based on this criterion, we exclude 12 subjects from the WBL and 60 subjects from MTurk. Second, subjects must make fewer than 40 choices (i.e., switch fewer than 40 times) in each of the timed questions they face. This cutoff arises because the maximum number of choices that the experimental software could be guaranteed to record for any given question was 40. Based on this criterion, we exclude 12 subjects from the WBL and 3 from MTurk. Consequently, our main analysis focuses on 343 subjects from the WBL and 304 from MTurk. In what follows, we mostly combine the data from these two subject pools. While there are some differences in the baseline level of generosity and propensity to change choices across groups, we show in Appendix Table A1 that subjects are fairly similar with respect to how quickly they make choices.

Of the subjects we analyze, 229 play timed dictator games followed by timed prisoner's dilemmas, 225 play timed prisoner's dilemmas followed by timed

[14]Subjects who participated in the WBL earned a $10 show-up fee in addition to any earnings from choices in our experiment (some WBL subjects also completed other, unrelated studies as part of their hour in the laboratory; however, our study was always played first in a session.) Subjects from MTurk received a show-up fee of $1 in addition to any earnings from choices in our experiment.

dictator games, 40 play timed dictator games followed by last choice untimed prisoner's dilemmas, 59 play timed prisoner's dilemmas followed by last choice untimed dictator games, 48 play accounts games followed by single choice untimed prisoner's dilemmas, and 46 play accounts games followed by single choice untimed dictator games. Only subjects from MTurk answered the untimed questions in either the last choice or single choice designs, and so when drawing comparisons between timed and untimed behavior we pay special attention to MTurk subjects playing in their second set of 10 questions.

This section proceeds as follows. First, we show that the majority of subjects change their choices when given the opportunity to deliberate. Second, we explore how choices change over the course of a minute. Third, we provide a series of robustness tests to rule out the possibility that first choices are random rather than instinctive.

A. Do Subjects Change Their Choices?

Of the 494 subjects who play the 10 timed dictator games, 339 subjects (68.6%) change their choice in at least one game. Similarly, out of the 513 subjects who play the 10 timed prisoner's dilemmas, 330 subjects (64.3%) change their choice to at least one question. Table 2 counts the number of questions (out of each set of 10) in which a subject changes her choice at least once. The table shows that, in both the dictator games and prisoner's dilemmas, approximately one-third of subjects never change their choices, another one-third change their choice to either 1 or 2 questions, and the final one-third change their choice in 3 or more questions.[15]

The percent of subjects who change their choice is fairly consistent across

[15]See Appendix Table A3, which shows Table 2 broken down by the first 5 questions and the last 5 questions of each set of 10.

Table 2—Percent of Subjects who Changed Answer at Least Once

	Number of Questions										
	0	1	2	3	4	5	6	7	8	9	10
Dictator Games	31.4	26.5	13.2	9.1	5.7	3.0	3.8	2.8	2.8	0.8	0.8
Prisoner's Dilemmas	35.7	26.3	13.5	7.8	4.1	3.3	2.7	3.1	0.8	1.8	1.0

exchange rates and game types. Between 16% and 23% of subjects change their choice in each dictator game (between 19% and 23% if we exclude exchange rates of 0 and 0.5). Between 15% and 20% of subjects change their choice in each prisoner's dilemma (between 18% and 20% if we exclude exchange rates of 0 and 0.5). Among changes that occur, the modal number of changes is 1 (which is also the median in all but 3 questions). In all questions, the majority of subjects change their choice an odd number of times (i.e., their final choice is different from their first choice). See Appendix Figure A5 for a summary of the number of times subjects change their choice within a game.

While we emphasize above that the majority of subjects change their choice at least once, another way to interpret our data is that—for any given exchange rate in the dictator games or the prisoner's dilemmas—most subjects become neither more generous nor more selfish over time. In the next subsection, however, we ask whether the subjects who do change their choices change in predictable ways.

B. How Choices Change

We now turn to our main question of interest: are deliberate choices systematically different from instinctive choices? Our main result can be seen in Figure 3, which shows the "Change in Percent Being Generous." This is the percentage of subjects being generous (i.e., transferring \$1 to give \$$X$ to the other subject) in their last choice minus the percentage of subjects being

generous in their first choice.[16] For both sets of games—the dictator games (Panel A) and the prisoner's dilemmas (Panel B)—subjects' change in generosity between first and last choice is a function of the exchange rate. In dictator games, subjects facing low exchange rates (i.e., $X = 0$ or $X = 0.5$, when giving is inefficient) become less generous with deliberation, but those facing exchange rates of 3 or more (i.e., when giving is efficient) become significantly more generous with deliberation. In the prisoner's dilemmas, subjects become less generous not only when giving is inefficient but also when it is efficient but still expensive (i.e., exchange rates of 1 and 2), but subjects become significantly more generous at relatively high exchange rates (i.e., $X = 5$ and $X = 10$).[17] For these results, we treat each question separately, and use a binomial probability test to assess whether choices are equally likely to become generous or selfish.[18]

In contrast to claims made by some prior literature, subjects do not become uniformly more or less generous over time. Instead, deliberate choices respond more to the underlying exchange rate than intuitive choices.[19] Note that the parameterization that has been most popular in the literature to assess whether generosity changes over time is the prisoner's dilemma with an exchange rate of 2 (see, e.g., Rand, Greene and Nowak, 2012), for which we find a significant decrease in generosity over time.[20] Consequently, our paradigm is consistent

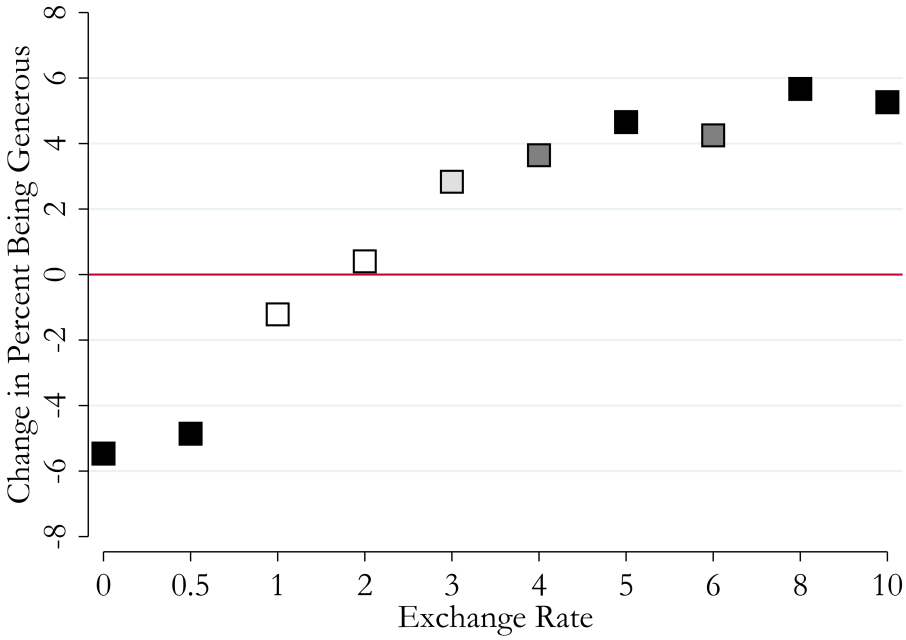
[16]We refer to transferring the \$1 as being generous with the recognition that we are slightly abusing terminology when the exchange rate is 0.

[17]While our results provide evidence of the effect of short-term deliberation on generosity, these findings may not generalize to longer periods of deliberation. Andersen et al. (2018) finds that a one-day deliberation period has no effect on generosity.

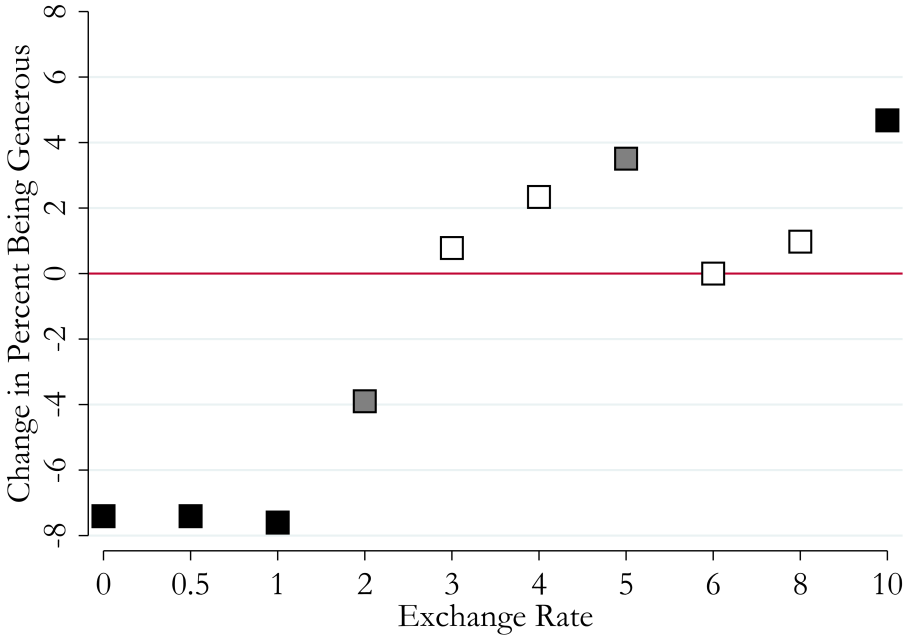
[18]More precisely, we estimate whether the fraction of subjects switching from generous to selfish across their first and last choices is equal to 50%.

[19]Enke and Graeber (2021) finds that deliberation reduces uncertainty about what the optimal action is. To the extent that subjects believe socially efficient giving is optimal, this could explain why for deliberate decisions, generosity is increasing in social efficiency. We explicitly test for complexity in the Accounts treatment in Section V.

[20]Similarly, the dictator game with an exchange rate of 1—the parameterization used in



(a) Change in Percent Being Generous in Dictator Games



(b) Change in Percent Being Generous in Prisoner's Dilemmas

Figure 3. Change in Percent Being Generous Between First and Last Choices

Notes: Tests of significance are binomial probability tests. The null hypothesis is that the probability of becoming selfish is equal to the probability of becoming generous across first and last choices. A black square indicates significance at 1%, dark gray at 5%, and light gray (DG 3) at 10%.

with previous work, but is able to demonstrate that the broad conclusion that individuals become systematically more selfish over time may be an artifact of the chosen parameters rather than a general finding.

The results in Figure 3 show that subjects' last choices are more responsive to the exchange rate than their first choices are and that subjects become less generous for low exchange rates and more generous for high exchange rates. Table 3 confirms these results using a linear probability model (OLS). Specifically, we regress an indicator for whether a subject transferred \$1 (*Generosity*) on the exchange rate (*Rate*), a last choice indicator (*Last Choice*), and an interaction (*Rate* $\times$ *Last Choice*). The table shows results combining all data in columns (1) and (2) and separately for just dictator games, columns (3) and (4), and just the prisoner's dilemmas, columns (5) and (6).

The coefficient on *Rate* reflects that as the exchange rate increases, first choices become statistically significantly more generous. The estimated coefficent on *Last Choice* is negative and significant for both types of games, confirming that subjects become less generous over time for the exchange rate of 0 (as can also be seen in the non-parametric tests in Figure 3). The fact that *Rate* $\times$ *Last Choice* is positive and significant for both types of games demonstrates that the slope of generosity with respect to the exchange rate indeed becomes larger in magnitude (i.e., steeper) when looking at subjects' last choices, reinforcing Figure 3. The slopes are estimated to be around a quarter larger for the last choice than for the first choice for both the dictator games ($0.11/0.37 = 30\%$) and the prisoner's dilemmas ($0.12/0.50 = 24\%$). Finally, the last row reports p-values from the test that subjects become more generous over time for the exchange rate of 10. These p-values are $p < 0.001$,

Cappelen et al. (2016)— generates directionally less generosity over time, which is consistent with the findings in that paper.

reinforcing the non-parametric tests that show increases in generosity for high exchange rates.

Table 3—Changes in Generosity and the Exchange Rate

	Combined		Dictator Games		Prisoner's Dilemmas	
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)	(6)
Rate × Last Choice	0.011***	0.011***	0.011***	0.011***	0.012***	0.012***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Last Choice	-0.045***	-0.045***	-0.027***	-0.027***	-0.062***	-0.062***
	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)	(0.008)
Rate	0.043***	0.043***	0.037***	0.037***	0.050***	0.050***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
MTurk		0.060**		0.038		0.079***
		(0.026)		(0.031)		(0.029)
Left		0.023		0.010		0.033
		(0.019)		(0.027)		(0.026)
First 10		-0.013		-0.092***		0.068**
		(0.013)		(0.027)		(0.027)
PD First		0.083***				
		(0.023)				
Dictator	0.007	0.016				
	(0.013)	(0.013)				
Constant	0.292***		0.318***		0.273***	
	(0.014)		(0.014)		(0.014)	
Controls	No	Yes	No	Yes	No	Yes
Observations	20,140	20,140	9,880	9,880	10,260	10,260
Subjects	553	553	494	494	513	513
R^2	0.098	0.109	0.072	0.082	0.127	0.141
Last Choice at Rate = 10	0.070	0.070	0.080	0.080	0.059	0.059
	$p = 0.000$	$p = 0.000$	$p = 0.000$	$p = 0.000$	$p = 0.000$	$p = 0.000$

Note: Table 3 shows linear probability model estimates of how generosity (transferring one dollar) responds to the exchange rate and changes over time. *Rate* shows the slope with respect to the first choice. *Rate* × *Last Choice* shows how the slope changes when comparing last choices to first choices. *Last Choice* shows the estimated change in generosity for the exchange rate of zero when going from first to last choice. *Last choice at rate = 10* reports *Last Choice + 10(Rate* × *Last Choice*), the estimated change in generosity for the exchange rate of 10 when going from first to last choice, and the p-value that it is equal to zero from a post-estimation test. Regressions (2), (4), and (6) additionally control for whether the button to be generous was on the left, for whether the game was played in the first set of 10 questions, and whether the subject came from MTurk. Controls include an indicator for the number of questions of the same game the subject had already answered, an indicator for the exchange rate they faced in the previous round, and an indicator for the second of the other player that was used in the prisoner's dilemma game. For the combined data, we also report whether the game was a dictator game and, in regression (2), whether the prisoner's dilemma was played first. Standard errors are clustered by subject. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

In Table 3, columns (2), (4), and (6) have additional controls for the subject pool (i.e., MTurk vs. Wharton), whether the transfer button was on the left (which was randomly assigned by subject), whether subjects were answering their first or second set of 10 questions, whether the dictator games or prisoner's dilemmas were played first, as well as indicators for the number of questions of the question type the subject had previously answered and indicators for the exchange rate they faced in the previous round. While there are some level effects (e.g., MTurk subjects are more generous overall), the key coefficients of interest: *Rate*, *Last Choice*, *Rate* $\times$ *Last Choice*, and *Last Choice at Rate = 10* and their standard errors are essentially identical to the corresponding uncontrolled regression. For this reason, we do not include these controls for the remainder of the analyses, though adding them never qualitatively changes the results.

