Turking Overtime: How Participant Characteristics and Behavior Vary Over Time and Day on Amazon Mechanical Turk

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Online experiments allow researchers to collect datasets at times not typical of laboratory studies. We recruit 2,336 participants from Amazon Mechanical Turk to examine if participant characteristics and behaviors differ depending on whether the experiment is conducted during the day versus night, and on weekdays versus weekends. Participants make incentivized decisions involving prosociality, punishment, and discounting, and complete a demographic and personality survey. We find no time or day differences in behavior, but do find that participants at nights and on weekends are less experienced with online studies; on weekends are less reflective; and at night are less conscientious and more neurotic. These results are largely robust to finer grained measures of time and day. We also find that those who participated earlier in the course of the study are more experienced, reflective, and agreeable, but less charitable than later participants.

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1 Introduction

Online survey platforms are an increasingly popular tool for studying human behavior in the social sciences. Since the appearance of Amazon Mechanical Turk (MTurk), a plethora of studies have validated their use by successfully replicating classic findings from economics and psychology (Paolacci et al. 2010; Horton et al. 2011; Amir et al. 2012; Berinsky et al. 2012; Rand 2012; Arechar et al. 2016). In comparison to other methods, online surveys permit quick and affordable collection of large volumes of data.

Another feature of these online studies is that they make it easy to collect data at any time and, unlike studies conducted in the laboratory or in other face-to-face environments, participation can easily occur late at night or on weekends. This is possible because researchers commonly leave a single study continuously open for a week or longer, allowing participation at whichever time suits participants.

A potential issue arising from this practice, however, is heterogeneity in participants' characteristics based on time of participation. There is evidence in support of such heterogeneity; for example, people who work in traditional white collar jobs may be unavailable to complete studies during regular business hours. As a result, studies run during those hours may be more likely to recruit "professional" participants who use MTurk as a primary source of income – and thus may have more prior experience (Casey et al. 2016), make fewer errors (Chandler et al. 2015), and complete studies more quickly (Deetlefs et al. 2015). Additionally, participants recruited when a study is first posted may differ from those recruited later, as in college samples where there is evidence that students differ depending on whether they sign up to complete studies at the beginning versus the end of the semester (Aviv et al. 2002). Indeed, in an unincentivized survey study, Casey et al. (2016) explore the demographic and personality differences of participants who took part in surveys at different times on MTurk. Notably, they find that experienced participants were more likely to complete tasks earlier in the day, and that participants tend to be older, less neurotic and more conscientious earlier in the data collection.

Still, little is known about how participants' *behavior* may vary based on time of participation, and this is crucial knowledge for accurately interpreting the results of online studies. To shed light on this issue, we ran an incentivized study at regular intervals over two weeks to explore how participation at day versus night, and on weekdays versus the weekend, affects incentivized

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behavior in common economic paradigms, as well as the demographics and personality of those who self-select to participate.

Participants took part in a series of tasks presented in randomized order. They made seven incentivized decisions: a dictator game, a one-shot prisoner's dilemma game, and a third-party punishment game with prosocial punishment of selfishness and antisocial punishment of fairness, as well as an honesty task, a charitable giving decision, and a time discounting task. In addition to these incentivized measures, they also completed unincentivized measures of reflectiveness (a modified version of the cognitive reflection test, CRT; Frederick (2005)), the Big-5 personality traits of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (Gosling et al. 2003), and basic demographics.

We do not find significant differences in decisions in any of the incentivized behavioral measures. However, we do find that people participating at night are less experienced, take more time to complete tasks, are less conscientious, and more neurotic than their daytime fellows; and that people participating on weekends are less experienced and reflective. We also examine behavioral and demographic differences based on participation order. We find no differences in any of the incentivized measures, with the exception of charitable giving, where people participating earlier on in the study give less. We also find that such participants are more experienced, reflective, and agreeable than later ones. Of course, our results cannot speak to causality. A person's characteristics could be influencing when they select into participation in studies on MTurk, or there could be a causal effect such that the same person tends to be, for example, less reflective on the weekend compared to weekdays. Although this distinction is important for understanding the psychological basis of our observations, the direction of causality does not have particular bearing on the practical implications for experimenters interested in running experiments on nights and weekends using MTurk.

In sum, our results suggest that incentivized economic behavior on MTurk is robust to the time of day and the day of the week, while there is some variation in participants' personality and prior experience across these recruitment times.

2 Experimental design and procedure

We recruited participants via MTurk, restricting their geographical location to the USA. A total of 2,336 American participants completed the study; average age was 34 years (range: 18-77), and

50% were female. Participants completed the task in an average of 15 minutes and they received a flat fee of $1 for participating, plus an additional variable payment (average $0.52, range: $0.02-$60) depending on their choices in the study – both amounts were in range of what was common Mturk practice at the time. We prevented repeated participation by excluding an additional 90 observations from duplicate Amazon worker IDs or IP addresses.

We collected data over a span of two separate weeks in November and December 2014, launching a total of 84 sessions.[1] We classified participation time as *day* (*night*) if the study was completed between 8am and 8pm (8pm and 8am). We classified participation day as *weekend* if the study was completed between the start of Friday *night* and the end of Sunday *day*, and *weekday* otherwise. In total, 844 participants took part during weekday-day, 819 during weekday-night, 345 during weekend-day, and 328 during weekend-night.[2]

We analyzed time of participation using participants' *experienced* time. To achieve this, we retrieved the participants' locations from their IP addresses, and adjusted their timestamp for their time zone (data were timestamped in the Eastern Time Zone because we are located there). As Figure 1 shows, most of our data (75%) originates from locations in the Eastern and Central Time Zones, which is consistent with 2014 Census estimates and recent evidence showing that MTurk can be more representative than in-person convenience samples (Berinsky et al. 2012).
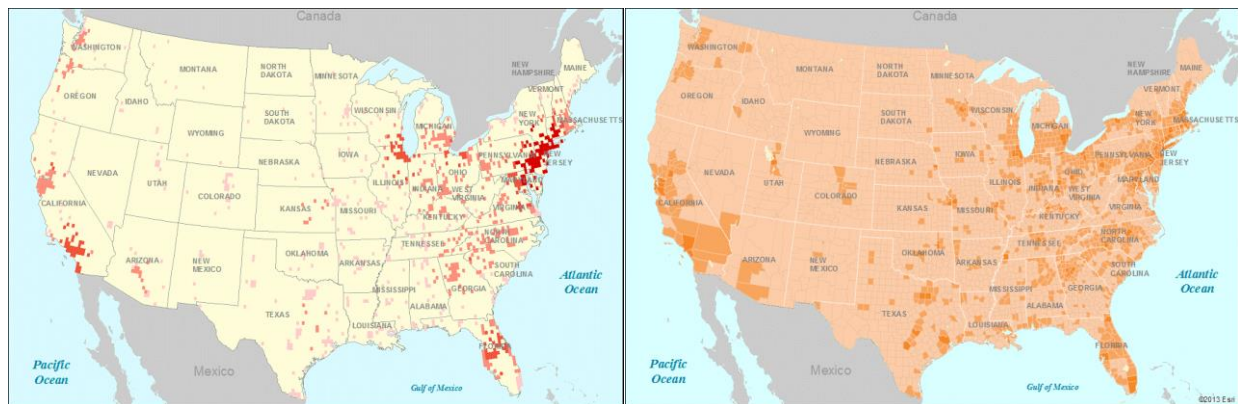
Figure 1 Location and population density of our sample (left) and the US (right). Darker points depict denser areas

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[1] Each session was closed after 30 participants accepted the HIT or 1 hour had elapsed, and participants had a maximum of one hour to complete the study. The first week (11/19-11/15) had 28 sessions launched every 6 hours starting at 00:00 EST; the second week (12/8-12/15) had 56 sessions launched every 3 hours starting at 09:00 EST. This difference in granularity is not relevant for our analyses of day versus night, which uses 12-hour blocks.

[2] Unless otherwise stated, we found qualitatively similar results when the 12-hours *night* was defined as beginning at 7pm or at 9pm, or if we define *weekend* as the time between the start of Saturday *day* and the start of Monday *day*.

All participants first took part in a battery of seven incentivized decisions: cooperation in the Prisoner's Dilemma (PD);[3] interpersonal altruism in a Dictator Game (DG) with a $0.50 endowment; charitable giving (CH) where participants choose how much of $60 to donate to the charity Oxfam International (www.oxfam.org), with one participant selected at random to have their choice implemented; third-party punishment of selfishness (3P) and of fairness (AP);[4] honesty (HO) in a measure where participants guessed which random number between 1 and 20 would be generated by the computer and then self-reported accuracy, with more reported accuracy leading to higher earnings (up to $0.50); and time discounting (TD).[5] To account for potential income effects, we randomized the order in which each task was presented at the individual level and informed participants that only one of the tasks would be randomly selected for payment after all were completed. All materials used neutral wording and the economic games included comprehension questions. See the online appendix for a copy of the instructions.

Finally, participants completed a 10-item version of the Big-5 measure capturing five dimensions of personality (O, openness; C, conscientiousness; E, extroversion; A, agreeableness; N, neuroticism (reverse-coded); from Gosling et al. 2003), a modified version of the cognitive reflection test to assess intuitive versus deliberative cognitive style (a set of three math problems with intuitively compelling but incorrect answers; original introduced by Frederick (2005), modified by Shenhav et al. 2012), and a set of standard demographic questions.

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[3] We used a continuous implementation of the PD (as in Capraro et al. 2014) such that each player received a $0.40 endowment and chose how much to transfer to the other person, with any transfer doubled by the experimenters.

[4] In the third-party punishment game, Player 1 chose whether or not to evenly split $0.50 with Player 2. The participant, in the role of Player 3, then chose how much of a $0.10 endowment to spend on punishing Player 1 (with each cent reducing Player 1's payoff by 3 cents) if Player 1 did not (3P) or did (AP) split the $0.50. Participants in our study played only in the role of the third player (which was our decision of interest). We did not deceive participants, however – a small number of Players 1 and 2 were recruited separately and repeatedly matched with Player 3s (as per Stagnaro et al. 2017).

[5] We used a short version of the discounting task developed by Kirby et al. (1999), where participants chose 9 different monetary allocations between a smaller reward and a larger, delayed reward (e.g. "Would you rather have $25 today or $60 in 14 days"). Log-transformed values reported in all analyses. One participant was selected at random to have one of their choices implemented. Because of the instructions stating "At the end of the study one participant and one question will be selected randomly. The winner will receive the associated bonus according to the choice made", we had assumed that participants understood "today" to mean "at the end of the study" On reflection, we realize that this (unintentional) poor execution on our part might have been misunderstood by the participants.

