(Im)patience by Proxy:
Making Intertemporal Decisions for Others

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Abstract:
Decisions with consequences that play out over time are ubiquitous in business, policy, and family relations, and frequently the agent making these decisions is distinct from those who bear the consequences. We use a lab experiment to examine whether individuals make different intertemporal decisions for others of varying social distance than for themselves. Subjects make a series of intertemporal work time allocation decisions for themselves and for another individual, either a friend or a stranger. We find that people choose more impatiently (moving more disutility cost into the future) for others than for themselves. In other words, a decision made for you by proxy is more impatient than a decision you would make for yourself and thus is probably suboptimal. This result contrasts with some of the literature. This divergence may be because, as we find in a separate survey, people perceive procrastination of tasks as qualitatively different from other discounting decisions. Survey evidence suggests that individuals believe that they are more patient than other subjects, suggesting that these too-impatient decisions are made for others out of benevolence with a mistaken belief that the other is relatively impatient. Further, when the decision-maker sees information about how patient the recipient believes herself to be, this bias of excessively impatient decisions disappears, particularly when the recipient is a friend. Taken together, our results show that given limited information, proxy decision-makers choose more impatiently (pushing more costs into the future) than agents would prefer, but information mitigates this suboptimal choice. Our results also suggest that intertemporal choice over time is not behaviorally the same as over money.

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1. Introduction

Many decisions have consequences that play out over time, and frequently the agent making decisions is not the one who bears the consequences. For example, a manager planning a team's work on a project must set intermediate deadlines. The manager may choose deadlines with a goal of smoothing work over time but may cater to the taste for procrastination she believes her employees have. The manager might make choices that match the employee's tastes or that correct for some behavioral bias (e.g., present bias) she believes the employee has by allocating tasks more patiently than the employee would do. Her choice may be suboptimal, however, if she chooses an allocation that the employee would not choose for himself without some justification like correcting for a bias.

Proxy intertemporal allocation scenarios like this arise not only in labor management but also in policy (e.g., investment in climate change adaptation), non-profits (e.g., spending on capacity-building versus immediate service provision), and families (e.g., financial or health decisions for an elder or disabled relative). However, little is known about how people make proxy decisions when time is an important element of the decision. To address this gap, we ask how a person's intertemporal choices differ when she chooses for another person as compared to for herself. To study why differences arise, we vary social distance between decision-maker and recipient and we vary whether information about the recipient is available to the decision-maker.

Previous research indicates that individuals choose differently for others than for themselves in some cases (e.g., Stone *et al*., 2013), but not in others (e.g., Stone *et al*., 2002), and social distance may alter proxy decision-making (Montinari and Rancan, 2018), perhaps because the decision-maker mis-estimates the recipient's feelings.[1] When self-other discrepancies occur, it may be because decision-makers fail to correctly predict others' preferences (e.g., Hsee and Weber, 1997), or because of other psychological phenomena such as a desire to conform to social values (Stone *et al*., 2013).

Intertemporal choice has been studied extensively (as surveyed in Cohen *et al.*, 2016; Frederick *et al.*, 2002), in contexts both of delaying receipt of tangible costs and benefits and of procrastinating tasks (e.g., Frakes and Wasserman, 2016), both of which have been modeled as discounting decisions; see, for example, Fischer (2001). It has also been noted, as in Akerlof (1991), that people may make suboptimal choices in such decisions for themselves, resulting in welfare loss. However, intertemporal decisions by proxy have received little attention.

The study most related to ours is Albrecht *et al*. (2011), who do neuroimaging when a subject makes intertemporal choices over cash for herself and an anonymous other person. They find (mixed) evidence that people choose more patiently for others than for themselves. They also find that while impatient people show neural activity indicating emotion and reward processes when choosing for themselves, this activity does not appear when people choose on behalf of others, which might imply that the emotions associated with impatience only drive decisions for oneself. Pronin *et al.* (2008) also find that people may make more patient decisions over money for other people than for themselves, as do Hershfield and Kramer (2017), and Rong *et al.* (2018) finds slightly but not statistically significantly more patient decisions for a spouse than for one's self. Another related study is Howard (2013), who finds that people discount less when choosing for a charity (i.e. are less impatient when acting as a proxy for a charity) as

[1] Delegation is a related phenomenon; e.g., Hamman *et al*. (2010) find that when they can delegate a dictator game decision, principals choose agents who will give away less of the principal's money than the principal herself would.

compared to for themselves.[2] Similarly, Lusk *et al.* (2013) find that people sometimes choose a healthier snack for others than for themselves, which might indicate that proxy decision-making involves paternalism.

Our study contributes to the literature by comparing intertemporal decisions people make for themselves with those they make for other people. Albrecht *et al*. (2011) only examine decisions for anonymous strangers; if emotions are important parts of impatience, then decisions made for friends may differ from those made for strangers. We use both friends and strangers, since many degrees of psychological distance have policy applications. Additionally, previous studies have examined decisions over benefits (cash or snacks) today versus in the future while we examine costs, specifically work time, today versus in the future. Theory is silent on whether people should behave symmetrically in proxy decisions over costs versus benefits, but the literature has generally assumed they do. If differences between the two exist, this is important to know, because many policy contexts involve tradeoffs of costs over time (e.g., workers' time allocation, climate change-related investments). We provide survey evidence that people view task procrastination as a different kind of decision from other intertemporal decisions, and this comports with the finding from Ellingsen and Johannesson (2009) that people treat time and money costs differently; if this holds in future studies, then standard models will need to be adjusted. Finally, our study complements studies of impatience and procrastination that use observational data because our experiment lets us precisely control the incentives and structure the decision problem, including isolating the proxy element of the decision by ensuring the choice affects only the decision-maker or only the decision recipient.

[2] Richards and Green (2015) find in non-proxy choices that subjects discount environmental goods less than money. A social discount rate might be more relevant in some environmental settings than an individual discount rate, and social discount rates may involve other considerations (Arrow *et al.*, 2013).

We use a laboratory experiment for which subjects are recruited in friend pairs. Each subject makes two sets of intertemporal choices: one for herself and one for another subject. We vary psychological distance: in one treatment the intertemporal choices for others are for the friend with whom the subject came to the experiment and in the other treatment the choices are for an anonymous stranger. These treatments are informative because if people are choosing benevolently for another person, familiarity may help guide optimal decisions, and if people are choosing paternalistically, greater emotional involvement might make it harder to make patient decisions that impose short term costs. Each intertemporal choice allocates time to be worked (at a tedious task) between the present and a session six weeks in the future, similar to Augenblick *et al*. (2015). The decisions are over work time instead of money, thus reflecting time preferences over costs instead of benefits, to minimize noise from out-of-lab transfers between friends.

We find decisions are responsive to the cost of impatience, but, consistent with either discounting or convexity of effort cost, the great majority do not simply minimize time worked. Further, individuals choose more impatiently (delaying costs more) for others than for themselves, which contradicts the results of Albrecht *et al*. (2011), Pronin et al. (2008), Rong *et al.* (2018), and Howard (2013). Since this pattern is systematic and is unlikely to reflect intentional paternalism, it reduces welfare. We ran an online survey to try to understand why our results differ from the literature, and find that people perceive task procrastination as qualitatively different from other intertemporal allocation decisions. We have suggestive evidence that this increased impatience for others is larger for strangers than friends, though this difference is not quite significant. These results and questionnaire responses imply that people are trying to be benevolent (rather than paternalistic), but (wrongly) believe others are more impatient than they themselves are. This is consistent with the findings of Deck and Jahedi

(2015) and Fedyk (2017). Further, this error is somewhat mitigated by familiarity, which lends credence to the role of benevolence with incorrect beliefs.

To test whether the increased impatience for others is driven by incorrect beliefs, we conduct a second experiment in which subjects receive information about the self-reported patience of their recipients before making decisions for them. Once information is provided, there are no significant differences between decisions for self and others, lending support to the interpretation that the greater impatience for others is driven by benevolence with incorrect beliefs. Together, our results suggest that well-intentioned proxy decision-makers may make insufficient near-term investments and leave their wards vulnerable to undesirable future costs, but that policies aimed at increasing information could be welfare enhancing.

2. Experiment Design and Implementation

Subjects participate in an individual and paired choice experiment that consists of two sessions. The experiment procedure for the baseline No Information condition is shown in Figure 1. We will call the first session "Now" or "Day 1" and the second session, which occurs six weeks later, "Later" or the "Return Session." On recruitment, subjects are told they must commit to coming to both sessions and must bring a friend[3] who can also thus commit, and that the first session will take up to 2 hours and the second session will take up to 4.5 hours.[4]

[3] Our results do not vary by whether the subject was the originally-invited subject or was brought as a friend.
[4] See the Reviewer's Appendix for invitation emails, as well as complete screen shots, including instructions, decision screens, and questionnaires.

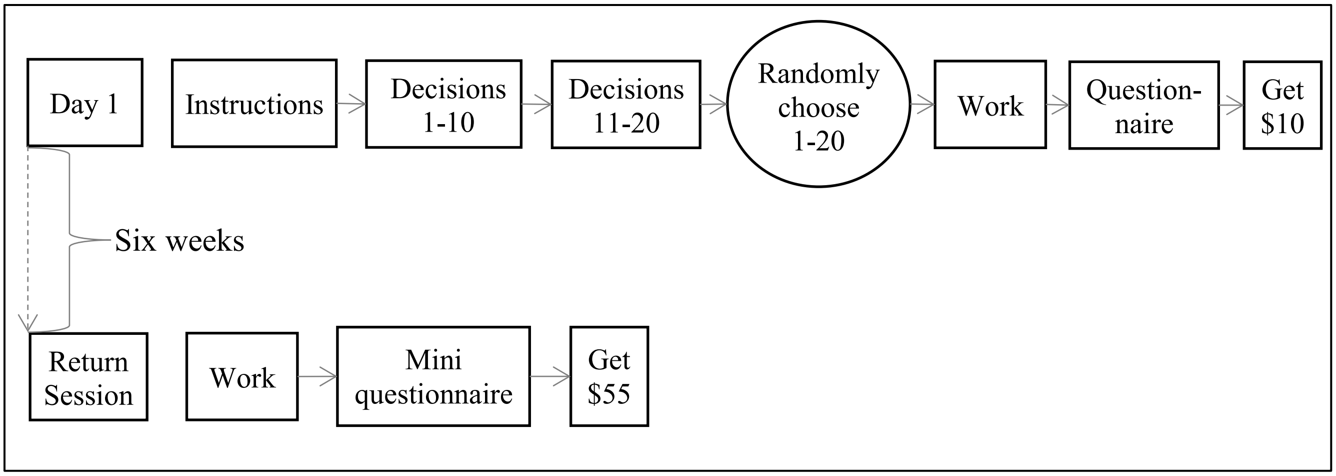

Figure 1: Experiment Procedure

When subjects arrive, each pair is split: one member is seated at a computer on one side of the lab, while her friend is seated at a computer on the opposite side of the lab. The experiment proceeds on the computer, using custom software written by the authors. Subjects receive instructions on their screens and the instructions are read aloud by the experimenter. It is made clear to subjects that they must come back for the return session in six weeks to claim their full payment (and, as we show later, nearly all do return). Subjects proceed through example decisions and example work tasks, and then they make their decisions: a series of ten decisions for themselves and ten for another person with whom they are reciprocally matched (so that while subject A is making decisions for subject B, B is making decisions for A). In half of the sessions, the other person a subject is deciding for is the friend she came to the session with; in the other half, it is a stranger—another unidentified subject from this session.[5] Subjects find out whether they will make decisions for their friend or a stranger at the start of the session. The decision block order is varied: in half of the sessions, a subject makes her first set of decisions (decisions 1-10) for herself while her second set (11-20) is for the other person; in the other half

[5] Friend pairings were necessarily reciprocal; to make treatments as similar as possible, we made stranger pairings reciprocal as well.

of the sessions, the decision blocks are reversed. Thus there are four session types in this baseline No Information Condition: Friend versus Stranger decisions crossed with Self-First versus Other-First order.