Appendix Table A4 additionally shows that our results are consistent when we only use data from the very first question that subjects answer in the experiment, when we restrict attention to either the first five or the last five questions of each game type, and when we only focus attention on exchange rates of 1 and higher. In Appendix Table A5, we show that our results are driven by subjects becoming less generous in dictator games with $X = 0$ and $X = \frac{1}{2}$ and in prisoner's dilemmas with $X = 0$, $X = \frac{1}{2}$, $X = 1$, and $X = 2$ as well as becoming more generous in dictator games with $X = 3$ and higher and in prisoner's dilemmas with $X = 4$ and higher.[21]

[21]That we find somewhat different patterns for exchange rates 1 and 2 between the dictator games and prisoner's dilemmas suggests that subjects' attitudes towards reciprocity may change with deliberation or that subjects' beliefs about the choices of the other subject changes with deliberation (Cooper and Kagel (2016) shows that it is notoriously difficult to disentangle various motivations).

IV. Are Changes in Choices Really Due to Deliberation?

We interpret our results as reflecting changes in behavior from intuitive to deliberate choices. This interpretation rests on the assumption that first choices are intuitive (i.e., based on subjects having seen the exchange rate and developed a first intuition about it) rather than random. In this section, we report results from a series of robustness tests which provide evidence that first choices are representative of underlying preferences and are not random.

A. First Choices Respond to the Exchange Rate

If first choices are completely random—and made without processing any information relevant to the decision—we would expect them to be uncorrelated with the exchange rate. In Figure 4, we plot the percentage of first choices that are generous as a function of the exchange rate for both the timed dictator games and timed prisoner's dilemmas. When subjects face a low exchange rate in their first choice, roughly 15% choose to transfer the \$1 to another subject. However, as the first choice exchange rate increases and giving becomes more efficient, the fraction of subjects being generous increases to over 60%. In other words, the fraction of subjects whose first choice is to transfer the \$1 quadruples from an exchange rate of zero to an exchange rate of 10. That generosity is so highly responsive to the exchange rate suggests that first choices cannot be purely random.

B. Timed First Choices are Not Faster Than Untimed Choices

If choices are somewhat random—and made too quickly to sufficiently process the information relevant to the decision—we would expect them to be made more quickly than the final choices subjects make when not facing time

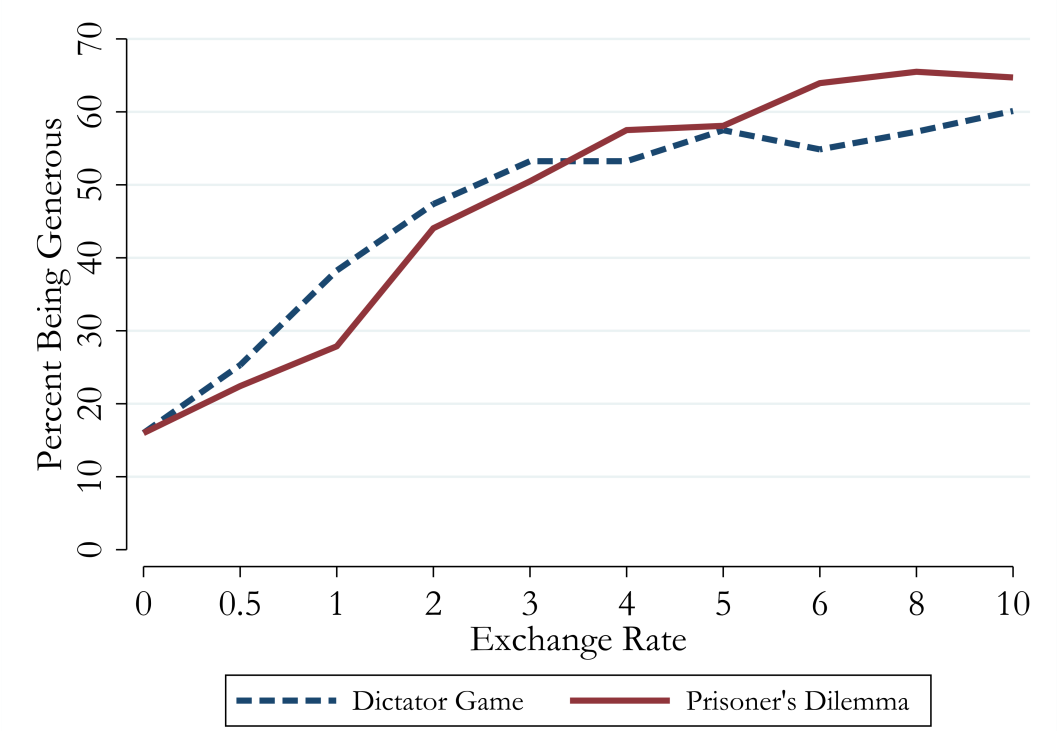
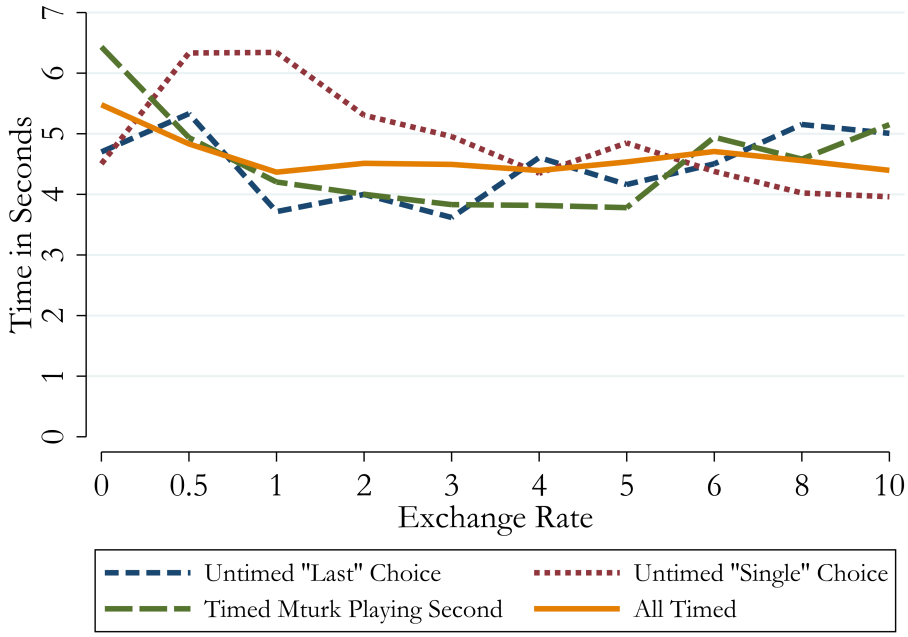


Figure 4. Percent Being Generous (i.e., average transfer rates for first choices) for all 10 exchange rates for 494 subjects who answered the timed DG questions and 513 subjects who answered the timed PD questions.

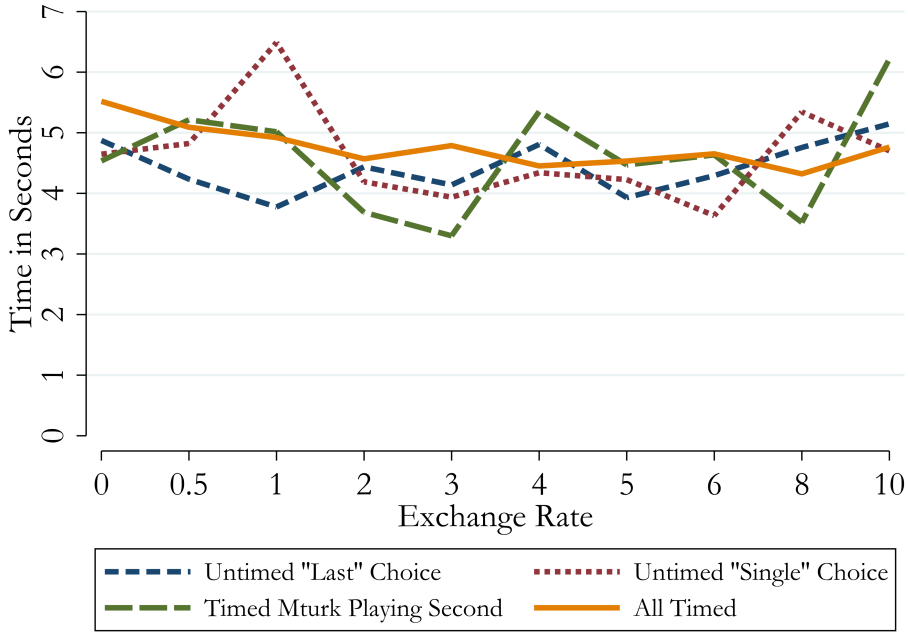
constraints. In Figure 5, we therefore compare the speed of first choices in the timed treatments to the speed of final choices in the untimed treatments (i.e., where subjects made decisions at their own pace). We find that the time of first choices in the timed treatments is virtually identical to the time of final choices in the untimed treatments.[22] This suggests that first choices in the timed treatments are instinctive, or as instinctive as choices made in typical (untimed) experiments.[23]

[22] Appendix Figure A2 confirms these results using medians instead of means. Appendix Figure A3 shows that the speed of first choices is not only the same on average, but also in CDFs.

[23] While the speed of first choices in the timed treatment and last choices in the untimed treatments is the same in our experiment—which is convenient to confirm that first choices are instinctive rather than random in our timed treatment—we do not expect this to hold in general; for example, it may be unlikely to hold in more complex decision environments.



(a) Speed of First Choices in Dictator Games



(b) Speed of First Choices in Prisoner's Dilemmas

Figure 5. Average speed of choices in the untimed control treatments compared to the speed of first choices in the timed versions.

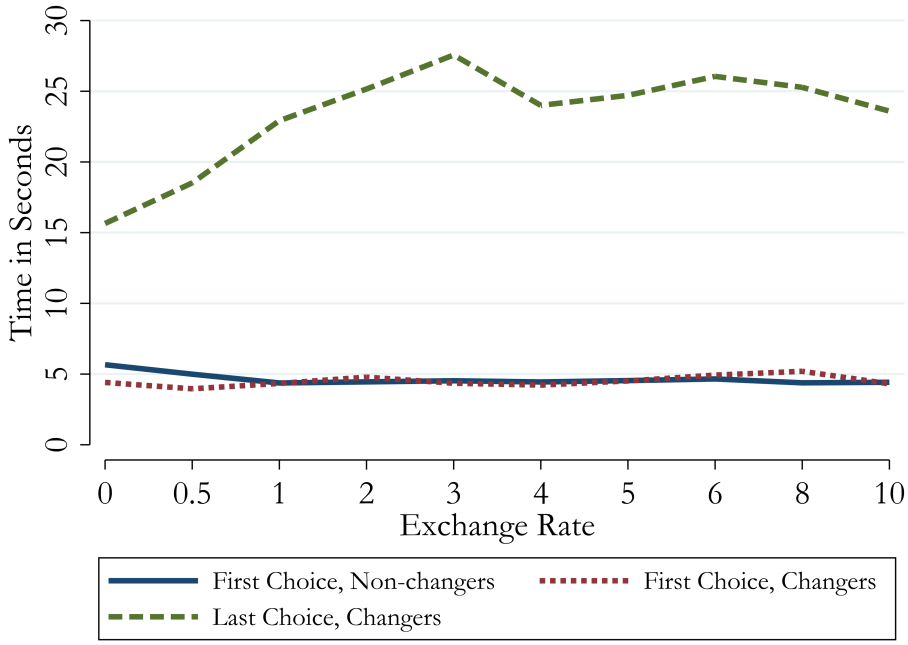
Notes: Since all untimed treatments involve MTurk subjects answering their second set of 10 questions, we show the speed of first choices in the timed treatments of MTurk subjects answering their second set of 10 questions as well as the speed of first choices of all subjects in the timed treatments. Panel A shows results from dictator games and Panel B shows results from prisoner's dilemmas

Because only MTurk subjects answered untimed questions, and because they always answered them after answering 10 timed questions, we may pay particular attention to comparisons between MTurk subjects playing the second set of 10 questions (the long dashed line in Figure 5).[24] That said, we find that decision speed is nearly identical when we compare all subjects who answered timed questions (see the solid line in Figure 5 and Appendix Table A2).[25]

