Asymmetric Naïveté: Beliefs about Self-Control

Anastassia Fedyk*

November 23, 2016

Abstract

Understanding people's beliefs regarding their own and others' present bias is pivotal in studying interactions between multiple present biased individuals. While several studies document individuals' naïveté about their own present bias, beliefs regarding others remain unexplored. This paper investigates beliefs about one's own and others' present bias within a unified experimental setting, both in the classroom and in the laboratory. First, a classroom survey reveals that students are systematically overconfident about how early they will turn in an assignment, but hold significantly more accurate beliefs about their classmates. Second, in a laboratory experiment, participants engaged in a real effort task are asked to predict their own future behavior and the average behavior of the other participants. Participants making predictions regarding their own decisions provide an estimate of self-awareness, while those making predictions regarding others provide beliefs about the present bias of others. Consistent with the interpretation of naïveté about own present bias as driven by overconfidence, I document a wedge in beliefs regarding self and others: participants display virtually no awareness of their own present bias, but anticipate present bias in others.

Keywords: time preference, beliefs, overconfidence

*Harvard University, Department of Economics and Harvard Business School. Mail: Baker Library 244C, 25 Harvard Way, Boston, MA 02163. Email: afedyk@hbs.edu. I am grateful to Philippe Aghion, Ned Augenblick, Linda Babcock, Max Bazerman, John Beshears, Vitaly Bord, Kirill Borusyak, Katie Coffman, Lucas Coffman, Tatiana Fedyk, Jerry Green, Oliver Hart, James Hodson, Xavier Jaravel, David Laibson, Andres Liberman, George Loewenstein, Michael Luca, Kristof Madarasz, Chris Malloy, Emily Oster, Matthew Rabin, Alex Rees-Jones, Todd Rogers, Charles Sprenger, Tomasz Strzalecki, Dmitry Taubinsky, and seminar participants at Harvard University for helpful discussions. I am thankful to Tatiana Fedyk for administering the survey in her classroom at the University of San Francisco. Funding for this project was generously provided by the Harvard Business School, the Lab for Economic Applications and Policy, the Russell Sage Foundation, and the Pershing Square Venture Fund for Research on the Foundations of Human Behavior. All remaining errors are my own.

1 Introduction

Time-inconsistent preferences have been gaining prominence in economics, helping explain a variety of observed individual behaviors ranging from life-time consumption and savings to exit rates from unemployment.[1] However, most work so far has focused on biased agents in isolation or interactions between biased agents and rational principals.[2] Yet many situations where time-inconsistent preferences are likely to play a key role – teams of employees in corporations, households' consumption decisions, group classroom assignments – involve *interactions* between biased agents. In order to study these situations, it is necessary to establish what beliefs individuals hold not only regarding their own present bias, but also regarding the present bias of others.

This paper offers an experimental investigation of individuals' beliefs regarding their own and others' present bias within the same framework. To what extent are individuals aware of the self-control problems of others? Are beliefs regarding others more critical than those regarding self? I document that while individuals are fairly unaware of their own tendency to procrastinate, they hold much more sophisticated beliefs about others.

I address the question of beliefs regarding one's own and others' present bias using both survey and laboratory evidence. First, I provide evidence from an unincentivized classroom survey, which suggests that the wedge in beliefs about self and others is operative and substantial in a real-world setting – the classroom – where interactions between present biased agents are likely to be of foremost importance. Second, I construct a large-scale laboratory experiment to isolate these beliefs. The experiment addresses the issue of incentive compatibility and allows for a more precise estimation of the wedge in beliefs regarding self and others.

The classroom survey, administered in a financial accounting class at the University of San Francisco, asks students to predict when they or their average classmates would submit an assignment. The students are assigned an Individual Project, which requires them to choose a publicly traded company and analyze its financial statements by May 2, 2016. The students must choose a company to analyze and download its financial statements ahead of time, and email their selection for instructor approval by April 2, 2016. The voluntary and fully anonymous survey on January 25, 2016 asks the students to predict the date on which they, their classmates, or both will email their selection to the instructor.

The results of the classroom survey reveal the students' naïveté about their own procras-

[1] See, for example, Laibson (1997), DellaVigna and Paserman (2005), and Laibson, Repetto, and Tobacman (2008).

[2] See O'Donoghue and Rabin (1999a, 1999b), Gul and Pesendorfer (2001), DellaVigna and Malmendier (2004), Gottlieb (2008), Heidhues and Kőszegi (2010), and Herweg and Müller (2011), among others.

tination coupled with more sophisticated beliefs about others. The students predict that they will send their chosen company to the instructor, on average, 22 days before the deadline. By contrast, the students expect that their peers will email the instructor an average of 9 days before the deadline. The actual times when the students email the instructor fall, on average, 7 days before the deadline, indicating that the predictions for self are quite naïve, while the predictions for others are, on average, remarkably accurate. The difference in predictions for self and others is highly statistically significant, and remains robust to posing the self- and other- predicting questions separately to different students or together to the same students.

The laboratory experiment runs over the course of four weeks, and recruits participants from the Harvard Decision Sciences Lab. The participants engage in a real effort task that involves identifying characters on a screen, and are asked how much work they would like to perform at different wages. Work decisions are elicited for the current date and for future dates, allowing for an estimate of present bias to be computed by comparing decisions about future work to decisions about immediate work. Some of the participants are also asked, on each date, to predict the immediate choices that they will make on future dates. This provides an estimate of the degree to which the participants are aware of the time-inconsistency in their own preferences. Participants in another group are asked to predict the average answers of the other experimental participants – both the others' current preferences for future dates and the immediate choices that others will make when the future dates arrive. The predicted differences in the others' answers capture the beliefs that experimental participants hold about others' present bias.

As in the classroom survey, I investigate the robustness of the results to asking the two sets of prediction questions (about self and about others) separately and together. Thus, a third group of participants receive both sets of questions, making predictions about both themselves and others. Their answers reveal beliefs in situations where individuals explicitly evaluate themselves and others in the same context. Such scenarios arise in a variety of common environments, including relative performance compensation contracts in the workplace and curve-graded assignments in schools.

The issue of eliciting incentive-compatible beliefs is relatively straight-forward in the case of beliefs regarding others, but less so for beliefs about self. With a small monetary incentive for correct guesses, participants are incentivized to truthfully reveal their expectations of the average of others' choices. Incentivizing beliefs regarding self is more problematic, since the participants can influence the correctness of their guesses through their own future choices. This poses a two-fold problem. First, having made an incentivized prediction of her own future behavior, a participant may then alter her future choice to conform to the prior

prediction. Second, if the participant anticipates her future self conforming to her earlier prediction, she may choose to make the prediction strategically, using it to commit himself to an ex ante preferred course of action.

It is unlikely that the elicited beliefs about self are driven by such strategic effects for the following reasons. Prior work by Augeblick and Rabin (2016) indicates that the size of the bonus for correct prediction does not substantially alter paritcipants' predictions and choices. Furthermore, both their findings and the results in the present paper indicate that participants are largely naïve about their own time-inconsistency, so it is unlikely that they would use incentivized predictions as a commitment device.

Nonetheless, in order to mitigate the potential adverse effects of incentives on predictions and decisions, I take the following two steps in the experimental design. First, I keep the bonus for correct predictions relatively low, varying from \$0.10 to \$0.40 per correct prediction. Second, I only incentivize predictions of half of the participants, with the rest constituting a control group of unincentivized predictions. In order to keep the design symmetric, this is implemented analogously for participants making predictions about self, those making predictions about others, and those making both sets of predictions. Consistent with the notion that strategic behavior is not driving the self-predictions, my results are robust to incentivized and unincentivized designs, and across the incentive sizes for the incentivized group.

The results of the laboratory experiment confirm those from the classroom experiment: overall, participants display significant time-inconsistency, are quite naïve about their own time-inconsistency, and are more aware of time-inconsistency in others. The participants in the laboratory experiment choose, on average, about 3.3 rounds of work fewer when faced with immediate decisions than when they make the decisions ahead of time. There is virtually no discernible self-awareness regarding this time-inconsistency in preferences when participants are asked to predict their own future decisions. However, when asked to predict the decisions of others, participants expect others to choose an average of approximately 1.4 rounds fewer when the choice is made for immediate work than when the choice is made for future work. The results are robust to posing the self- and other-prediction questions separately across participants and together to the same participants.

These results accord well with intuition and with the motivating evidence from the classroom survey. The findings of greater naïveté regarding one's own present bias than regarding the others' present bias are also consistent with existing evidence on relative overconfidence in other domains.[3] If individuals expect themselves to be better drivers, have a higher earn-

[3]For example, Svenson (1981) documents overconfidence regarding driving skills, while Weinstein (1980) finds overconfidence and overoptimism about a host of potential life events. Alicke (1985) documents that

ing potential, and experience fewer health problems than their peers, then it is intuitive that they would also perceive themselves to be less present biased. In addition, the results in the present paper confirm the notion of bias blind spots documented in the social psychology literature: that individuals are, in general, more perceptive of others' biases than of their own.[4]

This paper contributes to the growing experimental literature on time preference and naïveté. Multiple prior studies experimentally assess the extent of individuals' present bias[5] and participants' awareness of their own time-inconsistency.[6] These studies document present bias in the domains of monetary rewards, food choice, and real effort, and find a fair amount of naïveté regarding one's own present bias. For example, in the paper closest to mine, Augenblick and Rabin (2016) employ an analogous real effort task design to estimate individuals' present bias, naïveté, and projection bias over effort. The present paper extends this line of work by jointly investigating beliefs about self and beliefs about others, and the extent to which the previously documented naïveté is a systematic underestimation of present bias in general or optimism specifically about one's own self-control. I offer experimental evidence in favor of the latter, finding that individuals are generally better at predicting others' present bias than their own.

The results on the wedge in naïveté also contribute to the foundations for theoretical studies of interactions between biased agents. Naïveté regarding one's own present bias has informed a number of theoretical works, including DellaVigna and Malmendier (2004) and Heidhues and Kőszegi (2010). While beliefs regarding self suffice for these models of single biased agents and rational principles, recent theoretical studies have begun to foray into modeling interactions between multiple present biased agents. Fahn and Hakenes (2014) assume fully sophisticated agents who are aware of their own and others' self-control problems. Fedyk (2015) assumes that agents are at least partially naïve about their own present bias, but hold more critical beliefs regarding others. The validity of these and future papers' modeling assumptions rests crucially on whether it is empirically true that individuals recognize present bias in others. The investigation of individuals' awareness of others' present bias begun by the present paper will serve to ground future models of interactions between

participants deem positive (negative) adjectives to be more (less) characteristic of themselves than of their average peer.

[4]See, for example: Pronin, Lin, and Ross (2002), Ehrlinger, Gilovich, and Ross (2005), and West, Meserve, and Stanovich (2012).