3 Results

3.1 Time and Day

3.1.1 Incentivized Behaviors

We begin with our central (null) result: Figure 2 shows the difference in mean behavior in each of the seven incentivized decisions between day and night, and between weekday and weekend.[6] For the games with comprehensions questions—DG, PG and 3P—we exclude participants who answered incorrectly, but the results are qualitatively similar if included.
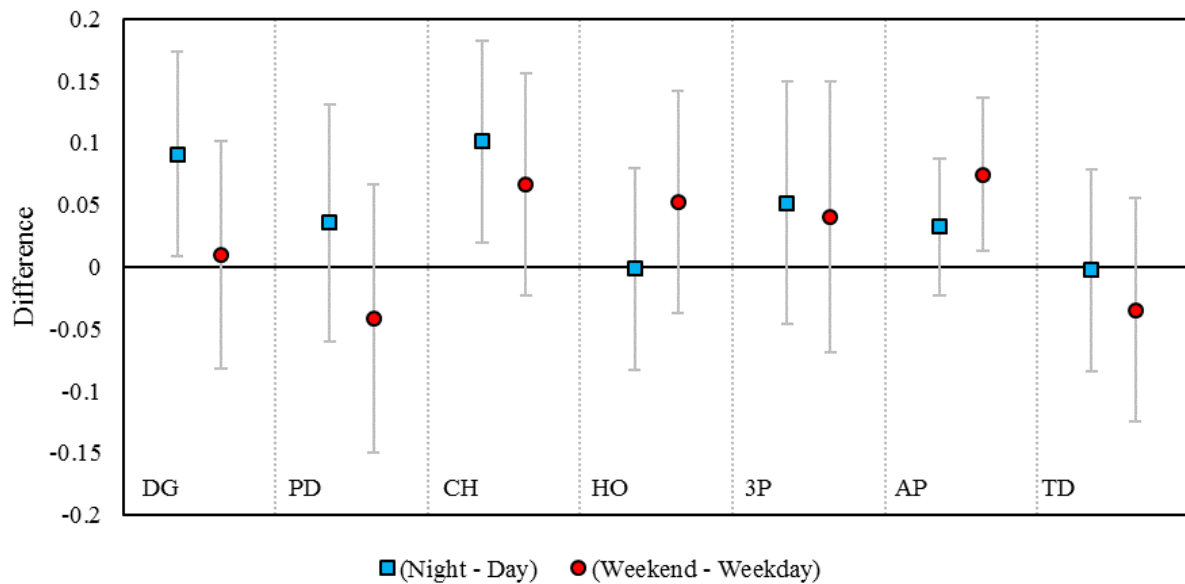
Figure 2 Differences in economic game behavior; 95% confidence intervals reported. We visualize *differences* in z-scored values to allow readers to more easily interpret the (lack of) main effects; positive values in the figure indicate higher values of the dependent variable during the day compared to the night, and weekday compared to weekend. DG: Dictator Game; PD: Prisoner's dilemma game; CH: Charity task; HO: Honesty task; 3P: Prosocial third-party punishment; AP: Antisocial third-party punishment; TD: (log) Time discounting task.

Although DG giving and donations to charity tend to be larger at nights (uncorrected $p=0.032$ and $p=0.015$, respectively), and antisocial punishment tends to be larger on weekends (uncorrected $p=0.018$), none of these differences survive even a modest Bonferroni correction for seven

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[6] We report only main effects because preliminary ANOVAs reveal no significant interaction between a dummy for night versus day and weekend versus weekday. See Appendix Table A1 for significance levels of all the variables and Appendix Figure A1 for their distributions.

simultaneous tests (which would require $p<.007$), let alone a more stringent correction for 21 tests that accounts for the 3 coefficients in each model.[7]

As our central findings are null results, we also conducted power analysis calculations. Setting the default power to 0.80 for three levels of alpha, based on the degree of conservativeness in Bonferroni correction ($\alpha=0.05$; $\alpha=0.007$; $\alpha=0.0024$), we find that we had sufficient power to detect economically meaningful differences (differences of at least 5 percentage points for most measures even using the more conservative level of Bonferroni correction) in all but three cases: PD and 3P for all the alphas and HO for the most conservative one. See Appendix Table A2 for details.

We also ask how variance (rather than mean values) differs by day and time. The only difference we find that survive Bonferroni correction is that variance in antisocial punishment is lowest on weekday days, followed by weekday nights, and then higher in the two weekend timeslots. See Appendix Figure A2 for details.

Taken together, these results do not provide evidence that incentivized behavior in economic decisions on MTurk varies meaningfully with time or day.

3.1.2 Demographics and Personality traits

To investigate demographic and personality variations across time and day, we perform an ANOVA on each of the eighteen variables shown in Figure 3, with a *night* dummy, a *weekend* dummy, and the interaction between the two.[8] Once we apply Bonferroni correction, we find no significant interactions and only eight results with significance at the 5% level. In particular, people who participated at night took longer to complete the study (day: 2.90 log(sec); night: 2.95 log(sec); $p<0.001$), were less experienced (day: 2.56 log(studies); night: 2.32 log(studies); $p<0.001$), were less likely to be participating during their usual MTurk work times (day: 85%; night: 75%; $p<0.001$), were less conscientious (C, Likert scale between 1 [less conscientious] and 7 [more conscientious]; day: 5.45; night: 5.26; $p<0.001$) and more neurotic (N, reverse-coded Likert scale between 1 [more neurotic] and 7 [less neurotic]; day: 5.03; night: 4.84; $p<0.002$); whereas people who participated on weekends were less experienced (weekday: 2.49 log(studies);

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[7] We also test those seven null results for robustness to demographic and personality controls in stepwise regressions (Appendix Table A3). We find that such controls have no effect on the non-significance of the time/day coefficients.
[8] There were no significant interactions for the demographics, Figure 3 shows means for each condition to allow readers to see the absolute levels (which may be of general interest).

weekend: 2.32 log(studies); *p*<0.001), less likely to be participating during their usual MTurk work times (weekday: 83%; weekend: 74%; *p*<0.001), and were less reflective (CRT correct answers; weekday: 1.57; weekend: 1.36; *p*<0.001).
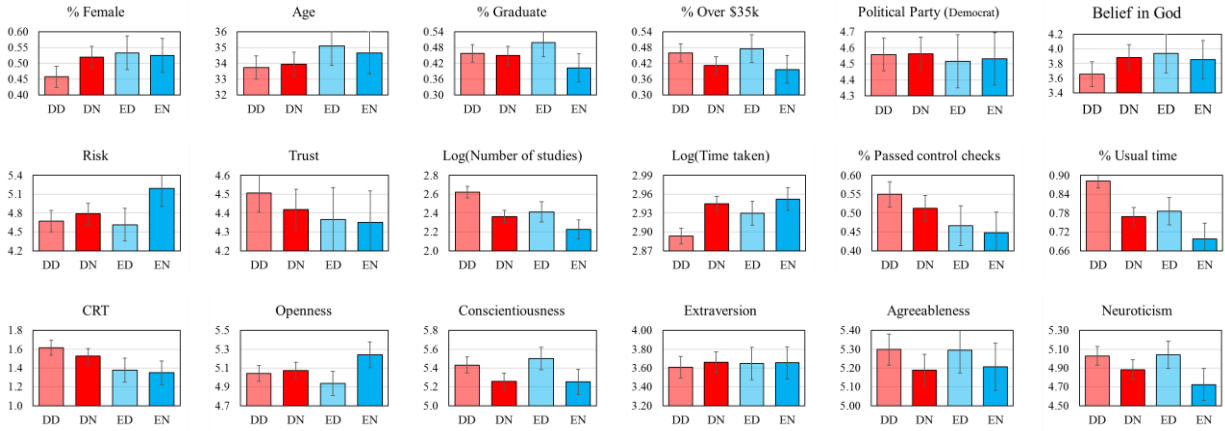
Figure 3 Differences between nights and weekends on: gender, age, education, income, political party (1=Strongly Republican; 7=Strongly Democrat), belief in God (1=Very little; 7=Very much), willingness to take risks (0=Not at all willing to take risks; 10=Very willing to take risks), trust in others (1=Very little; 7=Very much), number of previous studies completed on MTurk, time taken to complete the current study, whether the comprehension questions were answered correctly, whether participants usually completed MTurk tasks at the time of day when they completed our study, number of correct answers in the Cognitive Reflective Task, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. DD: Weekday day; DN: Weekday night; ED: Weekend day; EN: Weekend night. 95% confidence intervals reported. Mean values reported to allow readers to see the absolute levels (which may be of general interest).

3.1.3 Robustness Checks

To ensure the robustness of our results we perform the following three robustness checks:

1. *The direction of the results does not change when splitting the data into two:* We divide our dataset into two based on whether the participant's serial order is odd or even. The incentivized economic behaviors that were strongly null in the full dataset are similarly null in each half. For DG and CH, which were weakly significantly (i.e. did not survive Bonferroni correction) larger at night than during the day in the full dataset, these results were not consistently apparent in both halves of the data, further indicating lack of robustness. For AP, which was weakly significantly higher on weekends than weekdays in the full dataset, we observe the same result in both halves, suggesting that this result might be more robust. Finally, considering the significant demographic/personality results that were significant in the full dataset, the results were similar in the two halves (see Appendix Figure A3).

2. *Finer-grained definitions of time and day of the week:* For participation time we focus on four 6-hour intervals: *morning*, between 8am and 2pm; *afternoon*, between 2pm and 8pm; *evening*, between 8pm and 2am; and *pre-dawn*, between 2am and 8am. For day of the week we classify each day of the seven-day week separately (Monday-Sunday). Using these new definitions, we perform an ANOVA (with Bonferroni corrections) on all of the behavioral, demographic, and personality items. Doing so recovers all of the results described above using the more coarse-grained measures of time and day, with the only exceptions that neuroticism did not vary with time of day. We also found two new results that were not significant using the more coarse-grained analysis: participants at pre-dawn gave more generous donations to charity compared to the other times of day (pre-dawn: \$13.38; not pre-dawn: \$10.90, $p<0.001$), and age varied with time of day such that participants during the evening were younger while participants during pre-dawn were older (evening: 32.95; not evening: 35.74; $p=0.002$; pre-dawn: 35.74; not pre-dawn: 33.71; $p<0.001$). We note that the result regarding charitable giving was also evident in the coarse-grained analysis (Figure 2), but was only significant at the 5% level in that analysis (and thus did not survive Bonferroni correction).[9]

3. *Alternative definitions of night and weekend:* When nights are defined as either 9am to 9pm or 7am to 7pm ("N9" and "N7", respectively), or when weekend is instead defined as Saturday day through Sunday night ("WS"), we only note six minor changes in terms of the significance that nevertheless shift the value of the affected variables to (non-)significant Bonferroni-corrected values. Specifically, the significance of Conscientiousness and Neuroticism disappears if *N9* is used (from $p<0.001$ to $p=0.009$ and from $p<0.001$ to $p=0.017$, respectively), the significance of CRT also disappears if *WS* is used (from $p<0.001$ to $p=0.003$), the significance of usual time on weekends disappears if *WS* is used (from $p<0.001$ to $p=0.001$), and the relationship between passing comprehension checks and spending time on the task at weekends gains significance when *WS* is used (from $p=0.001$ to $p<0.001$ and from $p=0.007$ to $p<0.001$, respectively). See Table A1 for a complementary analysis of all remaining tasks.