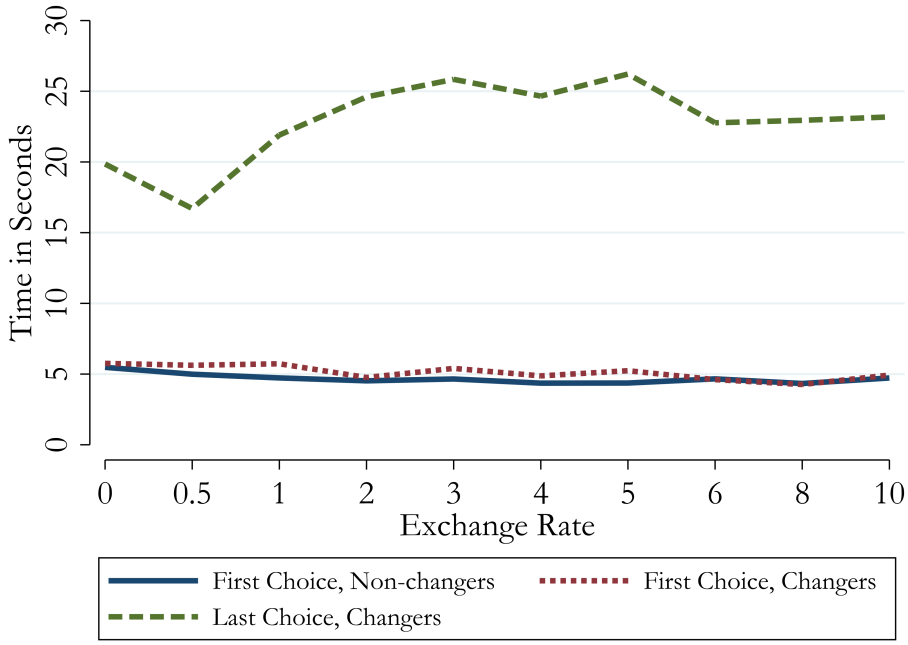
Figure 5 shows that the average time of first choices in the timed games is the same as the time of first (and final) choices in the untimed games. However, the data we use to identify how generosity changes with deliberation necessarily come from subjects whose choices change over the course of 60 seconds. Consequently, we want to ensure that the first choices of subjects who change their choices are not made unduly fast. Furthermore, we want to show that, conditional on a choice being changed, last choices are indeed made with more deliberation and are not quick corrections of initial choices. In Figure 6, we plot—for each game type and each exchange rate—the speed of first choices of subjects who subsequently change their choice and of those who do not. We find that the speed of first choices is comparable across groups, suggesting that the speed of first choices of subjects who change their mind is not unduly fast. In Figure 6, we also plot—for each game type and each exchange rate—the time to last choices of subjects who change their choice. The average time to last choices is about 25 seconds, which is 20 seconds longer than the time to first choices, suggesting that when individuals change their

[24]One might argue that having subjects play 10 timed questions, in which there is an incentive to answer quickly, may "train" subjects to answer quickly in response to the untimed questions. However, those timed questions similarly "train" subjects to sit with each question for a minute and think about it. Whether this speeds up or slows down response time to the untimed questions, if either, is ambiguous.

[25]As shown in Appendix Figure A4, the speed of first choices increases as subjects gain more experience playing timed games. Because we randomized the order in which exchange rates are shown to subjects at the individual level, we can average across all games without this affecting the estimated speed of any specific exchange rate.



(a) Speed of First and Last Choices in Dictator Games



(b) Speed of First and Last Choices in Prisoner's Dilemmas

Figure 6. Average time in seconds to first and last choices for subjects who change their choice in the timed treatment at each exchange rate; average time to first choices for those who do not change their choices in the timed treatment at each exchange rate. Panel A shows results from dictator games and Panel B shows results from prisoner's dilemmas.

mind, their last choices reflect substantially more deliberation than their first choices.

C. Timed First Choices are Not Different from Untimed Choices

In this section, we compare what is selected in the first choices (i.e., whether or not the subject transferred \$1) of the timed treatment to what is selected in the final choices of the untimed treatments. Given that their speed is similar—as shown in the previous section—we would expect choice values to be very similar in the timed and untimed dictator games. For the prisoner's dilemmas, the choices may still differ despite being made at the same speed, since beliefs about the other player's choice may differ across the timed and untimed treatments.[26] That said, for the prisoner's dilemmas, we can still test whether choices are equally responsive to the exchange rate across the timed and untimed treatments. Table 4 shows that, in the dictator games, first choices are virtually identical in the timed and untimed treatments. The table further shows that while subjects are more generous in the timed prisoner's dilemmas than in the untimed prisoner's dilemmas, the change in generosity as a function of the exchange rate is very similar.[27]

D. Additional Robustness Tests

In this section, we provide two final types of robustness tests to show that changes in decisions reflect a difference between intuitive and deliberate choices and not between random decisions and quick corrections. The first type of

[26]Recall that in the timed version of the prisoner's dilemma, a subject plays against the decision another subject made at second 15 (or 45); in the untimed version, a subject plays against whatever choice another subject made in the same untimed setting.

[27]Since untimed questions are always answered by MTurk subjects after 10 previously timed questions, for choices in timed games we restrict attention to MTurk subjects who play the timed questions after having answered 10 timed questions (of the other game type).

Table 4—First Choice Generosity of MTurk Subjects Playing Second, Timed vs. Untimed

	Dictator Games		Prisoner's Dilemmas	
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)
Timed Games × Rate		0.001		-0.012
		(0.008)		(0.009)
Timed Games	0.012	0.007	0.126**	0.172***
	(0.057)	(0.054)	(0.057)	(0.054)
Rate		0.042***		0.048***
		(0.005)		(0.006)
Constant	0.112***	0.368***	0.104***	0.156***
	(0.030)	(0.031)	(0.034)	(0.028)
Rate FE	Yes	No	Yes	No
Observations	1,560	1,560	1,480	1,480
Subjects	156	156	148	148
R^2	0.134	0.073	0.110	0.096

Note: Table 4 compares generosity (transferring one dollar) of MTurk subjects playing in their second set of 10 questions to all subjects playing the untimed versions of the game. Regressions in Columns (1) and (3) include exchange rate fixed effects. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

robustness test consists of identifying first choices that one might worry could be random and replacing those first choices with choices made later, which are more likely to be intuitive (these later choices may also be deliberate choices if our robustness tests are too conservative). We then compare these new "first" choices to last choices to address whether (further) deliberation yields different choices. The second type of robustness test consists of restricting attention to a subset of subjects who are less likely to have made random first choices.

The results of these robustness tests are reported in Table 5. Each column in the table shows the result of a separate test. These tests are conservative in nature (we often alter first choices so that they are the same as last choices or drop subjects entirely, leaving us with significantly less data to perform our analyses). Consequently, results reported in Table 5 combine data from dictator games and prisoner's dilemmas to recreate the specification in Column (1)

from Table 3 for each robustness test. For completeness, the results are broken down by game type in the Appendix (Table A6 and Table A7, respectively).[28]

We present two pairs of the first type of robustness test, which involves altering first choices. The first pair consists of identifying first choices that may have been made in error and hence may constitute mistakes rather than intuitive choices. Specifically, consider a subject whose second choice follows her first choice very quickly. This suggests that the first choice may have been a mistake (e.g., a subject meant to click the transfer button, accidentally clicked the other one, and quickly corrected it). In such a case, the subject's second choice (the quick correction of the first choice) may be the "true" intuitive choice. We rerun our main analysis by replacing first choices with second choices when a second choice comes quickly after the first choice: within 2 seconds in column (1) or within 5 seconds in column (2). Note that the median speed of first choices ranges from 2.94 and 3.85 seconds in dictator games and 2.76 and 4.05 seconds in prisoner's dilemmas, so allowing for corrections within 2 or 5 seconds both generate conservative tests.

By relabeling second choices as first choices when they come within 2 seconds of each other, we adjust first choices for 17% of the dictator games and 26% of the prisoner's dilemmas in which a subject changes their choice; for 5 seconds we adjust first choices for 42% (DG) and 48% (PD) of the questions in which a subject changes their choice. Notice that by expanding the length of time from 2 to 5 seconds we become more likely to adjust choices of subjects whose changes in behavior are actually changes from intuitive to deliberate choices, so the 5-second specification is more conservative than the 2-second specification. Columns (1) and (2) of Table 5 show that the pat-

[28]When we analyze the two types of questions separately, we always find that *Rate* × *Last Choice* is at least directionally positive for the dictator game and the prisoner's dilemma separately, and always statistically significant for at least one.

tern of behavior described earlier is robust in both specifications: *Rate* × *Last Choice* remains positive and significant and the increased responsiveness to the exchange rate is associated with subjects becoming less generous for the lowest exchange rate (*Last Choice* is negative and significant) and more generous for the highest exchange rate (*Last Choice at Rate = 10* is positive and significant).

The second pair of robustness tests also identifies first choices that one might worry are random and changes those choices to later choices. Specifically, we generate a subject-specific "reading speed" variable that is our best guess of the longest number of seconds it takes a subject to read a question and click their preferred answer. We then replace a subject's first choice with whatever choice the subject had recorded at their subject-specific reading speed. We construct the reading speed variable in two ways, both of which rely on the intuition that the choices that are easiest in our experiment are the decisions with very low exchanges rates of 0 and 0.5. In fact, these games have fewer changes in choices and subjects reach their final answers more quickly than for other exchange rates.

Our first reading speed variable is constructed by looking at subjects who change their choice in the exchange rate 0 question for a given game type. We treat as their reading speed the time at which they make their last choice for the exchange rate 0 question. Subjects who do not change their choice in the exchange rate 0 question are assigned the median of reading speeds of those who do change their choice (10.49 seconds for DG and 13.85 seconds for PD). Our second reading speed variable is constructed as the maximum time of last choice for subjects who change their choice in either of the dictator games or prisoner's dilemmas with exchange rates of 0 and 0.5. Again, subjects who do not change their choice in any of the four questions (exchange rate 0 and

0.5 in the DG or PD) are assigned the median of this reading speed variable of those who do change in at least one question (14.05 seconds). Results of the robustness tests of both reading speed measures are reported in columns (3) and (4) of Table 5. Using both measures we find that the robustness tests are consistent with the main results: *Rate* $\times$ *Last Choice* remains positive and significant, and subjects become less generous for the lowest exchange rate and more generous for the highest exchange rate.

Our second type of robustness test does not involve altering first choices. Instead, we drop data from subjects whose first choices fail to satisfy certain criteria. First, for each subject and each game type, we regress first choices on the exchange rate and drop any subject who does not have a directionally positive slope of generosity with respect to the exchange rate.[29] This drops 38% of our dictator game subjects and 31% of our prisoner's dilemma subjects. Column (5) of Table 5 shows that this robustness test is consistent with the main results—*Rate* $\times$ *Last Choice* remains positive and significant and subjects become less generous for the lowest exchange rate and more generous for the highest exchange rate. Second, for each subject and each game type, we ask whether subjects are "monotone" in their first choices. To be monotone in their first choices, a subject who is generous in their first choice for an exchange rate X must be generous in their first choice for any exchange rate larger than X (and similarly if they are selfish in their first choice for any exchange rate X, they must be selfish in their first choice for any exchange rate smaller than X). This drops roughly half of our subjects from each game type. Column (6) of Table 5 shows that this robustness test is also consistent with the main results.

[29]Note that this excludes subjects who always give or never give in their first choice within a game type.

Table 5—Changes in Generosity and the Exchange Rate (Robustness)

	Altering 1st Choices				Dropping Data	
	Replaced with 2nd Choice:		Replaced with Choice at Reading Speed:		Dropped Unless:	
	Within 2 Seconds	Within 5 Seconds	Rate 0 of Game	Max Rate 0 & 0.5 of both	Pos. Slope	Monotone 1st Choices
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)	(6)
Rate × Last Choice	0.009***	0.004***	0.004***	0.002***	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Last Choice	-0.031***	-0.015***	-0.015***	-0.011***	-0.030***	-0.018***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.006)	(0.007)
Rate	0.046***	0.050***	0.051***	0.052***	0.076***	0.056***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Dictator	0.004	0.008	0.012	0.012	0.015	0.014
	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)	(0.023)
Constant	0.279***	0.261***	0.259***	0.255***	0.264***	0.241***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.020)
Observations	20,140	20,140	20,140	20,140	13,160	10,240
Subjects	553	553	553	553	426	372
R^2	0.103	0.111	0.113	0.115	0.253	0.135
% questions adjusted	17% DG, 26% PD	42% DG, 48% PD	43% DG, 46% PD			
% data dropped					38% DG, 31% PD	50% DG, 48% PD
Last Choice at Rate = 10	0.054	0.030	0.020	0.013	0.021	0.026
	$p = 0.000$	$p = 0.000$	$p = 0.002$	$p = 0.030$	$p = 0.051$	$p = 0.009$

Note: Table 5 shows linear probability model estimates of how generosity (transferring one dollar) responds to the exchange rate. *Rate* shows the slope with respect to the first choice. *Rate* × *Last Choice* shows how the slope changes when comparing last choices to first choices. *Last Choice* shows the estimated change in generosity for the exchange rate of 0 when going from first to last choice. *Last choice at rate = 10* reports *Last Choice + 10(Rate* × *Last Choice)*, the estimated change in generosity for the exchange rate of 10 when going from first to last choice, and the p-value that it is equal to 0 from a post-estimation test. *Rate 0 of game* reading speed is defined as time to last choice if the subject changed answers in the exchange rate 0 of the question type or, if the subject did not change, then the median speed to last choice of the subjects who did change (10.49 seconds for dictator game, 13.85 seconds for prisoner's dilemma). *Max rate 0 & 0.5 of both* reading speed is defined as the maximum time to last choice if the subject changed answers in at least one of the exchange rate 0 or 0.5 questions in either question type. If the subject did not change answers to any of those four questions, the median reading speed of those who did (14.05 seconds) is used. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

V. Why Do Deliberate Choices Differ from Intuitive Choices?

We have shown that deliberate choices differ from intuitive choices and that changes are a function of the exchange rate. Compared to intuitive choices, subjects' deliberate choices are less generous for low exchange rates and more generous for high exchange rates. In this section, we present evidence on why choices change with deliberation.