[5]See Solnick, Kannenberg, Eckerman, and Waller (1980), Read and van Leeuwen (1998), McClure, Laibson, Loewenstein, and Cohen (2004), Andersen, Harrison, Lau, and Rutstrom (2008), Tanaka, Camerer, and Nguyen (2010), and Augenblick, Niederle, and Sprenger (2015), among others.

[6]See Ariely and Wertenbroch (2002), DellaVigna and Malmendier (2006), Skiba and Tobacman (2009), and Acland and Levy (2015).

present biased individuals with experimentally-tested assumptions.

The remainder of the paper proceeds as follows. Section 2 presents field evidence of the wedge in beliefs regarding own and others' procrastination from a simple classroom survey. Section 3 outlines the design of the main laboratory experiment, while Section 5 presents the results. Section 7 concludes.

2 Motivating Evidence: Classroom Survey

This section presents a simple, intuitive field survey conducted in a classroom, which serves to illustrate the wedge in beliefs regarding one's own and others' present bias. The first subsection outlines the setting and design of the classroom survey, while the results are presented in the second subsection.

2.1 *Design*

The survey is administered to students in a financial accounting course (BUS201) at the University of San Francisco on the first day of class, January 25, 2016. First, the students are presented with the course syllabus and introduced to the Individual Project that they have to complete for the course, due on May 2, 2016. The project consists of analyzing accounting ratios of a publicly traded company. In order to proceed with the project, students must first choose a company to analyze and confirm that they can download the company's financial statements for the past three years from the Securities and Exchange Commission's website. The students need to email their chosen company and the downloaded financial statements for instructor approval by April 2, 2016. No two students can cover the same company, and approval is granted on a first come first served basis.

Present bias is captured in reduced form as the time when the students email the instructor for approval (hereafter referred to as the students' "completion dates"). On the one hand, earlier submission is efficient in that it maximizes the chances of approval (i.e., that no other student has preempted the choice) and leaves more time to work on the project once approved. On the other hand, downloading financial statements carries an immediate effort cost that the students might wish to procrastinate. Thus, the more present biased a given student is, the more likely she is to delay the completion date.

After the project is explained to the students, they are asked to fill out an anonymous, voluntary survey, featuring one or both of the following two questions:

- **Self-Prediction:** As you can see from the syllabus, the deadline for the Individual Project is on May 2, 2016. The last day to submit your chosen company for instructor

approval is on April 2, 2016. When do you think you will email your chosen company to the instructor? (Enter a date)

- **Other-Prediction:** As you can see from the syllabus, the deadline for the Individual Project is on May 2, 2016. The last day to submit your chosen company for instructor approval is on April 2, 2016. On average, when do you think your classmates will email their chosen companies to the instructor? (Enter a date)

Each student receives one of four survey versions, passed out randomly among the students:

- Group 1: Asked the self-prediction question only.
- Group 2: Asked the other-prediction question only.
- Group 3: Asked to make both predictions, with the self-prediction written first.
- Group 4: Asked to make both predictions, with the other-prediction first.

A total of 57 students attended the class on January 25, 2016, all of whom filled out the voluntary survey. Of these students, 13 were in Group 1, 11 in Group 2, 15 in Group 3, and 18 in Group 4.

2.2 *Results*

The results of the classroom survey indicate that the students are significantly more aware of their classmates' procrastination than of their own. While expectations for self are quite overconfident, the expectations for others are, on average, correct.

To begin with, I assess the differences in the students' predictions about themselves and their classmates graphically. Panel 1 of Figure 1 displays: (1) the distribution of answers among the students predicting for themselves (in dark blue); (2) the distribution of the students' predictions about their classmates (in light blue); and (3) the distribution of the actual completion dates (in grey). Only 37% of students making self-predictions expect their completion dates to fall in the last week, but a substantially larger proportion (68%) of students expect that others' completion dates would fall, on average, in the last week.

In order to compare the average predictions about self and others, I code predicted completion dates as the number of days before the April 2, 2016 deadline. Thus, for example, a student that predicts that she will email the instructor on March 25, 2016 is coded as making a self-prediction 8 days before the deadline. The average predictions for self and others across survey versions are presented in Panel 1 of Table 1. The average (median)

predicted completion date for self is 22 days (15 days) before the deadline, while the average (median) prediction for others is only 9 days (1 day) before the deadline.

To more precisely evaluate the difference between the students' self- and other- predictions, I estimated the following specification:

$$\#DaysBeforeDeadline_i = \alpha + \beta SelfDummy_i + \epsilon_i, \tag{1}$$

where the response variable $\#DaysBeforeDeadline_i$ denotes the number of days between the predicted date and the deadline (April 2, 2016), and $SelfDummy_i$ is a dummy variable equal to one for predictions made about self. In samples including students from Groups 3 and 4, standard errors are clustered by student. The estimates of the difference (coefficient β) are reported in Panel 2 of Table 1.

The average difference between the students' predictions of their own and others' completion dates is 12-14 days. This result is significant at the 1% level when using larger samples (Group 4 or the combined Overall sample), and at the 10% level in smaller (Groups 1 and 2, and Group 3) samples.

The predictions are independent of either the set of questions asked or the order in which they are asked. In particular, the result is robust to comparing the responses of the students answering only one question each (Groups 1 and 2) versus comparing the responses of the students answering the two questions together (Groups 3 and 4). Thus, posing the two questions side by side to the same students yields the same results as asking different groups of students to make the two sets of predictions. Similarly, varying the order in which the students in Groups 3 and 4 see the two questions does not materially affect the result.

For the students who make both sets of predictions, I can also observe the distribution of the individual-level differences in the predicted dates. This distribution, presented in Panel 2 of Figure 1, displays the incidence of individual students being more optimistic about themselves or about others, or holding identical beliefs about themselves and others. While a large portion of the students (30%) make the exact same prediction for themselves as for their average classmates, the clear majority (58%) expect others to email the instructor later than they will. Only 12% of the respondents expect themselves to email the instructor later than their classmates. Thus, the individual-level results confirm the patterns of the pooled analysis: that the students expect themselves to display less present bias (i.e., have earlier completion dates) than their peers.

Which set of predictions is closer to correct? A cursory examination of the distributions in Panel 1 of Figure 1 indicates that the more critical expectations about others (in light blue) more closely match the real distribution of completion date (in grey). In fact, a sizable

proportion of the students (26%) email the instructor for approval a few days *after* the April 2, 2016 deadline.

The notion that beliefs about others more closely match real completion dates is confirmed by a statistical comparison of self- and other-predictions against actual completion dates, presented in Panel 3 of Table 1. The test compares the average predictions from students making self- and other- predictions against the average actual completion dates of all students. The students' predictions of their own completion dates are, on average, a full two weeks off from actual completion dates. The difference between self-predictions and actual completion dates is highly statistically significant at the 1% level. Predictions about others, however, are remarkably spot-on. The average difference between the students' predictions of when their classmates would email the instructor and actual completion dates is not statistically distinguishable from zero.

Altogether, the results of the classroom survey indicate that there is a strong tendency among college students to anticipate last-minute assignment completion from their classmates, but not from themselves. Next, I construct a formal laboratory experiment to isolate this apparent wedge in beliefs about own and others' present bias.

3 Laboratory Experiment: Design

In this section, I detail the design of the laboratory experiment used to more precisely elicit the participants' beliefs about their own and others' present bias. The experiment centers around a real effort task, analogous to Augenblick and Rabin (2015). The participants' predictions of their own and others' work decisions allow me to measure their beliefs about their own and others' present bias.

The experiment runs over the course of four weeks, recruiting participants from the Harvard Decision Sciences Lab. Each participant chooses a day of the week on which to participate, and needs to log in on that day of the week during each of the following four weeks. The instructions are presented on the first participation date, and the participants must pass a comprehension quiz in order to be eligible for the study. All instructions, questions, and assignments are catalogued in the Online Appendix.

I present the experimental design in five subsections. First, I describe the experimental task and the information that the participants receive about other participants in the experiment. Next, I present the experimental timeline and detail the payment scheme. The work decisions faced by the participants are described in the third subsection, while the predictions are discussed in the fourth subsection. The last subsection presents sample details including sessions, recruitment, and attrition.

3.1 *Experimental task*

The real effort in the study is a task that consists of a random sequence of characters appearing (one by one) on an otherwise empty screen, where the participants are asked to press a key every time an asterisk appears. The duration of each round is 60 seconds: 50 seconds of work (with a total of 25 characters appearing during that period), followed by a 10 second break. The participants must achieve an average accuracy of 80% across all rounds within a session to successfully complete the work and receive payment. Figure 2 displays a sample task screen.

This task is specifically designed with a two-fold objective. First, the task needs to be unpleasant, so that the participants are exposed to the dynamic tension between the cost of completing more rounds of the task now and the benefit of receiving a higher payment later. Second, the task must be relatively straightforward and simple to complete, so that there is no skill involved, ensuring that any differences in predictions of the participants' own and others' choices are indeed driven by a wedge in beliefs about present bias, rather than overconfidence regarding skill.

While the present character-identification task satisfies the objectives of being unpleasant rather than engaging or game-like and not requiring any skill, it is somewhat artificial, which poses a concern that participants might be ill-equipped to make predictions regarding either their own or others' behavior. In order to alleviate this concern and ensure that the elicited beliefs more accurately reflect real-world belief formation, I do the following:

1. All participants try the task for 5, 10, or 15 minutes before making any predictions, which ensures that they are familiar with what it is like to engage in the task.

2. A pilot study of the experimental design is run in October-November 2015, with participants recruited from the same participant pool. Demographic data are gathered from all pilot study participants on the first participation date. Data on task enjoyment are gathered from the participants who complete the pilot study during a debrief questionnaire at the end of the last participation date.

3. Participants in the main experiment are presented with the data from the pilot study participants in an interactive display with break-downs by gender, education, etc. A screenshot of this display is shown in Figure 3. The participants are encouraged to study these data as part of familiarizing themselves with the task.

Thus, when the participants in the main experiment are asked for predictions about others, they have some amount of empirical familiarity with who the others are and how

they feel about the task. The elicited beliefs then more closely correspond to beliefs in real-world scenarios, where individuals have familiarity with the general population of others and the assignment at hand.

3.2 *Experimental Timeline and Payments*

On each participation date, the participant must log in, complete a mandatory warm-up of the task, and answer all questions. At the end of the experiment, the participants are paid based on the amount of work they do as well as completion of all mandatory items. The full experimental timeline is presented in Figure 4.

The first item on each participation date is warmup, which involves the participants having to do a mandatory number of rounds of the task. The warm-up amounts vary randomly across participants and consist of 5, 10, or 15 rounds. The differential warm-up amounts allow me to control for projection bias (see Loewenstein, O'Donoghue, and Rabin (2003)), which might lead participants to underestimate the effort cost of doing the task when not significantly exposed to it.