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[9] See Appendix Table A4 for a complete list of the significance levels, and Tables A5 and A6 for regression analyses with dummies for each of the day/time categories as independent variables.

3.2 Participant order

Finally, we test whether participants who take part in a study early on differ from those who participate later in the course of the study (and thus how important it is to have full randomization over all treatments of an experiment, versus running some treatments after others have been completed). We run regressions on each of the measures presented in the previous section using the chronological order in which participants accessed our study as the independent variable.[10]

After Bonferroni corrections, we find that this variable predicts significant changes in five measures. To give a sense of the magnitude of these changes, we report values predicted from the regression models for the first participant (participant 1) and for the last participant (participant 2,336). We find that later-participating individuals are less experienced (b=-0.0002, p<0.001; from 2.72 to 2.17 log(studies) [525 studies to 148 studies]), work at more unusual times (b=-0.00005, p<0.001; from 14% to 26%), give more donations to charity (b=0.002, p<0.001; from \$9.65 to \$13.21 given, a 37% increase), are less reflective (b=-0.0002, p<0.001; from 1.70 to 1.32 correct CRT answers, a 22% decrease), and are less agreeable (b=-0.0002, p<0.001; from 0.156 to -0.156 z-scored response, a 0.3 standard deviation decrease). We also note that when controlling for experience, the only difference that remains significant is agreeableness (b=-0.0001, p<0.001).

4 Discussion

We investigated whether participants' economic game behavior, as well as demographics and personality factors, varied based on time of day and day of the week. Our key results are nulls: there are no significant differences on any of the incentivized economic behaviors. With respect to the non-incentivized measures, we do find that people participating on weekends were less reflective and less experienced, and less experienced, conscientious, and more neurotic when participating at night. Our finer-grained analysis also revealed more charitable giving between 2am and 8am. In addition to exploring time of day and day of the week effects, we also compared subjects who participated earlier in the study with those who participated later. We found later-participating subjects to have less prior experience, less reflectiveness, more charitable giving and less agreeableness.

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[10] See Appendix Figure A4 for a visual representation of cumulative averages over the data collection process, and Tables A7 and A8 for regression results. Our findings are qualitatively similar when using either a dummy for week, session number or the total of hours passed since the first session as an independent variable.

With respect to the non-incentivized measures, a comparison between our results and those of Casey et al. (2016) reveals substantial convergence: both papers find more experienced participants earlier in the day and earlier in the data collection process, that participants who scored lower on the Big-5 personality dimension of conscientiousness were more likely to complete HITs later in the day, and that participants tended to score higher in the Big-5 personality dimension of agreeableness earlier in the data collection process.

We also note that our null result regarding time of day and honesty is inconsistent with prior work suggesting that people are more honest in the mornings (Kouchaki and Smith 2014). It is possible that this inconsistency results from the use of somewhat different honesty measures, or from some feature of how MTurk workers self-select into time of day for participation (e.g. their chronotype, as argued by Gunia et al. 2014). A more general point regarding our null results is that our games used instructions which were much shorter than is typical for experimental economics, which could have led to more noise; however, we did screen for comprehension of the game payoffs, and prior work with the same short instructions has successfully observed correlations between game play and various other factors (Peysakhovich et al., 2014). Finally, we note that there was some evidence of more giving in the DG and charitable donation in the night relative to the day, but these differences were only significant when not including Bonferroni correction. Future work could assess whether our null findings for these measures replicate.

Broadly, our results suggest that researchers using MTurk to explore economic behavior need not be especially concerned about running studies during the day versus the night, or on weekdays versus weekends, or even without full randomization across treatments. This frees researchers to make fuller use of MTurk's ease of recruitment, collecting participants around the clock and throughout the week – and potentially comparing treatments and studies conducted at different times (although we note that lack of full randomization always introduces the possibility of threats to causal inference and encourage researchers to randomize across all conditions). However, if participants' level of prior experience, charitable giving, reflectiveness, agreeableness, neuroticism or consciousness seem likely to impact task performance (or, more importantly, interact with treatment effects for a given study, e.g. as in Rand et al. (2014) and Chandler et al. (2015)), researchers should use full randomization across treatments and be mindful of when they launch online studies.

References

Amir, O., Rand, D. G., & Gal, Y. K. (2012). Economic Games on the Internet: The Effect of $1 Stakes. *PLoS ONE, 7*(2), e31461.

Arechar, A. A., Molleman, L., & Gachter, S. (2016). Conducting interactive experiments online. *Social Science Research Network (SSRN), 2884409*.

Aviv, A. L., Zelenski, J. M., Rallo, L., & Larsen, R. J. (2002). Who comes when: personality differences in early and later participation in a university subject pool. *Personality and Individual Differences, 33*(3), 487-496.

Berinsky, A. J., Huber, G. A., & Lenz, G. S. (2012). Evaluating Online Labor Markets for Experimental Research: Amazon.com's Mechanical Turk. *Political Analysis, 20*(3), 351-368, doi:10.1093/pan/mpr057.

Capraro, V., Jordan, J. J., & Rand, D. G. (2014). Heuristics guide the implementation of social preferences in one-shot Prisoner's Dilemma experiments. *Scientific Reports, 4*, 6790.

Casey, L. S., Chandler, J., Levine, A. S., Proctor, A., & Strolovitch, D. Z. (2016). Intertemporal Differences Among MTurk Worker Demographics. [Web]. *PsyArXiv,*.

Chandler, J., Paolacci, G., Peer, E., Mueller, P., & Ratliff, K. A. (2015). Using Nonnaive Participants Can Reduce Effect Sizes. *Psychological Science, 26*(7), 1131-1139.

Deetlefs, J., Chylinski, M., & Ortmann, A. (2015). MTurk 'Unscrubbed': Exploring the Good, the 'Super', and the Unreliabe on Amazon's Mechanical Turk. *Availabe at SSRN: http://ssrn.com/abstract=2654056*.

Frederick, S. (2005). Cognitive Reflection and Decision Making. *The Journal of Economic Perspectives, 19*(4), 25-42.

Gosling, S. D., Rentfrow, P. J., & Swann Jr, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality, 37*(6), 504-528.

Gunia, B. C., Barnes, C. M., & Sah, S. (2014). The Morality of Larks and Owls: Unethical Behavior Depends on Chronotype as Well as Time of Day. *Psychological Science, 25*(12), 2272-2274.

Horton, J. J., Rand, D. G., & Zeckhauser, R. J. (2011). The Online Laboratory: Conducting Experiments in a Real Labor Market. *Experimental Economics, 14*(3), 399-425, doi:10.1007/s10683-011-9273-9.

Kirby, K. N., Petry, N. M., & Bickel, W. K. (1999). Heroin addicts have higher discount rates for delayed rewards than non-drug-using controls. *Journal of Experimental Psychology-General, 128*(1), 78-87.

Kouchaki, M., & Smith, I. H. (2014). The Morning Morality Effect: The Influence of Time of Day on Unethical Behavior. *Psychological Science, 25*(1), 95-102, doi:10.1177/0956797613498099.

Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running Experiments on Amazon Mechanical Turk. *Judgment and Decision Making, 5*(5), 411-419.

Rand, D. G. (2012). The promise of Mechanical Turk: How online labor markets can help theorists run behavioral experiments. *Journal of Theoretical Biology, 299*, 172-179.

Rand, D. G., Peysakhovich, A., Kraft-Todd, G. T., Newman, G. E., Wurzbacher, O., Nowak, M. A., et al. (2014). Social Heuristics Shape Intuitive Cooperation. *Nature Communications, 5*, 3677.

Shenhav, A., Rand, D. G., & Greene, J. D. (2012). Divine intuition: Cognitive style influences belief in God. *Journal of Experimental Psychology: General, 141*(3), 423-428.

Stagnaro, M. N., Arechar, A. A., & Rand, D. G. (2017). From good institutions to generous citizens: Top-down incentives to cooperate promote subsequent prosociality but not norm enforcement. *Cognition*, doi:http://dx.doi.org/10.1016/j.cognition.2017.01.017.