We aim to disentangle two hypotheses. One hypothesis is that underlying preferences change with deliberation. Under this hypothesis, subjects correctly implement their preferred outcome with their intuitive choice and then change their choice when they prefer a different outcome. Another hypothesis is that individuals have static preferences, but intuitive choices are an imperfect implementation of these static preferences and deliberate choices are more accurate implementations of true preferences. Under this hypothesis, subjects need time to correctly compute the choice that best reflects these static preferences.[30]

To explore the second hypothesis, we investigate behavior in an environment where subjects can be expected to have static preferences. In this environment, we explore how long it takes subjects to implement these preferences and whether they need to change their answers to correctly implement these preferences. In particular, we explore the "accounts" treatment, which mirrors the dictator games with one crucial difference: we eliminate the other subject. Instead of deciding whether to transfer \$1 from herself to another subject who receives $\$X$, a subject in the accounts treatment decides whether to transfer \$1 from one account she owns to another account she also owns (where the

[30]If this latter hypothesis is true, then subjects in our untimed treatments are likely failing to correctly implement their static preferences since they make choices that look—in both speed and outcome—very much like the first choices subjects make in our timed treatments.

$1 transferred still turns into $\$X$). Preferences are presumably static in that subjects should always want to make a transfer that maximizes their earnings. In all other respects, the accounts treatment is as similar as possible to the dictator game and the 60-second decision screens are virtually identical (compare Appendix Figure A1 and Figure 1).

We perform two tests where we compare data from the accounts treatment to data from the dictator games in the timed treatment. First, we investigate how long it takes subjects to arrive at a final answer if they change their answer. Second, we investigate the patterns of changed answers. We hypothesize that if subjects in the dictator games have static preferences and first choices are merely imperfect implementations of those preferences that later choices correct, the speed and patterns of decision-making should be similar across the accounts treatment and the timed dictator games.

Table 6 reports on the relative speed of choices in the accounts and dictator game data. The first set of three columns compares the accounts treatment, which was always played first, with all dictator games that were played first. Since only MTurk subjects played the accounts treatment, the second set of three columns compares the accounts treatment to all dictator games played first by MTurk subjects. Columns (1) and (4) compare the average speed of first choices. Columns (2) and (5) compare the average speed of last choices. Columns (3) and (6) compare the average speed of last choices for those who changed choices such that the first and last choices are different. The data shows that while subjects' first choices are roughly made at the same time, the subjects who change their minds—those who drive the main results in Section III—take much longer to make their final choices in the dictator game than in the accounts treatment.[31] This pattern suggests that at least some

[31]These results are robust to using the log of the number of seconds rather than the

of the changes in the dictator game are due to changes in preferences rather than subjects needing time to implement static preferences. If subjects in dictator games change their choices solely because it took them time to process the exchange rate, then the speed of last choices among subjects who change their choice should be similar between the dictator game and the accounts treatment. The fact that subjects who change their choices in dictator games take much longer to reach a final choice than subjects in the accounts treatment reveals that subjects in dictator games are doing more than just recognizing that the exchange rate is high or low.

Table 6—Speed of Choices, Dictator Games v. Accounts Treatment

	All Played First			MTurk Played First		
	1st Choice	Last Choice	Last Choice if Changed	1st Choice	Last Choice	Last Choice if Changed
Dep. Variable: *Seconds*	(1)	(2)	(3)	(4)	(5)	(6)
Dictator	0.271	1.162	7.918***	0.364	0.224	5.277**
	(0.390)	(0.998)	(2.059)	(0.474)	(1.137)	(2.614)
Constant	4.571***	8.237***	13.032***	4.571***	8.237***	13.032***
	(0.340)	(0.882)	(1.671)	(0.340)	(0.883)	(1.675)
Observations	3,630	3,630	596	1,940	1,940	321
Subjects	363	363	233	194	194	123
R^2	0.001	0.002	0.048	0.001	0.000	0.029

Note: Table 6 compares the speed of choices in the accounts treatment to timed dictator games played first either including all subjects in Columns (1) and (3) or including MTurk subjects playing first in Columns (4) and (6). *Dictator* is an indicator for the dictator game (rather than the accounts treatment). Analysis in Columns (3) and (6) compares speed of last choices conditional on the subject changing their choice such that their first and last choices are different. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

The second test we perform is to compare choice patterns between dictator games and the accounts treatment for subjects who change their answers. For this exercise, we focus on exchange rates of 2 and above where the choice in the accounts treatment that maximizes a subject's earnings is to transfer the \$1.[32]

number of seconds (see Appendix Table A8).

[32]As is common in the literature on other-regarding preferences, we ignore other-regarding

For these exchange rates, subjects in the dictator game become more generous over time. If these changes in choices in dictator games arise due to changing preferences with regard to another subject (e.g., changing concerns for social efficiency over time), then the pattern of choices in the accounts treatment should be different from that in the dictator games. If, however, changes in choices in dictator games are due only to subjects' failure to process the level of efficiency of the exchange rate, then the behavior in the accounts treatment should mirror the behavior in dictator games.

Table 7 compares changes in the decision to transfer \$1 across the dictator games and accounts questions for exchange rates $X \geq 2$.[33] Column (1) shows that in the accounts treatment, there is no significant difference in generosity between later and earlier choices. Column (2) shows data from all subjects who played dictator games first. It finds that for these exchange rates ($X \geq 2$), last choices are on average 5 percentage points more generous than first choices. Column (3) compares Columns (1) and (2) and shows that the difference in changes in generosity is significant. Columns (4) and (5) repeat this exercise restricting the analysis to MTurk subjects who played dictator games first.[34]

One potential worry is that because the initial proportion of subjects transferring \$1 in the accounts treatment is higher—the constant is 0.84 in the accounts treatment in Column (1) but only 0.47 in the dictator games in Column (2)—there are simply fewer subjects for whom the last choice is different from the first choice in the accounts treatment compared to the dictator games. This could be why we find a significant difference in the change in generosity

preferences that concern the experimenter.

[33]We label the dependent variable *Generosity* for consistency, though transferring in the accounts treatment is not being generous—it is turning \$1 into \$$X$ for the subject's other account.

[34]In Table A9, we rerun the analysis in column (3), making the same adjustments to first choices described in Section IV (i.e., replacing the first choice with the second choice if the second choice is made within 2 seconds of the first choice). This yields similar results.

Table 7—Changes in Generosity, Dictator Games v. Accounts Treatment

		All Played First		MTurk Played First	
	Accounts	Timed DG	Combined	Timed DG	Combined
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)
Dictator × Last Choice			0.060**		0.069**
			(0.024)		(0.030)
Last Choice	-0.009	0.050***	-0.009	0.060**	-0.009
	(0.019)	(0.014)	(0.019)	(0.023)	(0.019)
Dictator			-0.369***		-0.352***
			(0.031)		(0.045)
Constant	0.837***	0.468***	0.837***	0.486***	0.837***
	(0.020)	(0.023)	(0.020)	(0.040)	(0.020)
Observations	1,316	3,766	5,082	1,400	2,716
Subjects	94	269	363	100	194
R^2	0.000	0.003	0.093	0.004	0.116

Note: Table 7 compares choices in the accounts treatment in Column (1) to choices in the timed dictator game played first either including all subjects in Columns (2) and (3) or including MTurk subjects playing first in Columns (4) and (5), always for questions with an exchange rate $X \geq 2$. *Last* indicates it was the last choice subjects made in the minute. *Dictator* indicates it was the dictator game rather than data from the accounts treatment. *Dictator* × *Last* is the interaction of these two variables. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

in these two treatments. However, when we check the proportion of subjects with different first and last choices in the accounts treatment (13.7%), we find that the proportion is nearly identical to the dictator game data both when we include all subjects who play the dictator game first (16.3%) or MTurk subjects who play the dictator game first (14.6%). This means that there are just as many subjects changing choices such that their first choice is different from their last choice, but subjects in the dictator games are becoming more generous whereas the changes in the accounts treatment are not systematic.

VI. Conclusion

We use a direct test that incentivizes choices over the course of a minute to assess whether preferences for giving change with deliberation. We use simple dictator games and prisoner's dilemmas. We find that deliberate choices are

more responsive to the efficiency of giving than intuitive choices. Individuals become systematically less generous for low exchange rates and more generous for high exchange rates over the course of a minute.

Control treatments and robustness tests reveal that this pattern is not an artifact of our experimental design, nor does it arise due to random first choices. That the pattern holds for both dictator games and prisoner's dilemmas suggests that changes in choices are not solely due to changes in beliefs or changes in the interpretation or considerations about the choices of others. Comparing behavior in the dictator game to a version where all payoffs go to the same subject shows that the change in choices in the dictator game cannot be fully attributed to a subject having difficulty in interpreting the exchange rate. Rather, as individuals deliberate longer, their choices change in a way that is largely consistent with preferences changing to place more weight on social efficiency.

Our experiments thus refute two hypotheses in the existing literature. First, we can reject that choices and preferences are stable over time, a possibility that had been left open by critiques of the previous approaches to testing dual-system models (e.g., Recalde, Riedl and Vesterlund, 2018). Second, we can reject that individuals become uniformly less (or more) generous over time, refuting the hypothesis by Rand, Greene and Nowak (2012). Rather, our results suggest that subjects change their choices with deliberation because deliberation leads them to care more about the efficacy of their giving. If one were to ascribe behavior to a dual-system (or dual-self) model, our results would lend support to the second, slower process being more calculating (see, e.g., Loewenstein and Small, 2007).[35]

[35]In a similar spirit, Imas, Kuhn and Mironova (2022) shows that more deliberation leads to less present bias.

While our experiment was primarily designed to test whether and how prosocial choices change over the course of a minute, we have a rich dataset on how long it takes individuals to make a choice in an environment where there are explicit costs of delay. While not a focus of our paper, our data allow us to speak to prior work on the speed of choices and to test a comparative static prediction of drift diffusion models, which we do in Appendix B.[36] Consistent with the drift diffusion model, subjects in our experiment take longer to make a choice for hard questions where they are likely to be close to indifferent.

Our results also highlight two potential complications of using revealed preference for welfare analysis in the context of generous behavior. Given that preferences towards giving change over time, it is open for debate which preference we should honor for welfare calculations—intuitive choices or deliberate choices. Second, we find that the choices subjects make in untimed games (when they have as much time as they want to make decisions) are as fast as the first choices in timed games, in which subjects can subsequently change their choice. Since most questions answered in the world are answered in the untimed way, this suggests that choices observed in practice might be intuitive choices that do not necessarily reflect deliberate preferences. Consequently, without the ability to observe changes in choices over time, we do not know whether we are observing an intuitive or deliberate choice, which makes it hard to use revealed preference for welfare analysis, even if we decided which set of preferences we wanted to honor.

Policymakers who want to encourage private provision of public goods and charity fundraisers can also learn from our results. In particular, our results suggest that less efficient charities might have more success raising funds if

[36] As discussed in Appendix B, the comparative static allows us to distinguish a drift diffusion model from a model of rational inattention with sequential information sampling.

they ask for donations in settings without much opportunity for deliberation (e.g., as individuals are walking by on the street or on a check-out screen at the supermarket). In contrast, more efficient charities might generate more donations by giving potential donors time to reflect on the opportunity to donate, so that preferences for social efficiency are heightened.[37] In addition, given that preferences change as potential donors deliberate, the charitable appeals that are more effective at encouraging giving when individuals are making intuitive choices might differ from the appeals that are effective when individuals have more time to reflect. Exploring which types of appeals work best in each environment is an interesting avenue for future work.

[37]Of course, changes in attitudes toward generosity may not be the only thing that changes over time. Previous work has shown that in some settings individuals may use extra time to look for an "excuse" not to give (Exley, 2016, 2020).

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Appendix A: Figures and Tables

Appendix A includes an additional decision screen from the experiment as well as secondary results excluded from the main text.