After the warm-up, the participants are asked how many extra rounds (between 0 and 70) of the task they would like to complete for additional pay at different wages, either on the same day or on future participation dates. The participants are also randomized into groups asked to predict their own future decisions, the average decisions of the other participants, or both.

Once all questions are answered, the next step is completing the chosen number of rounds of work. In particular, one of the decisions *for* that date (made either *on* that date or earlier) is selected at random to be implemented, and the participant must immediately complete the number of extra rounds in that decision.

On the first participation date, the participants also fill out a questionnaire consisting of demographic questions and questions eliciting the participants' predictions regarding their own and their peers' psychological state, time constraints, and preferences over the next few weeks, presented in random order. The purpose of the questionnaire is to shed some light on the psychological mechanism driving the wedge in beliefs: e.g., is asymmetric naïveté driven by a perception of others as less productive or more time-constrained?

At the end of the last participation date, there is a short debrief questionnaire that also seeks to better understand the mechanism behind differential belief formation. Participants are asked for reasons behind their own and others' inconsistencies and predictions on whether they would behave more consistently if offered another chance to participate. The debrief also elicits beliefs regarding one's own and one's peers' present bias in other domains: expected

gym attendance, work procrastination, and healthy eating.

The participants' payments consist of two components: the completion payment and supplemental wages. Each participant receives the $30 completion payment for logging in and completing all required work on each participation date. The supplemental wages are computed at the corresponding rates for any extra rounds that the participants complete, and any incentive bonuses earned for correct predictions. In order to be eligible for the $30 completion payment, a participant must complete each warm-up, answer all decision and prediction questions, and then finish the additional rounds in her implemented work decisions. If the participant fails to complete any of these tasks on one of her participation dates, the participant is disqualified and foregoes the $30 completion payment. Disqualified participants still receive payment for the additional rounds that they have completed before disqualification. The payments are dispensed in the form of Amazon.com gift cards on the Sunday one week after the end of Week 4.

3.3 *Work Decisions*

A critical part of the experimental design consists of the participants' decisions about how much of the real effort task to do. The participants are asked to make these decisions for the current date and for future participant dates, and all decisions have a chance of being implemented. The differences in the participants' decisions for immediate versus future work are used to capture the participants' present bias.

The participants face work decisions on each of their participation dates, as indicated in red in Figure 4. Each set of decisions consists of two allocations for the same date but at different wages. The wages are drawn randomly from between $0.10/round and $0.30/round, in increments of $0.05. This corresponds to $6/hour-$18/hour. All wages are equally likely to be drawn, with the restriction that the two wages on a single screen must be different. An example of a work decision screen is shown in Figure 5.

A few checks are in place to ensure that the participants' work decisions reflect their genuine preferences. First, if a participant enters the same number into both fields, she sees a warning enquiring whether she is certain that she would like to proceed with a decision to do the same amount of work regardless of the wage, or if she would like to reconsider. Second, if a participant enters a higher number into the field with the lower wage, she is asked whether she would really wish to do more work for lower pay, or whether she would like to reconsider her answers. These checks are in place to ensure that the participants are paying attention to the questions, rather than quickly entering random or repeating numbers into the fields. To ensure that the decisions correspond to permissible amounts, the participants

must also enter an integer between 0 and 70 into each field to proceed.

Overall, each participant makes 16 work decisions – 6 immediate decisions for the same date and 10 ahead-of-time decisions for future dates. The full set of decisions is displayed in Panel 1 of Table 2, with each cell corresponding to a two-decision screen analogous to the one displayed in Figure 5. The blue row displays immediate decisions, while the green rows contain ahead-of-time decisions.

During weeks 2, 3, and 4, each participant's actual amount of work is chosen from all the decisions that the participant has made for that date. In particular, once her work decisions are complete on a given participation date, the participant is shown all decisions that she had made for that date – this includes immediate decisions made only moments earlier as well as ahead-of-time decisions made on prior dates. Figure 6 displays a sample screen aggregating work decisions for a date. The participant is reminded that she must complete the work in this decision immediately, with no more than a total of 15 minutes of break. This restriction serves to ensure that the immediate decisions are perceived as truly immediate, rather than decisions made, for example, in the morning for work to be completed in the evening.

Once the participant clicks on the "SELECT" button on the bottom right, a randomization is run and one of the decisions is selected as the "Decision that Counts." All decisions are ex ante equally likely to be selected. The selected decision is then marked in dark blue. In oder to continue participating in the experiment and receive the completion payment, the participant must complete the amount of work in the selected decision immediately with no more than 15 minutes of breaks.

3.4 *Predictions*

In order to experimentally compare participants' beliefs about their own and others' present bias, the participants are asked to make a set of predictions. After making their work decisions, the participants are asked to predict how much work they will choose for immediate completion on future dates, how much work other participants would choose, or both.

For the prediction questions, I split the participants into the following three groups:

- **Group 1:** Throughout the experiment, participants in this group are asked how much work they anticipate choosing for immediate completion when asked to make the choices on various future dates. Since the decision and prediction questions are quite similar, predictions appear side by side with the decision questions, in order to make the questions clearer and more straightforward. See Panel 1 of Figure 7 for an example screen presented to participants in this group.

- **Group 2:** Throughout the experiment, participants in this group are asked to predict how others make decisions. They are asked to predict the average of the other participants' current work decisions for completion on future dates, and the average of the other participants' choices for immediate work completion when those future dates arrive. These participants make their work decisions, as displayed in Figure 6, and then are asked to make the predictions about others' current and future decisions side by side, as illustrated in Panel 2 of Figure 7.

- **Group 3:** Participants in this group are asked both sets of questions described above and illustrated in Figure 7. With the exception of one experimental session, the order in which the participants see these questions is randomized across participants.[7]

As in the classroom survey, I test the robustness of the participants' predictions by posing the two sets of prediction questions (about self and others) to two separate groups of participants (Groups 1 an 2) and to the same participants (Group 3). On the one hand, asking participants to make predictions about both themselves and others may lead to anchoring effects analogous to those documented by Tversky and Kahneman (1974), where participants use their answers to the first set of predictions as an anchor for the second set of predictions. In this sense, the answers by Group 1 and Group 2 participants present cleaner, unanchored beliefs regarding self and other. On the other hand, the wedge in beliefs could potentially be both more relevant in situations where beliefs are simultaneously formed about one's own and others' present bias, such as group work or relative performance evaluation. To this effect, a more contextualized wedge in beliefs about self and others can be estimated from the predictions by Group 3 participants. As I show in the next section, the effects are consistent across posing the two sets of questions separately and together, suggesting that the above concerns do not play a significant role.

The structure of the decision and prediction questions for both groups of participants is illustrated in Table 2. The participants' present bias can be estimated by comparing immediate decisions (blue row in Panel 1 of Table 3) to ahead-of-time decisions (green rows in Panel 1). Beliefs about one's own present bias are captured by comparing predictions of one's own immediate decisions (blue row in Panel 2 and the first set of blue rows in Panel 4) to ahead-of-time decisions (green rows in Panel 1). Beliefs about the present bias of others are estimated by comparing predictions of others' immediate decisions (blue rows in Panel 3 and the second set of blue rows in Panel 4) to predictions of others' ahead-of-time decisions (green rows in Panels 3 and 4).

[7] In the first session of the experiment, run on January 11 - February 7, 2016, all participants are first asked for their work decisions and self-predictions, and then for predictions about others.

I wish to elicit thoughtful, truthful answers to the prediction questions. For predictions regarding others (by Group 2 and 3 participants), this can be achieved by making the questions incentive-compatible with monetary rewards for correct predictions. Predictions about one's own behavior (by Group 1 and 3 participants), however, are more subtle. In this case, there are feedback effects, since the correctness of these predictions is influenced by the participants' own subsequent behavior, which creates scope for strategic rather than truthful answers and behavior. For example, the participants may use their predictions as commitment devices to guide their future behavior.

To check that the monetary incentives do not prompt any commitment demand that would perversely affect the participants' predictions, I randomly assign each participant into either the incentivized or the unincentivized group, with equal probability. Participants in the incentivized group are given a monetary incentive for correct predictions about decisions that are eventually implemented. The monetary incentives are randomized across these participants, and vary from \$0.10 to \$0.40 – equivalent to the wages for one minute of work. Participants in the unincentivized group are asked to state their predictions without any monetary incentive. This extends equally to all predictions made by a given participant.

For example, consider a participant from Group 1 or 3 who is randomly assigned to the incentivized group with a prediction bonus of \$0.20. Suppose that she is asked on her first participation date (Date 1) to predict how much work she will choose to do immediately at \$0.10/round on Date 2, and she guesses 15 rounds. Then she will receive a prediction bonus of \$0.20 if the following conditions are met: (a) on Date 2, she is asked how much work she would like to complete immediately at \$0.10/round, and she chooses 15 rounds; and (b) this decision is implemented as the "Decision that Counts." Similarly, consider a participant from Group 2 or 3, who is randomly assigned to the incentivized group with a prediction bonus of \$0.20. Suppose that on Date 1, she is asked to predict how much work, on average, other participants will prefer to do immediately on Date 2 at \$0.10/round, and she answers 15 rounds. Then she will receive a bonus of \$0.20 if: (a) on Date 2, at least one other participant is asked how much work he would like to complete immediately at \$0.10/round, and the average answer is 15 rounds; (b) this decision is implemented as the "Decision that Counts" for at least one of the other participants.

3.5 Sample

The experiment is run over five sessions, with a total of 364 individuals taking part and a total of 198 participants completing the entirety of the experiment. All participants are recruited through the Harvard Decision Sciences Lab.

The five experimental sessions are run at the following times:

- Session 1: January 11 - February 7, 2016
- Session 2: February 8 - March 6, 2016
- Session 3: March 28 - April 24, 2016
- Session 4: June 6 - July 3, 2016
- Session 5: July 11 - August 7, 2016

In addition, a small-scale pilot study of the experimental design is run during October 12 - November 8, 2015. For the results of the pilot study, please refer to Appendix B.

A total of 198 participants complete the entirety of the experiment during the five experimental sessions, with an additional 166 participants consenting to participate but not finishing the entirety of the four-week-long experiment. A break-down of recruited participants and attrition rates by session is reported in Table 3. Since registering for the online study is virtually costless, a large number of participants drop out once they begin reading the instructions upon their first log in; of the 364 participants consenting to take part in the experiment, 86 (24%) do not complete the instructions, warmup, and work decisions on the first participation date. The attribution rates attenuate over the subsequent weeks, as exiting the experiment costs the participants their $30 completion payments. Of the 278 participants who complete their first participation date, 230 (83%) complete the second participation date, 208 (75%) complete the third participation date, and 198 (71%) complete the entirety of the experiment.