The procedures in the Information Condition are identical to those in the baseline except that subjects complete a very short (three-question) survey before reading experiment instructions. In this survey, they provide demographic information and information about their self-reported patience. Then, information about the self-reported patience of the subject for whom this subject is choosing is provided immediately before making allocation choices for others.[6] Thus, we have a total of eight treatments, four each (Friend/Stranger x Self/Other First) in the No Information Condition (with no information about the preferences of the "other") and the Information Condition (with information about the preferences of the "other").

In each decision, the subject must allocate time to work between now and later (six weeks from now). The work to be done is the same in each period: subjects must transcribe passages of text (see Figure 2). Payment does not depend on how many passages are transcribed; subjects can complete zero passages but must sit at their desk with no sources of amusement. Copy-and-paste is not possible. The software checks their transcription and requires them to revise it if it is imperfect. The transcription task requires attention to detail because passages are relatively long and even misplaced spaces or punctuation cause the transcription to be rejected. It is not inherently interesting because the passages describe minutiae relating to a commission responsible for construction and maintenance of Oregon's roads and highways, and it is also obviously pointless so subjects will not believe they are helping anyone with their work.

[6] Before they answered these self-report questions, subjects were not informed how this information would be used, so had incentive to strategically answer. It is common in experimental economics to use behavior or responses for a purpose later in the experiment without telling the subjects in advance; an example is Gächter and Thöni (2005).

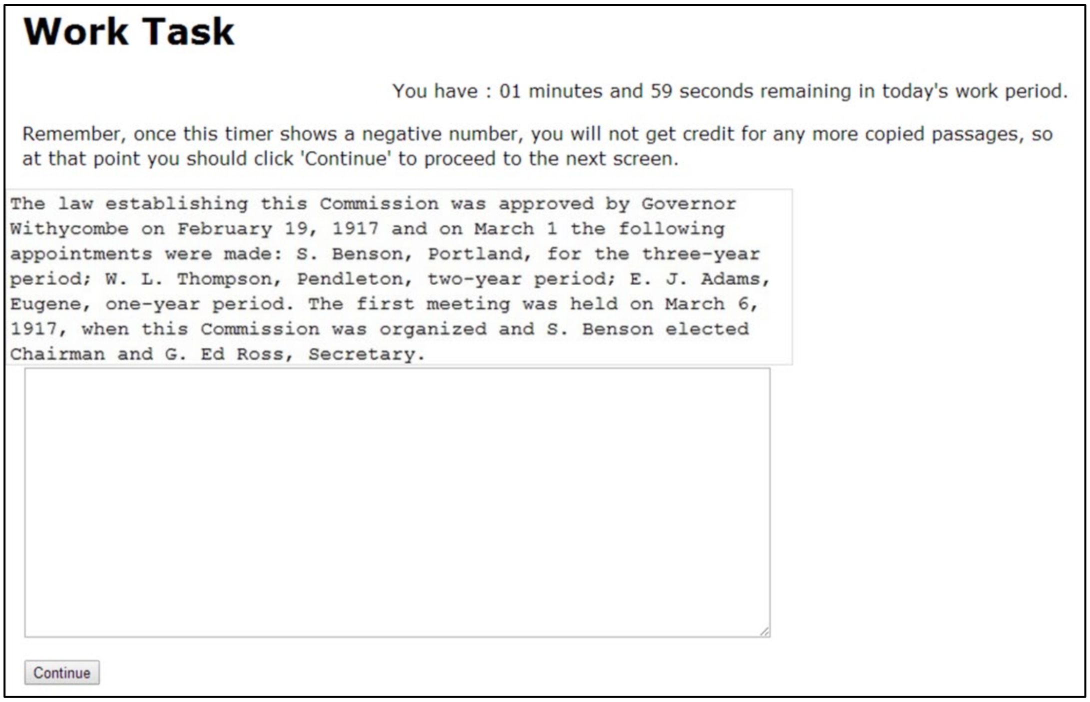

Figure 2: Text Transcription Task

Each of the ten decisions in a block is at a different "minute rate"—i.e., a different rate at which minutes now can substitute for minutes later. If the minute rate is R, minutes now is m_N, and minutes later is m_L, it is always true that:

$$m_N + \frac{m_L}{R} = 60 \qquad (1)$$

Subjects specify the number of minutes to work now for each of ten minute rates, similar to the "task rates" in Augenblick *et al*. (2015). The set of decisions is shown in Figure 3. Note that each row varies the exchange rate between present and future minutes. There is a rate of equal "prices" (1 minute now:1 minute later), two rates that make working in the future more favorable (1:0.5 and 1:0.75), and seven rates that make working in the present more favorable (1:1.25 to 4). This continuous allocation across the two time periods is derived from the convex time budget of Andreoni and Sprenger (2012). The default number of minutes now in each decision cell is zero, but the software requires subjects to click "Calculate" on each row before they can proceed even if they want to choose zero minutes now. Subjects may make as many changes to each "minutes now" as they like before clicking to submit their choices.

Decision #	Minute Rate	Minutes Now		Minutes in Six Weeks
1	1:0.5	30	Calculate	15 (0 hrs 15 mins)
2	1:0.75	10	Calculate	37.5 (0 hrs 37.5 mins)
3	1:1	45	Calculate	15 (0 hrs 15 mins)
4	1:1.25	20	Calculate	50 (0 hrs 50 mins)
5	1:1.5	10	Calculate	75 (1 hrs 15 mins)
6	1:2	55	Calculate	10 (0 hrs 10 mins)
7	1:2.5	20	Calculate	100 (1 hrs 40 mins)
8	1:3	35	Calculate	75 (1 hrs 15 mins)
9	1:3.5	40	Calculate	70 (1 hrs 10 mins)
10	1:4	5	Calculate	220 (3 hrs 40 mins)

Submit

Figure 3: Time Allocation Decisions

We designed the experiment with fixed money payments and intertemporal decisions that allocate work time rather than using decisions over money as is often done in the literature (Frederick *et al*., 2002 survey relevant literature). We did this because choices in our study are interpersonal and, for friends, are not anonymous. If subjects were compensated with different amounts of money, then they could agree after the session to compensate each other. If subjects think they can compensate their partners, this could affect their choices—for example, they might always choose the option that provides more money overall. Such compensation is less likely with work time. As discussed in Augenblick *et al*. (2015) and Cohen *et al.* (2016), time allocation may also avoid other confounds, though it is subject to its own set of issues. Further, many of the contexts with which we are concerned (e.g., labor management) involve tradeoffs of costs rather than benefits over time; if intertemporal choice varies by context, these contexts deserve attention. Also, we have our subjects choose time to work rather than number of tasks as in Augenblick *et al*. (2015) because in the proxy decision-making context subjects' heterogeneous expectations of others' productivity could add significant noise.

After subjects make all twenty decisions, one decision is randomly chosen (using a bingo cage) to be implemented for all subjects in the session. This determines how many minutes each subject must work now and how much in six weeks. Since the same decision is implemented for all subjects in the session, it will never be the case that a subject's choices for herself and her partner are both implemented; either all subjects must work according to their own choices, or all must work according to their partners' choices. This makes it impossible for a subject to coordinate when she and her friend will leave the lab. Subjects then complete their current-day work time and a questionnaire, and are paid $10.[7] Regardless of whether any work time was allocated to the six-weeks-later return session, each subject is contacted five weeks after the first session to schedule a time to return. In the return session, subjects' identities are verified to ensure that subjects do not ask someone else to work for them. Subjects then work for the allocated time if necessary, answer a brief questionnaire, and receive $55. This large payment is designed to ensure that subjects return. Since all subjects must return for the second session, subjects do not have incentive to allocate all time to the present to avoid the transaction costs of returning, nor to allocate all work time to the future to avoid doing it altogether.

The experiment sessions were conducted at the Cleve E. Willis Experimental Economics Laboratory at University of Massachusetts Amherst in fall 2014 (the No Information Condition) and spring 2016 (the Information Condition). [8] Table 1 shows the distribution of subjects across

[7] Since payment does not depend on number of passages transcribed, it is possible for subjects to not work during their work periods; however, they are not allowed to do anything else (including use cell phones) during the allocated time. As discussed in Section 4.1, nearly all subjects worked during their allocated time.
[8] Subject demographics were different between the No Information and the Information Conditions, but most of our analysis is conducted within a condition. Further, demographics do not seem to predict choices in this study. Within a condition, subjects in the Friend and Stranger treatments were balanced on demographics except that in the No

treatments. Note that data for four subjects in the Information Condition were unusable because of a software error. There was very little attrition from the initial to the return session: only three of the 220 subjects failed to return for the second session.

Table 1: Subject Counts in Experiment Treatments

	No Information	Information
Friend	Self first $N = 28$	Self first $N = 24$ (22 usable)
	Other first $N = 26$	Other first $N = 32$ (31 usable)
	Pooled $N = 54$	Pooled $N = 56$ (53 usable)
Stranger	Self first $N = 30$	Self first $N = 26$
	Other first $N = 26$	Other first $N = 28$ (27 usable)
	Pooled $N = 56$	Pooled N =54 (53 usable)

3. Theoretical Framework

We next discuss a theoretical framework. The model is only intended to help inform our predictions and interpret our results; we do not structurally estimate its parameters. Similarly, we are agnostic about whether people's intertemporal utility reflects exponential discounting, hyperbolic discounting, or both; but for convenience, we use words like "patience" and our model is one of exponential discounting. Not only does this general patience influence the decision-maker, but so does the shape of the effort cost function, and if she is choosing for someone else, her preferences for that person matter as well.