Online Appendix

Table A1

| | Weekend commencing Friday night | | | | | | | | | Weekend commencing Saturday day | | | | | | | | |
| | Day starts at 7am | | | Day starts at 8am | | | Day starts at 9am | | | Day starts at 7am | | | Day starts at 8am | | | Day starts at 9am | | |
	Night (N)	Weekend (D)	NxD	Night (N)	Weekend (D)	NxD	Night (N)	Weekend (D)	NxD	Night (N)	Weekend (D)	NxD	Night (N)	Weekend (D)	NxD	Night (N)	Weekend (D)	NxD
Female	0.2073	0.1092	0.1297	0.2381	0.0789	0.1161	0.3809	0.0689	0.0431	0.0718	0.0052	0.7575	0.1102	0.0068	0.5411	0.1857	0.0047	0.3197
Age	0.7106	0.0673	0.5721	0.8443	0.0435	0.5232	0.7677	0.0531	0.5434	0.7368	0.0610	0.6098	0.8272	0.0517	0.4814	0.7391	0.0466	0.5887
Graduate	0.0323	0.8805	0.0877	0.0222	0.8816	0.0529	0.0570	0.9029	0.1185	0.0346	0.9385	0.1036	0.0318	0.8554	0.1097	0.0504	0.9933	0.0954
Over $35k	0.0043	0.9937	0.6005	0.0050	0.9910	0.4967	0.0811	0.8761	0.9241	0.0018	0.5372	0.2583	0.0027	0.6703	0.2649	0.0664	0.7082	0.7537
Democrat	0.9774	0.4731	0.8938	0.8893	0.5925	0.9443	0.9408	0.9940	0.7448	0.9612	0.5098	0.8508	0.8890	0.5986	0.9386	0.7214	0.5232	0.3395
God	0.3575	0.2767	0.1974	0.5304	0.2741	0.1777	0.0609	0.2787	0.3829	0.3346	0.2325	0.2411	0.5315	0.2740	0.1800	0.0589	0.2599	0.4118
Risk	0.0148	0.1185	0.0378	0.0025	0.1281	0.0455	0.0061	0.1313	0.0951	0.0321	0.3854	0.1672	0.0061	0.3948	0.1843	0.0147	0.4296	0.3425
Trust	0.3771	0.1204	0.3894	0.4663	0.1370	0.6019	0.1257	0.1934	0.8280	0.2529	0.0343	0.7747	0.3390	0.0461	0.9930	0.0680	0.0519	0.3869
Log(Exp.)	0.0000	0.0001	0.4154	0.0000	0.0001	0.4029	0.0000	0.0001	0.3575	0.0000	0.0000	0.7719	0.0000	0.0000	0.6425	0.0000	0.0000	0.6879
Log(Time)	0.0000	0.0046	0.0275	0.0000	0.0067	0.0752	0.0000	0.0086	0.0301	0.0000	0.0001	0.2570	0.0000	0.0004	0.3512	0.0000	0.0003	0.2377
Passed all	0.0917	0.0011	0.8379	0.2242	0.0012	0.6859	0.3319	0.0025	0.2947	0.0746	0.0006	0.9783	0.2017	0.0008	0.7719	0.2368	0.0005	0.5547
Usual time	0.0000	0.0000	0.4092	0.0000	0.0000	0.4877	0.0000	0.0000	0.2972	0.0000	0.0007	0.0382	0.0000	0.0011	0.0411	0.0000	0.0013	0.0210
DG	0.0863	0.8364	0.7901	0.0990	0.8545	0.5196	0.1310	0.7389	0.2825	0.0227	0.1480	0.3295	0.0293	0.1663	0.5772	0.0435	0.1398	0.9442
PD	0.2486	0.4186	0.4180	0.4063	0.4633	0.6932	0.5239	0.4345	0.8204	0.1296	0.9584	0.1195	0.2596	0.9264	0.3021	0.2824	0.8768	0.2477
CH	0.0337	0.1627	0.3386	0.0469	0.1489	0.5892	0.0434	0.0709	0.5625	0.0244	0.0925	0.5090	0.0428	0.1266	0.6526	0.0516	0.1029	0.4570
HO	0.5256	0.3181	0.1901	0.6015	0.2623	0.2460	0.5393	0.2822	0.4243	0.6573	0.1570	0.3771	0.6896	0.1630	0.3790	0.6705	0.1376	0.7028
3P	0.1765	0.4749	0.7002	0.2594	0.4639	0.6474	0.2761	0.5542	0.9881	0.2099	0.6168	0.8633	0.2843	0.5474	0.7435	0.2517	0.4749	0.8873
AP	0.2517	0.0173	0.7634	0.2721	0.0178	0.8495	0.6073	0.0205	0.8664	0.1456	0.0027	0.3512	0.1701	0.0031	0.4356	0.3996	0.0029	0.6094
CRT	0.1261	0.0002	0.7105	0.2880	0.0001	0.5600	0.5295	0.0002	0.5520	0.2231	0.0024	0.2723	0.4590	0.0025	0.1788	0.7226	0.0019	0.2083
TD	0.5160	0.4164	0.3892	0.5843	0.4323	0.2578	0.4738	0.4795	0.0929	0.7941	0.2236	0.2425	0.7572	0.2372	0.4027	0.8830	0.2037	0.7621
O	0.0060	0.5676	0.0200	0.0035	0.6013	0.0185	0.0060	0.4877	0.0568	0.0205	0.6969	0.1737	0.0133	0.6208	0.1821	0.0231	0.6937	0.4162
C	0.0006	0.6066	0.4451	0.0002	0.5708	0.5205	0.0088	0.5370	0.4705	0.0003	0.9815	0.2116	0.0001	0.8438	0.3133	0.0036	0.9506	0.1632
E	0.9034	0.8914	0.9489	0.6718	0.8233	0.7592	0.8552	0.8667	0.5405	0.8707	0.8206	0.9783	0.6898	0.8635	0.7220	0.8680	0.8861	0.5274
A	0.0902	0.9853	0.8034	0.0735	0.9071	0.8348	0.1367	0.7089	0.7454	0.0419	0.4496	0.5986	0.0271	0.3907	0.4433	0.0432	0.3955	0.1223
N	0.0005	0.2476	0.2710	0.0007	0.2812	0.2099	0.0168	0.3248	0.2605	0.0002	0.0679	0.0766	0.0003	0.0890	0.0606	0.0057	0.0715	0.0521

Table A1. Significance levels of two-way ANOVAS on each of the demographic variables of the study. Cells highlighted in light gray have a p-value of 0.05 or less; cells highlighted in dark gray have a p-value of 0.001 or less (Bonferroni corrected; 0.05/50). DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; O: Openness; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.

Table A2

	Day versus Night				Weekday versus Weekend		
	α=0.05	*α=0.007*	*α=0.0024*		*α=0.05*	*α=0.007*	*α=0.0024*
DG ($0.50)	0.032	0.040	0.044		0.030	0.038	0.042
PD ($0.40)	0.056	0.071	0.078		0.062	0.078	0.086
CH ($60)	0.027	0.034	0.037		0.030	0.037	0.041
HO ($0.50)	0.037	0.047	0.051		0.039	0.050	0.055
3P ($0.10)	0.054	0.068	0.075		0.061	0.077	0.085
AP ($0.10)	0.014	0.018	0.020		0.005	0.006	0.007
TD (2.98)	0.027	0.034	0.037		0.029	0.037	0.040

Table A2 Power analysis calculation for the incentivized tasks in the day versus night and weekday versus weekend comparisons. The default power is set to 0.80 and the level of alpha is set to three levels of conservativeness of Bonferroni correction: α=0.05, or uncorrected; α=0.007, corrected for one comparison or 0.05/7; and α=0.0024, corrected for 3 comparisons or 0.05/21. DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. Numbers in parenthesis represent the endowment available in each task.

Table A3

	DG	PD	CH	HO	3P	AP	TD
Night (N)							
Weekend (W)							
Female	0.107*						
	(0.044)						
Age	0.006**			0.012***			-0.006***
	(0.002)			(0.002)			(0.002)
Graduate							-0.288***
							(0.043)
Over $35k							
Democrat				-0.031*	0.051**		0.029*
				(0.014)	(0.016)		(0.13)
God					0.028**		
					(0.011)		
Risk			0.025**				0.025**
			(0.008)				(0.009)
Trust	0.048**	0.078***	0.060***				-0.029*
	(0.014)	(0.016)	(0.013)				(0.013)
Log(experience)	-0.097***	-0.167***	-0.108***	-0.077**	-0.090**		0.064**
	(0.023)	(0.028)	(0.023)	(0.022)	(0.027)		(0.024)
Log(time taken)	0.641***	0.546***	0.797***	0.328**			-0.276*
	(0.127)	(0.145)	(0.119)	(0.120)			(0.129)
Passed all			-0.118**				-0.118**
			(0.044)				(0.045)
Usual time		0.139*		-0.109*			
		(0.062)		(0.054)			
CRT correct	-0.049**		-0.074***			-0.060***	-0.129***
	(0.019)		(0.018)			(0.014)	(0.019)
O							
C	-0.056**	-0.067**					
	(0.017)	(0.019)					
E				-0.034**			
				(0.013)			
A	0.068***	0.007**					
	(0.019)	(0.002)					
N				-0.043**			
				(0.015)			
Constant	-2.149***	-1.590***	-2.285***	-0.614	-0.240*	-0.138***	1.114***
	(0.385)	(0.440)	(0.367)	(0.371)	(0.118)	(0.036)	(0.393)
N	1980	1623	2230	2228	1410	1410	2220
R²	0.072	0.065	0.083	0.043	0.017	0.017	0.079

Table A3 (OLS) Regression results. Stepwise forward estimation for models with demographic and personality controls. *** $p<0.001$; ** $p<0.01$; * $p<0.05$. We performed preliminary regressions with a night and weekend interaction, none of them were significant. All controls had pairwise correlations within a ±0.37 range. DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; O: Openness; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.

Table A4

	Time bin (T)	Day (D)	T x D
Female	0.1776	0.0529	0.1965
Age	0.0004	0.3852	0.6717
Graduate	0.1873	0.1709	0.3381
Over $35k	0.048	0.5024	0.6489
Democrat	0.9717	0.1157	0.9559
God	0.3152	0.2085	0.5644
Risk	0.0506	0.471	0.7739
Trust	0.1065	0.2129	0.5479
Log(Exp.)	0	0.0001	0.9659
Log(Time)	0	0.0028	0.1025
Passed all	0.3164	0	0.9026
Usual time	0	0.0021	0.0927
DG	0.0397	0.6571	0.7607
PD	0.7158	0.0735	0.6446
CH	0.0015	0.1671	0.184
HO	0.5756	0.2469	0.6672
3P	0.1632	0.5621	0.561
AP	0.6257	0.1369	0.4013
CRT	0.2738	0.0015	0.6787
TD	0.7576	0.2488	0.1313
O	0.0535	0.7414	0.6437
C	0.0009	0.6122	0.3798
E	0.5395	0.6705	0.2418
A	0.0784	0.6428	0.2371
N	0.0124	0.103	0.4529

Table A4 Significance levels of two-way ANOVAS on each of the demographics and tasks of the study. Time bin includes: *morning* (8am-2pm); *afternoon* (2pm-8pm); *evening* (8pm-2am); and *pre-dawn* (2am-8am). Day of the week includes the seven-day week (Monday-Sunday). Cells highlighted in light gray have a p-value of 0.05 or less. Cells highlighted in dark gray have a p-value of 0.001 or less (Bonferroni corrected; 0.05/50). DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; O: Openness; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.