4 Laboratory Experiment: Results

The results from the laboratory experiment confirm the wedge in beliefs regarding self and others documented in the classroom survey. I find that experimental participants systematically display present bias in their work decisions: they choose to do fewer rounds of the task when the work is immediate than when the decision is made for future work. The participants are, on average, unaware of their own present bias, but anticipate present bias in others. The results are robust to varying the incentive structure for the predictions and to posing the questions about self and others together to the same participants or to separate groups of participants.

4.1 Present Bias and Beliefs: Full Sample

Pooled results from all participants who finish the experiment indicate that (1) participants display present bias in their effort choices; (2) participants do not anticipate their own present bias; and (3) participants anticipate present bias in others' choices. For robustness of these results to the inclusion of attritted participants who complete the preliminaries but do not finish the experiment, please refer to Appendix A.

The pooled sample consists of the 198 participants who complete the entirety of the experiment. Of these, 138 are asked to make predictions regarding self, and 138 make predictions regarding others. Overall, the analysis is based on a total of 1,188 work decisions for immediate completion; 1,980 work decisions for future completion; 1,380 predictions of one's own future work decisions for immediate completion; 1,380 predictions of others' current work decisions for future completion; and 1,380 predictions of others' future work decisions for immediate completion.

The participants' present bias is estimated by comparing the participants' work decisions for future completion against their work decisions for immediate completion. The experimental participants choose to do, on average, 30.03 rounds per session when the choices are elicited ahead of time. When asked how much work they would like to complete immediately, the participants choose an average of 26.53 rounds per session. Figure 8 plots the ahead of time and immediate work decisions across the five possible wages from \$0.10/minute to \$0.30/minute, with standard error bars clustered by participant. As illustrated in the figure, participants choose to do more work when the decisions is made in advance for all wages except for \$0.10/minute.

I estimate the statistical significance of the difference between the two types of decisions, and find that it is robust to controlling for wage fixed effects and participant fixed effects. The results are presented in Panel 1 of Table 4. The participants choose to do, on average, 3.50 rounds fewer when the decisions are for immediate work (3.33 rounds when controlling for wage fixed effects, 3.30 with participant fixed effects, and 3.36 including both fixed effects). The difference is highly statistically significant at the 1% level across specifications, and consistent with prior evidence on present bias in real effort tasks (e.g., Augenblick et al (2015)).

Are the participants aware of this time inconsistency in their effort choices? The participants' naıveté regarding their own present bias is captured by comparing the work decisions they make for future completion against their *predictions* of the work decisions they will make for immediate completion when the time comes to actually do the work. Since the participants end up doing less work when the decisions are made for immediate completion, predictions of lower work decisions for immediate completion would indicate the experimental

participants' sophistication regarding their present bias. On the other hand, if participants do not anticipate their decisions changing when the work becomes immediate, then they display naïveté regarding their present bias.

The results reveal that on average, the experimental participants display virtually no anticipation of their own present bias. The average predicted differences in their effort choices, estimated from the 138 participants making self-predictions (i.e., participants from Groups 1 and 3), are displayed in Panel 2 of Table 4. The differences are small, and significant at the 10% level only in one specification (participant fixed effects, no wage fixed effects). In all other specifications, the differences are not statistically different from zero, with differing signs across the specifications. This is consistent with prior findings in Augenblick and Rabin (2016).

By contrast, predictions about others, made by the 138 participants in Groups 2 and 3, indicate awareness of present bias in others. The experimental participants expect their peers to choose less work when the decisions are for immediate completion than when the decisions are for future completion. Asked how many rounds others wish to do ahead of time, participants predict 28.28 rounds. When asked about others' work decisions for immediate completion, the average prediction is 27.01 rounds. The difference, estimated in Panel 3 of Table 4, is significant at the 1% level if participant fixed effects are included, and at the 5% level omitting participant fixed effects. The results are robust to inclusion of attrited participants, and are statistically stronger in this larger sample (see Appendix A).

Interestingly, while the predictions regarding others reveal that participants expect others to be time inconsistent (the predicted differences in others' decisions are statistically significantly different from zero), they do not correctly guess the magnitude of the effect. The average predicted differences in others' decisions are 1.3-1.5 rounds, whereas the actual differences in participants' work decisions are, on average, 3.3-3.5 rounds. This contrasts with the classroom survey, in which the students' predictions were remarkably accurate regarding the time when their peers would turn in the assignment. The difference in accuracy across the two settings is most likely attributable to the participants' differential levels of experiences with the settings: students have substantial experience observing their classmates procrastinate on assignments, but the participants in the laboratory experiment have no experience observing others choose work decisions for the experimental task.

Overall, the pooled results from the laboratory experiment confirm the wedge in beliefs documented in the classroom survey. Experimental participants display almost full naíveté about their own present bias, but some, although imperfect, awareness of others' present bias.

4.2 Incentivizing Predictions

In this subsection, I test the robustness of the results to altering the incentivization mechanism for eliciting the participants' predictions regarding their own and others' work decisions. The participants' predictions are not significantly different when the questions are posed in an unincentivized manner versus when the participants are offered monetary bonuses for correct predictions.

The incentive structure is randomized across the experimental participants. Each participant is randomly allocated, with equal probability, to either the incentivized or the unincentivized treatment. Within the incentivized treatment, the size of the incentive is randomly selected from \$0.10, \$0.20, \$0.30, or \$0.40 per correct prediction, with equal likelihoods. Thus, of the 198 participants who finish the experiment, 95 are unincentivized, and 103 are incentivized, with 23 participants receiving the \$0.10 bonus, 24 receiving the \$0.20 bonus, 30 receiving the \$0.30 bonus, and 26 receiving the \$0.40 bonus.

The participants' expectations of their own present bias do not noticeably differ across incentive structures. Panel 1 of Table 5 reports the average predicted differences in one's own decisions for the 72 participants asked to make incentivized self-predictions and the 66 participants making self-predictions without monetary incentives. The predicted differences are estimated with wage and participant fixed effects. The average predicted difference is 0.40 rounds with the incentive and 0.65 rounds without the incentive. In both cases, the predicted difference is not statistically significantly different from zero, indicating that the participants do not anticipate present bias in their own decisions, regardless of whether they are incentivized for correct predictions.

For the incentivized group, the participants' naïveté is also robust across the size of the incentive. With the exception of the \$0.10 incentive, for which the predicted difference is -1.06 rounds, the point estimates of the predicted differences are approximately 0.60 rounds across the incentive amounts. For none of the incentives are these predicted differences statistically distinguishable from zero, although the sliced samples are too small to properly evaluate significance.

Incentivizing predictions also has no effect on the elicited beliefs about other participants. The predicted differences in others' decisions are, on average, 1.41 rounds when the predictions are incentivized and 1.70 rounds without the incentive. In both cases, the predicted differences are statistically different from zero. The former is significant at the 5% level and the latter at the 1% level.

Overall, the subsample analysis slicing by incentive indicates that the results are not driven by strategic responses to incentive structures. Instead, the participants' answers are quite robust to incentivized and unincentivized elicitation of beliefs. Across the board, par-

ticipants display fairly precise awareness of others' present bias, and no significant awareness of their own present bias.

4.3 Juxtaposing Predictions about Self and Others

In this subsection, I confirm the robustness of the results to asking the two sets of questions (predictions regarding self and others) to the same participants, or separately to two groups of participants. As in the classroom survey, the participants' answers do not systematically vary across the two methods of posing the questions.

Participants do not expect significant time inconsistency in themselves, regardless of whether they are also asked to make predictions about others. The 60 participants who make only self-predictions anticipate that they will choose to do an average of 0.40 rounds fewer when the work decision is for immediate completion; this predicted difference is not statistically different from zero. Similarly, the 78 participants who also face questions about others predict that they will choose an average of 0.65 rounds fewer for immediate completion, also not statistically different from zero.

Likewise, participants' expectations of others' time-inconsistency are similar for those who also answer questions about themselves and those who are not asked to make self-predictions. The 60 participants who are only asked to make predictions about others expect that the average other participant will want to do 1.53 rounds fewer when the work decision is made for immediate completion. The 78 participants who are asked to make both sets of predictions anticipate that others will choose 1.46 rounds fewer when the work decision is made for immediate completion. The predicted differences by both groups are statistically significantly different from zero at the 5% level.

Overall, participants appear to be providing independent answers for the two sets of questions, and their answers remain the same regardless of whether they see only one type of questions or both. These results suggest that the participants' predictions regarding their own future decisions and regarding the decisions of the other participants are not influenced by anchoring effects or strategic comparisons. Instead, the elicited beliefs reflect the participants' underlying beliefs regarding self and others.

5 Conclusion

This paper experimentally investigates individuals' beliefs regarding their own and others' present bias. Both the classroom survey and the laboratory experiment reveal a wedge in beliefs: individuals are fairly naïve about their own present bias, but anticipate present

bias in their peers. This finding is robust to incentivizing the predictions with monetary payments, and to asking the two sets of predictions – about self and about others – to the same experimental participants versus separately to different groups of participants.

The documented wedge in beliefs lays the foundations for understanding interactions between present biased individuals in the workplace, in the classroom, in households, and in markets. Differential awareness of one's own and others' present bias is likely to impact how groups of present biased individuals schedule their joint work, seek external commitment devices, or evaluate their own and their peers' performance. I believe that investigating these effects, both theoretically and empirically, constitutes a fruitful avenue for future research.

References

[1] Acland, Dan, and Matthew R. Levy (2015). "Naiveté, projection bias, and habit formation in gym attendance." *Management Science,* 61.1: 146-160.

[2] Alicke, M. D (1985). "Global self-evaluation as determined by the desirability and controllability of trait adjectives." *Journal of Personality and Social Psychology,* 49.6: 1621.

[3] Andersen, S., G. W. Harrison, M. I. Lau, and E. E. Rutstrom (2008). "Eliciting risk and time preferences." *Econometrica*, 76.3: 583-618.

[4] Ariely, D. and K. Wertenbroch (2002). "Procrastination, deadlines, and performance: Self-control by precommitment." *Psychological Science*, 13.3: 219-224.

[5] Augenblick, N., M. Niederle, and C. Sprenger (2015). "Working over time: Dynamic inconsistency in real effort tasks." *The Quarterly Journal of Economics,* 130.3: 1067-1115.

[6] Augenblick N, and Rabin M. (2016). "An experiment on time preference and misprediction in unpleasant tasks." Working Paper.

[7] DellaVigna, S. and U. Malmendier (2004). "Contract design and self-control: Theory and evidence." *The Quarterly Journal of Economics*, 119.2: 353-402

[8] DellaVigna, S. and U. Malmendier (2006). "Paying not to go to the gym." *The American Economic Review*, 96.3: 694-719.

[9] DellaVigna, S. and M. D. Paserman (2005). "Job search and impatience." *Journal of Labor Economics*, 23.3: 527-588.