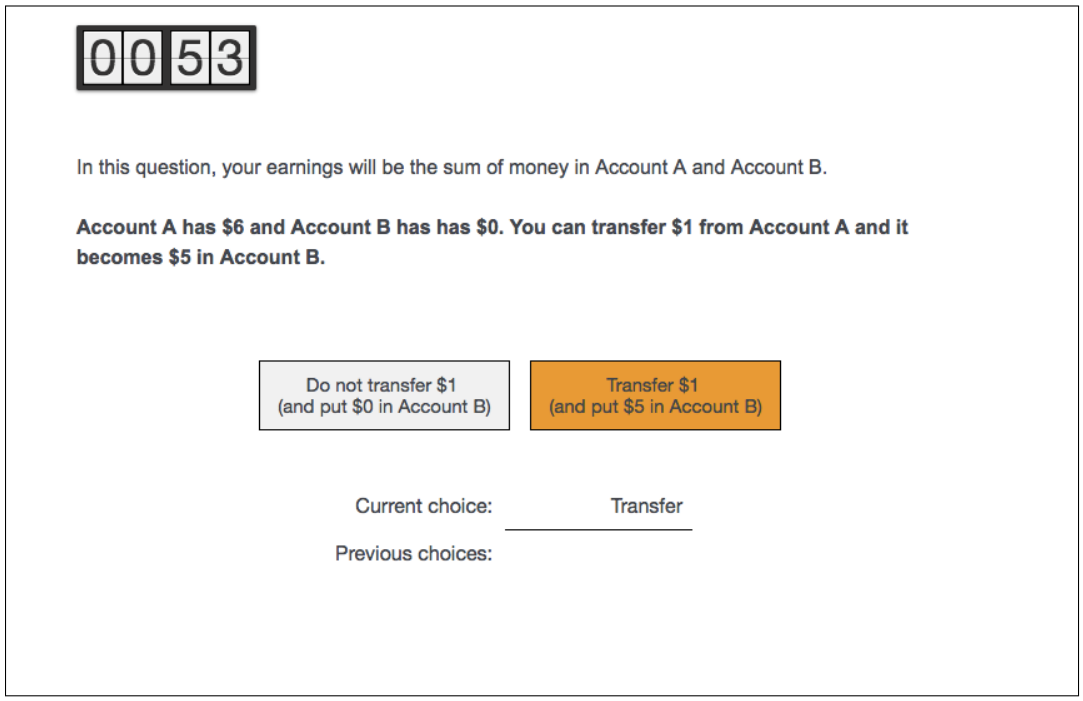
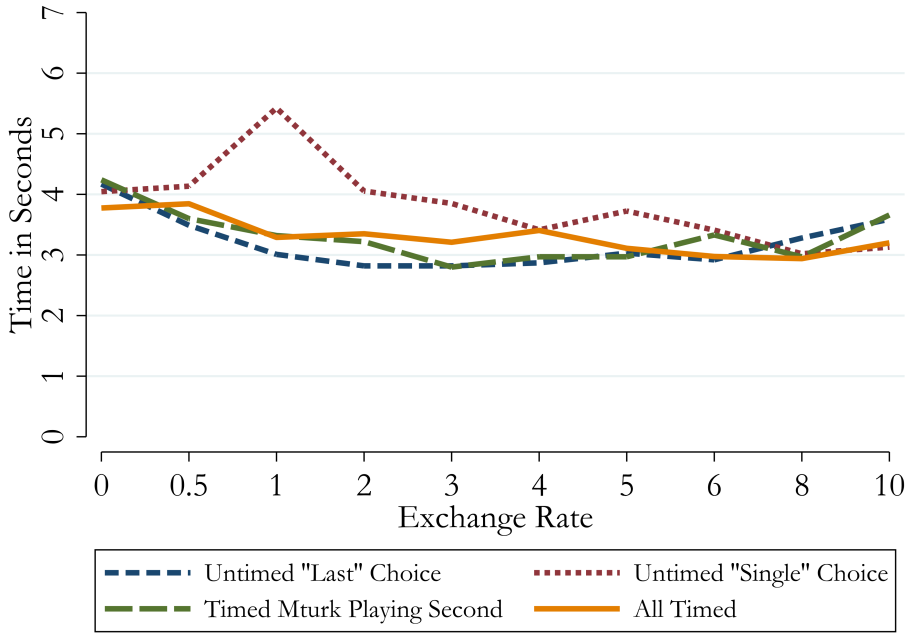
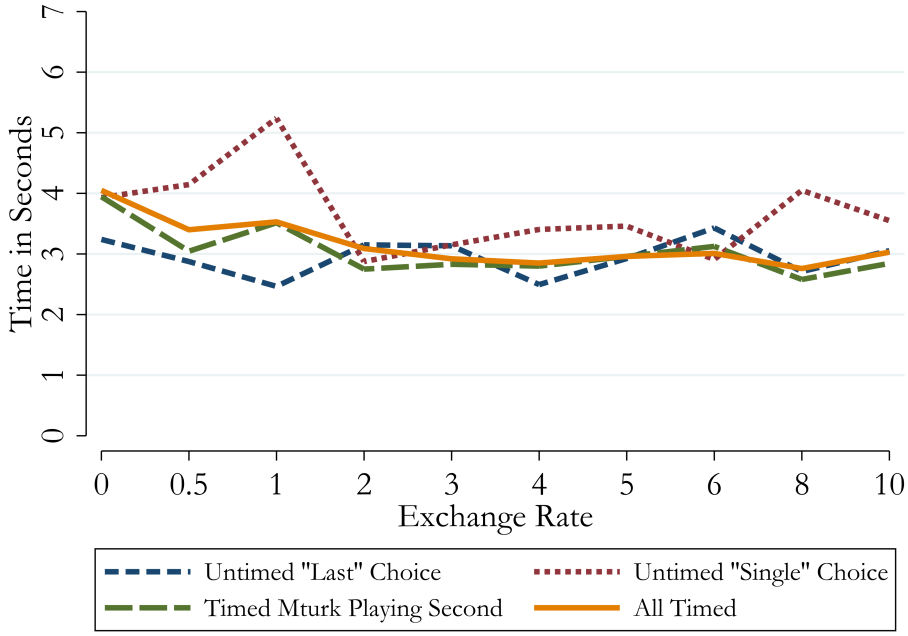


Figure A1. Decision Screen for "Accounts" Questions

Notes: This is how the accounts question with exchange rate of 5 would look if a subject had clicked to transfer within the first 7 seconds of the minute. A typo in the survey code inserted an extra "has" between "Account B" and "$0" in the first bold sentence. This typo was only caught after all data had been collected.

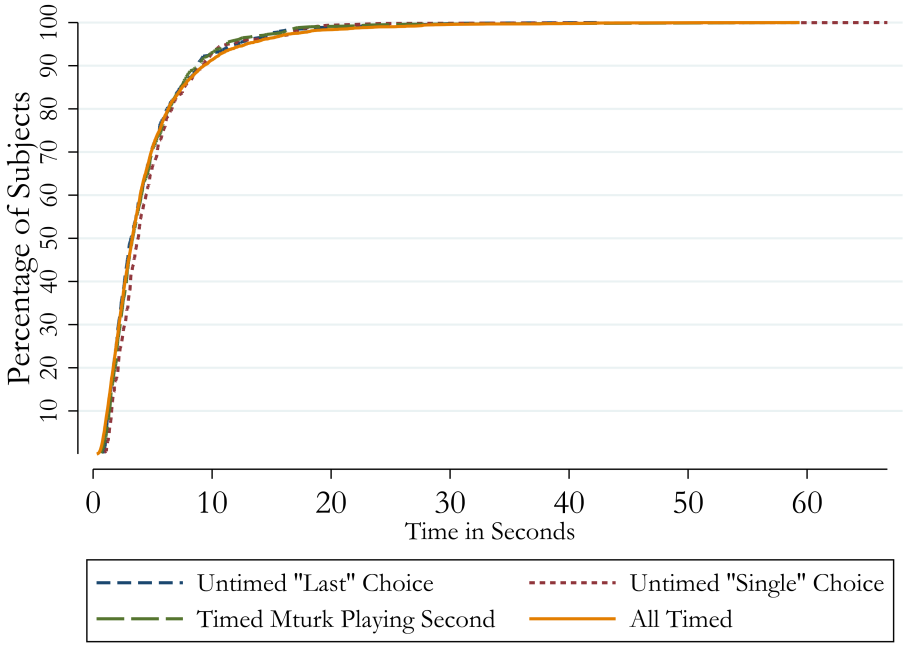


(a) Median Speed of 1st Choices in Dictator Games

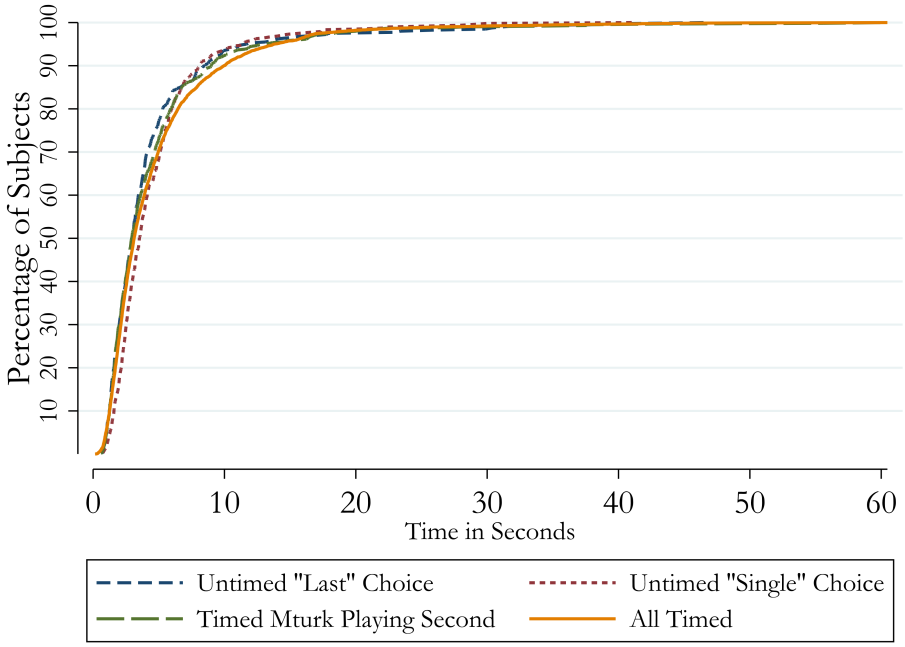


(b) Median Speed of 1st Choices in Prisoner's Dilemmas

Figure A2. Median speed of choices in the untimed control treatments compared to the median speed of first choices in the timed versions.

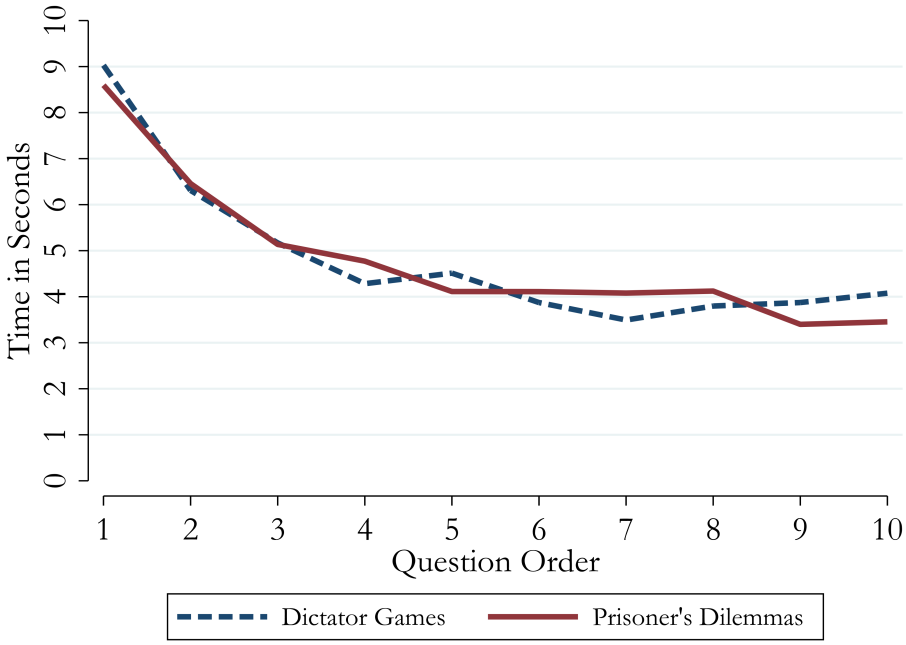


(a) Dictator Games

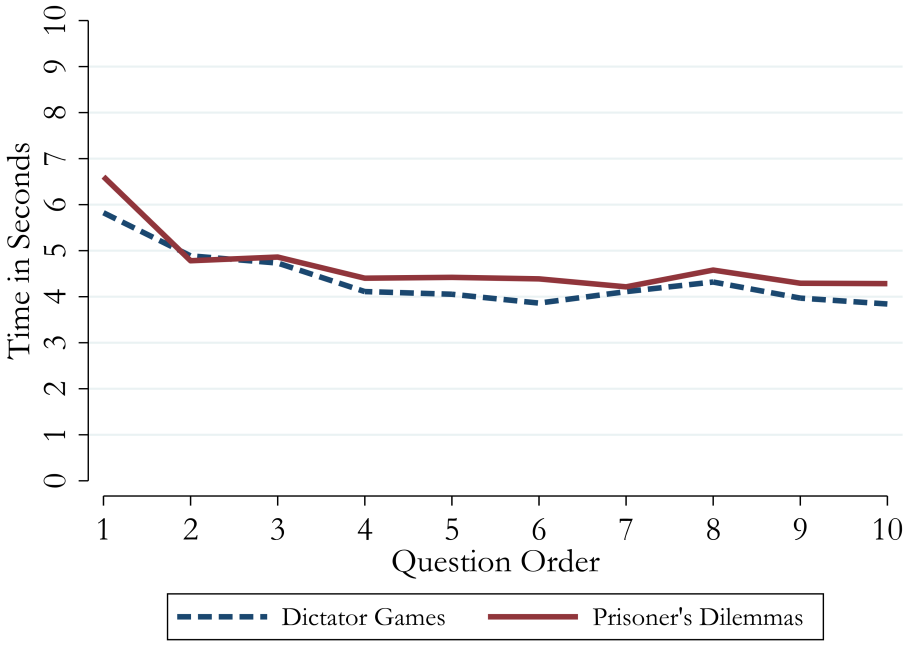


(b) Prisoner's Dilemmas

Figure A3. CDFs of decision times of first choices, collapsed across all exchange rates for the dictator games (Panel A) and the prisoner's dilemmas (Panel B).



(a) Speed of 1st Choices for 1st Set of 10 Questions



(b) Speed of 1st Choices for 2nd Set of 10 Questions

Figure A4. Average speed of first choices in the timed questions by the order in which the subject saw the question, averaging over exchange rates.