Table A5

	Female	Age	Graduate	> $35k	Pol. Party	God	Risk	Trust	Log(Exp)	Log(Time)	Comp.	Usual
Time of day												
14:00-19:59	-0.023	-0.269	-0.010	-0.004	0.027	-0.064	0.191	0.102	-0.153**	0.010	-0.005	-0.055*
	(0.029)	(0.654)	(0.029)	(0.029)	(0.088)	(0.145)	(0.146)	(0.090)	(0.055)	(0.010)	(0.029)	(0.023)
20:00-01:59	0.022	-1.308*	-0.023	-0.056*	0.036	0.013	0.406**	0.055	-0.327***	0.040***	-0.021	-0.126***
	(0.028)	(0.637)	(0.028)	(0.028)	(0.086)	(0.142)	(0.142)	(0.087)	(0.054)	(0.010)	(0.028)	(0.022)
02:00-07:59	0.040	1.499*	-0.062*	-0.065*	0.004	0.209	0.254	-0.119	-0.288***	0.057***	-0.050	-0.137***
	(0.030)	(0.683)	(0.030)	(0.030)	(0.092)	(0.152)	(0.153)	(0.094)	(0.058)	(0.011)	(0.030)	(0.024)
Day of the week												
Tuesday	0.011	-0.103	0.090*	0.042	0.005	0.304	-0.065	0.121	0.025	0.012	0.028	0.000
	(0.039)	(0.885)	(0.039)	(0.039)	(0.119)	(0.197)	(0.197)	(0.121)	(0.075)	(0.014)	(0.039)	(0.031)
Wednesday	-0.041	0.091	0.018	-0.004	0.190	0.116	0.011	0.036	0.102	0.011	0.137***	-0.014
	(0.039)	(0.889)	(0.039)	(0.039)	(0.120)	(0.198)	(0.198)	(0.122)	(0.075)	(0.014)	(0.039)	(0.031)
Thursday	0.029	0.576	0.062	0.049	0.268*	0.011	0.067	0.196	0.041	0.011	0.066	-0.043
	(0.039)	(0.888)	(0.039)	(0.039)	(0.120)	(0.198)	(0.198)	(0.122)	(0.075)	(0.014)	(0.039)	(0.031)
Friday	0.028	-0.033	0.082*	0.060	-0.018	0.366	0.212	0.226	-0.117	0.041**	0.029	-0.070*
	(0.040)	(0.894)	(0.039)	(0.039)	(0.121)	(0.199)	(0.200)	(0.123)	(0.075)	(0.014)	(0.039)	(0.031)
Saturday	0.095*	1.729	0.034	0.031	0.046	0.396*	0.150	0.067	-0.211**	0.028*	-0.026	-0.113***
	(0.039)	(0.891)	(0.039)	(0.039)	(0.120)	(0.198)	(0.199)	(0.122)	(0.075)	(0.014)	(0.039)	(0.031)
Sunday	0.039	0.586	0.064	-0.009	0.105	0.357	0.291	-0.020	-0.162*	0.050***	-0.032	-0.066*
	(0.039)	(0.885)	(0.039)	(0.039)	(0.119)	(0.197)	(0.197)	(0.121)	(0.074)	(0.014)	(0.039)	(0.031)
Constant	0.468***	33.841***	0.425***	0.442***	4.445***	3.549***	4.465***	4.328***	2.680***	2.877***	0.499***	0.924***
	(0.033)	(0.748)	(0.033)	(0.033)	(0.101)	(0.166)	(0.167)	(0.102)	(0.063)	(0.012)	(0.033)	(0.026)
N	2336	2334	2334	2336	2336	2336	2336	2336	2313	2336	2336	2336
R²	0.008	0.010	0.006	0.006	0.005	0.006	0.006	0.006	0.032	0.025	0.013	0.029

Table A5 (OLS) Regression results of the demographics of the study. *** $p<0.001$; ** $p<0.01$; * $p<0.05$.

Table A6

	DG	PD	CH	HO	3P	AP	CRT	TD	O	C	E	A	N
Time of day													
14:00-19:59	-0.100	0.461	1.233	0.538	-0.356	0.011	0.049	0.034	-0.079	-0.078	-0.094	-0.064	0.047
	(0.789)	(1.076)	(0.816)	(0.898)	(0.273)	(0.080)	(0.069)	(0.040)	(0.073)	(0.073)	(0.095)	(0.070)	(0.086)
20:00-01:59	0.497	0.266	1.081	-0.304	-0.112	0.062	-0.007	0.004	0.113	-0.194**	0.029	-0.172*	-0.214*
	(0.771)	(1.069)	(0.794)	(0.873)	(0.266)	(0.078)	(0.067)	(0.039)	(0.071)	(0.071)	(0.092)	(0.068)	(0.084)
02:00-07:59	2.040*	1.348	3.252***	0.914	0.220	0.093	-0.093	0.034	0.009	-0.290***	-0.051	-0.090	-0.119
	(0.835)	(1.156)	(0.853)	(0.938)	(0.290)	(0.085)	(0.072)	(0.041)	(0.076)	(0.076)	(0.099)	(0.073)	(0.090)
Day of the week													
Tuesday	-0.555	0.485	-0.331	-0.097	-0.211	-0.144	-0.046	-0.098	0.028	0.035	0.037	0.098	0.083
	(1.069)	(1.478)	(1.104)	(1.215)	(0.374)	(0.109)	(0.094)	(0.054)	(0.098)	(0.099)	(0.128)	(0.095)	(0.117)
Wednesday	-0.610	-0.477	-1.795	-0.594	-0.374	-0.067	-0.006	-0.009	0.040	0.187	0.054	0.160	0.204
	(1.070)	(1.464)	(1.109)	(1.221)	(0.364)	(0.106)	(0.094)	(0.054)	(0.099)	(0.099)	(0.129)	(0.095)	(0.118)
Thursday	-0.847	-0.920	-0.549	-1.730	-0.246	-0.112	0.002	-0.016	0.094	0.175	-0.109	0.102	0.264*
	(1.071)	(1.487)	(1.108)	(1.220)	(0.369)	(0.108)	(0.094)	(0.054)	(0.099)	(0.099)	(0.129)	(0.095)	(0.117)
Friday	0.941	3.445*	0.433	0.540	0.154	-0.108	-0.124	-0.109*	0.157	0.120	0.015	0.118	0.152
	(1.082)	(1.507)	(1.115)	(1.227)	(0.382)	(0.111)	(0.095)	(0.054)	(0.099)	(0.099)	(0.129)	(0.096)	(0.118)
Saturday	-0.229	-0.136	-0.401	-0.754	0.013	0.173	-0.255**	-0.021	0.092	0.123	0.118	0.122	0.042
	(1.086)	(1.511)	(1.112)	(1.223)	(0.382)	(0.111)	(0.094)	(0.054)	(0.099)	(0.099)	(0.129)	(0.095)	(0.118)
Sunday	0.348	-0.110	1.216	1.299	-0.425	-0.052	-0.296**	-0.028	0.031	0.084	-0.068	0.057	-0.038
	(1.077)	(1.539)	(1.103)	(1.214)	(0.373)	(0.109)	(0.094)	(0.054)	(0.098)	(0.098)	(0.128)	(0.095)	(0.117)
Constant	13.641***	16.547***	10.332***	17.632***	2.537***	0.195*	1.626***	-1.906***	4.989***	5.386***	3.659***	5.235***	4.909***
	(0.906)	(1.251)	(0.933)	(1.028)	(0.314)	(0.091)	(0.079)	(0.045)	(0.083)	(0.083)	(0.108)	(0.080)	(0.099)
N	2061	1689	2336	2333	1462	1462	2336	2326	2322	2318	2324	2309	2320
R^2	0.006	0.008	0.010	0.004	0.006	0.009	0.011	0.002	0.005	0.006	0.003	0.004	0.010

Table A6 (OLS) Regression results of economic and personality tasks. *** $p<0.001$; ** $p<0.01$; * $p<0.05$. DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; O: Openness; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.

Table A7

	Female	Age	Graduate	> $35k	Pol. Party	God	Risk	Trust	Log(Exp)	Log(Time)	Comp.	Usual
Participant order	0.000**	0.000	0.000	0.000	0.000	0.000	0.000*	0.000	-0.000***	0.000**	-0.000**	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.453***	34.597***	0.445***	0.431***	4.537***	3.677***	4.550***	4.442***	2.717***	2.906***	0.563***	0.860***
	(0.021)	(0.468)	(0.021)	(0.021)	(0.063)	(0.104)	(0.104)	(0.064)	(0.039)	(0.007)	(0.021)	(0.016)
N	2336	2334	2334	2336	2336	2336	2336	2336	2313	2336	2336	2336
R^2	0.003	0.001	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.004	0.004	0.007

Table A7 (OLS) Regression results of each of the demographics included in this study. *** $p<0.001$; ** $p<0.01$; * $p<0.05$ (Bonferroni corrections at the 0.001 level; 0.05/50).

Table A8

	DG	PD	CH	HO	3P	AP	CRT	TD	O	C	E	A	N
Participant order	0.001	0.000	0.002***	0.001	0.000**	0.000	-0.000***	0.000	0.000	0.000	0.000	-0.000***	0.000
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	13.097***	17.160***	9.646***	16.706***	1.839***	0.200***	1.703***	-1.939***	5.098***	5.373***	3.602***	5.434***	5.027***
	(0.559)	(0.773)	(0.582)	(0.640)	(0.192)	(0.056)	(0.049)	(0.028)	(0.052)	(0.052)	(0.067)	(0.050)	(0.062)
N	2061	1689	2336	2333	1462	1462	2336	2326	2322	2318	2324	2309	2320
R^2	0.002	0.000	0.005	0.001	0.005	0.000	0.009	0.000	0.000	0.000	0.000	0.008	0.001

Table A8 (OLS) Regression results of economic and personality tasks. *** $p<0.001$; ** $p<0.01$; * $p<0.05$ (Bonferroni corrections at the 0.001 level; 0.05/50). DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; O: Openness; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.
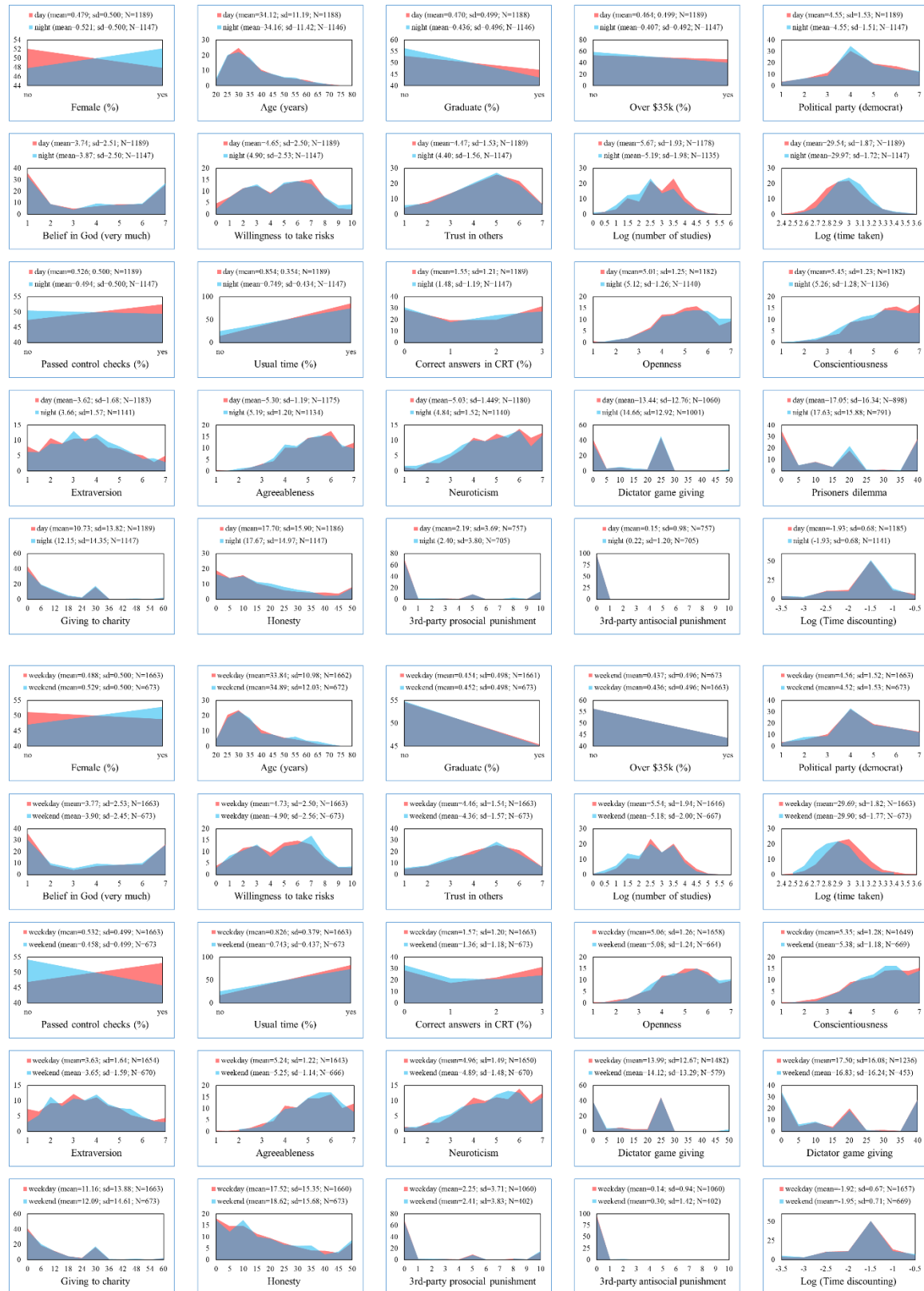
Figure A1