[10] Ehrlinger, J., T. Gilovich, and L. Ross (2005). "Peering into the bias blind spot: People?s assessments of bias in themselves and others." *Personality and Social Psychology Bulletin*, 31.5: 680-692.

[11] Fahn, M., and H. Hakenes (2014). "Teamwork as a self-disciplining device." Working paper.

[12] Fedyk, A. (2015). "Overcoming overconfidence: Teamwork and self-control." Working paper.

[13] Gottlieb, D. (2008). "Competition over time-inconsistent consumers." *Journal of Public Economic Theory*, 10.4: 673-684.

[14] Gul, F. and W. Pesendorfer (2001). "Temptation and self-control." *Econometrica*, 69.6: 1403-1435.

[15] Heidhues, P. and B. Kőszegi (2010). "Exploiting naïveté about self-control in the credit market." *The American Economic Review*, 100.5: 2279-2303.

[16] Herweg, F., and D. Müller (2011). "Performance of procrastinators: on the value of deadlines." *Theory and Decision*, 70.3: 329-366.

[17] Laibson, D. (1997). "Hyperbolic discounting and golden eggs." *Quarterly Journal of Economics*, 112: 443-477.

[18] Laibson, D., A. Repetto, and J. Tobacman (2008). "Estimating discount functions with consumption choices over the lifecycle." NBER Working Paper No. 13314.

[19] Loewenstein, G., T. O'Donoghue, and M. Rabin (2003). "Projection bias in predicting future utility." *The Quarterly Journal of Economics*, 118.4: 1209-1248.

[20] McClure, S.M., D. Laibson, G. Loewenstein, and J. D. Cohen (2004), "Separate neural systems value immediate and delayed monetary rewards." *Science*, 306.5695: 503-507.

[21] O'Donoghue, T. and M. Rabin (1999a), "Doing it now or later." *The American Economic Review*, 89: 103-124.

[22] O'Donoghue, T., and M. Rabin (1999b). "Incentives for procrastinators." *The Quarterly Journal of Economics*, 114.3: 769-816.

[23] Pronin, E., D. Y. Lin, and L. Ross (2002). "The bias blind spot: Perceptions of bias in self versus others." *Personality and Social Psychology Bulletin,* 28.3: 369-381.

[24] Read, D. and B. Van Leeuwen (1998). "Predicting hunger: The effects of appetite and delay on choice." *Organizational Behavior and Human Decision Processes*, 76.2: 189-205.

[25] Skiba, P. and J. Tobacman (2009). "Payday loans, uncertainty and discounting: Explaining patterns of borrowing, repayment, and default." NBER Working Paper No. 14659.

[26] Solnick, J.V., C. H. Kannenberg, D. A. Eckerman, and M. B. Waller (1980). "An experimental analysis of impulsivity and impulse control in humans." *Learning and Motivation*, 11.1: 61-77.

[27] Tanaka, T., C. F. Camerer, and Q. Nguyen (2010). "Risk and time preferences: linking experimental and household survey data from Vietnam." *The American Economic Review*, 100.1: 557-571.

[28] Tversky, A. and D. Kahneman (1974). "Judgment under uncertainty: Heuristics and biases." *Science,* 185.4157: 1124-1131.

[29] Svenson, O. (1981). "Are we all less risky and more skillful than our fellow drivers?" *Acta Psychologica* 47.2: 143-148.

[30] Weinstein, N. D (1980). "Unrealistic optimism about future life events." *Journal of Personality and Social Psychology*, 39.5: 806-820.

[31] West, R. F., R. J. Meserve, and K. E. Stanovich (2012). "Cognitive sophistication does not attenuate the bias blind spot." *Journal of Personality and Social Psychology,* 103.3: 506.

Appendix A Results Including Attrited Participants

The results from the laboratory experiment are robust to the inclusion of attrited participants. The findings presented in the main body of the paper consider only the participants who went through with the entirety of the experiment. In this section, I repeat the analysis over the full set of participants, including those who attritted between Week I and Week IV.

Table 7 replicates the results presented in Table 4 for this full set of participants. The results are very consistent with those reported in Table 6, and slightly stronger due to the larger sample sizes.

Appendix B Pilot Study

This section briefly presents the results from the pilot run of the laboratory experiment, which are broadly consistent with the results from the subsequent main experimental sessions.

The participants participating in the pilot study choose to do, on average, 29 rounds per session when asked ahead of time, and 27 rounds per session when asked immediately. I estimate the difference between immediate and ahead-of-time decisions in two ways: using the full set of decisions, and using only the decisions made by participants who completed the entire four-week experiment. The results are reported in Panel 1 of Table 8. The estimation is done with wage fixed effects, and with and without participant fixed effects. In all specifications, standard errors are clustered by participant. On average, participants choose to do 2-2.5 rounds fewer when the decision is immediate than when the decision is made ahead of time. The difference is statistically significant in all but one specification (with attrited participants, without participant fixed effects), even with the small pilot sample of 19 participants.

Participants' beliefs regarding their own present bias, estimated as the difference between the participants' ahead-of-time decisions for a given date and their predictions of the immediate choices they would make when that date arrives, are estimated in Panel 2 of Table 8. Across specifications, participants' predictions of the changes in their choices are statistically indistinguishable from zero, indicating that the participants are naïve about their own present bias.

Beliefs about others appear to be quite sophisticated, as indicated by the estimates in Panel 3 of Table 8. The participants expect others to do an average of 1.9-2.2 rounds of work fewer when the work decision is made immediate completion than when the work decision is made ahead of time. This result is statistically significant across specifications. The predicted differences for others in Panel 3 are also very close to the actual differences in

Panel 1, suggesting that the participants in the pilot study sample are almost fully aware of time-inconsistency in others, even as they remain naïve about their own present bias.

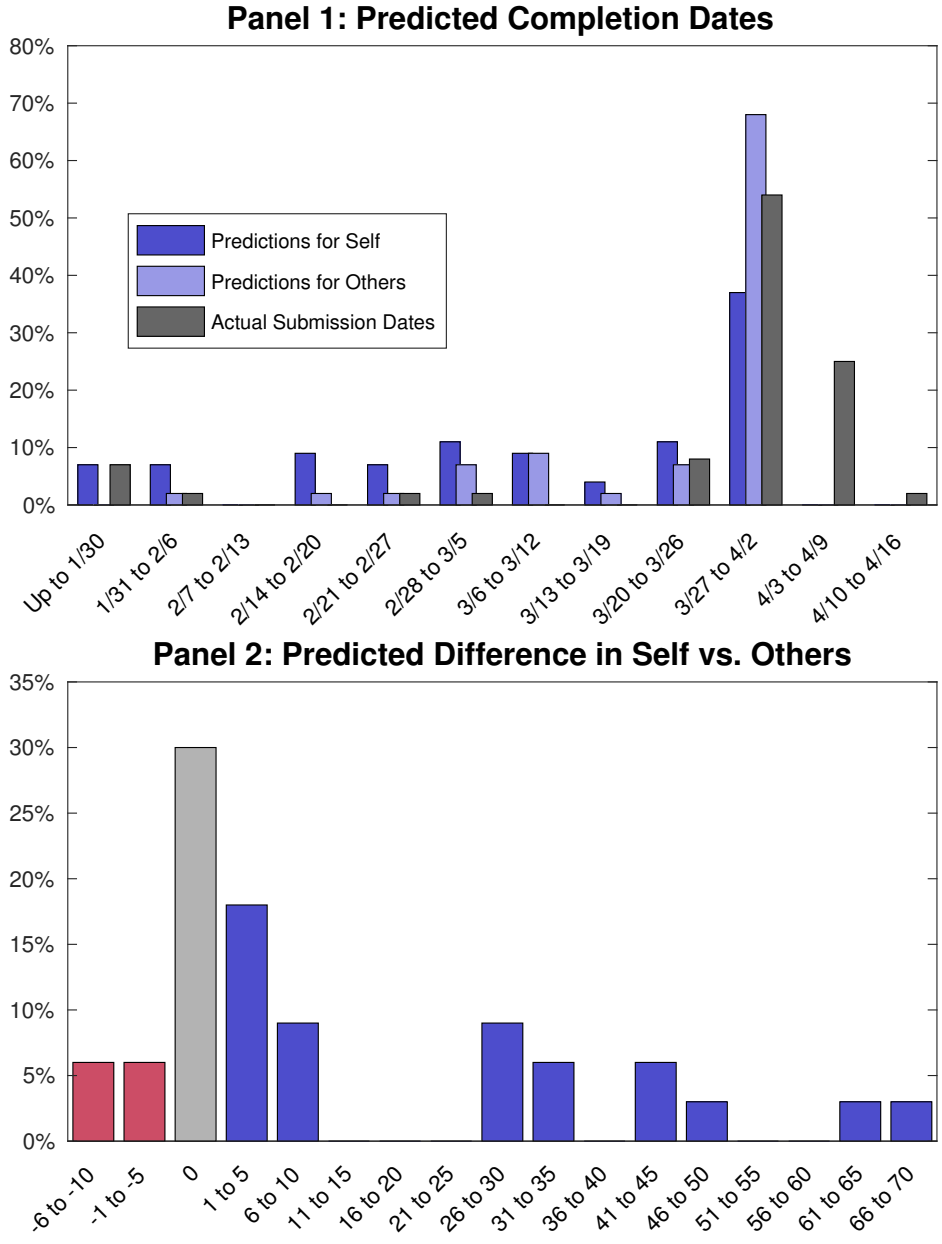


Figure 1: Results from the classroom survey. **Panel 1** presents the predicted assignment completion dates for self and others. **Panel 2** displays the distribution of individual-level differences in predicted completion dates for self and others. For example, a value of 10 corresponds to a student predicting that, on average, others in the class would send the chosen company to the instructor 10 days later than she will.

