Behavioral Changes of MTurkers During the COVID-19 Pandemic *

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Abstract

We study the economic behaviors and demographics of Amazon Mechanical Turk (MTurk) workers during the COVID-19 pandemic, and compare it to a pre-pandemic MTurker sample, a student sample, and a representative sample of the United States. We find that MTurkers during the pandemic behave differently than previous MTurkers in many contexts, even after accounting for changes in demographic composition. These MTurkers behave more similarly to a pre-pandemic representative sample than a student sample. Additionally, we revisit gender differences in preferences and document fewer and smaller differences in many contexts. These results help contextualize online research conducted during the pandemic.

JEL Codes: C90, D90, D91
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1 Introduction

The COVID-19 pandemic has not only catastrophically affected global health and economic well-being, but also challenged experimental social scientists to find creative ways to pursue their research. While online experiments had been gaining popularity among economists and other social scientists before the pandemic, this accelerated in 2020 due to preventive public health measures prompting the closure of nearly all in-person experimental economics laboratories. Given the increased popularity of online experiments during the pandemic, it is important to have an in-depth understanding of the online samples used during the pandemic and how they compare to previous samples. This would help us understand how to compare research conducted during the COVID-19 pandemic to previously existing research.

In this paper, we evaluate the overall economic behavior of workers on Amazon's Mechanical Turk (MTurkers) during the pandemic. We ask: are average behaviors of MTurkers different during the pandemic relative to those of a sample collected pre-COVID? If so, can this be accounted for by potential changes in demographics? And, how do MTurkers' behaviors compare to a student and a U.S. representative sample? In order to study these questions, we use Snowberg and Yariv (2021) as a benchmark and repeat their experiment on MTurk during the COVID-19 pandemic in late 2020. By comparing the behavior of our MTurk sample, which was collected during the pandemic, to pre-pandemic MTurk, student, and representative samples of Snowberg and Yariv (2021), we explore the economic preferences of MTurkers during the pandemic.

While, online platforms such as Amazon's Mechanical Turk and Prolific provide a convenient and easy recruitment method with a more representative sample than a lab experiment (e.g., Goodman et al., 2013; Paolacci et al., 2010), [1] the validity of online experiments has been a central question (e.g., Exadaktylos et al., 2013; Horton et al., 2011; Hergueux and Jacquemet, 2015; Snowberg and Yariv, 2021). However, there are reasons to believe

[1] While Mechanical Turk and Prolific are the most popular platforms for running online experiments, they are not alone. For example, Takahashi and Tanaka (2021) use the "iResearch" platform to investigate punishment behavior with respect to firms that breach COVID-19 restrictions in Japan.

that experimental data collected online *during* the pandemic may differ from that collected *prior to it*. This could happen through two main channels: First, COVID-19 and the accompanying economic recession may have directly influenced the *economic preferences* of individuals. Indeed, there is evidence to suggest that public health crises, fear of a pandemic, military conflict, natural disasters, and other economic and environmental shocks can change and shape the development of economic preferences (e.g., Callen, 2015; Chuang and Schechter, 2015; Fisman et al., 2015; Aksoy and Palma, 2019; Jakiela and Ozier, 2019; Alsharawy et al., 2021). Second, the measured behaviors might have also changed through changes to *demographics* in convenience samples from online worker platforms.[2] The pandemic and associated response measures (such as social distancing guidelines and stay-at-home orders) could have resulted in, for example, i) newly unemployed people registering for online recruitment platforms as a means of alternative employment and ii) employed people using extra time at home to do the same. This potential change in the demographic composition of MTurk workers may also have indirectly influenced the overall observed behavior. Hence it is important to study both the changes in economic behaviors of online workers and the changes in demographics of online worker platforms during the pandemic to a pre-pandemic benchmark.

We find that MTurkers' overall behaviors are different during the COVID-19 pandemic. We also document significant shifts in the demographic characteristics of MTurkers. Even controlling for these demographic differences, we find that MTurkers during the pandemic behave considerably differently, on average, than previous MTurkers in many contexts (e.g. social preferences, time preferences, lying behavior). Moreover, by comparing our MTurk data collected during the pandemic to the pre-pandemic non-MTurk samples of Snowberg and Yariv (2021), we find that the MTurk sample during the pandemic is more often similar to the pre-pandemic representative sample of the United States than to a student sample.