Each person is assumed to have an intra-temporal utility function in which time worked gives disutility, and an intertemporal utility function that discounts future values. We assume that work is effortful and that work disutility increases convexly with time worked in each period, m_N and m_L. Intertemporal allocation of tasks can be thought of as a choice of whether to procrastinate. Procrastination is modeled in the literature like other intertemporal decisions with models in which the future is discounted relative to the present, as in Fischer (2001). As we show

Information Condition, subjects in the Friend treatment are slightly younger (19.4 versus 19.9 years old), and in the Information Condition, subjects in the Friend treatment are more likely to be female (62.3% versus 43.4%).

in the Discussion section, we have evidence that people do not perceive procrastination to reflect impatience but rather a lack of responsibility, so a different model may be appropriate for task procrastination. However, we use the standard model here to set benchmark predictions.

We write a simple intertemporal effort cost function that the agent seeks to minimize as:[9]

$$C = m_N^\gamma + \delta^t m_L^\gamma \qquad (2)$$

where *t* is the time that will elapse between the decision and the later work period, γ describes the convexity of the effort cost function (where we assume $\gamma \geq 1$), and δ is the discount factor (where $0 < \delta \leq 1$). Effort cost could also comprise opportunity cost.

If a person's $\delta = 1$, she weights the present and future equally, while $\delta < 1$ indicates an impatient person (a person who discounts the future). If a person's $\gamma = 1$, she has perfect substitutes preferences and will prefer to be at a corner solution (work only now or only later) because the marginal rate of substitution between minutes now and later is a constant $-{}^{1}/_{\delta^t}$. If such a person also views time in the two periods as perfect substitutes (so $\delta = 1$), she will simply choose to minimize total time worked $m_N + m_L$. For some people, time *t* and work times m_N and m_L are so small that even with some curvature these corner solutions will be optimal.

Assume first that each person is choosing a time allocation for herself (i.e., that each person bears the consequences of her own decision). When individuals make a choice between time expended now and time expended in the future, the constraint in equation (1) is binding. If $\gamma > 1$, the first order conditions[10] yield the following:

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[9] This model assumes exponential discounting, as in Samuelson (1937). Hyperbolic discounting as in O'Donoghue and Rabin (2001) would give a cost function like $C = (m_N)^\gamma + \beta\delta^t(m_L)^\gamma$. This would have the same implications for us, since our design does not separately identify discounting and present bias. Disutility of visiting the lab could also be incorporated, but is constant across both dates so is omitted for simplicity.

[10] All mathematical derivations are in Appendix A.

$$m_N^{\gamma-1} = R\delta^t m_L^{\gamma-1} \quad (3)$$

Recall that R is the number of minutes worked later for each minute not worked now out of a maximum of 60 minutes now. From equation (3), we can see that a larger R (price of impatience) will result in a time choice more tilted toward m_N and away from m_L, but at a decreasing rate, as m_N/m_L is proportional to $R^{\frac{1}{\gamma-1}}$. This will also be the case as δ gets bigger (approaches 1, as it does for more patient individuals), while the allocation will be more tilted toward m_L as δ gets smaller (approaches 0, which it does for more impatient individuals).

Using the constraint in (1) and the tangency condition in (3), the optimal m_N is:

$$m_N = \frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}} \quad (4)$$

From (4) one can show that $\frac{\partial m_N}{\partial R} > 0$ when $\gamma > 1$, indicating that individuals prefer to work more now when the cost of delaying is higher. Additionally, $\frac{\partial m_N}{\partial \delta} > 0$ when $\gamma > 1$, which means that more patient individuals (those with δ closer to 1) prefer to work more minutes now while more impatient people (δ closer to 0) allocate more work to the future and less to the present. This may appear backward relative to studies that examine time preferences over smaller and sooner versus larger and later benefits. Impatient individuals prefer to move benefits sooner and costs farther into the future.

It is also straightforward to show that for $R > 1$, $\frac{\partial^2 m_N}{\partial R^2} < 0$, so response to minute rate is concave. Further, from equation (4), $\lim_{R\to\infty} m_N = \frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}} = 60$. Since $m_N = 0$ if $R = 0$ and as shown above $\frac{\partial m_N}{\partial \delta} > 0$, if a person has $\gamma > 1$, for every $\varepsilon > 0$ there is a minute rate R^{ε} above which the person will allocate less than ε minutes of work time to the future because the price of doing so is too high. As minute rate increases, in a population with varying γ and δ, more people find themselves above this threshold. Thus, for high minute rates, choices in a heterogeneous population converge toward full allocation of work to the present.

We next consider what differs when a person chooses time allocations for another person instead of for herself. We consider four kinds of tastes the decision-maker could have for the recipient: indifference, malevolence, simple benevolence, and benevolence with paternalism.

If the decision-maker is indifferent about the welfare of the recipient, it literally does not matter to her what she chooses. Therefore, if the cost of choosing each option is the same, then she will choose any option, perhaps randomly. If the decision-maker is malevolent, then she will choose to maximize rather than minimize costs, and the predicted behavior would be the opposite of the theoretical predictions for a benevolent decision-maker, which are described below. Our results are not consistent with a malevolent decision-maker (no subjects choose to maximize work time), and in the situations we model from outside the lab (managers, policymakers, family members, etc.) malevolence is, one hopes, uncommon.

In fact, in situations of interest, it is reasonable to assume the decision-maker is benevolent. We are agnostic about the root of this benevolence but use it to comprise any kind of preferences that makes her rank better outcomes for the recipient above worse outcomes for the recipient. Since all options that could be chosen for the recipient levy the same negligible cost on the decision-maker, and there is no sequence of moves, even a small amount of altruism could drive benevolence. Inequality-aversion is not a relevant kind of preference because if the decision-maker's choice is implemented for the recipient, the recipient's choice from the same choice set will be implemented for the decision-maker herself, and she doesn't know yet what that choice will be.

The simplest sort benevolence will see the decision-maker's utility from the choice mirroring the utility she believes the recipient will get from the choice. For simplicity, assume that the decision-maker either knows or correctly guesses the degree of effort cost convexity γ for the recipient.[11] However, since patience is known to vary widely across people, each person must simply make a guess, δ^{guess}, about her recipient's patience parameter, and she will choose the time allocation that minimizes $m_N^{\gamma} + (\delta^{guess})^t m_L^{\gamma}$. This guess may be based on what she knows about the recipient, or if she does not know the recipient it may be based on what she knows about the population from which he is drawn. The guess might also be correlated with the decision-maker's own patience; one might conjecture that the more patient a person is the more patient she thinks others are, but the opposite seems to be true in our results.

If there is random mean-zero error in the guess, then sometimes she will allocate too many minutes to now, and at other times she will allocate too many minutes to later, as compared to what the recipient would most prefer (i.e. would choose for himself), but on average the choice will be correct. If instead the guess is biased (not correct on average), the decision-maker will make a biased choice. One possible source of such a bias is the Lake Wobegon effect (see, e.g., Maxwell and Lopus, 1994), according to which on certain traits people have an excessive tendency to perceive themselves as above average in some way; here, they might perceive themselves as being above average in patience, which could make them believe others are less patient than they actually are. When a person has better information about their recipient

[11] While a decision-maker could have an incorrect guess about her recipient's effort cost, incorrect beliefs about effort cost convexity (γ) are unlikely to drive patterns in our data. First, effort cost convexity is a second order parameter since it refers not to level of cost but rate of change, so it is hard to tell a realistic story that involves an incorrect belief about such a parameter. Second, it is unclear why anyone should have a biased (wrong on average) perception of this parameter in the way that they might for patience. Third, and most importantly, information about the recipient's patience changes behavior in our study.

the guess should be closer to what the recipient would choose. This information could come from familiarity with the recipient or from some signal of the recipient's tastes.

Instead of being simply benevolent, the decision-maker may be paternalistic in the sense of wanting to give the recipient an allocation other than what he would choose for himself. This divergence may be driven by some normative judgment the decision-maker has about what the optimal choice should be or a belief that the recipient has some kind of bias. In such a case, she may know the recipient's true δ but choose instead to minimize costs based on some other δ^{ideal}. Here, a bias the decision-maker might expect is hyperbolic discounting, which could cause the recipient to later regret an allocation he made for himself as too impatient (procrastinating too much). If this is so, the decision-maker will choose more patiently (allocate more work time to the present based on a $\delta < \delta^{ideal}$)[12] than she believes the recipient would choose for himself. This logic may be the rationale for time limits on welfare programs, as suggested by Fang and Silverman (2004).

Paternalism differs observably from simple benevolence in that a paternalist who learns that the recipient would have chosen a different allocation will not change her choices.

In summary, if an optimizing decision-maker cares about the recipient, either she will choose for him just as he does for himself or she will choose based on a different discount factor. If she chooses based on a different discount factor, either through error or through paternalism, the divergence between the time allocations she makes and the allocations the recipient would have made for himself will vary with the minute rate. Since choices for all discount rates converge at $m_N = 0$ if $R = 0$ and again at $m_N = 60$ as $R \to \infty$, divergences from any cause

[12] Hyperbolic discounting is not represented by the exponential discounting we use in our model. A hyperbolic discounter's behavior would be interpreted in our model as having a large δ because of present bias.

(mistaken beliefs or paternalism) will be compressed for very small or very large *R*, and will be largest for moderate *R*'s—any divergence will be non-constant and nonlinear.

Decision-makers, when choosing an allocation for themselves or others, may deviate from this model for a few reasons. First, there might be a failure of rationality (e.g. a mistaken desire to form a portfolio, as in Benartzi and Thaler, 2001; see also Choi *et al*., 2011). This kind of error should be mean zero. Second, the recipient may have idiosyncratic time constraints that increase the opportunity cost of working now or later. However, we expect these constraints to be equally spread across the present and future time periods and thus to average out.[13] If future opportunity costs are more uncertain than present opportunity costs, a risk averse decision-maker will allocate more time to the present. If a decision-maker is choosing for a recipient, she may be more uncertain about his current and particularly his future constraints. If she is risk averse over his outcomes, this should cause her to allocate his work time more patiently than her own (i.e., more time to the present). This is the opposite of the pattern that we observe in our results.

Social distance may affect the decision-maker's choices for a recipient by changing her familiarity or emotional engagement with the recipient. Montinari and Rancan (2018) find that people making risky decisions over losses choose in a less risk seeking way for friends, but not strangers, as compared to for themselves, and conjecture that this is because of a failure to predict the friends' emotional responses to gains and losses.

When the chooser is paired with a friend, her beliefs about the person's preferences (or what is best for the person) will be based on her knowledge of that person; when she is choosing for a stranger, her beliefs must be based on her beliefs about the population from which the stranger is drawn. Therefore, when deciding for friends as compared to for strangers, decision-

[13] Further, in our experiment, all subjects know in advance that they must commit time at the initial session and at another session six weeks in the future, so such constraints are selected against in the enrollment process.

makers should have more accurate guesses about their recipient's preferences, so that benevolent choices will be more like the choices the recipients make for themselves.