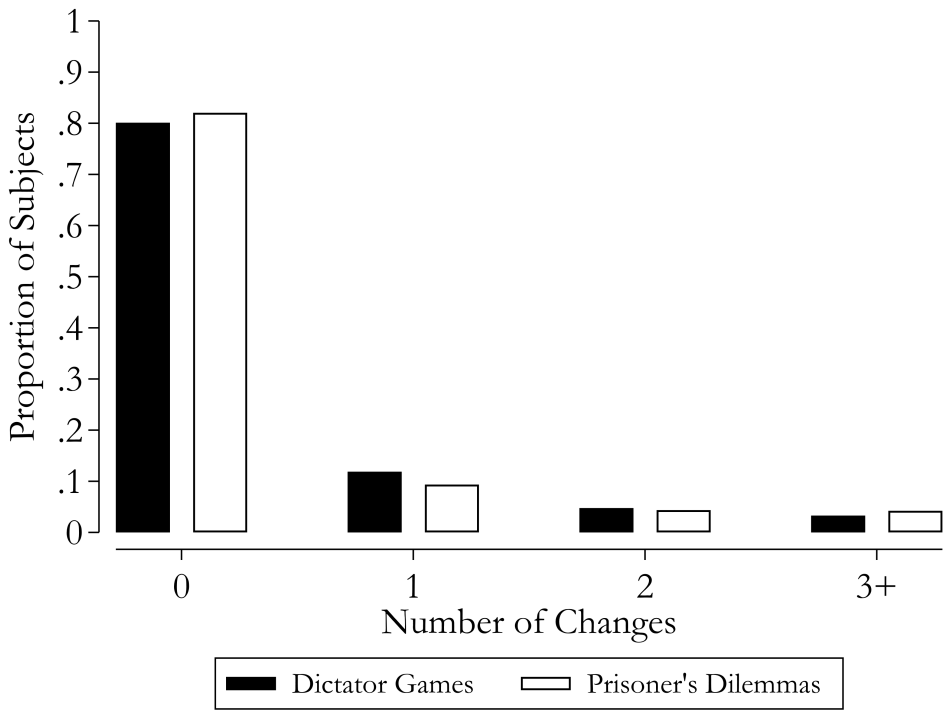


Figure A5. Overall Number of Times Subjects Change Choices within a Question

Table A1—Wharton v. MTurk Subjects

	Speed of 1st Choice (Seconds)	Generosity (DG)	Generosity (PD)	Changed Choice
	(1)	(2)	(3)	(4)
MTurk	0.187	0.021	0.096***	-0.055***
	(0.252)	(0.033)	(0.030)	(0.016)
Dictator	-0.129			0.003
	(0.122)			(0.010)
Constant	5.502***	0.154***	0.128***	0.153***
	(0.227)	(0.018)	(0.018)	(0.014)
Rate FE	Yes	Yes	Yes	Yes
Observations	10,070	4,940	5,130	11,060
Subjects	553	494	513	553
R^2	0.004	0.082	0.134	0.007

Note: Table A1 compares subjects playing on Amazon's Mechanical Turk to those playing in the Wharton Behavioral Lab. Regressions include exchange rate fixed effects. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A2—Speed, MTurk Subjects Playing Second v. All Timed Subjects

	All	Dictator Game	Prisoner's Dilemma
Dep. Variable: *Seconds*	(1)	(2)	(3)
MTurk Played 2nd	-0.132	-0.066	-0.189
	(0.260)	(0.404)	(0.386)
Dictator	-0.136		
	(0.122)		
Constant	5.580***	5.486***	5.540***
	(0.216)	(0.278)	(0.263)
Rate FE	Yes	Yes	Yes
Observations	10,070	4,940	5,130
Subjects	553	494	513
R^2	0.004	0.005	0.004

Note: Table A2 compares speed of first choices for MTurk subjects playing in their second set of 10 questions to all other timed subjects. Regressions include exchange rate fixed effects. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A3—Percent of Subjects Changing Choice for Given Number of Questions

Panel A: First 5 Questions	0	1	2	3	4	5
Dictator Games	44.7	28.1	12.3	6.3	4.9	3.6
Prisoner's Dilemmas	44.6	26.9	13.3	7.4	4.5	3.3
Panel B: Last 5 Questions	0	1	2	3	4	5
Dictator Games	57.3	22.7	9.5	4.7	4.5	1.4
Prisoner's Dilemmas	64.1	18.7	7.8	4.1	3.5	1.8

Table A4—Changes in Generosity and the Exchange Rate (Robustness)

	First Round	First 5 Rounds	Last 5 Rounds	Dropping $X = 0, X = 0.5$
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)
Rate × Last Choice	0.013**	0.012***	0.011***	0.008***
	(0.007)	(0.002)	(0.002)	(0.002)
Last Choice	-0.122***	-0.058***	-0.032***	-0.025***
	(0.032)	(0.008)	(0.008)	(0.008)
Rate	0.039***	0.041***	0.046***	0.028***
	(0.006)	(0.002)	(0.003)	(0.002)
Dictator	-0.114***	0.015	-0.001	0.003
	(0.035)	(0.015)	(0.015)	(0.015)
Constant	0.411***	0.302***	0.282***	0.396***
	(0.037)	(0.016)	(0.016)	(0.018)
Observations	1,106	10,070	10,070	16,112
Subjects	553	553	553	553
R^2	0.104	0.090	0.106	0.035
Last Choice at Rate = 10	0.010	0.065	0.074	0.060
	$p = 0.816$	$p = 0.000$	$p = 0.000$	$p = 0.000$

Note: Table A4 shows linear probability model estimates of how generosity (transferring one dollar) responds to the exchange rate. *Rate* shows the slope with respect to the first choice. *Rate* × *Last Choice* shows how the slope changes when comparing last choices to first choices. *Last Choice* shows the estimated change in generosity for the exchange rate of zero when going from first to last choice. *Last choice at rate = 10* reports *Last Choice + 10(Rate* × *Last Choice)*, the estimated change in generosity for the exchange rate of 10 when going from first to last choice, and the p-value that it is equal to 0 from a post-estimation test. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A5—Changes in Generosity and the Exchange Rate (Robustness)

	Dictator Game		Prisoner's Dilemma	
	Low Rate ($X = 0, 0.5$)	High Rate ($X = 3, ..., 10$)	Low Rate ($X = 0, 0.5, 1, 2$)	High Rate ($X = 4, ..., 10$)
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)
Last Choice	-0.052***	0.044***	-0.066***	0.023***
	(0.011)	(0.010)	(0.008)	(0.008)
Constant	0.206***	0.560***	0.276***	0.619***
	(0.015)	(0.018)	(0.013)	(0.018)
Observations	1,976	5,928	4,104	5,130
Subjects	494	494	513	513
R^2	0.005	0.002	0.006	0.001

Note: Table A5 shows linear probability model estimates of how generosity (transferring one dollar) in first choices and last choices differs as a function of the game and whether the exchange rate is low or high. We define low and high based on the direction of the changes in Figure 3 (based on whether the graph shows an increase or decrease from first to last choice) to demonstrate robustness without linear functional form assumptions. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A6—Dictator Games Only (Robustness)

	Altering 1st Choices				Dropping Data	
	Replaced with 2nd Choice:		Replaced with Choice at Reading Speed:		Dropped Unless:	
	Within 2 Seconds	Within 5 Seconds	Rate 0 of Game	Max Rate 0 & 0.5 of both	Pos. Slope	Monotone 1st Choices
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)	(6)
Rate × Last Choice	0.008***	0.004***	0.004***	0.003**	0.003	0.005***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Last Choice	-0.010	0.002	-0.009	-0.003	-0.008	-0.013
	(0.008)	(0.007)	(0.007)	(0.006)	(0.009)	(0.010)
Rate	0.040***	0.044***	0.043***	0.045***	0.073***	0.050***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Constant	0.300***	0.288***	0.299***	0.294***	0.287***	0.272***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.022)
Observations	9,880	9,880	9,880	9,880	6,100	4,900
Subjects	494	494	494	494	305	245
R^2	0.077	0.084	0.082	0.085	0.223	0.112
% questions adjusted	17%	42%	43%	52%		
% data dropped					38%	50%
Last Choice at Rate = 10	0.068	0.040	0.036	0.026	0.018	0.041
	$p = 0.000$	$p = 0.000$	$p = 0.000$	$p = 0.004$	$p = 0.235$	$p = 0.011$

Note: Table A6 shows linear probability model estimates of how generosity (transferring one dollar) responds to the exchange rate. *Rate* shows the slope with respect to the first choice. *Rate* × *Last Choice* shows how the slope changes when comparing last choices to first choices. *Last Choice* shows the estimated change in generosity for the exchange rate of 0 when going from first to last choice. *Last choice at rate = 10* reports *Last Choice + 10(Rate* × *Last Choice)*, the estimated change in generosity for the exchange rate of 10 when going from first to last choice, and the p-value that it is equal to 0 from a post-estimation test. *Rate 0 of game* reading speed is defined as time to last choice if the subject changed answers in the exchange rate 0 of the dictator game or, if the subject did not change, then the median speed to last choice of the subjects who did change (10.49 seconds). *Max rate 0 & 0.5 of both* reading speed is defined as the maximum time to last choice if the subject changed answers in at least one of the exchange rate 0 or 0.5 questions in either question type. If the subject did not change answers to any of those four questions, the median reading speed of those who did (14.05 seconds) is used. Standard errors are clustered by subject. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table A7—Prisoner's Dilemmas Only (Robustness)

	Altering 1st Choices				Dropping Data	
	Replaced with 2nd Choice:		Replaced with Choice at Reading Speed:		Dropped Unless:	
	Within 2 Seconds	Within 5 Seconds	Rate 0 of Game	Max Rate 0 & 0.5 of both	Pos. Slope	Monotone 1st Choices
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)	(6)
Rate × Last Choice	0.009***	0.005***	0.003**	0.002*	0.007***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Last Choice	-0.051***	-0.031***	-0.021***	-0.018***	-0.050***	-0.023***
	(0.007)	(0.006)	(0.005)	(0.005)	(0.009)	(0.009)
Rate	0.053***	0.057***	0.059***	0.060***	0.080***	0.061***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Constant	0.263***	0.243***	0.232***	0.230***	0.256***	0.225***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.020)
Observations	10,260	10,260	10,260	10,260	7,060	5,340
Subjects	513	513	513	513	353	267
R^2	0.133	0.141	0.147	0.149	0.280	0.158
% questions adjusted	26%	48%	46%	50%		
% data dropped					31%	48%
Last Choice at Rate = 10	0.040	0.020	0.006	0.002	0.024	0.011
	$p = 0.000$	$p = 0.036$	$p = 0.475$	$p = 0.852$	$p = 0.085$	$p = 0.261$

Note: Table A7 shows linear probability model estimates of how generosity (transferring one dollar) responds to the exchange rate. *Rate* shows the slope with respect to the first choice. *Rate* × *Last Choice* shows how the slope changes when comparing last choices to first choices. *Last Choice* shows the estimated change in generosity for the exchange rate of 0 when going from first to last choice. *Last choice at rate = 10* reports *Last Choice + 10(Rate* × *Last Choice)*, the estimated change in generosity for the exchange rate of 10 when going from first to last choice, and the p-value that it is equal to zero from a post-estimation test. *Rate 0 of game* reading speed is defined as time to last choice if the subject changed answers in the exchange rate 0 of the prisoner's dilemma or, if the subject did not change, then the median speed to last choice of the subjects who did change (13.85 seconds). *Max rate 0 & 0.5 of both* reading speed is defined as the maximum time to last choice if the subject changed answers in at least one of the exchange rate 0 or 0.5 questions in either question type. If the subject did not change answers to any of those four questions, the median reading speed of those who did (14.05 seconds) is used. Standard errors are clustered by subject. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table A8—Log Speed of Choices, Dictator Games v. Accounts Treatment (Robustness)

	All Played First			MTurk Played First		
	1st Choice	Last Choice	Last Choice if Changed	1st Choice	Last Choice	Last Choice if Changed
Dep. Variable: $log(seconds + 1)$	(1)	(2)	(3)	(4)	(5)	(6)
Dictator	0.008	0.050	0.468***	0.018	-0.006	0.328**
	(0.052)	(0.069)	(0.116)	(0.062)	(0.080)	(0.145)
Constant	1.519***	1.821***	2.284***	1.519***	1.821***	2.284***
	(0.044)	(0.060)	(0.097)	(0.044)	(0.060)	(0.097)
Observations	3,630	3,630	596	1,940	1,940	321
Subjects	363	363	233	194	194	123
R^2	0.000	0.001	0.061	0.000	0.000	0.039

Note: Table A8 compares the log speed of choices in the accounts treatment to timed dictator games played first either including all subjects in Columns (1) and (3) or including MTurk subjects playing first in Columns (4) and (6). *Dictator* is an indicator for the dictator game (rather than the accounts treatment). Analysis in Columns (3) and (6) compares speed of last choices conditional on the subject changing their choice such that their first and last choices are different. Standard errors are clustered by subject. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A9—Generosity, Dictator Games v. Accounts Treatment (Robustness)

	Altering 1st Choices				Dropping Data	
	Replaced with 2nd Choice:		Replaced with Choice at Reading Speed:		Dropped Unless:	
	Within 2 Seconds	Within 5 Seconds	Rate 0 of Game	Max Rate 0 & 0.5 of both	Pos. Slope	Monotone 1st Choices
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)	(6)
Dictator × Last Choice	0.049	0.029	0.053***	0.044*	0.035	0.106**
	(0.021)	(0.018)	(0.013)	(0.012)	(0.023)	(0.035)
Last Choice	-0.002***	0.002***	-0.026***	-0.017***	-0.021***	-0.069***
	(0.017)	(0.015)	(0.009)	(0.009)	(0.016)	(0.030)
Dictator	-0.358**	-0.338	-0.363***	-0.353***	-0.177	-0.504***
	(0.030)	(0.029)	(0.027)	(0.027)	(0.031)	(0.051)
Constant	0.830***	0.827***	0.854***	0.845***	0.851***	0.973***
	(0.019)	(0.018)	(0.014)	(0.015)	(0.018)	(0.027)
Observations	5,082	5,082	5,082	5,082	2,912	2,156
Subjects	363	363	363	363	208	154
R^2	0.090	0.084	0.091	0.088	0.029	0.156

Note: Table A9 shows linear probability model estimates of how generosity (transferring one dollar) responds to the exchange rate, replicating Column (3) from Table 7 in the main text. *Last Choice* indicates it was the last choice subjects made in the minute. *Dictator* indicates it was the dictator game rather than the accounts treatment. *Dictator × Last Choice* is the interaction of these two variables. *Rate 0 of game* reading speed is defined as time to last choice if the subject changed answers in the exchange rate 0 of the dictator game or accounts game or, if the subject did not change, then the median speed to last choice of the subjects who did change (10.49 seconds for dictator games, 8.30 seconds for accounts). *Max rate 0 & 0.5 of both* reading speed is defined as the maximum time to last choice if the subject changed answers in at least one of the exchange rate 0 or 0.5 questions in either dictator game or prisoner's dilemma. If the subject did not change answers to any of those four questions, the median reading speed of those who did (14.05 seconds) is used. We define a similar measure for the accounts data, looking at whether a subject changed at exchange rate 0 or 0.5 (median time was 8.35 seconds). Standard errors are clustered by subject. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Appendix B: Timing of Choices and the Drift Diffusion Model

B1. Fast Versus Slow Choices

Prior work has explored whether faster choices are more generous or more selfish than slower choices (Rand, Greene and Nowak, 2012). Our data allows us to replicate and extend this analysis. We first report results from the untimed treatments, which are closer to the standard implementation used by Rand, Greene and Nowak (2012). For each game type (DG and PD) and exchange rate, we compute the median speed to answer a question pooling data from both untimed treatments. We classify an answer as slow if the subject took longer than the median speed for a particular exchange rate of a particular game type and classify it as fast otherwise.