Additionally, women are impacted disproportionately by the pandemic. Although the research on the impacts of COVID-19 on women and their economic well-being has been

[2]Indeed, Arechar and Rand (2021) document that the demographics in online worker platforms changed immediately following pandemic restrictions between March and July 2020.

unfolding in real time, the Center for Global Development has released a series of working papers documenting the gendered dimensions of the COVID-19 crisis. One of these series is by O'Donnell et al. (2021) and they discuss, among other topics, how unpaid care work, which is mostly provided by women, has increased since the onset of the pandemic. They also examine the asymmetric impact of the pandemic on the paid work of women. Additionally, Deryugina et al. (2021) provide further evidence of this asymmetric impact by studying how female academics in economics are impacted disproportionately by the pandemic. Therefore, we revisit gender differences in several key preference domains (e.g. social preferences, risk preferences) that have been extensively documented previously. We find that MTurkers during the pandemic exhibit fewer (and smaller) gender differences in nearly every behavioral domain relative to pre-pandemic MTurkers.

All in all, our results suggest that researchers should be cognizant of both demographics and preference shifts of the MTurkers during the pandemic when comparing findings to pre-pandemic research. However, we also find promising results for the external validity of MTurk experiments during the pandemic. Finally, our findings on gender differences provide important guidance to researchers who investigate gender differences in economic behavior during the pandemic. Future research could investigate whether our findings of little to no gender differences persist even after the pandemic and/or whether this finding extends beyond the domains explored in this paper.

2 Experimental Design and Procedures

The subjects participated in a battery of games which were standard tasks for eliciting risk preferences, time preferences, social preferences, truthfulness, cognitive ability and competitiveness. Table 1 provides a list of these tasks along with their short descriptions.[3] Since

[3]We also measured subjects' implicit gender and racial biases using Implicit Association Tests (Greenwald et al., 1998). We observe large and significant differences in these biases (measured by IAT scores) when we compare our data to Snowberg and Yariv (2021). However, one should be cautious when interpreting these scores. IAT scores rely on response times which could be impacted by various factors. First, they could be impacted by individuals' implicit biases toward the group of interest. However, they could also be

Table 1: Description of Tasks

Preference	Task	Description	Variable (x)	Interpretation (higher x:)
Risk Preference	Risky Project	Gneezy and Potters (1997) task, investing between a safe and a risky option	Amount invested in risky project	More risk-seeking
	Risky Urns	Choosing between a lottery and a sure amount from a multiple price list	Sure amount at switch point	More risk-seeking
	Qualitative Risk	Self-perceived risk-preference on a scale of 0 to 10 as in Dohmen et al. (2011)	Willingness to take risks	More risk-seeking
Time Preference	Time	Choosing amount needed to have a 30 day delay in payment	Delta	More patient
Social Preference	Dictator	Dictator game	Amount allocated to opponent	Less selfish
	Prisoner's Dilemma	Prisoner's dilemma game	Frequency of dominant strategy play	Less cooperative
Lying Preference	Coin Flip	Self-reported number of times Heads flipped	Number of Heads	More lying
	Coin Switch	Self-reported number of times the coin outcome changed	Number of switches	More lying
Cognitive Ability	Raven's Matrices	Raven (1936) test used to measure abstract reasoning	Number of correct answers	Higher cognitive ability
	Cognitive Reflection Test (CRT)	Frederick (2005), measures ability to suppress an intuitive incorrect response	Number of correct answers	Higher cognitive ability
Confidence in Guesses	Jellybean Counting	Self-confidence on the over-precision task of Ortoleva and Snowberg (2015)	Confidence level on a scale of 1 to 6	Higher confidence
Competition Preferences	Summing Two-Digit Numbers	Niederle and Vesterlund (2007) task	1 if chosen payment scheme is competition, 0 if piece-rate	More competitive

our goal is to compare the behavior of MTurkers during the pandemic to pre-pandemic samples of Snowberg and Yariv (2021), we followed their exact experimental design, protocol, and instructions. We made a minor change to the Snowberg and Yariv (2021) instructions and added attention check questions.[4] Our instructions can be found in Appendix C.

impacted by other technical factors such as the speed of internet and the servers or the number of subjects simultaneously participating in a session. Since we cannot control for potential differences in these technical factors across the two data sets, we choose to exclude the IAT scores from the analysis.