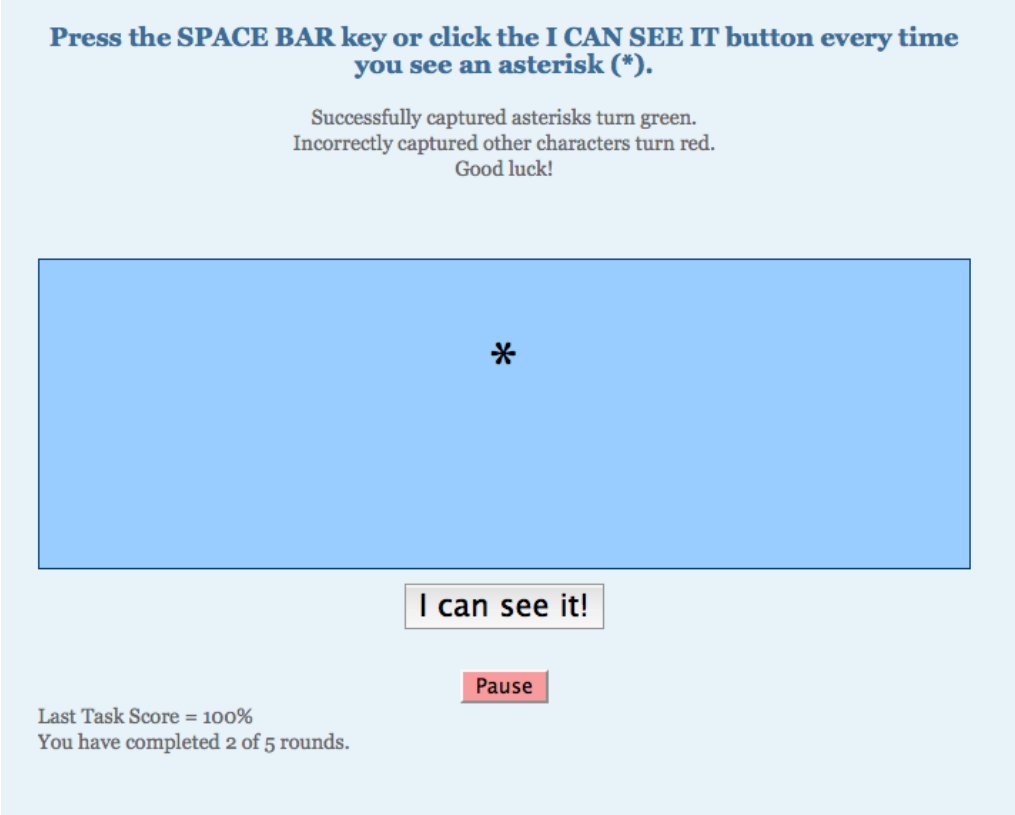


Figure 2: Screenshot of the experimental task.

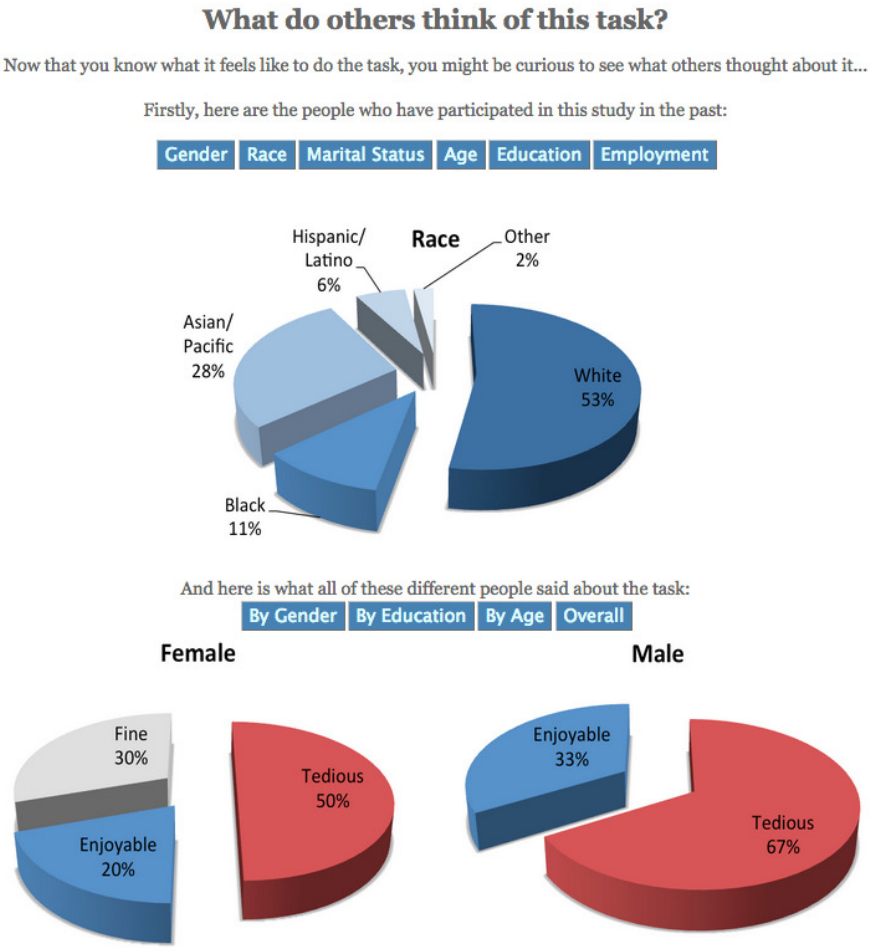


Figure 3: Breakdown of demographics and task enjoyment responses from the pilot study. This interactive display is presented to the participants in the main laboratory experiment to provide them with an understanding of the backgrounds of other participants in the study and their opinions of the experimental task.

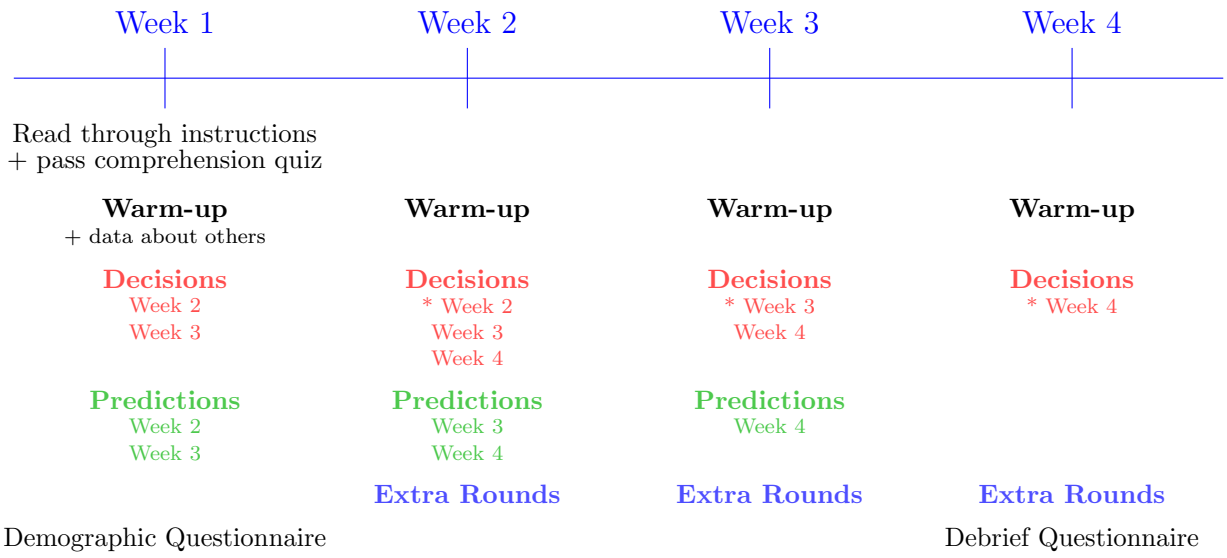


Figure 4: Experimental timeline.

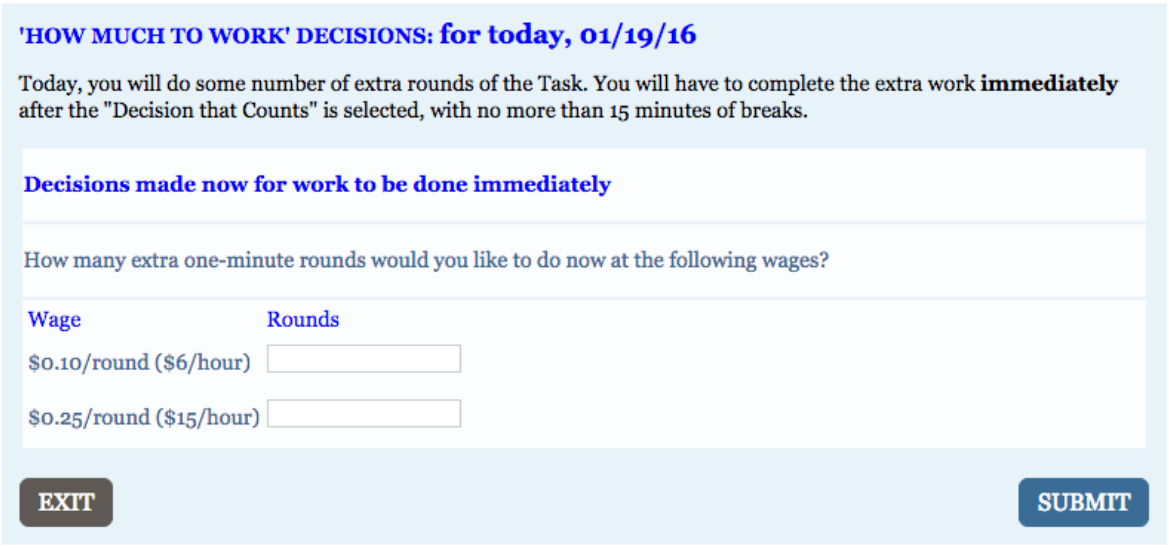


Figure 5: An example of a work decision screen.