Decisions for friends may also engage emotions more than decisions for strangers. If, as shown in Albrecht *et al.* (2011), emotions are associated with impatience, decisions for friends may be more impatient than those for strangers, and (if people are most emotionally engaged in decisions for themselves and least so for strangers) that should make decisions for friends be more like decisions for oneself than are decisions for strangers. At the same time, decision-makers may care more about—or be held more to account, as in Pollmann *et al.* (2014)—by their friends than they would by strangers. This could push decisions for a friend to be more in line either with the friend's best interests or with the friend's immediate impulses; and if the friend is myopic this could either make the decision-maker choose more or less patiently for a friend than for a stranger.[14]

4. Results

We next present our results. Although work time was determined by one decision from each subject, we analyze all twenty decisions from each subject. We begin by confirming that individuals exert substantial effort in both work periods, a condition which must be met in order for our cost framework to be relevant. We then discuss the decision data by examining the impact of treatment and minute rate on intertemporal allocations of work time when no information is provided. Finally, we discuss the impact of information on decisions made for others. There are no substantial order effects so we pool orders for all analysis.[15]

[14] For the same reason, decisions for a friend may be more carefully-made than those for a stranger. It is not clear how this would affect choice, since patient and impatient decisions appear equally costly in terms of direct effort and perhaps cognitive costs. Decisions that differ most from those one makes for oneself may take more cognitive effort; if so, people should choose more like themselves for strangers than for friends. This is not what we see in our data.
[15] Three out of twenty pairwise order effect tests show statistical differences at the 10% significance level. These differences are not systematic and appear random. On the other hand, there is evidence of slight cross-task spillover between a subject's first and second treatment, as decisions for self differ slightly between the Friend and Stranger

4.1 Are subjects exerting effort?

The distributions of transcriptions per minute are shown in Figure 4 for those with non-zero work times (18 of 220 implemented choices were for zero time to work on the first day, and 80 were for zero work time on the return session). Most subjects take the work task seriously: of subjects with non-zero time to work, only five of 202 completed zero transcriptions on the first day and only 15 of 140 completed zero in the return session. Subjects with time to work completed 0.353 transcriptions per minute on average in the first session and 0.307 in the return session. This indicates that subjects are exerting effort.[16] There were subjects who completed a low number of transcriptions given their work time, particularly on the return day, but what matters for our purposes is that when they make choices (in the first session), subjects believe that their decision will commit them to spending the time in a way that provides some disutility[17] (recall subjects were monitored so they could do nothing other than the work task).

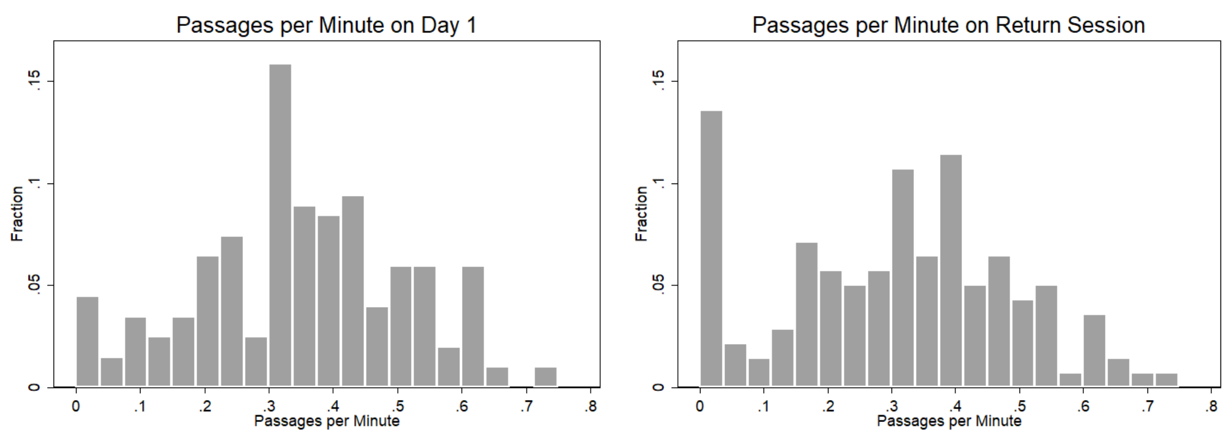


Figure 4. Passages Transcribed per Minute

treatments if decisions for self are made after decisions for other. This emphasizes the need to perform within-subject analysis, and it may cause the appearance of these order effects. See Appendix B for details.

[16] The number of transcriptions per minute does not differ significantly based on whether the subject's own decision or her partner's was implemented (ranksum $p > 0.14$).

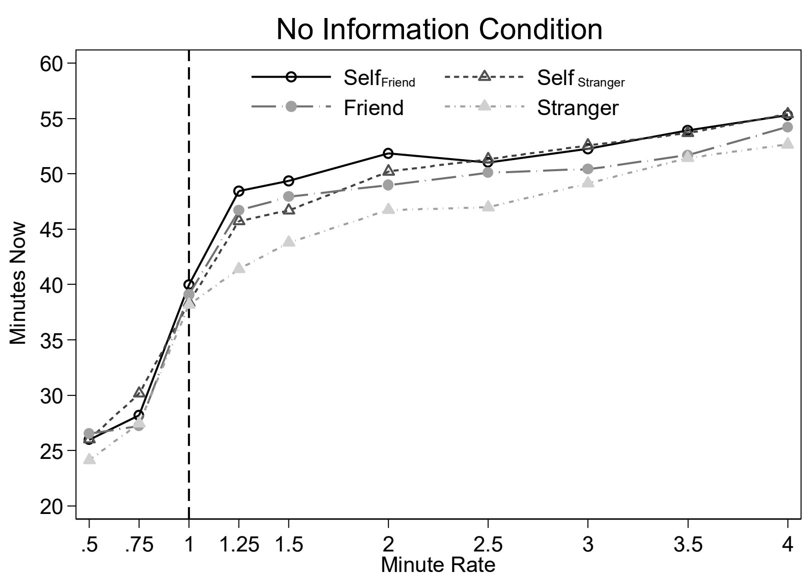
[17] Subject questionnaire responses indicate that they did not enjoy the task; for example, many subjects expressed a desire to "Limit the amount of time I have to spend working."

Further evidence of attention and intentionality is shown in the fact that only one of 220 subjects left all time allocation choices for himself or herself at the default of zero minutes now, and only three of 220 left all at the default for their partner (all in the Stranger treatment).

Therefore, we proceed, having confirmed that subjects understood the decisions they faced and that they actually bore costs as a result of their decisions.

4.2 Decisions for Self versus Others with No Information Provided

We next examine differences between decisions for self and decisions for others when no information is provided. We test the relationship between an individual's time allocation choice for herself and for someone else, and we test the impact of social distance on choices for others.



"Minutes now" is minutes allocated to work now; a larger number indicates more patience. "Minute rate" is *R*, the rate at which a minute worked now reduces minutes to work in the future; a larger number indicates that impatience is more costly. $\text{Self}_{\text{Friend}}$ refers to choices made for self in the treatment in which the "other" choice is for a friend; $\text{Self}_{\text{Stranger}}$ are choices for self in the treatment in which the "other" choice is for a stranger.

Figure 5: Time Allocation Choices by Treatment, No Information Condition

Decision data are shown in Figure 5. The horizontal axis shows minute rate *R*: the number of minutes worked later for every one minute not worked today. The vertical axis shows the average number of minutes worked now, m_N, for each type of decision and minute rate. The vertical dotted line at minute rate of one indicates the threshold between rates for which it is more costly in terms of total minutes worked to work in the present (to the left of the line) versus the future (to the right of the line). A decision is more "patient" if more of the cost, or minutes worked, is allocated to the present ("minutes now"). $\text{Self}_{\text{Friend}}$ and $\text{Self}_{\text{Stranger}}$ indicate the decisions made for oneself in either Friend or Stranger treatment, respectively. Friend and Stranger indicate the decisions made for others in the Friend or Stranger treatment, respectively.

First, it is clear that average m_N increases monotonically with the minute rate, indicating that individuals are responsive to price, and it appears to be concave as predicted for $R > 1$.[18] These patterns hold for choices made for others as well as for self, indicating that choices made for others are not made at random (as they might be if proxy decision-makers were indifferent about their recipients). Second, there is general agreement across treatments as to the minutes worked now versus later at the extreme minute rates, as predicted by the theoretical framework. Third, recall that the theoretical framework also suggests that if either benevolence with incorrect beliefs or paternalism is driving choices for other, then the impact will be non-linear and largest at moderate R's. The aggregate data suggest some separation between choices made for oneself and for others, particularly strangers, at these moderate minute rates.

These observations are borne out in statistical tests, shown in Table 2. Individuals allocate significantly less time to the present for strangers than for themselves for minute rates from 1.25 to 3. The separation is on the order of 3 or 4 minutes, or 6 to 10 percent of the time chosen for self. The time allocation to the present is also less for friends than for self, but this

[18] Choices are weakly monotonic for 78 of 110 subjects. Tendency to choose monotonically is associated (in analysis not shown) with being male, white, more self-reported patience, fewer economics classes, and perhaps more experience in economics experiments. All results generally hold if we exclude non-monotonic subjects. Also, 73 of the 110 subjects have a threshold minute rate above which they always choose 60 minutes now, as theory predicts.

difference is only marginally significant for minute rates 2 and 3, and significant for 3.5, and is smaller in value, 2 to 3 minutes (4 to 6 percent of the time for self). Although Friend and Stranger decisions look different, these differences are not statistically significant.[19]

Table 2: Average Minutes Allocated to the Present by Minute Rate and Treatment, No Information Condition

	Self		Other		Tests		
	Friend (1)	Stranger (2)	Friend (3)	Stranger (4)	Self (1) vs. Friend (3)	Self (2) vs. Stranger (4)	Friend (3) vs. Stranger (4)
Minute Rate (R)							
0.5	26	26.036	26.537	24.143	0.585	0.580	0.684
	(23.312)	(21.719)	(23.254)	(21.660)			
0.75	28.185	30.161	27.241	27.464	0.504	0.142	0.940
	(23.540)	(21.644)	(21.964)	(21.114)			
1	39.981	38.375	39.093	38.179	0.410	0.915	0.882
	(18.383)	(19.406)	(18.362)	(18.996)			
1.25	48.426	45.75	46.685	41.393	0.386	0.063	0.152
	(15.627)	(16.33)	(17.688)	(19.961)			
1.5	49.389	46.696	47.926	43.786	0.413	0.033	0.270
	(15.689)	(16.643)	(15.973)	(19.061)			
2	51.833	50.214	48.981	46.732	0.060	0.069	0.507
	(14.762)	(14.892)	(16.843)	(18.570)			
2.5	51.037	51.321	50.093	46.982	0.193	0.035	0.448
	(16.281)	(14.968)	(15.331)	(18.739)			
3	52.278	52.571	50.426	49.143	0.097	0.046	0.610
	(15.114)	(13.033)	(15.578)	(17.277)			
3.5	53.907	53.679	51.685	51.429	0.039	0.181	0.604
	(12.314)	(13.220)	(15.093)	(15.242)			
4	55.315	55.411	54.222	52.661	0.849	0.166	0.433
	(10.227)	(9.919)	(11.123)	(13.855)			
N	54	56	54	56			

Standard deviations in parentheses. "Tests" cells report p-values of Wilcoxon signed rank tests for within subject tests (Self = Friend and Self = Stranger) and Wilcoxon ranksum tests for between subject tests (Friend = Stranger).