Figure A1 Histogram of frequencies of each of the variables studied, by day vs night, and weekday vs weekend

Figure A2

FEM

	DD	DN	ED	EN
DD				
DN	0.93			
ED	0.95	1		
EN	0.93	0.98	0.98	

AGE

	DD	DN	ED	EN
DD				
DN	0.81			
ED	0.11	0.17		
EN	0.01	0.01	0.36	

GRAD

	DD	DN	ED	EN
DD				
DN	0.97			
ED	0.91	0.89		
EN	0.76	0.78	0.72	

>$35k

	DD	DN	ED	EN
DD				
DN	0.72			
ED	0.94	0.72		
EN	0.71	0.92	0.71	

POL

	DD	DN	ED	EN
DD				
DN	0.98			
ED	0.58	0.57		
EN	0.86	0.87	0.54	

GOD

	DD	DN	ED	EN
DD				
DN	0.82			
ED	0.82	0.69		
EN	0.35	0.27	0.55	

RISK

	DD	DN	ED	EN
DD				
DN	0.68			
ED	0.53	0.76		
EN	0.28	0.16	0.15	

TRUST

	DD	DN	ED	EN
DD				
DN	0.2			
ED	0.12	0.58		
EN	0.7	0.56	0.34	

XP

	DD	DN	ED	EN
DD				
DN	0.06			
ED	0.03	0.45		
EN	0.5	0.47	0.22	

TIME

	DD	DN	ED	EN
DD				
DN	0.02			
ED	0.33	0.38		
EN	0.03	0.71	0.3	

PASS

	DD	DN	ED	EN
DD				
DN	0.89			
ED	0.93	0.99		
EN	0.98	0.94	0.96	

USUAL

	DD	DN	ED	EN
DD				
DN	0			
ED	0	0.59		
EN	0	0.06	0.04	

DG

	DD	DN	ED	EN
DD				
DN	0.96			
ED	0.51	0.54		
EN	0.15	0.16	0.5	

PD

	DD	DN	ED	EN
DD				
DN	0.19			
ED	0.57	0.68		
EN	0.91	0.29	0.58	

CH

	DD	DN	ED	EN
DD				
DN	0.28			
ED	0.25	0.75		
EN	0.04	0.23	0.45	

HO

	DD	DN	ED	EN
DD				
DN	0.15			
ED	0.43	0.06		
EN	0.32	0.93	0.14	

3P

	DD	DN	ED	EN
DD				
DN	0.58			
ED	0.67	0.99		
EN	0.27	0.5	0.57	

AP

	DD	DN	ED	EN
DD				
DN	0			
ED	0	0		
EN	0	0	0.01	

CRT

	DD	DN	ED	EN
DD				
DN	0.89			
ED	0.93	0.98		
EN	0.35	0.41	0.47	

TD

	DD	DN	ED	EN
DD				
DN	0.3			
ED	0.88	0.52		
EN	0.1	0.02	0.14	

O

	DD	DN	ED	EN
DD				
DN	0.99			
ED	0.43	0.43		
EN	0.86	0.85	0.62	

C

	DD	DN	ED	EN
DD				
DN	0.44			
ED	0.02	0		
EN	0.53	0.23	0.14	

E

	DD	DN	ED	EN
DD				
DN	0.03			
ED	0.31	0.55		
EN	0.09	0.92	0.56	

A

	DD	DN	ED	EN
DD				
DN	0.99			
ED	0.12	0.12		
EN	0.23	0.24	0.77	

N

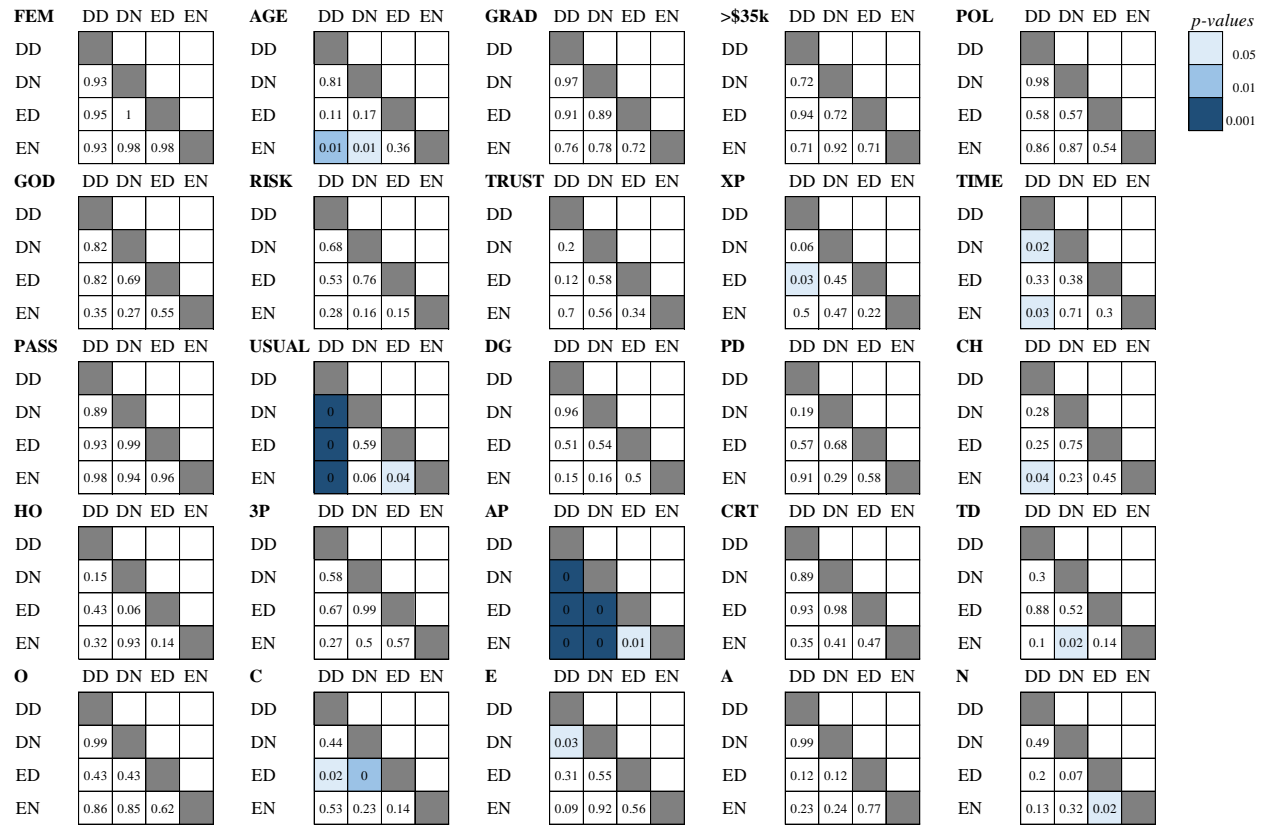|	DD	DN	ED	EN
DD				
DN	0.49			
ED	0.2	0.07		
EN	0.13	0.32	0.02	