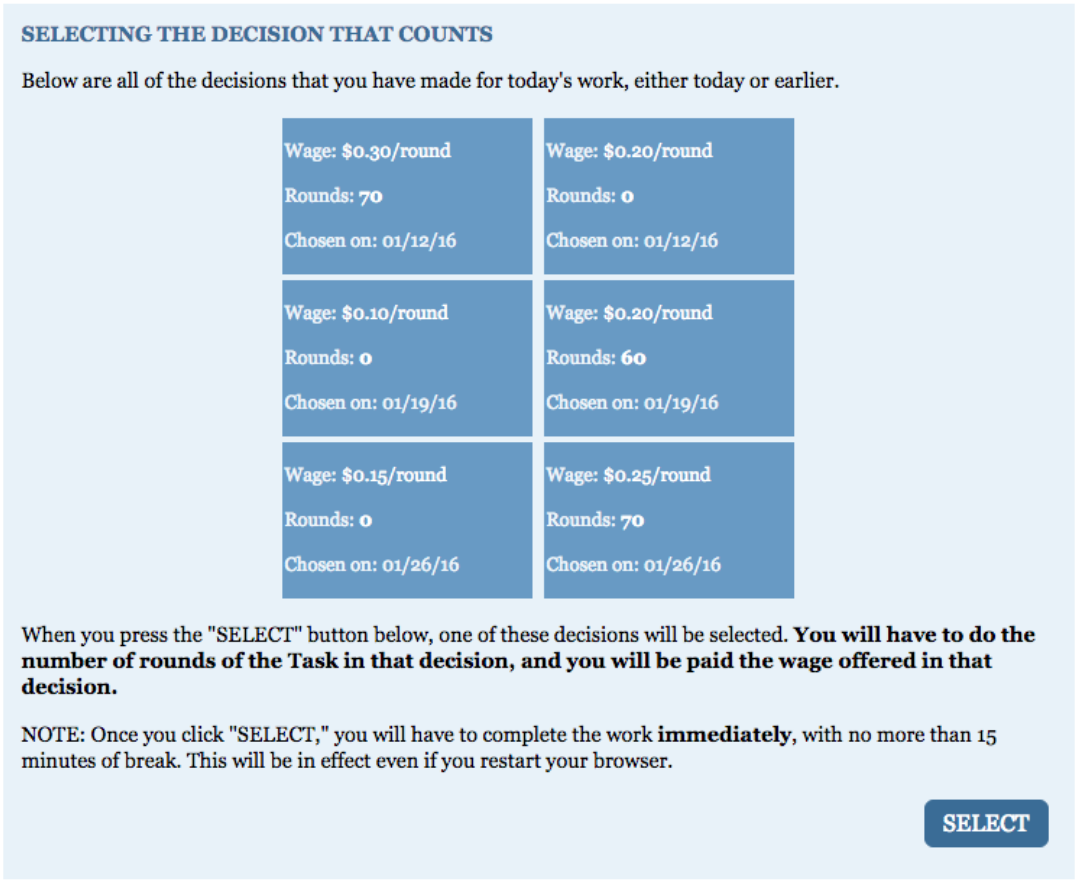
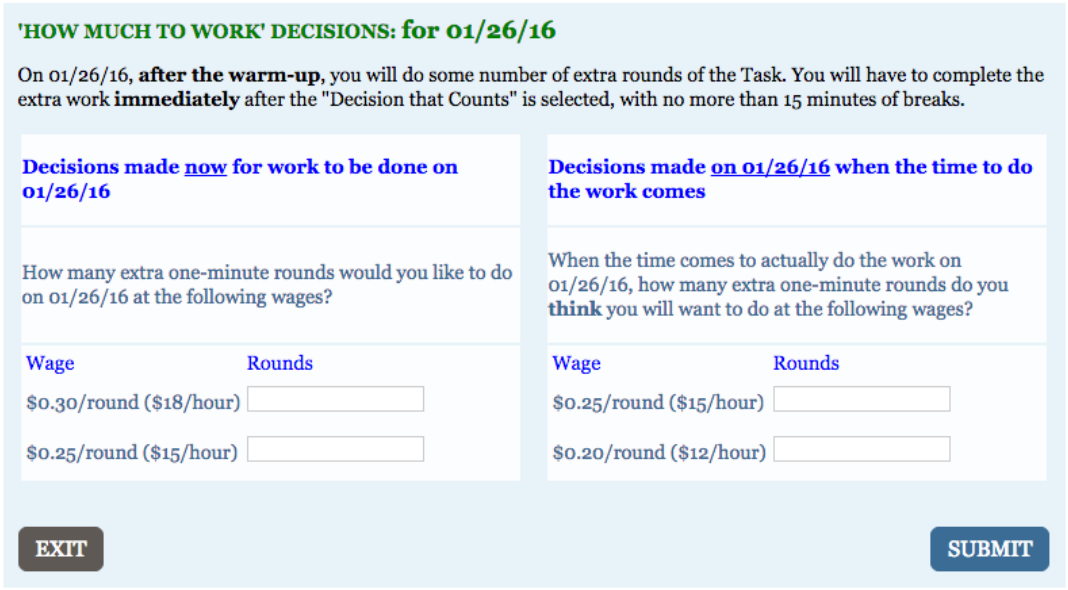


Figure 6: An example screen aggregating a participant's work decisions for a given date. Once the participant presses "Select," one choice is implemented as the "Decision that Counts."

Panel 1: Self-Predictions



Panel 2: Other-Predictions

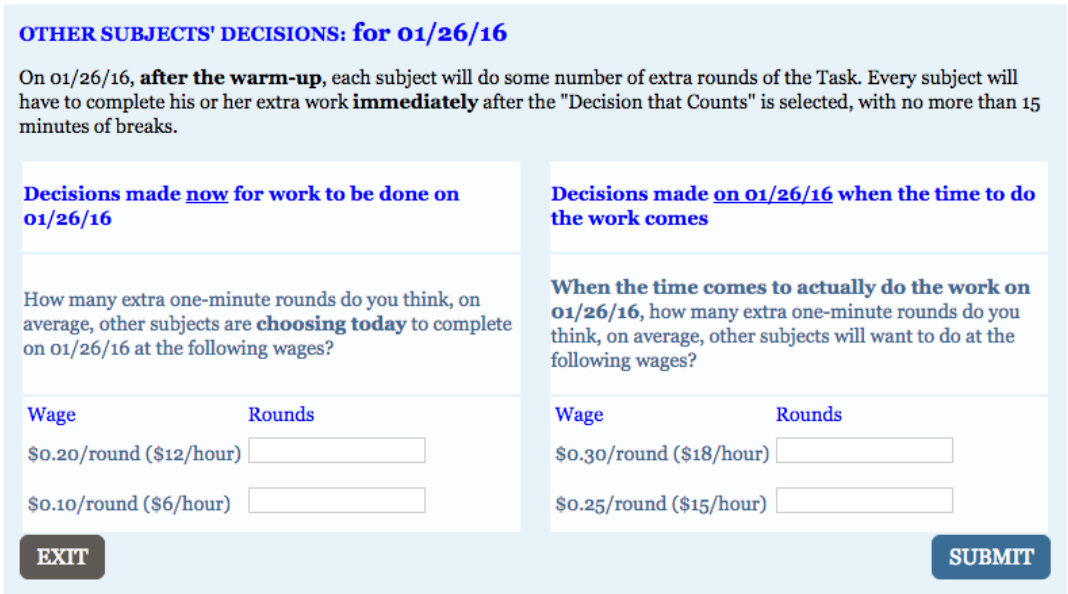


Figure 7: Examples of screens eliciting participants' predictions of their own and others' work decisions. **Panel 1** offers an example of a self-prediction screen. On the left, the participant is asked to make decisions for a future participation date. On the right, she is asked to predict how much work she would like to complete when that future participation date actually arrives. **Panel 2** presents an example of predictions about others. On the left, the participant is asked to guess what others are choosing now for the future. On the right, the participant is asked to predict how much work others will wish to do when the future date actually arrives.

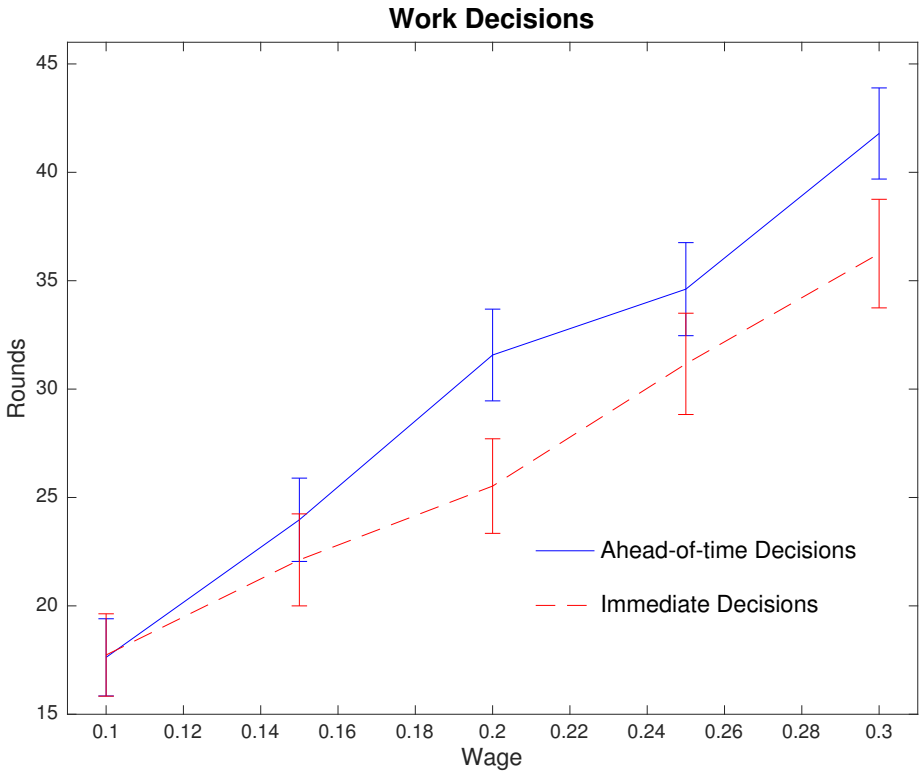


Figure 8: A comparison of work decisions made ahead of time and for immediate completion. The decisions are displayed for each of the five possible wages between \$0.10/round and \$0.30/round.

Table 1: Comparison of students' predictions of their own and their classmates' completion dates. **Panel 1:** Means, standard errors, and medians of predicted completion dates for self and others. Predicted completion dates are coded as the number of days before the deadline, April 2, 2016. **Panel 2:** Difference in predicted completion dates for self and others estimated using the following specification:
$\#DaysBeforeDeadline_i = \alpha + \beta SelfDummy_i + \epsilon_i$,
where $\#DaysBeforeDeadline_i$ denotes the number of days between the predicted date and the deadline, and $SelfDummy_i$ is a dummy variable equal to one for predictions made about self. The reported coefficient of interest is β. In samples including Groups 3 and 4, standard errors are clustered by student.
Panel 3: Differences between the self- and other-predictions from actual average completion dates. The test compares all predictions of a given type (for self in the left column or for others in the right column) against all actual completion dates.

Panel 1						
		Overall	Group 1	Group 2	Group 3	Group 4
Self-prediction	Mean	22	22	–	21	23
	SE	*(3.3)*	*(6.9)*	–	*(5.6)*	*(5.1)*
	Median	15	18	–	8	16
	# Obs	46	13	–	15	18
Other-prediction	Mean	9	–	8	9	10
	SE	*(2.2)*	–	*(3.4)*	*(3.6)*	*(4.0)*
	Median	1	–	1	3	1
	# Obs	44	–	11	15	18

Panel 2				
	Overall	Group 1 & Group 2	Group 3	Group 4
Difference in predictions for self vs. others	**13.21****	**14.40†**	**11.87†**	**13.61****
SE	*(3.28)*	*(7.42)*	*(6.15)*	*(4.29)*

Panel 3		
	Self-prediction	Other-prediction
Diff in predictions from actual completion dates	**14.82****	**1.61**
SE	*(4.07)*	*(3.24)*

**, *, and † denote significance at the 1%, 5%, and 10% levels, respectively.

Table 2: Decision and prediction questions posed to the participants in Groups 1, 2, and 3. Decisions for immediate work and predictions of such decisions are marked in blue. Decisions for future work and predictions of such decisions are marked in green.