The responsiveness of individuals to the minute rate implies that in aggregate they do not view time worked in the two periods as perfect substitutes. In our model, if a person has both $\gamma = 1$ and $\delta = 1$, she will always minimize total minutes worked. In the No Information condition, only 17 of 110 subjects always chose to minimize time worked for themselves (by

[19] A difference-in-difference test comparing the difference between time chosen for self and the time chosen for partner shows no significant differences between Friend and Stranger treatments at any minute rate. ($p > 0.29$). The across-minute-rate average Self-Other choice difference does not differ between Friend and Stranger ($p = 0.317$).

choosing 0 minutes now when the minute rate favors work in the future and 60 minutes now when it favors work now), and only 15 of 110 always chose to minimize time worked for their partner. [20] An additional 25 of 110 subjects always chose the same value of minutes now for all minute rates for themselves, with that value being 60 (i.e. all time worked now and none in the future) in 21 of the cases (25 of 110 chose the same minutes now for all minute rates for their recipient, and 18 of these were all 60). This is consistent with subjects being uncertain about future opportunity cost.[21] The remaining majority of subjects make non-linear tradeoffs between present and future, because they discount the future or because effort costs are convex (or both).

Table 3: Regressions of Minutes Allocated to the Present on Treatment Variables, No Information Condition

	(1)	(2)	(3)
Other	-2.102***		
	(0.696)		
Friend		-1.346*	-1.346*
		(0.773)	(0.773)
Stranger		-2.830**	-2.830**
		(1.139)	(1.139)
Minute Rate	7.122***	7.122***	
	(0.544)	(0.544)	
Minute Rate (< 1)			-11.925***
			(1.674)
Minute Rate (> 1)			11.088***
			(1.234)
Constant	31.078***	31.078***	39.946***
	(1.139)	(1.140)	(0.931)
R^2	0.17	0.17	0.22
n (subjects)	110	110	110
N (observations)	2,200	2,200	2,200
Test: Friend = Stranger, *p*		0.283	0.284

* p<0.1; ** p<0.05; *** p<0.01. Fixed effects OLS panel regressions with robust standard errors clustered on subject in parentheses. Omitted category in Specification (3) is minute rate of 1. The Minute Rate (<1) and Minute Rate (>1)

[20] Regression results (available upon request) indicate that whites and men are more likely to minimize total time, but this is only significant for this, the No Information, Condition.

[21] In regressions (available upon request), subjects who know their friends less well are more likely to choose a flat pattern across minute rates for their recipient. In the Information Condition, discussed in the next section, subjects who choose flat patterns have taken fewer economics classes and are older.

variables represent linear trends for minute rates that are respectively less than and greater than 1.

We next examine time allocation choices for self and others with no information using multivariate fixed effects panel regressions, as shown in Table 3. We create a panel in which each observation corresponds to one decision by a subject for herself or her partner, so there are twenty observations per subject. Since these are fixed effects specifications, these are within-subject tests. Results do not change substantively when we change the specification to random effects, pooled OLS, or Tobit (available upon request).[22]

Specification 1 shows that subjects choose fewer minutes now (more impatiently) for other subjects than for themselves. Since the average choice a subject receives from his proxy decision-maker differs from the choice he makes for himself, decision-makers are either paternalistic or simply benevolent but have incorrect beliefs. Specification 1 also shows that the number of minutes chosen to work now is strongly responsive to minute rate when minute rate is represented as a linear trend. This again shows that subjects respond to the cost of delay.

Specification 2 separates the effect of choosing for someone else into effects for friends and for strangers. Subjects choose marginally significantly fewer minutes now for friends and significantly fewer minutes now for strangers as compared to for themselves. While the point estimates for friends and strangers appear different from each other, that difference is not statistically significant with this sample size.[23]

[22] If we cluster on session (of which there are only four), Specification 3 can no longer be run, and Friend ceases to be significant in Specification 2. Results are robust (available upon request) to removing subjects who do not respond to experimental conditions (always minimize time worked, or choose the same number of minutes now for all minute rates, or choose the same for others as for themselves). The only exception is that the coefficient on Friend ceases to be significant. This is likely a power issue since the point estimate is slightly larger.
[23] We see weak evidence of more patient choices for friends than for strangers when we allow the effect of choosing for someone else to vary by minute rate. In regression specifications (not shown) in which we focus only on decisions for the other (the friend or the stranger) and we interact a Stranger dummy with minute rate, the interaction is marginally significantly negative (p = 0.084 or 0.086) in OLS specifications for a minute rate of 1.25; while it is negative for the other moderate minute rates, it is never significant for them.

Specification 3 shows the results are robust to representing the minute rate as two linear trends (for minute rates less than and greater than one). In results not shown, we also find results are robust to representing minute rates as a series of indicators and that the coefficients on minute rate dummies do not linearly relate to the minute rate, so that choice is nonlinear in minute rate as theory predicts. Specification 3 is our preferred specification.

We have identified a gap between decisions for oneself and decisions for someone else. Recall that this could theoretically be caused by simple benevolence or paternalism. Paternalism seems unlikely since it would imply a judgment that people ought to behave more impatiently than they do (and, as we show in the Discussion, respondents to an online survey identify a procrastinating decision as less responsible). We seek suggestive evidence for this intuition by examining (un-incentivized) beliefs about the patience of oneself and others. In the post-experiment questionnaire, subjects answered questions about themselves and the friend they came to the experiment with: "Do you think of [yourself / the friend you came to this experiment with] as a pretty patient person or a pretty impatient person?" As shown in Table 4, on average people think of themselves as pretty patient[24] but their friends as less patient than they themselves are.

Table 4: Questionnaire Responses about Patience of Self and Friend

	I am…	My friend is…
Pretty patient	68 / 110 = 61.82%	57 / 110 = 51.82%
Neither patient nor impatient	23 / 110 = 20.91%	28 / 110 = 25.45%
Pretty impatient	19 / 110 = 17.27%	25 / 110 = 22.73%
Signrank *p*-value	0.124	
One-tailed proportions test *p*-value	0.067	

Numbers indicate number and percent of subjects who made each choice.

[24] Since a large literature exists showing that people are impatient, one might be tempted to say this is self-delusion; however, our subjects do make decisions that are relatively patient. For example, at a minute rate of one, subjects choose to work slightly more now than in the future; if they were impatient they would choose more in the future. This comports with the literature that people discount losses less than gains (Frederick *et al.*, 2002).

These differences are not quite significant at conventional levels using a Wilcoxon signed-rank test, but they are significant at the 10% level in a one-sided proportions test (which is done on a binary variable indicating whether a subject chose "Pretty patient"). Power analysis indicates that the difference in proportions indicating that they are "Pretty patient" would be significant at the 5% level with a two-sided test with a sample of N=190 (α=0.05, β=0.8). This suggests that people believe, incorrectly, that others are less patient than they themselves are. This could be a manifestation of the Lake Wobegon effect (see, e.g., Maxwell and Lopus, 1994), according to which everyone thinks she is "above average." Such a belief could drive people to choose more impatiently for others. Deck and Jahedi (2015) also find that people believe others are more impatient than they themselves are and that this belief affects strategic choices, and Fedyk (2017) finds that people predict others to be more present-biased than themselves. Further, in our study people are probably better able to guess how patient a friend is as compared to how patient other unknown people are, and this would be consistent with the directional ordering observed in Table 3. Responses to this question are, however, not significantly predictive of time allocation decisions for self or others for this treatment, and this will continue to be true for the Information Condition. We will return to this point in the Discussion.

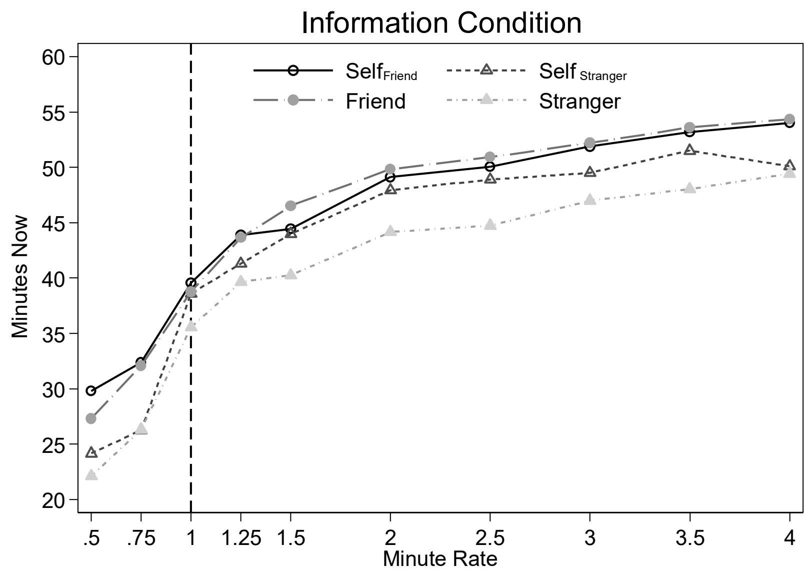
4.3 Impact of Information

To better understand whether choices for others are driven by simple benevolence or paternalism, we turn to the Information Condition. We replicate all four treatments of the No Information Condition with two changes. First, subjects complete a three-question survey before reading instructions and making work time allocations. This survey includes a self-reported patience question (like that reported in Table 4 but on a five point scale). Second, just before a participant makes choices for her recipient, she sees her recipient's self-reported patience. When answering the pre-survey, subjects were not informed that their responses would be revealed to another agent, so their answers should not be strategic. If the gap between decisions for self and other results from paternalism, information about the recipient's preferences should not affect the gap; but if it results from simple benevolence with mistaken beliefs, information should alleviate or eradicate the gap.

Responses to the pre-survey patience question are strongly correlated (correlation 0.816) with responses to the post-experiment patience question. However, pre-survey patience self-reports are not significantly correlated with decisions for oneself ($p > 0.18$ for coefficients, OLS regressions not shown) and the pre-survey patience measure of the recipient is not correlated with decisions subjects make for recipients ($p > 0.30$, OLS regressions not shown).