p-values
0.05
0.01
0.001

Figure A2 Variance-comparison tests between nights and weekends; p-values reported. DD: Weekday day; DN: Weekday night; ED: Weekend day; EN: Weekend night. DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; O: Openness; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism.
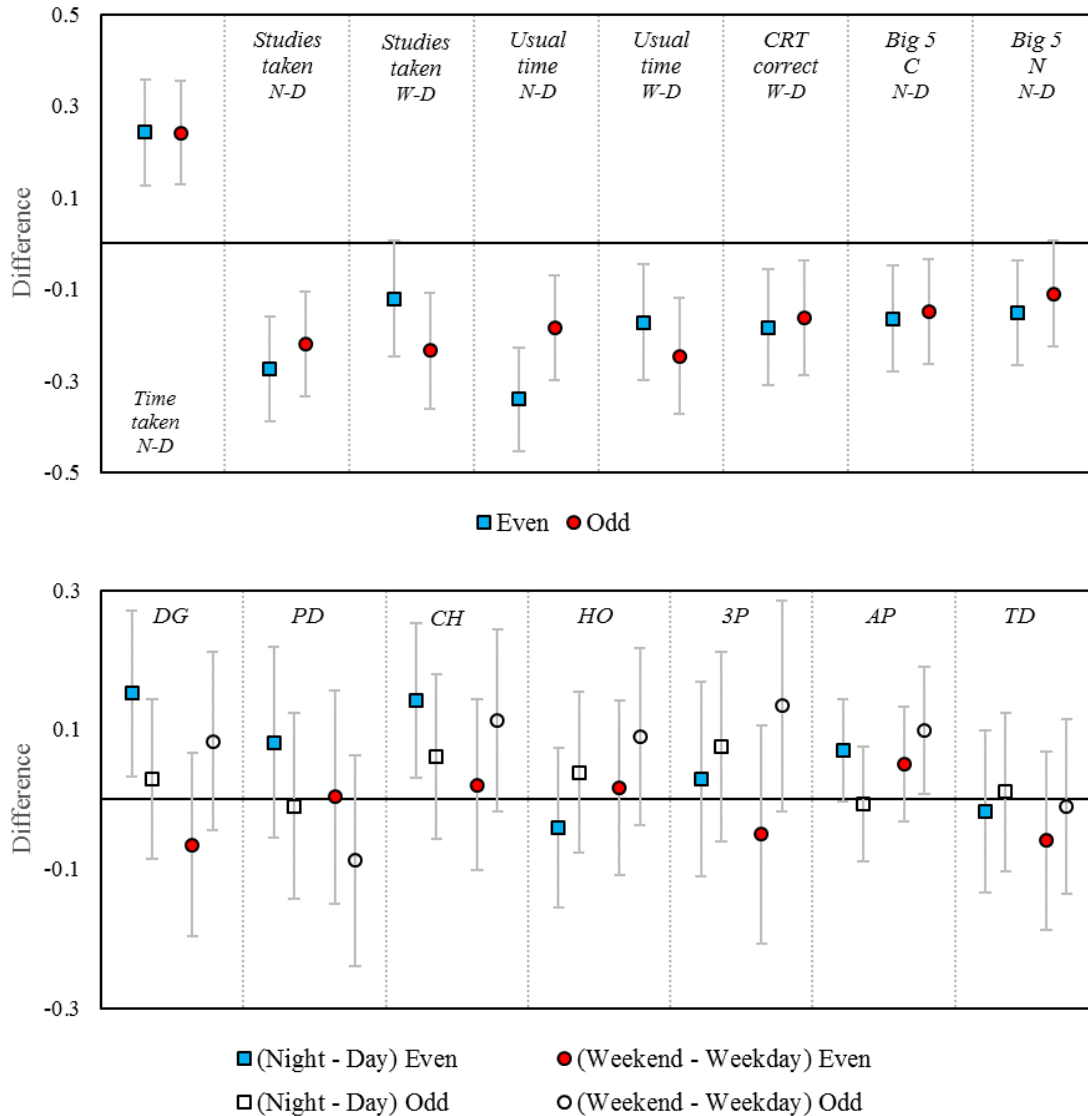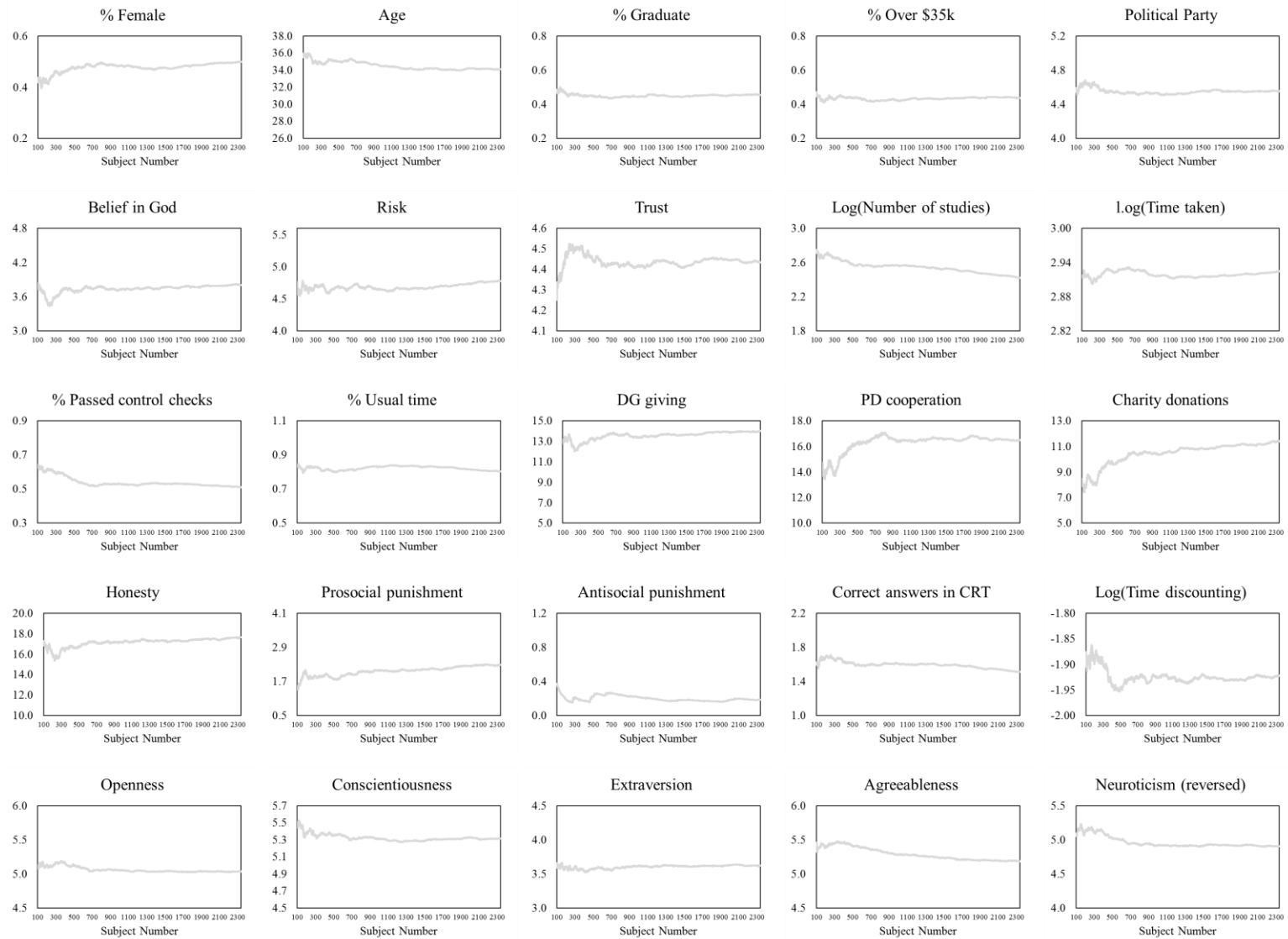
Figure A3

Figure A3 Differences in demographics, economic game behavior, and personality traits, by order of participation (even/odd); 95% confidence intervals reported. Variables standardized to ensure equivalent distributions; positive values in the figure indicate higher values of the dependent variable during the day *vs.* the night, and weekday *vs.* weekend. DG: Dictator Game; PD: Prisoner's dilemma; CH: Charity task; HO: Honesty task; 3P: (Prosocial) Third-party punishment; AP: (Antisocial) Third-party punishment; TD: (log) Time discounting task. CRT: Cognitive reflective task; C: Conscientiousness; N: Neuroticism.

Figure A4

Figure A4 Cumulative average of each of the demographics and tasks of this study, by the chronological order of participation.

Experimental Instructions

Breaks between pages shown as long lines.

To begin, please enter your Amazon Mechanical Turk Worker ID here:
(Please see below for where you can find your Worker ID.)
Your Worker ID starts with the letter A and has 12-14 letters or numbers. It is NOT your email address. If we do not have your correct Worker ID we will not be able to pay you.

Note that your Worker ID can be found on your dashboard page:
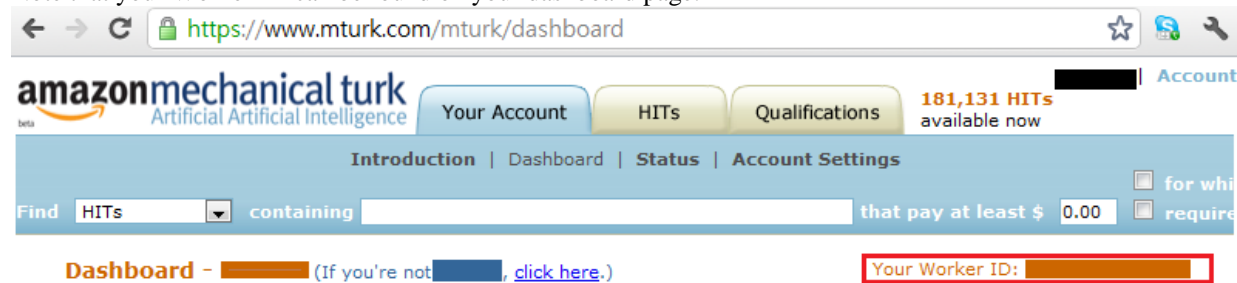
This experiment consists of several sections. In each section you will be called to make one or more decisions.
We don't want what happens in one section to affect your decisions in another. So at the end of the study we will randomly choose one section and use its outcomes to determine your bonus payment.
Thus, because only one interaction will count, but you don't know which one it will be, you should treat each decision as if it is the only one that matters for your final payoff.
When you are ready for the first section, press >> to continue.

New Section
In this section, you will play in a three-person game. You have been randomly assigned to interact with two other MTurk workers. You will be Player 3. The other people will be Players 1 and 2. All three of you receive this same set of instructions. You cannot participate in this interaction again: you can only play this game once.
In addition to the payment you each receive for participating in this HIT, you can earn more as a bonus, as follows:
In Stage 1:
• Player 1 is given 50 cents.
• Player 1 decides how many of the 50 cents to share with Player 2. Player 1 can share either 0 or 25 cents.
• Player 3 receives 50 cents (no matter what Player 1 chooses).
In Stage 2:
• Player 3 can then spend up to 10 cents to reduce Player 1's bonus. For every cent Player 3 spends, Player 1 loses 3 cents.
Player 1's total bonus is therefore the money Player 1 keeps minus the money Player 3 causes Player 1 to lose.
Player 2's total bonus is therefore the money Player 1 transfers to Player 2.
Player 3's total bonus is therefore 50 cents minus the money Player 3 spends on reducing Player 1's bonus.

Please answer the following questions, to make sure you understand the game. <u>You MUST answer ALL questions correctly to receive your bonus!</u>

Imagine that Player 1 is deciding whether or not to share with Player 2.
If Player 3 does not decide to reduce Player 1's bonus, which decision will result in Player 1 earning the highest payoff?
○   Player 1 deciding to share
○   Player 1 deciding NOT to share
○   Neither - Player 1's payoff is not influenced by this decision

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Imagine that Player 1 is deciding whether or not to share with Player 2.   Which decision will result in Player 2 earning the highest payoff?
❍   Player 1 deciding to share
❍   Player 1 deciding NOT to share
❍   Neither - Player 2's payoff is not influenced by this decision

Imagine that Player 3 is deciding whether or not to reduce Player 1's bonus.   Which decision will result in Player 1 earning the highest payoff?
❍   Player 3 deciding to reduce Player 1's bonus
❍   Player 3 deciding NOT to reduce Player 1's bonus
❍   Neither - Player 1's payoff is not influenced by your decision
❍
Imagine that Player 3 is deciding whether or not to reduce Player 1's bonus.   Which decision will result in Player 3 earning the highest payoff?
❍   Player 3 deciding to reduce Player 1's bonus
❍   Player 3 deciding NOT to reduce Player 1's bonus
❍   Neither - your payoff is not influenced by your decision

The game is now in Stage 2. As Player 3, you have received 50 cents. You now have the option to spend up to 10 cents to reduce Player 1's total bonus.
Remember, for every 1 cent you spend, Player 1 loses 3 cents.
You can base your decision on Player 1's choice in Stage 1.
How many of your 50 cents (if any) would you like to spend on reducing Player 1's bonus if…

	0 cents	1 cent	2 cents	3 cents	4 cents	5 cents	6 cents	7 cents	8 cents	9 cents	10 cents
Player 1 chose to keep 50 cents and give 0 cents to Player 2?	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Player 1 chose to keep 25 cents and give 25 cents to Player 2?	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

The choice that you make on this page will determine how much bonus you and Player 1 actually receive.
Once the HIT is over, we will calculate bonuses and you will be told what Player 1 chose in Stage 1.
We will see how much you wanted to spend to reduce Player 1's bonus given Player 1's actual choice. Then, we will reduce Player 1's bonus based on that decision. We will also determine your bonus based on that decision.