Panel 1: Decisions – All Participants

Decisions on Date I	Decisions on Date II	Decisions on Date III	Decisions on Date IV
	For Date II	For Date III	For Date IV
For Date II	For Date III	For Date IV	
For Date III	For Date IV		

Panel 2: Predictions – Group 1 Participants

Predictions on Date I	Predictions on Date II	Predictions on Date III	Predictions on Date IV
Own decision on Date II for Date II	Own decision on Date III for Date III	Own decision on Date IV for Date IV	
Own decision on Date III for Date III	Own decision on Date IV for Date IV		

Panel 3: Predictions – Group 2 Participants

Predictions on Date I	Predictions on Date II	Predictions on Date III	Predictions on Date IV
Others' dec. on Date II for Date II	Others' dec. on Date III for Date III	Others' dec. on Date IV for Date IV	
Others' dec. on Date III for Date III	Others' dec. on Date IV for Date IV		
Others' dec. on Date I for Date II	Others' dec. on Date I for Date III	Others' dec. on Date I for Date IV	
Others' dec. on Date I for Date III	Others' dec. on Date I for Date IV		

Panel 4: Predictions – Group 3 Participants

Predictions on Date I	Predictions on Date II	Predictions on Date III	Predictions on Date IV
Own decision on Date II for Date II	Own decision on Date III for Date III	Own decision on Date IV for Date IV	
Own decision on Date III for Date III	Own decision on Date IV for Date IV		
Others' dec. on Date II for Date II	Others' dec. on Date III for Date III	Others' dec. on Date IV for Date IV	
Others' dec. on Date III for Date III	Others' dec. on Date IV for Date IV		
Others' dec. on Date I for Date II	Others' dec. on Date I for Date III	Others' dec. on Date I for Date IV	
Others' dec. on Date I for Date III	Others' dec. on Date I for Date IV		

Table 3: Numbers of recruited participants and attrition rates across experimental sessions.

	Consent	Done Week I	Week II	Week III	Week IV
Pilot	27	23	21	19	19
Sessions 1-5	364	278	230	208	198
Session 1	78	61	53	50	50
Session 2	81	65	59	52	50
Session 3	86	71	57	49	43
Session 4	64	42	31	29	28
Session 5	55	39	30	28	27

Table 4: Pooled results from the participants who complete the entirety of the experiment. **Panel 1** estimates the actual difference between work decisions made ahead of time and work decisions for immediate completion. **Panel 2** estimates the predicted difference in ahead-of-time vs. immediate decisions when participants are asked to make the predictions about themselves. **Panel 3** displays the predicted difference in ahead-of-time vs. immediate decisions when participants are asked to make the predictions for others participating in the experiment.

Panel 1: Actual Difference in Ahead-of-time vs. Immediate Decisions				
Actual Difference	**3.50****	**3.33****	**3.30****	**3.36****
Standard error	*(0.59)*	*(0.55)*	*(0.61)*	*(0.57)*
Controls:				
Wage FE		X		X
Participant FE			X	X
# Observations	198	198	198	198

Panel 2: Predicted Difference in Own Ahead-of-time vs. Immediate Decisions				
Self-Prediction	**-0.00**	**-0.53**	**1.04***	**0.52**
Standard error	*(1.14)*	*(1.12)*	*(0.41)*	*(0.35)*
Controls:				
Wage FE		X		X
Participant FE			X	X
# Observations	138	138	138	138

Panel 3: Predicted Difference in Others' Ahead-of-time vs. Immediate Decisions				
Other-Prediction	**1.27***	**1.47****	**1.27***	**1.49****
Standard error	*(0.52)*	*(0.42)*	*(0.53)*	*(0.44)*
Controls:				
Wage FE		X		X
Participant FE			X	X
# Observations	138	138	138	138

** and * denote significance at the 1% and 5% levels, respectively.

Table 5: Predicted differences in one's own and others' choices, sliced by incentive. **Panel 1** estimates the participants' predictions of the differences in their own work decisions, for participants who receive monetary incentives for correct predictions and those who do not. **Panel 2** further splits the sample of incentivized participants by the size of the incentive. **Panel 3** reports the participants' predictions of the differences in others' immediate and ahead-of-time work decisions, for predictions elicited with and without monetary incentives.

Panel 1: Self-Predictions by Incentivized and Unincentivized Participants		
	Incentivized	Unincentivized
Self-Prediction	**0.40**	**0.65**
Standard error	*(0.53)*	*(0.46)*
Controls:		
Wage FE	X	X
Participant FE	X	X
# Observations	72	66

Panel 2: Self-Predictions by Incentivized Participants, Varying Size of Incentive				
	$0.10 incentive	$0.20 incentive	$0.30 incentive	$0.40 incentive
Self-Prediction	**-1.06**	**0.66**	**0.67**	**0.57**
Standard error	*(1.46)*	*(1.11)*	*(0.58)*	*(0.98)*
Controls:				
Wage FE	X	X	X	X
Participant FE	X	X	X	X
# Observations	13	17	22	20

Panel 3: Other-Predictions by Incentivized and Unincentivized Participants		
	Incentivized	Unincentivized
Other-Prediction	**1.41***	**1.70****
Standard error	*(0.62)*	*(0.60)*
Controls:		
Wage FE	X	X
Participant FE	X	X
# Observations	72	66

** and * denote significance at the 1% and 5% levels, respectively.

Table 6: Predicted differences in one's own and others' choices, sliced by method of presenting the questions. **Panel 1** estimates the participants' predictions of the differences in their own work decisions, elicited from participants who were only asked to make predictions about themselves (left column) and from participants who were asked both self- and other- prediction questions (right column). **Panel 2** presents the participants' predictions for others, elicited from participants who were asked only to make predictions regarding others (left column) and from participants who were asked both sets of questions (right column).

Panel 1: Self-Predictions		
	Self-Prediction Only	Both Sets of Questions
Self-Prediction	**0.38**	**0.73**
Standard error	*(0.48)*	*(0.50)*
Controls:		
Wage FE	X	X
Participant FE	X	X
# Observations	60	78

Panel 2: Other-Predictions		
	Other-Prediction Only	Both Sets of Questions
Other-Prediction	**1.53***	**1.46***
Standard error	*(0.59)*	*(0.64)*
Controls:		
Wage FE	X	X
Participant FE	X	X
# Observations	60	78

* denotes significance at the 5% level.

Table 7: Actual differences and predicted differences in one's own and others' choices, sliced by warmup amount. **Panel 1** presents the actual differences in choices for future work versus immediate work. **Panel 2** estimates the participants' predictions of the differences in their own work decisions. **Panel 3** presents the participants' predictions for others.

Panel 1: Actual differences			
	Warmup = 5 rounds	Warmup = 10 rounds	Warmup = 15 rounds
Self-Prediction	**4.04****	**3.79****	**2.32***
Standard error	*(0.94)*	*(0.84)*	*(1.13)*
Controls:			
Wage FE	X	X	X
Participant FE	X	X	X
# Observations	62	72	65

Panel 2: Self-Predictions			
	Warmup = 5 rounds	Warmup = 10 rounds	Warmup = 15 rounds
Self-Prediction	**0.84**	**1.04***	**-1.05**
Standard error	*(1.24)*	*(1.95)*	*(1.45)*
Controls:			
Wage FE	X	X	X
Participant FE	X	X	X
# Observations	40	48	50

Panel 3: Other-Predictions			
	Warmup = 5 rounds	Warmup = 10 rounds	Warmup = 15 rounds
Other-Prediction	**1.08†**	**2.48****	**0.84**
Standard error	*(0.57)*	*(0.98)*	*(0.61)*
Controls:			
Wage FE	X	X	X
Participant FE	X	X	X
# Observations	46	49	43

**, *, and † denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Pooled results from from all participants who participated in the experiments, including participants who attrited between Week I and Week IV. **Panel 1** estimates the actual difference between work decisions made ahead of time and work decisions for immediate completion. **Panel 2** estimates the predicted difference in ahead-of-time vs. immediate decisions when participants are asked to make the predictions about themselves. **Panel 3** displays the predicted difference in ahead-of-time vs. immediate decisions when participants are asked to make the predictions for others participating in the experiment.

Panel 1: Actual Difference in Ahead-of-time vs. Immediate Decisions				
Actual Difference	**3.46****	**3.22****	**3.56****	**3.34****
Standard error	*(0.60)*	*(0.57)*	*(0.53)*	*(0.50)*
Controls:				
Wage FE		X		X
Participant FE			X	X
# Observations	306	306	306	306

Panel 2: Predicted Difference in Own Ahead-of-time vs. Immediate Decisions				
Self-Prediction	**0.80**	**0.22**	**0.66†**	**0.11**
Standard error	*(1.09)*	*(1.07)*	*(0.37)*	*(0.32)*
Controls:				
Wage FE		X		X
Participant FE			X	X
# Observations	214	214	214	214

Panel 3: Predicted Difference in Others' Ahead-of-time vs. Immediate Decisions				
Other-Prediction	**1.19****	**1.44****	**1.19****	**1.45****
Standard error	*(0.43)*	*(0.35)*	*(0.44)*	*(0.36)*
Controls:				
Wage FE		X		X
Participant FE			X	X
# Observations	202	202	202	202

** and * denote significance at the 5% and 10% levels, respectively.

Table 9: Results from the pilot run of the laboratory experiment. **Panel 1** estimates the actual differences between decisions made ahead of time and decisions for immediate work. **Panel 2** estimates the predicted differences in ahead-of-time vs. immediate decisions when participants are asked to make the predictions about themselves. **Panel 3** displays the predicted differences in ahead-of-time vs. immediate decisions when participants are asked to make the predictions for others participating in the experiment.

Panel 1: Actual Difference in Ahead-of-time vs. Immediate Decisions				
	With attrited participants		Without attrited participants	
Actual Difference	**1.92**	**2.51***	**2.34***	**2.36***
Standard error	*(1.57)*	*(1.40)*	*(1.44)*	*(1.47)*
Controls:				
Wage FE	X	X	X	X
Participant FE		X		X
# Observations				

Panel 2: Predicted Difference in Own Ahead-of-time vs. Immediate Decisions				
	With attrited participants		Without attrited participants	
Self-Prediction	**-0.26**	**0.25**	**-1.04**	**0.45**
Standard error	*(2.65)*	*(0.70)*	*(3.04)*	*(0.74)*
Controls:				
Wage FE	X	X	X	X
Participant FE		X		X
# Observations				

Panel 3: Predicted Difference in Others' Ahead-of-time vs. Immediate Decisions				
	With attrited participants		Without attrited participants	
Other-Prediction	**1.87***	**2.15****	**1.97***	**2.22****
Standard error	*(1.02)*	*(0.99)*	*(1.01)*	*(0.99)*
Controls:				
Wage FE	X	X	X	X
Participant FE		X		X

** and * denote significance at the 5% and 10% levels, respectively.