However, subjects are attentive to recipients' self-reported patience, particularly for friends. When a subject see her friend's self-reported patience, that value is correlated with the subject's answer to the post-survey question about how patient the friend is (correlation 0.494, OLS regression coefficient 0.361, $p < 0.001$). Further, subjects no longer believe their friends are less patient than themselves (one-tailed proportions test $p = 0.652$; compare to 0.067 in Table 4). This bias does not disappear, however, when they are shown information about a stranger's patience (one-tailed proportions test $p = 0.060$). Subjects less often make the same set of choices for the other subject as for themselves in the Information Condition (40% of the time in the No Information and 26.42% of the time in the Information Condition, Wilcoxon signrank $p = 0.046$).

Finally, a subject's own self-reported patience is correlated with choices she makes for her recipient: the more patient a subject thinks she herself is, the *less* patiently she chooses (the fewer minutes now) for another subject. This is consistent with a subject choosing too impatiently for others because she believes others are less patient than herself: if she thinks she's relatively patient, then she apparently thinks others are relatively impatient. This result is similar to one found by Füllbrunn and Luhan (2015) in the risk domain: they find that subjects making risky choices for others move to the perceived population average, with relatively risk tolerant individuals making more risk averse choices for others than for themselves and vice versa.



"Minutes now" is minutes allocated to work now; a larger number indicates more patience. "Minute rate" is rate at which minutes worked now reduce minutes to work in the future; a larger number indicates that impatience is more costly. $\text{Self}_{\text{Friend}}$ refers to choices made for self in the treatment in which the "other" choice is for a friend; $\text{Self}_{\text{Stranger}}$ are choices for self in the treatment in which the "other" choice is for a stranger.

Figure 6: Time Allocation Choices by Treatment, Information Condition

Decision data for the Information Condition are shown in Figure 6. As before, the horizontal axis shows minute rate *R*: the number of minutes worked later for every one minute not worked today, with larger numbers indicating a greater cost of impatience. The vertical axis shows the average number of minutes worked now, with larger numbers indicating greater patience. The vertical dotted line at a minute rate of one indicates the threshold between rates for which it is more costly in terms of total minutes worked to work in the present (to the left of the line) versus the future (to the right of the line). $Self_{Friend}$ and $Self_{Stranger}$ indicate the decisions made for oneself in either Friend or Stranger treatment, respectively. Friend and Stranger indicate the decisions made for others in the Friend or Stranger treatment, respectively.

Figure 6 shows that, similar to the No Information Condition, the amount of work time allocated to the present is increasing in the cost of delay.[25] The choices seem shifted slightly downward relative to those in the No Information Condition (Figure 5), although these differences are not strong; for example, the Information Condition dummy is not significant in a pooled OLS regression (see Appendix Table C-2), and the differences between decisions for self across the two conditions are significant for minute rates above 1 if the treatments are pooled but only a few are significant in either the Friend or Stranger treatments alone. These differences might arise because people learn others' self-reported patience (although some differences are marginally significant even if only the self-first order is examined), or because the pre-survey primes them to behave more impatiently; or they might result from a different sample of the population and a different time of year. Since we perform our main comparisons within either the No Information or the Information Condition, these differences are not important.

Within the Information Condition, no differences between pooled Self and Other or between Friend and Stranger decisions are significant at the 5% level. Five of these thirty pairwise comparisons are significant at the 10% level. Three of these indicate that decisions for strangers are more impatient than those for self, one indicates that decisions for a stranger are more impatient than those for a friend, and one indicates that decisions for a friend are *less* impatient than those for self. (We expect this latter reverse-direction result is likely noise.) In

[25] Choices are weakly monotonic for 73 of 110 subjects. Similarly to the No Information Condition, monotonic choices are associated in regressions (not shown) with self-reported patience, males, whites, fewer economics classes, age, and perhaps past economics experiment experience. Results generally hold if we exclude non-monotonic subjects. Also, 58 of 110 subjects have a minute rate above which they always choose 60 minutes now.

other words, the differences between decisions for self and for other appear diminished or even eradicated. Tests are shown in Appendix Table C-1.

To further test whether information about the time preferences of others reduces the increased impatience for others, we analyze these time allocation choices using multivariate fixed effects panel regressions, as shown in Table 5.[26] In the same manner as for Table 3, we create a panel in which each observation corresponds to one decision by a subject for herself or her partner, so there are twenty observations per subject.[27]

Table 5: Regressions of Minutes Allocated to the Present on Treatment Variables, Information Condition

	(1)	(2)	(3)
Other	-1.214		
	(0.969)		
Friend		0.079	0.079
		(0.838)	(0.838)
Stranger		-2.508	-2.508
		(1.729)	(1.729)
Minute Rate	6.770***	6.770***	
	(0.470)	(0.470)	
Minute Rate (< 1)			-10.564***
			(1.667)
Minute Rate (> 1)			9.892***
			(1.038)
Constant	30.002***	30.002***	38.730***
	(1.096)	(1.096)	(1.010)
R^2	0.20	0.21	0.23
n (subjects)	106	106	106
N (observations)	2,120	2,120	2,120
Test: Friend = Stranger, *p*		0.18	0.18

* p<0.1; ** p<0.05; *** p<0.01. Fixed effects OLS panel regressions with robust standard errors clustered on subject in parentheses. Omitted category in Specification (3) is minute rate of 1. The Minute Rate (<1) and Minute Rate (>1) variables represent linear trends for minute rates that are respectively less than and greater than 1.

[26] We perform pooled OLS regressions to test the gross effects of the Information Condition and the Friend and Stranger treatments, with results in Table C-2. Information does not have an overall significant effect; nor are decisions for a friend significantly different from those made for self or for a stranger, although those for a stranger are different from those for self. These specifications are not preferred because they are between-subject.

[27] The number of subjects is 106 instead of 110 because a software bug caused four subjects' decisions to be lost.

The results in Table 5 confirm that, when information about the other's self-reported patience is provided, there is no longer a significant difference between choices for self and others.[28] The point estimate of the bias for friends gets close to zero. While the point estimate of the bias for strangers is not significantly different from zero, it is also not much smaller in magnitude than it was in the No Information Condition. Thus information corrects the bias for friends, and may mitigate it for strangers.[29] The fact that information can have this effect suggests that the increased impatience for others seen in the No Information Condition is due to benevolence with incorrect beliefs about patience; if the gap was due to incorrect beliefs about effort cost convexity then information about patience should not ameliorate it. Therefore, providing decision-makers with information about their recipients' tastes can improve welfare, at least if they share an underlying relationship.

5. Discussion

One can argue that proxy intertemporal decisions are more important now than ever before. Semi-autonomous work in teams is the norm in many workplaces and teleworking arrangements are common; thus the manager's dilemma in allocating work tasks for a project across time is ubiquitous. Parallel situations are also increasingly common in policy, as crucial sustainability questions must be considered on a vast time scale (and the policymaker can be seen as the proxy decision-maker for the populace). They also occur in family situations: as

[28] In regressions (not shown) that interact dummies representing for whom the decision was made with minute rates, there are still no significant differences between Self and Other or Friend or Stranger or between Friend and Stranger. These results also do not change (regressions not shown) when we exclude subjects who are relatively unresponsive to experimental conditions (those that always minimize time worked, or choose the same number of minutes now for all minute rates, or who choose the same for others as for themselves).

[29] The coefficients are not significantly different between the Information and No Information conditions. For example, when we run a pooled regression of the type of Specification (3) including both the No-Information and Information conditions and interacting a dummy for the Information condition with the Friend and Stranger dummies, the interaction term for Friend is 1.426 ($p = 0.212$) while that for Stranger is 0.323 ($p = 0.876$).

people live longer with diminished capacities, relatives are often entrusted for years with care of their elders. It is thus important that we understand how people make proxy decisions when time is involved. Akerlof (1991) noted people may lose welfare in overly impatient decisions for themselves. Our results show this impatience may be exacerbated in proxy decisions: optimal investments may remain unmade or time may be misallocated, and the recipient may suffer as a result. Our study is the first to address this question with significant power, to study the cost domain (which may be different from the benefit domain), and to identify the role of the decision-maker's intimacy with the recipient.

We find that people choose more patiently for themselves than for either friends or strangers. In other words, people choose more impatiently for other people than those other people would choose for themselves. We also find weak evidence that people choose more patiently for friends than for strangers. This seems at odds with the implication from Albrecht *et al*. (2011) that emotional involvement is associated with impatient decisions. In fact, the ordering of impatience in our results is the opposite of the ordering of emotional engagement, and of the results in Albrecht *et al*. (2011), Howard (2013), Pronin *et al.* (2008), Rong *et al.* (2018), and Lusk *et al.* (2013) that people choose more patiently when acting as proxy to allocate benefits over time for others.

These differences may arise because our decisions involve tradeoffs in costs (effort disutility) whereas these previous studies focus on tradeoffs in benefits (money). We had no *a priori* reason to believe that the sign of the consequences should change the patience ordering of decisions, but there is no theoretical reason that it could not be so, and, as described in Frederick *et al.* (2002), previous studies have noted differences between discounting losses as compared to gains (specifically, less discounting for losses). Some proxy intertemporal choice situations have consequences that are positive (as in allocating a loved one's savings to consumption over time) while others have consequences that are costs (as in climate adaptation), so both signs are interesting.

While inconsistent with some past literature, our results are supported by suggestive evidence from our questionnaire that people have incorrect beliefs about others' relative patience: people seem to think others are more impatient than they themselves are, which may be a manifestation of the Lake Wobegon effect (see, e.g., Maxwell and Lopus, 1994). Indeed, this result comports with the finding from Ellingsen and Johannesson (2009) that people treat time and money costs differently, and echoes the findings in Deck and Jahedi (2015) and Fedyk (2017) that people believe others are more impatient or present-biased than they themselves are. (The result in Fedyk (2017), however, differs from ours in that the prediction for one's self is inaccurate whereas the prediction for others is more accurate.) This implies that benevolence with mistaken beliefs explains the gap between decisions for self and others. We further support this hypothesis by showing that when subjects get information about the recipient's patience, the difference between self and other decisions disappears. This reduction is bias is clear for friends but the bias simply ceases to be significant (with little reduction in magnitude) for strangers, suggesting that familiarity may help decision-makers interpret preference information.

One possible reason for the difference between our results and the small existing literature is that people may approach procrastination of a task through a different decision process than that they use for other intertemporal allocation decisions. We conducted a survey through Amazon Mechanical Turk in fall 2016 (see Appendix D) in which we asked respondents to choose words to characterize choices to delay receiving money at some interest rate or to delay doing a task with a similar "minute rate." We find that over 92% of subjects assign the words "patient" and "impatient" to the appropriate money-based choices, while they did not apply these words to the task-based decisions in any particular pattern. Instead, the words "procrastination" and "responsible" seemed to resonate with respondents for the time-based decisions. Nevertheless, in our information treatment, a signal of recipient taste using the word "patient" reduced the proxy bias, so subjects must have correlated that word with what they perceived to be the recipient's relevant preferences in some way.