Table B1 tests whether slower choices are more selfish across all of the exchange rates. Columns (1) and (3) show that, if anything, slow choices are *more generous* than fast choices — this is in stark contrast to the findings in Rand, Greene and Nowak 2012, which finds that slow choices were less generous. This effect is directionally consistent for both game types and significant for the prisoner's dilemmas. In Columns (2) and (4), we repeat this analysis using data from the timed treatments, restricting attention to the first choices subjects make. Consistent with the results from the untimed treatments, we find that slower first choices are also more generous than faster first choices.

The additional parameter in our experiment — the exchange rate — allows us to explore the relationship between decision speed and generosity in greater detail. Tables B2 and B3 test whether the exchange rate mediates the relationship between decision speed and generosity. In particular, Table B2 investigates whether slower choices are more selfish for exchange rates where subjects in our sample become more selfish over time ($X \leq 0.5$ for dictator

Table B1—Generosity, Fast v. Slow Choices

	Dictator Games		Prisoner's Dilemmas	
	Untimed Choice	1st Timed Choice	Untimed Choice	1st Timed Choice
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)
Slow Choice	0.051	0.118***	0.086**	0.057***
	(0.046)	(0.020)	(0.043)	(0.020)
Rate FE	Yes	Yes	Yes	Yes
Observations	1,050	4,940	880	5,130
Subjects	105	494	88	513
R^2	0.156	0.096	0.131	0.129

Note: Table B1 compares the generosity (transferring one dollar) of choices as a function of speed in the untimed games in Columns (1) and (3) and the first choice in the timed games in Columns (2) and (4). *Slow Choice* is an indicator for whether the time spent making a choice was longer than the median time for that exchange rate in that treatment. We allow exchange rate fixed effects to be different for the two different untimed treatments. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

games and $X \leq 2$ for prisoner's dilemmas). While none of the differences are statistically significant, in the untimed treatments we find conflicting results between the dictator games and prisoner's dilemmas. In the timed treatments, effects are much smaller than when we examine all exchange rates in Table B1, though the effects are generally in the same direction, indicating that slow choices are somewhat more generous. Table B3 investigates whether slower choices are more generous for exchange rates where subjects in our sample become more generous over time ($X \geq 3$ for dictator games and $X \geq 4$ for prisoner's dilemmas). We find that, in the timed games, slow subjects are significantly more generous than fast subjects, a pattern that is directional, but not significant, in the untimed data.

To summarize, we find correlational evidence that slow choices are more generous, particularly for exchange rates in which later, deliberate choices are more generous than early, intuitive choices. Consequently, there may be some

hope that response time could be predictive of changes in behavior associated with a dual-system model, although the evidence is far from conclusive.

Table B2—Generosity, Fast v. Slow Choices at Low Exchange Rates

	Dictator Games ($X = 0, 0.5$)		Prisoner's Dilemmas ($X = 0, 0.5, 1, 2$)	
	Untimed Choice	1st Timed Choice	Untimed Choice	1st Timed Choice
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)
Slow Choice	-0.082	0.020	0.063	0.005
	(0.056)	(0.026)	(0.041)	(0.023)
Rate FE	Yes	Yes	Yes	Yes
Observations	210	988	352	2,052
Subjects	105	494	88	513
R^2	0.058	0.014	0.047	0.054

Note: Table B2 compares the generosity (transferring one dollar) of choices as a function of speed in the untimed games in Columns (1) and (3) and the first choice in the timed games in Columns (2) and (4) for exchange rates where subjects become less generous over time. *Slow Choice* is an indicator for whether the time spent making a choice was longer than the median time for that exchange rate in that treatment. We allow exchange rate fixed effects to be different for the two different untimed treatments. Standard errors are clustered by subject. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

B2. Drift Diffusion Model

While not the purpose of our design, the structure of our data allows us to provide a test of the drift diffusion model, which predicts that choices should be faster when the utility difference between the options in the choice set is large. In this section, we show that we find substantial support for a key comparative static prediction of the drift diffusion model.

In a basic version of the drift diffusion model, an individual receives signals about the utility associated with each of the options she considers. These signals are modeled with a drift diffusion process. The individual reaches a decision as soon as she is sufficiently certain which option yields a higher utility.

Table B3—Generosity, Fast v. Slow Choices at High Exchange Rates

	Dictator Games ($X = 3, ..., 10$)		Prisoner's Dilemmas ($X = 4, ..., 10$)	
	Untimed Choice	1st Timed Choice	Untimed Choice	1st Timed Choice
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)
Slow Choice	0.086	0.143***	0.091	0.088***
	(0.058)	(0.026)	(0.063)	(0.026)
Rate FE	Yes	Yes	Yes	Yes
Observations	630	2,964	440	2,565
Subjects	105	494	88	513
R^2	0.032	0.023	0.027	0.013

Note: Table B3 compares the generosity (transferring one dollar) of choices as a function of speed in the untimed games in Columns (1) and (3) and the first choice in the timed games in Columns (2) and (4) for exchange rates where subjects become more generous over time. *Slow Choice* is an indicator for whether the time spent making a choice was longer than the median time for that exchange rate in that treatment. We allow exchange rate fixed effects to be different for the two different untimed treatments. Standard errors are clustered by subject. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

In a theoretical analysis where subjects incur costs from gathering information, Fudenberg, Strack and Strzalecki (2018) shows that when the utilities of two options are closer, subjects are more likely to receive conflicting — and weaker — signals of the relative utility, making it harder for the drift diffusion process to pass a (moving) threshold at which the subject is ready to make a decision.[38]

This turns out to be a key comparative static prediction of the drift diffusion model, which distinguishes it from other models of costly information acquisition. Hébert and Woodford (2021) generalizes a rational inattention model (Sims, 2003, 2010). In the sequential information sampling problem, the information sampled at each stage can be chosen very flexibly given an information cost function. As in Fudenberg, Strack and Strzalecki (2018), the

[38]For overviews of the drift diffusion model in economics, see Clithero (2018), Fehr and Rangel (2011), Krajbich, Oud and Fehr (2014). For more recent theoretical advances, see, e.g., Baldassi et al. (2022), Fisher (2017), Fudenberg et al. (2020).

decisions of when to stop sampling and what choice to make are optimized given the entire history of information sampled up to that point. While the resulting model of Hébert and Woodford (2021) shares many features with the drift diffusion model, it does not predict that subjects should take longer to make a choice when questions are hard (in the sense that utilities between the options are close).

While our design is not perfectly suited to address the drift diffusion model or the rational inattention model with sequential information sampling, we have several features conducive for a test of the key comparative static prediction that distinguishes these two models. We have subjects make binary choices where the utility of the two options changes with the exchange rate X, and we have explicit costs of delaying choice. To test the comparative static that relies on a measure of the utility difference between options, we restrict attention to the subset of subjects for whom we can reasonably identify the decision problems for which the utility between options is closer. Specifically, we start by considering subjects whose first choices are monotone in the exchange rate X. There are three types of subjects whose first choices are monotone: subjects who always transfer, subjects who never transfer, and subjects who transfer as soon as the exchange rate reaches some "crossover exchange rate" but not for lower exchange rates. We call this last group of subjects "Elastic." For our evaluation of the drift diffusion model, we focus on Elastic subjects. For these subjects, we can reasonably argue that the utilities of the two choices — transfer or not transfer — are closer when the exchange rate is closer to their crossover exchange rate than when it is farther from it.

A test in the spirit of the drift diffusion model is to assess whether the time of first choices of Elastic subjects is later when the exchange rate is close to, rather than far from, their crossover exchange rate. In our design, the

cost of delaying a choice is to increase the risk of not getting any payment. So, if a subject knew the utilities of the two options were basically identical, she would optimally make a decision immediately instead of gathering costly evidence on which is the slightly better option. While there has been some previous evidence that "hard" choices (i.e., choices where the utilities of the options are closer) take longer than "easy" choices, subjects in these studies generally do not incur direct costs of delaying decisions.

We have 141 subjects who are classified as Elastic in the timed dictator games and 166 in the timed prisoner's dilemmas. For each Elastic subject, we identify the lowest exchange rate for which the subject chose to transfer and the highest for which the subject decided not to transfer, and we label the question at these two exchange rates as "hard" while questions at other exchange rates are labeled "easy". Column (1) of Table B4 shows that the time of first choice is almost a second longer (i.e., over 20% longer) when the decision is made for a hard rather than an easy question. This result holds when we look at the first five rounds in Column (2) and the last five rounds in Column (3).

A second prediction of the drift diffusion model (Fudenberg, Strack and Strzalecki, 2018) is that when utilities are similar, individuals do not just take longer to make a choice but they are also more likely to make a wrong choice. One interpretation of this prediction in our experiment would be that subjects are more likely to change their choices for hard questions than for easy questions. Indeed, Column (4) shows that subjects are 12 percentage points more likely to change their choice when the decision is classified as hard then when it is classified as easy (in which case less than 6 percent of subjects change their choices, an increase of over 200%). These results are true both for the first five rounds, as in Column (5), and the last five rounds,

as in Column (6).[39]

These results are robust to a variety of alternative specifications, such as classifying two additional decisions as hard (i.e., exchange rates that neighbor the decisions previously labeled as hard, so subjects have 4 hard and 6 easy questions for the 10 exchange rates), as in Appendix Table B5. We also re-do this analysis, classifying subjects as Elastic and questions as hard or easy based on the last choice subjects make rather than the first choice (see Appendix Table B6).

Table B4—Generosity, Hard v. Easy Questions

	Speed of 1st Choice (Seconds)			Changed Choice		
	All 10 Rounds	First 5 Rounds	Last 5 Rounds	All 10 Rounds	First 5 Rounds	Last 5 Rounds
Dep. Variable: *Generosity*	(1)	(2)	(3)	(4)	(5)	(6)
Hard Question	0.964***	1.030***	0.788***	0.118***	0.129***	0.108***
	(0.206)	(0.280)	(0.295)	(0.015)	(0.025)	(0.022)
Dictator	-0.080	-0.373	0.201	-0.033**	-0.029	-0.036**
	(0.186)	(0.302)	(0.278)	(0.015)	(0.022)	(0.016)
Mean for Easy	4.673	5.456	3.880	0.059	0.077	0.041
Observations	3,070	1,535	1,535	3,070	1,535	1,535
Subjects	237	237	237	237	237	237
R^2	0.359	0.459	0.393	0.273	0.322	0.367

Note: Table B4 reports how speed of first choice and probability of changing a choice correlates with whether the question is easy or hard. *Hard Question* is an indicator for whether the question is classified as easy or hard for a subject. *Dictator* is an indicator for the game type. All regressions include subject fixed effects, control for the order in which the questions were answered in the set of 10, and the exchange rate. Standard errors are clustered by subject. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

We provide direct evidence that, even when there are explicit costs of making slow choices, subject answers are slower for hard questions (i.e., questions where the utilities of the two options are closer than they are for other questions). Our findings provide support for a key comparative static prediction

[39]These results are in line with Konovalov and Krajbich (2019). That paper finds that slow choices — a potential indication of hard choices — are more likely to be associated with a preference reversal when subjects are asked to make the same choice for a second time.

that distinguishes the drift diffusion model from a rational inattention model with sequential information sampling.

Table B5—Time to First Choice and Probability of Changing Choice (Robustness, Four Hard Questions)

	Speed of 1st Choice (Seconds)			Changed Choice		
	All 10 Rounds	First 5 Rounds	Last 5 Rounds	All 10 Rounds	First 5 Rounds	Last 5 Rounds
	(1)	(2)	(3)	(4)	(5)	(6)
Hard Question	0.881***	0.878***	0.751***	0.106***	0.114***	0.104******
	(0.196)	(0.291)	(0.213)	(0.013)	(0.023)	(0.017)
Dictator	-0.072**	-0.358	0.209	-0.032	-0.027	-0.035
	(0.187)	(0.308)	(0.279)	(0.015)	(0.022)	(0.016)
Mean for Easy	4.522	5.325	3.721	0.046	0.066	0.026
Observations	3,070	1,535	1,535	3,070	1,535	1,535
Subjects	237	237	237	237	237	237
R^2	0.359	0.458	0.394	0.274	0.321	0.372

Note: Table B5 reports how speed of first choice and probability of changing a choice correlates with whether the question is easy or hard where *Hard Question* is defined as two exchange rates above and two exchange rates below a subject's crossover point. *Dictator* is an indicator for the game type. All regressions include subject fixed effects, controls for the order in which the questions were answered in the set of 10, and the exchange rate. Standard errors are clustered by subject. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table B6—Time to First Choice and Probability of Changing Choice (Robustness, Elastic Based on Last Choice)

	Speed of 1st Choice (Seconds)			Changed Choice		
	All 10 Rounds	First 5 Rounds	Last 5 Rounds	All 10 Rounds	First 5 Rounds	Last 5 Rounds
	(1)	(2)	(3)	(4)	(5)	(6)
Hard Question	0.588***	0.481*	0.585	0.113***	0.117***	0.102***
	(0.211)	(0.276)	(0.356)	(0.022)	(0.033)	(0.028)
Dictator	-0.096	-0.497**	0.299	0.001	-0.013	0.014
	(0.147)	(0.249)	(0.203)	(0.015)	(0.022)	(0.018)
Mean for Easy	4.398	5.168	3.621	0.132	0.156	0.107
Observations	4,460	2,230	2,230	4,460	2,230	2,230
Subjects	308	308	308	308	308	308
R^2	0.373	0.449	0.385	0.278	0.326	0.347

Note: Table B6 reports how speed of first choice and probability of changing a choice correlates with whether the question is easy or hard based on the crossover point for subjects who are elastic in last choices. *Dictator* is an indicator for the game type. All regressions include subject fixed effects, controls for the order in which the questions were answered in the set of 10, and the exchange rate. Standard errors are clustered by subject. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Appendix C: Experimental Instructions

The following screens show the Instructions that were common to all versions of the experiment. Notes about the instructions appear in blue italics.