New Section
In this section one participant selected randomly from this study can earn $60.
How much of this $60 bonus you would like to donate to Oxfam if you win it?
(Oxfam is a non-governmental organization that focuses on hunger, poverty, and similar global issues. You will keep the money that you do not donate.)
❍ $0
❍ $6
❍ $12
❍ $18
❍ $24
❍ $30
❍ $36
❍ $42
❍ $48
❍ $54
❍ $60

New Section

In this section you are matched with one other brand new person.

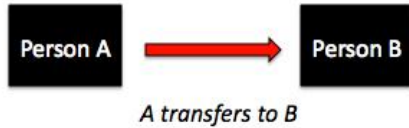One of you will be person A, one of you will be person B.

Person A starts with 50 cents and person B starts with 0.

This interaction has one single decision:

1) Person A will choose how many of the 50 cents to transfer to person B

Person B will get the number of points A transfers and A will get to keep the rest.

The graphic below shows a summary of the interaction:

A transfers to B

You MUST answer these questions correctly to receive your bonus! For person A, what transfer maximizes person B's payoff?

○ 0
○ 10
○ 20
○ 30
○ 40
○ 50
○ All transfer levels earn the same amount

For person A, what transfer maximizes person A's payoff?

○ 0
○ 10
○ 20
○ 30
○ 40
○ 50
○ All transfer levels earn the same amount

Person A

If you are person A in the interaction, how much will you transfer to person B?

○ 0
○ 5
○ 10
○ 15
○ 20
○ 25
○ 30
○ 35
○ 40
○ 45
○ 50

New Section

In this task, your pay will be determined by whether you correctly guess a randomly drawn number between 1 and 20. Please read the instructions.

On the next page, you will see a randomly generated number between 1 and 20. Before seeing the number, you will be asked to guess the number you are about to see (a number between 1-20). After seeing the number, you will report whether your guess was correct or incorrect.

Your bonus for this task will be paid as follows:

-- If your guess is correct, you will earn $0.50

-- For every number by which you are off, you will earn $0.05 less

-- If you are off by 10 or more numbers, you will earn $0.00

For Example:

The random number is 5.

If you would guess 6, you would earn $0.45.

If you would guess 1, you would earn $0.30.

If you would guess 15, you would earn $0.00.

Please guess which number between 1 and 20 you are about to see.

When you have made a guess, go to the next page.

The number is **XX**.
○ I guessed CORRECTLY $0.50
○ I was off by 1 $0.45
○ I was off by 2 $0.40
○ I was off by 3 $0.35
○ I was off by 4 $0.30
○ I was off by 5 $0.25
○ I was off by 6 $0.20
○ I was off by 7 $0.15
○ I was off by 8 $0.10
○ I was off by 9 $0.05
○ I was off by 10 or more $0.00

New Section

You have been randomly assigned to interact with another MTurk worker. Both of you receive this same set of instructions. You cannot participate in this study more than once.

Both of you are given 40 cents for this interaction. You each decide how much of your 40 cents to keep for yourself, and how much (if any) to give to the other person.

Any money you give to the other person will be doubled. Thus, for every 1 cent you give to the other person, he or she will receive 2 cents.

If both of you choose to give away all of your 40 cents, each of you will double your money: each of you will earn 80 cents.

But if the other person sends all of his or her 40 cents to you, while you keep all of your 40 cents for yourself, you will earn 120 cents, while the other person will earn 0 cents.

No matter what the other person chooses, you earn the most by keeping all of your money.

The other person is REAL and will really make a decision – there is no deception in this study.

Once you and the other person have chosen how much to give, the interaction is over.

You MUST answer these questions correctly to receive your bonus!   How many cents would you give to the other person in order to maximize the other person's earnings?
○   0
○   10
○   20
○   30
○   40

How many cents would you give to the other person in order to maximize your own earnings?
- ○ 0
- ○ 10
- ○ 20
- ○ 30
- ○ 40

Please choose how many cents you will send to the other person:

_____

New Section

In this section one participant selected randomly from this study can earn up to $60. Please read the following paragraphs carefully.

For each of the following 10 questions you decide whether you prefer to be paid a certain amount today or a larger amount later. You must select one option for each question.

At the end of the study one participant and one question will be selected randomly. The winner will receive the associated bonus according to the choice made.

Please answer the questions quickly and honestly.

1. Would you rather have
- ○ $54 Today
- ○ $55 in 117 Days

2. Would you rather have
- ○ $47 Today
- ○ $50 in 160 Days

3. Would you rather have
- ○ $25 Today
- ○ $60 in 14 Days

4. Would you rather have
- ○ $40 Today
- ○ $55 in 62 Days

5. Would you rather have
- ○ $27 Today
- ○ $50 in 21 Days

6. Would you rather have
- ○ $49 Today
- ○ $60 in 89 Days

7. Would you rather have
- ○ $34 Today
- ○ $50 in 30 Days

8. Would you rather have
- ○ $54 Today
- ○ $60 in 111 Days

9. Would you rather have
- ○ $20 Today
- ○ $55 in 7 Days

Here are a number of personality traits that may or may not apply to you. Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.
I see myself as:

Extraverted, enthusiastic.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Critical, quarrelsome.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Dependable, self-disciplined.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Anxious, easily upset.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Open to new experiences, complex.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Reserved, quiet.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Sympathetic, warm.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Disorganized, careless.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Calm, emotionally stable.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

Conventional, uncreative.
- ❍ 1 - Disagree strongly
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Agree strongly

In this section you will be asked three questions. Please do your best to answer as accurately as possible.

The ages of Mark and Adam add up to 28 years total. Mark is 20 years older than Adam. How many years old is Adam?

If it takes 10 second for 10 printers to print out 10 pages of paper, how many seconds will it take 50 printers to print out 50 pages of paper?

On a loaf of bread, there is a patch of mold. Every day, the patch doubles in size. If it takes 40 days for the patch to cover the entire loaf of bread, how many days would it take for the patch to cover half of the loaf of bread?

What is your age?

Gender?
- ❍ Male
- ❍ Female

Highest level of education completed:
- ❍ Less than a high school degree
- ❍ High School Diploma
- ❍ Vocational Training
- ❍ Attended College
- ❍ Bachelor's Degree
- ❍ Graduate Degree
- ❍ Unknown

Please choose the category that describes the total amount of income you earned in 2013. Consider all forms of income, including salaries, tips, interest and dividend payments, scholarship support, student loans, parental support, social security, alimony, and child support, and others.
- ❍ Under $5,000
- ❍ $5,000-$10,000
- ❍ $10,001-$15,000
- ❍ $15,001-$25,000
- ❍ $25,001-$35,000
- ❍ $35,001-$50,000
- ❍ $50,001-$65,000
- ❍ $65,001-$80,000
- ❍ $80,001-$100,000
- ❍ Over $100,000

How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoidtaking risks?
- ❍ 0 - Not at all willing to take risks
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7
- ❍ 8
- ❍ 9
- ❍ 10 - Very willing to take risks

To what extent do you feel you can trust other people that you interact with in your daily life?
- ❍ 1 - Very little
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Very much

I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.
- ❍ 1 - Very untrue
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5 - Very true

I trust my initial feelings about people.
- ○ 1 - Very untrue
- ○ 2
- ○ 3
- ○ 4
- ○ 5 - Very true

Which US political party do you identify with more strongly?
- ○ 1-Strongly Republican
- ○ 2
- ○ 3
- ○ 4-Neutral
- ○ 5
- ○ 6
- ○ 7-Strongly Democrat

How strongly do you believe in the existence of a God or Gods?
- ○ 1 - Very little
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7 - Very much

In the text box below, please describe why you made the decisions that you did in this study.

Please indicate your current degree of emotion, meaning such characteristics as how pleasant or unpleasant you feel.
- ○ 1: extremely sad
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7
- ○ 8
- ○ 9: extremely happy

Politically, how conservative are you in terms of social issues
- ○ 1 - Very liberal
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6 - Very conservative

Politically, how conservative are you in terms of fiscal issues
- ○ 1 - Very liberal
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6 - Very conservative

When you fly, which type of seat do you prefer?
- ❍ Aisle
- ❍ Window
- ❍ Middle
- ❍ Don't have a preference
- ❍ Don't fly

Do you usually work on HITs at this time of the day?
- ❍ Yes
- ❍ No

Do you smoke?
- ❍ No
- ❍ Yes

What is your marital status?
- ❍ Single, never married
- ❍ Married or domestic partnership
- ❍ Widowed
- ❍ Divorced
- ❍ Separated

Are you currently...?
- ❍ Employed for wages
- ❍ Self-employed
- ❍ Out of work and looking for work
- ❍ Out of work but not currently looking for work
- ❍ A homemaker
- ❍ A student
- ❍ Military
- ❍ Retired
- ❍ Unable to work

About how many surveys/studies have you participated in on MTurk before?

About how many surveys/studies have you participated with us (online research studies)?

Please let us know how much you have participated in the following types of HITs on Amazon Mechanical Turk:

	Never	Rarely	Sometimes	Often	All of the Time
Transcribe audio or video	❍	❍	❍	❍	❍
Review text or video	❍	❍	❍	❍	❍
Answer survey questions	❍	❍	❍	❍	❍
Divide money between yourself and others	❍	❍	❍	❍	❍
Edit text (e.g. for English as a 2nd language writers)	❍	❍	❍	❍	❍
Find contact info (e.g. phone number, address, etc.)	❍	❍	❍	❍	❍
Website content review	❍	❍	❍	❍	❍
Write an essay	❍	❍	❍	❍	❍

To what extent have you previously participated in other studies like to this one (i.e. that involve the dividing up of money)?

○ 1 - Nothing like this scenario
○ 2
○ 3 - Something like this scenario
○ 4
○ 5 - Exactly this scenario

Unlike some other requesters on Mechanical Turk, we never use deception in our studies. Your actions and the actions of others in the study really did affect the bonuses that other individuals will earn. For our own records, to what extent did you believe that the other people were real when making your decision?

○ 1 - Very skeptical that others were real
○ 2
○ 3
○ 4
○ 5
○ 6
○ 7 - Very confident that others were real