Our survey results, therefore, suggest a different underlying process for evaluating decisions over costs (or at least work effort) as compared to over benefits. These implications are similar in spirit to Olivola and Wang (2016), who compare discounting of time versus money using an auction framework. They find that decisions over time are more impatient, more likely to be captured by exponential discounting, and less present-biased than discounting over money.

Thus, when making benevolent proxy decisions with a time element, it seems that people will try to do so faithfully; but their biased perceptions may make them choose too impatiently, resulting in a suboptimal decision. Policymakers might be at a large psychological distance from those who will live under the consequences of their policies, and thus less familiar with them and their tastes, so this excessive impatience by proxy could be particularly problematic in policy. To return to our example scenario in the workplace, a manager may schedule tasks on a project to pile up later rather than being smoothed out over time. In either case, welfare is lost because of suboptimal decisions.

Further research in this area is needed to study whether decisions for others might be more patient than those for oneself in some contexts or with benefits instead of costs; how choices change when the recipient is on closer terms with the decision-maker, as family-members often are in natural situations, or in a more fiduciary role, as a policy-maker is when choosing climate adaptation strategies; whether these patterns vary with the context or framing of the decision; and what might happen if it is costly to choose impatiently or benevolently. Further research is also needed to understand the difference between people's decision processes when making task procrastination choices as compared to other intertemporal choices.

References

Akerlof, G.A., 1991. Procrastination and Obedience. The American Economic Review, 81(2), 1-19.

Albrecht, K., Volz, K.G., Sutter, M., Laibson, D.I., von Cramon, D.Y., 2011. What is for me is not for you: brain correlates of intertemporal choice for self and other. Social cognitive and affective neuroscience, 6(2), 218-225.

Andreoni, J., Sprenger, C., 2012. Estimating Time Preferences from Convex Budgets. American Economic Review, 102(7), 3333-3356.

Arrow, K., Cropper, M., Gollier, C., Groom, B., Heal, G., Newell, R., Nordhaus, W., Pindyck, R., Pizer, W., Portney, P., Sterner, T., Tol, R.S.J., Weitzman, M., 2013. Determining Benefits and Costs for Future Generations. Science, 341(6144), 349-350.

Augenblick, N., Niederle, M., Sprenger, C., 2015. Working over Time: Dynamic Inconsistency in Real Effort Tasks. The Quarterly Journal of Economics, 130(3), 1067-1115.

Benartzi, S., Thaler, R.H., 2001. Naive Diversification Strategies in Defined Contribution Saving Plans. American Economic Review, 91(1), 79-98.

Choi, J.J., Laibson, D., Madrian, B.C., 2011. $100 Bills on the Sidewalk: Suboptimal Investment in 401(k) Plans. Review of Economics and Statistics, 93(3), 748-763.

Cohen, J.D., Ericson, K.M., Laibson, D., White, J.M., 2016. Measuring Time Preferences. National Bureau of Economic Research Working Paper Series, No. 22455.

Deck, C., Jahedi, S., 2015. An experimental investigation of time discounting in strategic settings. Journal of Behavioral and Experimental Economics, 54, 95-104.

Ellingsen, T., Johannesson, M., 2009. Time is not money. Journal of Economic Behavior & Organization, 72(1), 96-102.

Fang, H., Silverman, D., 2004. On the compassion of time-limited welfare programs. Journal of Public Economics, 88(7), 1445-1470.

Fedyk, A., 2017. Asymmetric Naiveté: Beliefs about Self-Control.

Fischer, C., 2001. Read this paper later: procrastination with time-consistent preferences. Journal of Economic Behavior & Organization, 46(3), 249-269.

Frakes, M.D., Wasserman, M.F., 2016. Procrastination in the Workplace: Evidence from the U.S. Patent Office. National Bureau of Economic Research Working Paper Series, No. 22987.

Frederick, S., Loewenstein, G., O'Donoghue, T., 2002. Time Discounting and Time Preference: A Critical Review. Journal of Economic Literature, 40(2), 351-401.

Füllbrunn, S., Luhan, W.J., 2015. Am I My Peer's Keeper? Social Responsibility in Financial Decision Making.

Gächter, S., Thöni, C., 2005. Social Learning and Voluntary Cooperation among Like-Minded People. Journal of the European Economic Association, 3(2-3), 303-314.

Hamman, J.R., Loewenstein, G., Weber, R.A., 2010. Self-Interest through Delegation: An Additional Rationale for the Principal-Agent Relationship. American Economic Review, 100(4), 1826-1846.

Hershfield, H., Kramer, L., 2017, Examining the Effect of Social Distance on Financial Decision-Making.

Howard, G., 2013. Discounting for personal and social payments: Patience for others, impatience for ourselves. Journal of Environmental Economics and Management, 66(3), 583-597.

Hsee, C.K., Weber, E.U., 1997. A fundamental prediction error: Self–others discrepancies in risk preference. Journal of Experimental Psychology: General, 126(1), 45.

Lusk, J.L., Marette, S., Norwood, F.B., 2013. The Paternalist Meets His Match. Applied Economic Perspectives and Policy.

Maxwell, N.L., Lopus, J.S., 1994. The Lake Wobegon Effect in Student Self-Reported Data. The American Economic Review, 84(2), 201-205.

Montinari, N., Rancan, M., 2018. Risk taking on behalf of others: The role of social distance. Journal of Risk and Uncertainty, 57(1), 81-109.

O'Donoghue, T., Rabin, M., 2001. Choice and Procrastination. The Quarterly Journal of Economics, 116(1), 121-160.

Olivola, C.Y., Wang, S.W., 2016. Patience auctions: the impact of time vs. money bidding on elicited discount rates. Experimental Economics, 19(4), 864-885.

Pollmann, M.M., Potters, J., Trautmann, S.T., 2014. Risk taking by agents: The role of ex-ante and ex-post accountability. Economics Letters, 123(3), 387-390.

Pronin, E., Olivola, C.Y., Kennedy, K.A., 2008. Doing Unto Future Selves As You Would Do Unto Others: Psychological Distance and Decision Making. Personality and Social Psychology Bulletin, 34(2), 224-236.

Richards, T., Green, G., 2015. Environmental Choices and Hyperbolic Discounting: An Experimental Analysis. Environmental and Resource Economics, 62(1), 83-103.

Rong, R., Gnagey, M., Grijalva, T., 2018. “The less you Discount, the more it shows you really care”: Interpersonal discounting in households. Journal of Economic Behavior & Organization, 154, 1-23.

Samuelson, P.A., 1937. A Note on Measurement of Utility. The Review of Economic Studies, 4(2), 155-161.

Stone, E.R., Choi, Y., de Bruin, W.B., Mandel, D.R., 2013. I can take the risk, but you should be safe: Self-other differences in situations involving physical safety. Judgment and Decision Making, 8(3), 250-267.

Stone, E.R., Yates, A.J., Caruthers, A.S., 2002. Risk Taking in Decision Making for Others Versus the Self. Journal of Applied Social Psychology, 32(9), 1797-1824.

Reviewers' Appendix

(Not Intended for Print Publication)

Appendix A. Mathematical Proofs

Finding the Optimal Time Allocation

The problem is to minimize $C = m_N^\gamma + \delta^t m_L^\gamma$ subject to $60 = m_N + \frac{1}{R} m_L$

We write the Lagrangian: $\min_{m_N, m_L, \lambda} \mathcal{L} = m_N^\gamma + \delta^t m_L^\gamma + \lambda\left(60 - m_N - \frac{1}{R} m_L\right)$

This yields first order conditions:

$$\frac{\partial \mathcal{L}}{\partial m_N} = \gamma m_N^{\gamma-1} - \lambda = 0 \rightarrow \gamma m_N^{\gamma-1} = \lambda$$

$$\frac{\partial \mathcal{L}}{\partial m_L} = \gamma \delta^t m_L^{\gamma-1} - \lambda \frac{1}{R} = 0 \rightarrow \gamma \delta^t m_L^{\gamma-1} = \lambda \frac{1}{R}$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 60 - m_N - \frac{1}{R} m_L = 0 \rightarrow 60 = m_N + \frac{1}{R} m_L$$

Using the first order conditions, we get:

$$\gamma m_N^{\gamma-1} = \gamma R \delta^t m_L^{\gamma-1} \rightarrow m_L = \frac{1}{R^{\frac{1}{\gamma-1}} \delta^{\frac{t}{\gamma-1}}} m_N$$

Plug that into the budget constraint:

$$60 = m_N + \frac{1}{R}\left(\frac{1}{R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}m_N\right) = m_N\left(1+\frac{1}{R^{\frac{1}{\gamma-1}+1}\delta^{\frac{t}{\gamma-1}}}\right) = m_N\left(\frac{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

This yields the solution:

$$m_N = \frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}$$

How Does Minute Rate Influence Minutes Now?

$$\frac{\partial m_N}{\partial R} = \frac{60\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{\gamma}{\gamma-1}R^{\frac{\gamma}{\gamma-1}-1}\right)+60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}(-1)\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^{-2}\left(\frac{\gamma}{\gamma-1}R^{\frac{\gamma}{\gamma-1}-1}\delta^{\frac{t}{\gamma-1}}\right)$$

Group terms:

$$\frac{\partial m_N}{\partial R} = \frac{60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{\gamma}{\gamma-1}\right)-\frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(\frac{\gamma}{\gamma-1}R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)=\frac{60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{\gamma}{\gamma-1}\right)\left(1-\frac{R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

$$\frac{\partial m_N}{\partial R} = \frac{60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{\gamma}{\gamma-1}\right)\left(1-\frac{R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

$$\frac{\partial m_N}{\partial R} = \frac{60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{\gamma}{\gamma-1}\right)\left(\frac{1}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)=\frac{60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(\frac{\gamma}{\gamma-1}\right)$$

This is positive for gamma greater than 1.