Consent Form:

Title of the Research Study: Decision Making Study

Protocol Number: 821552

Principal Investigators: Professor Judd Kessler (juddk@wharton.upenn.edu)

You are being asked to take part in a research study. This is not a form of treatment or therapy. It is not supposed to detect a disease or find something wrong. Your participation is voluntary which means you can choose whether or not to participate. If you decide to participate or not to participate there will be no loss of benefits to which you are otherwise entitled. Before you make a decision you will need to know the purpose of the study, the possible risks and benefits of being in the study and what you will have to do if decide to participate. The researcher is available by email to talk with you about the study and give you this consent document to read.

If you do not understand what you are reading, do not sign it. Please ask the researcher to explain anything you do not understand, including any language contained in this form. If you decide to participate, you will be asked to continue with the study after reading this form and your continuation will indicate your consent.

What is the purpose of this research?

The purpose of the study is to better understand how people make decisions.

How long will I take part in this research?

Your participation will take approximately 30 minutes.

What can I expect if I take part in this research?

As a participant, you will be asked to answer a series of questions. Additional information will be provided to you during your study participation.

What are the risks and possible discomforts?

There are no anticipated risks associated with the study.

Will I be compensated for participating in this research?

In addition to your show-up fee, you may earn additional money from participating in the study.

If I take part in this research, how will my privacy be protected? What happens to the information you collect?

The data we collect will not include any personal or sensitive information. In addition, it will not be identified with your name, but only with a participant number. The data will eventually be used for publication in research journals and presentations at scientific conference. At such time, the data will be presented in aggregate, and individual participants will never be discussed.

Who can I call with questions, complaints or if I'm concerned about my rights as a research subject?

If you have questions, concerns or complaints regarding your participation in this research study or if you have any questions about your rights as a research subject, you should speak with the Principal Investigator listed at the top of this form. If a member of the research team cannot be reached or you want to talk to someone other than those working on the study, you may contact the Office of Regulatory Affairs with any question, concerns or complaints at the University of Pennsylvania by calling (215) 898-2614.

By continuing with this study, you are consenting to participate.

Thank you for participating in this study.

In this study you can earn money and you can affect the earnings of other people who participate in this study. Anything you earn in the study will be paid to you as a bonus payment on top of your show-up fee.

Please read the rules of the study carefully so you understand how the study works.

What are the rules of the study?

On each screen in this study, you will face a decision question that may affect your earnings and may affect the earnings of others in the study.

There are two types of questions. Some are in the standard format, where your answer is only recorded when you press submit. Other questions you will see for a fixed amount of time. For these timed questions, the answer you record at each second has the potential to affect your earnings and the earnings of others in the study.

You will be shown each timed question for 60 seconds. In addition to having an initial answer to the question, you may decide you want to change your answer one or more times during the 60 seconds.

Your earnings and the earnings of the other people in the study depend on what your answer is at each moment during the 60 seconds. In particular, for each question we will determine your *official answer* to that question by randomly picking one second out of the 60 seconds. Whatever your answer was during that second of the 60 seconds will be your *official answer* for the question, and this *official answer* will determine your payment.

This means that at each moment during the 60 seconds, you should report whatever is your best answer to the question at that moment in time.

If you had not yet provided an answer at the second that we randomly pick, no additional earnings will be awarded for you or anyone else in the study for that question.

This means that you should record your initial answer as soon as you have one.

How do I answer the question at each moment in time?

For each question, you will report your answer by pressing one of a number of buttons on the screen. Each button has one potential answer to the question.

To select your initial answer, click one of the buttons. To change your answer at any moment in time, click a new button.

Every time you click a button, we will display your choice in a table below the buttons. We will report your most recent choice in the top row of the table.

A timer will appear above the question to let you know how many seconds remain for the question.

What are the types of questions I will answer?

The timed questions you will answer in the study take a variety of forms. On each screen you will see a description of the question for 10 seconds before the buttons appear and the 60 seconds to answer the question begin. A 10-second timer will count down the number of seconds before the buttons appear.

We will show you a sample question on the following screen so you can see how the interface looks and how the boxes and table work.

Sample question

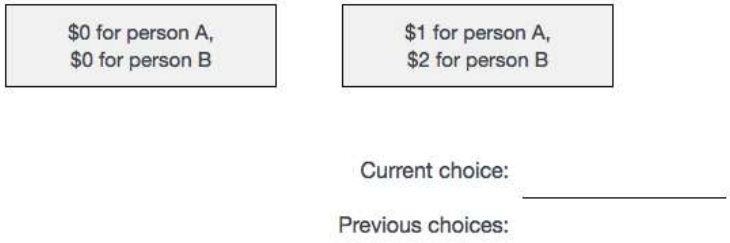
This question does not affect your or anyone's earnings. Please click on the buttons to see how they work.

20-second screen (timer appeared):

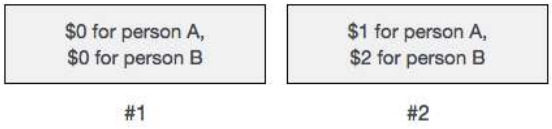
Sample question

This question does not affect your or anyone's earnings. Please click on the buttons to see how they work.

Choose which outcome you want for person A and person B.



We will now show you some examples so you can see how your official answer is determined by your choices. To explain this more clearly we label the buttons #1 and #2.



Example 1:

Suppose you chose the button #2 immediately and left it there for the entire 60 seconds. Then for any second we randomly selected your official answer would be "$1 for person A, $2 for person B" since that was your choice at every second.

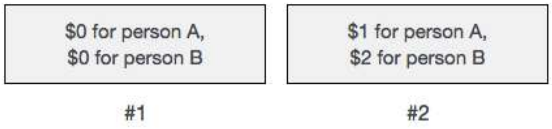
Example 2:

Suppose that you selected nothing for 10 seconds and then selected button #2. Suppose then that at second 15 you switched to button #1. Suppose that then at second 22 you switched to button #2 and left it there for the rest of the time.

In this case your official answer would be:

• If we randomly select a second between 1 and 9 seconds: No answer recorded.
• If we randomly select a second between 10 and 14 seconds: $1.00 for person A, $2.00 for person B.
• If we randomly select a second between 15 and 21 seconds: $0.00 for person A, $0.00 for person B.
• If we randomly select a second between 22 and 60 seconds: $1.00 for person A, $2.00 for person B.

Reminder: if you have no answer recorded at the randomly selected second, then neither you nor anyone else in the study can earn any money from that question.

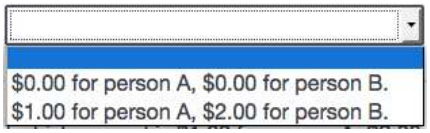


To make sure you understand how choices map into an official answer, please read the example below and answer the two accompanying questions. You will not be able to advance with the study until you answer both questions correctly.

Survey Question 1:

Suppose that you selected nothing for 13 seconds and then selected button #2. Suppose that then at second 20 you switched to button #1. Suppose that then at second 32 you switched to button #2 and left it there for the rest of the time.

Imagine second 25 was randomly chosen to be the one that count. What would be your official answer?



At which second is $1.00 for person A, $2.00 for person B your official answer?

How do you determine my extra earnings?

There are 21 questions in this study.

We will randomly pick 1 question to be paid, and pay you (and possibly others in the study) based on your choices.

Note that for the question that gets picked, your official answer will determine your earnings (and possibly the earnings of others in the study).

The following screens show the Instructions in the Timed Dictator Games

---

For each of the next 10 questions, you will randomly be paired with another person in the study. You will be paired with a different person for each question.

Your choice alone will affect how much money you and that person receive in the study.

You have the opportunity to transfer money to them but they do not have an opportunity to transfer to you.

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question you are paired with someone else in the study. Your choice alone affects how much money you and that other person will receive in the study.

1-minute screen (timer appeared), example question:

In this question you are paired with someone else in the study. Your choice alone affects how much money you and that other person will receive in the study.

You have $3 and the other person has $0. You can transfer $1 and it becomes $2 to the other person

---

The following screens show the Instructions in the Timed Prisoner's Dilemmas

---

For each of the next 10 questions, you will randomly be paired with another person in the study. You will be paired with a different person for each question.

Both your choice and that person's choice will affect how much money you and that person earn in the study.

You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

Your earnings will depend on what they choose at second 15.

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you. Your earnings will depend on what they choose at second 15.

1-minute screen (timer appeared), example question:

In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you. Your earnings will depend on what they choose at second 15.

You have $1 and the other person has $1. You can transfer $1 and it becomes $2 to the other person.

The following screens show the Instructions in the Accounts Treatment

---

For each of the next 10 questions, you will have two accounts. The accounts will be called Account A and Account B. Your earnings from each question will be the sum of the money in the two accounts. For example, if you have $4 in Account A and $3 in Account B, you will earn $4 + $3 = $7 dollars for the question.

In each of the next 10 questions, you can choose whether or not transfer money from Account A to Account B. The amount of money from Account A may change when it is put into Account B.

For example, suppose Account A has $5 and Account B has $0. Suppose you can transfer $2 from Account A and it becomes $6 in Account B.

Please answer the comprehension questions about the example above. You must answer all of them correctly to proceed with the study.

If you do not transfer $2 from Account A: How much money do you have in Account A and in Account B?

- ○ $5 in Account A and $0 in Account B
- ○ $3 in Account A and $6 in Account B
- ○ $0 in Account A and $5 in Account B

If you do not transfer $2 from Account A: How much money do you earn for this question?

- ○ $5
- ○ $6
- ○ $2

If you transfer $2 from Account A: How much money do you have in Account A and in Account B?

- ○ $5 in Account A and $0 in Account B
- ○ $3 in Account A and $6 in Account B
- ○ $0 in Account A and $5 in Account B

If you transfer $2 from Account A: How much money do you earn for this question?

○ $0
○ $9
○ $2

For another example, suppose account A has $8 and Account B has $0. Suppose you can transfer $1 from Account A and it becomes $7 in Account B.

How much money do you make in this question if you transfer the $1?

How much money do you make if you do not transfer?

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question, your earnings will be the sum of money in Account A and Account B.

1-minute screen (timer appeared), example question:

In this question, your earnings will be the sum of money in Account A and Account B.

Account A has $3 and Account B has has $0. You can transfer $1 from Account A and it becomes $2 in Account B.

The following screens show the Common Instructions in the "Single Choice" Treatments

---

The next 10 questions have the single-choice format, where your answer is recorded when you make a choice. After you press a button, your choice will be recorded and you will automatically advance to the next page.

We will show you a sample question on the following screen so you can see how the interface looks and how you are automatically advanced to the next page when you make a choice.

10-second screen (timer appeared):

This is an example question that doesn't affect anyone's payoffs. After you press a button, your choice is recorded and you will automatically advance to the next page.

This is an example question that doesn't affect anyone's payoffs. After you press a button, your choice is recorded and you will automatically advance to the next page.

Choose which outcome you want for person A and person B:

$0 for person A, $0 for person B	$1 for person A, $2 for person B

The following screens show the Dictator Game Instructions for the "Single Choice" Treatments

---

For each of the next 10 questions, you will randomly be paired with another person in the study. You will be paired with a different person for each question.

Your choice alone will affect how much money you and that person receive in the study.

You have the opportunity to transfer money to them but they do not have an opportunity to transfer to you.

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question you are paired with someone else in the study. Your choice alone affects how much money you and that other person will receive in the study.

Example question:

In this question you are paired with someone else in the study. Your choice alone affects how much money you and that other person will receive in the study.

You have $3 and the other person has $0. You can transfer $1 and it becomes $2 to the other person.

The following screens show the Prisoner's Dilemma Instructions for the "Single Choice" Treatments

---

For each of the next 10 questions, you will randomly be paired with another person in the study. You will be paired with a different person for each question.

Both your choice and that person's choice will affect how much money you and that person earn in the study.

You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

Example question:

In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

You have $1 and the other person has $1. You can transfer $1 and it becomes $2 to the other person.

The following screens show the Dictator Game Instructions for the "Last Choice" Treatments

---

The next 10 questions have the standard format where your answer is only recorded when you press submit.

For each of the next 10 questions, you will randomly be paired with another person in the study. You will be paired with a different person for each question.

Your choice alone will affect how much money you and that person receive in the study. You have the opportunity to transfer money to them but they do not have an opportunity to transfer to you.

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question you are paired with someone else in the study. Your choice alone affects how much money you and that other person will receive in the study.

Example question:

In this question you are paired with someone else in the study. Your choice alone affects how much money you and that other person will receive in the study.

You have $3 and the other person has $0. You can transfer $1 and it becomes $2 to the other person.

The following screens show the Prisoner's Dilemma Game Instructions for the "Last Choice" Treatments

---

The next 10 questions have the standard format where your answer is only recorded when you press submit.

For each of the next 10 questions, you will randomly be paired with another person in the study. You will be paired with a different person for each question.

Both your choice and that person's choice will affect how much money you and that

person earn in the study.

You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

On the next page, you will see one of the questions. Only click to proceed to the next screen when you are ready.

10-second screen (timer appeared):

In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

Example question:

In this question you are paired with someone else in the study. Your choice and their choice both affect how much money you and that other person will receive in the study. You have the opportunity to transfer money to them and they have the exact same opportunity to transfer to you.

You have $1 and the other person has $1. You can transfer $1 and it becomes $2 to the other person.