<u>Does the Minute Rate Influence Minutes Now in a Way that Varies by Minute Rate?</u>

$$\frac{\partial^2 m_N}{\partial R^2}=\left(\frac{\gamma}{\gamma-1}\right)\left(\frac{60\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\frac{1}{\gamma-1}R^{\frac{1}{\gamma-1}-1}+60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}(-2)\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^{-3}\left(\frac{\gamma}{\gamma-1}R^{\frac{\gamma}{\gamma-1}-1}\delta^{\frac{t}{\gamma-1}}\right)\right)$$

$$\frac{\partial^2 m_N}{\partial R^2}=\left(\frac{\gamma}{\gamma-1}\right)\left(\frac{1}{\gamma-1}\frac{60R^{\frac{2-\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}-\frac{2\gamma}{\gamma-1}\frac{60R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}R^{\frac{1}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^3}\right)$$

$$\frac{\partial^2 m_N}{\partial R^2}=\frac{\gamma}{(\gamma-1)^2}\frac{60\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(R^{\frac{2-\gamma}{\gamma-1}}-\frac{2\gamma R^{\frac{2}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

$$\frac{\partial^2 m_N}{\partial R^2}=\frac{\gamma}{(\gamma-1)^2}\frac{60R^{\frac{2-\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(1-\frac{2\gamma R^{\frac{\gamma}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

$$\frac{\partial^2 m_N}{\partial R^2}=\left(\frac{\gamma}{(\gamma-1)^2}\right)\frac{60R^{\frac{2-\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(\frac{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}-2\gamma R^{\frac{\gamma}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

$$\frac{\partial^2 m_N}{\partial R^2}=\left(\frac{\gamma}{(\gamma-1)^2}\right)\frac{60R^{\frac{2-\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(\frac{1+R^{\frac{\gamma}{\gamma-1}}\left(\delta^{\frac{t}{\gamma-1}}-2\gamma\right)}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right)$$

This is negative, and thus minutes now is concave in minute rate, iff:

$$1+R^{\frac{\gamma}{\gamma-1}}\left(\delta^{\frac{t}{\gamma-1}}-2\gamma\right)<0$$

$$1<R^{\frac{\gamma}{\gamma-1}}\left(2\gamma-\delta^{\frac{t}{\gamma-1}}\right)$$

$$R^{\frac{\gamma}{\gamma-1}}>\frac{1}{2\gamma-\delta^{\frac{t}{\gamma-1}}}$$

$$R>\left(\frac{1}{2\gamma-\delta^{\frac{t}{\gamma-1}}}\right)^{\frac{\gamma-1}{\gamma}}$$

Note that delta is between zero and 1 and gamma is greater than 1, so as long as *t* is positive, the denominator is greater than 1, so this should be true for $R > 1$.

How Does Patience Influence Minutes Now?

$$\frac{\partial m_N}{\partial\delta}=\frac{60R^{\frac{\gamma}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{t}{\gamma-1}\right)\delta^{\frac{t}{\gamma-1}-1}+\left(60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)(-1)\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^{-2}\left(\frac{t}{\gamma-1}\right)\left(R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}-1}\right)$$

$$\frac{\partial m_N}{\partial\delta}=\frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t-\gamma+1}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{t}{\gamma-1}\right)-\frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t-\gamma+1}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^{2}}\left(\frac{t}{\gamma-1}\right)$$

$$\frac{\partial m_N}{\partial \delta} = \frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t-\gamma+1}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\left(\frac{t}{\gamma-1}\right)\left(1-\frac{R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}{1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}}\right) = \frac{60R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t-\gamma+1}{\gamma-1}}}{\left(1+R^{\frac{\gamma}{\gamma-1}}\delta^{\frac{t}{\gamma-1}}\right)^2}\left(\frac{t}{\gamma-1}\right)$$

This is positive for gamma greater than 1 and positive *t*.

Appendix B. Order Effects and Cross-Task Spillovers

In this appendix, all p values are from Wilcoxon ranksum tests unless otherwise stated.

First, we address order effects. If we pool data from the Information and No Information conditions and the Friend and Stranger treatments, the only differences in time allocation decisions between Self-First and Other-First sessions could have arisen randomly. For the ten minute rates, one ($R = 0.05$) yields $p = 0.092$ for decisions for self and 0.094 for decisions for the matched player, and $R = 0.75$ yields $p = 0.066$ for decisions for the matched player; so three of 20 tests are significant at the 10% significance level, and $p > 0.31$ for the remaining 17. Therefore, we pool data across orders.

These barely-detectable order effects could instead have arisen from cross-task spillovers, because, as we are about to show, it seems that decisions subjects make for themselves are influenced by decisions they made for other subjects if the decisions for self are made after the decisions for the other person.

All differences between choices made for self across the Friend and Stranger treatments when the orders are pooled may also be random: $p = 0.064$ for $R = 0.5$ and $p = 0.029$ for $R = 0.075$ for the information treatment, so one test significant at the 10% level and one at the 5% level out of 20 tests, with all $p > 0.19$ otherwise). However, if the data are separated by treatment order, we see some more interesting patterns. When decisions are made for oneself first, only one out of 20 decisions is at all statistically significantly different between the Friend and Stranger treatment: in the Information condition at $R = 0.75$, $p = 0.072$ (all $p > 0.016$ otherwise, except for $R = 0.05$ in the Information treatment has $p = 0.102$, but most p are much larger). But in the No Information condition, there are four significant differences in decisions made for oneself at moderate to high minute rates (1.25, 2, 3.5, and 4) for subjects who chose for strangers before choosing for themselves as compared to those who chose for friends before choosing for themselves ($p = 0.061$, 0.045, 0.097, and 0.093, respectively). Further, although this is not conclusive, we note that in each case that is statistically different, the mean choice for minutes now for self is lower in the Stranger than in the Friend treatment; and we remind the reader that choices for the other reflect slightly fewer minutes now for strangers than for friends. This evidence weakly suggests a cross-task behavioral spillover: if subjects chose for strangers before choosing for self, their choices for themselves may be more impatient than if they chose for friends before choosing for self.

Appendix C. Supplementary Tables

Table C-1: Average Minutes Allocated to the Present by Minute Rate and Treatment Information Condition
(To Accompany Figure 6)

		Self		Other		Tests		
		Friend	Stranger	Friend	Stranger	Self vs. Friend	Self vs. Stranger	Friend vs. Stranger
Minute Rate	0.5	29.811 (2.704)	24.170 (2.834)	27.302 (2.564)	22.113 (2.442)	0.14	0.10	0.18
	0.75	32.377 (2.347)	26.283 (2.775)	32.094 (2.493)	26.321 (2.569)	0.17	0.30	0.10
	1	39.585 (2.090)	38.585 (2.283)	38.774 (1.851)	35.547 (2.233)	0.45	0.35	0.45
	1.25	43.906 (1.879)	41.321 (2.335)	43.642 (1.713)	39.642 (2.217)	0.59	0.95	0.40
	1.5	44.453 (2.101)	44.000 (2.139)	46.528 (1.499)	40.264 (2.328)	0.06	0.08	0.06
	2	49.151 (1.951)	47.943 (1.971)	49.849 (1.412)	44.170 (2.394)	0.85	0.06	0.18
	2.5	50.057 (1.869)	48.906 (1.927)	50.925 (1.359)	44.736 (2.643)	0.81	0.09	0.22
	3	51.906 (1.535)	49.509 (2.012)	52.226 (1.178)	47.000 (2.391)	0.84	0.16	0.28
	3.5	53.208 (1.428)	51.509 (1.623)	53.604 (0.964)	48.038 (2.353)	0.72	0.12	0.37
	4	54.038 (1.426)	50.113 (2.075)	54.340 (1.023)	49.434 (2.057)	0.77	0.36	0.14
	N	53	53	53	53			

Standard deviations in parentheses. "Tests" cells report *p*-values of Wilcoxon signed rank tests for within subject tests (Self = Friend and Self = Stranger) and Wilcoxon ranksum tests for between subject tests (Friend = Stranger).

Table C-2: Pooled OLS Regressions Across All Treatments

	(1)	(2)
Information	-1.354	
	(1.523)	
Friend	0.163	
	(0.883)	
Info x Friend		
Stranger	-3.462***	
	(1.149)	
Info x Stranger		
Friend x No Info		-1.034
		(1.382)
Stranger x No Info		-3.132**
		(1.563)
Self x Info		-1.781
		(1.597)
Friend x Info		-0.394
		(1.647)
Stranger x Info		-5.596***
		(2.081)
Minute rate	6.949***	6.949***
	(0.360)	(0.360)
Constant	31.215***	31.215***
	(1.513)	(1.513)
R^2	0.189	0.189
n (subjects)	216	216
N (observations)	4,320	4,320
Tests:		
Friend = Stranger	0.032	
No Info: Friend = Stranger		0.422
Info: Self = Friend		0.201
Info: Self = Stranger		0.025
Info: Friend = Stranger		0.013
Friend: Info = No Info		0.762
Stranger: Info = No Info		0.341

* $p<0.1$; ** $p<0.05$; *** $p<0.01$. Pooled OLS specification with robust standard errors clustered on subject in parentheses. Omitted treatment cell in (2) is Self x No Info.

Appendix D. Survey on Procrastination in Decision-Making

In fall 2016, we conducted a survey on Amazon Mechanical Turk in which we asked the following questions:

1. Fred and George each has to do get some work done. If they do it today, it will take two hours, but if they do it in six weeks it will take three hours. Fred chooses to do two hours of work today, and George chooses to do three hours of work in six weeks.
    a. Which word do you associate more with each person? (check one per row)

	Fred	George	Neither
Patient			
Satisfied			
Procrastination			
Responsible			
Impatient			
Diligent			
Impulsive			

    b. If you were in this situation, which would you choose?

2 hours of work today	3 hours of work in six weeks

2. Robert and Stuart each will get money either today or in six weeks. If they get it today, they will get $100, but if they get it in six weeks, they will get $150. Robert chooses to get $100 today and Stuart chooses to get $150 in six weeks.
    a. Which word do you associate more with each person?

	Robert	Stuart	Neither
Patient			
Satisfied			
Procrastination			
Responsible			
Impatient			
Diligent			
Impulsive			

    b. If you were in this situation, which would you choose?

$100 today	$150 in six weeks

We randomized the order of presentation of the two scenarios. The survey was limited to US-based respondents who had at least a 98% positive completion rate on past HITs. We got 445 usable responses. The data from the main questions of interest are shown in Table D-1.

Table D-1: Survey Responses Categorizing Behavior in Scenarios

	Money			Time		
	% who say the more "patient" person (Stuart) fits this	% who say the more "impatient" person fits this	% who say neither	% who say the more "patient" (Fred) person fits this	% who say the more "impatient" person fits this	% who say neither
Patient	95.73	2.47	1.80	31.24	31.46	37.30
Satisfied	49.66	33.71	16.63	62.02	11.69	26.29
Procrastination	13.48	20	66.52	2.47	93.03	4.49
Responsible	77.98	5.62	16.4	90.56	3.82	5.62
Impatient	2.70	92.14	5.17	36.18	22.02	41.80
Diligent	72.58	5.84	21.57	88.76	4.27	6.97
Impulsive	5.17	84.94	9.89	16.63	37.30	46.07

The survey respondents themselves claimed to be quite patient, especially with regard to the procrastination decision, as shown in Table D-2.

Table D-2: Respondents' Hypothetical Choices for Themselves

	Money More Patient ($150 later)	Money Less Patient ($100 now)
Time More Patient (2 hours now)	296 (66.52%)	111 (24.94%)
Time Less Patient (3 hours later)	23 (5.17%)	15 (3.37%)