[4]There were three attention check questions in the experiment. Subjects needed to complete at least two of the attention check questions in order to satisfy the attention check requirement. Subjects who failed to answer two or more attention checks correctly only received $1 for completing the study. These subjects correspond to 12% of our subject pool. Snowberg and Yariv (2021) did not include any attention checks in their original MTurk sample (which we use in this paper). It is important to note that they include attention checks in their second round of data collection with MTurkers and they do not see any significant difference when they include or exclude those who failed the checks. Similar to Snowberg and Yariv (2021), we do not

The experiment was coded in oTree (Chen et al., 2016) and conducted online. In November - December 2020, we recruited 1,000 participants from Amazon's Mechanical Turk (MTurk) U.S. subject pool. MTurkers with an acceptance rate of at least 90% were invited to participate. None of the subjects participated in the experiment more than once. In the experiment, we used tokens (600 tokens = $1). Average completion time was about 49 minutes and average earnings of those who passed the attention check requirement was $4.40, including the $1 completion fee.[5] Throughout this paper, *During-COVID MTurkers* is used to refer to our sample and *Pre-COVID MTurkers* is used to refer to the Snowberg and Yariv (2021) MTurk sample.

3 Results

In order to address our research questions, first in Section 3.1, we investigate i) how aggregate MTurker behavior during the COVID-19 pandemic differs relative to that of pre-pandemic MTurkers and ii) whether the MTurk demographic profile during the pandemic can account for these differences. Then, in Section 3.2, we study whether the MTurk sample during the pandemic moves closer to a previous student sample or a previous representative sample of the United States in terms of their behavior. Finally, in Section 3.3 , we also study the extent to which the MTurk sample during the COVID-19 pandemic replicates previously documented gender differences in several important behavioral dimensions (e.g. risk preferences).

restrict our data based on these attention checks and our results are also similar if we restrict the subject pool to those who passed the attention check requirement.

[5] In the original MTurk sample of Snowberg and Yariv (2021), the average payment was $10.26. As the authors also state, this is high relative to those commonly used on MTurk, which ranges between $1-$5 per hour. For this reason, Snowberg and Yariv (2021) conducted a robustness check in which conversion rate between tokens and money was reduced by half. They found that the results were nearly identical for regular and half-pay samples. In light of their robustness check, we use their low incentives which is also consistent with the usual hourly payment on MTurk.

3.1 Do MTurkers behave differently during the COVID-19 Pandemic?

In this section, we study the behavioral and demographic differences between MTurkers during the COVID-19 pandemic (*During-COVID*) and the pre-pandemic MTurkers of Snowberg and Yariv (2021) (*Pre-COVID*). We find that MTurkers' overall behavior shifted. We also document significant differences in the demographic characteristics of MTurkers. Even after controlling for these demographic differences, we still see that MTurkers during the pandemic behave considerably differently than previous MTurkers in many contexts (e.g. social preferences, lying behavior).

Differences in Behavior:

First we compare our During-COVID MTurk sample to the Pre-COVID MTurk sample of Snowberg and Yariv (2021), where we investigate behavioral differences between the two in the aggregate without any demographic controls. The first two columns of Table 2 report the average behavior for a given measure for the two samples.[6] The third column reports the coefficients for a *During-COVID* dummy variable from OLS regression specifications without any demographic controls. First, During-COVID MTurkers are considerably more pro-social than previous MTurkers, giving more, on average, in the Dictator Game. This finding is in line with Alsharawy et al. (2021) where the authors report an increased altruistic behavior among MTurkers as the fear of the pandemic increases. During-COVID MTurkers are also more cooperative, playing the dominant strategy in the Prisoner's Dilemma game less frequently than previous MTurkers. They lie more frequently, but are less reflective (as measured by their CRT scores). We do not see a significant difference in competition across two samples.

Measures of risk preferences are considerably muddier: During-COVID MTurkers are more risk seeking according to the incentivized Gneezy and Potters (1997) elicitation method as well as the unincentivized Dohmen et al. (2011) survey measure.However, they seem to

[6]For brevity, we selected a subset of the games used in the experiment and only present data from this subset in the main text of our paper. However, we also report our findings using the full list of measures in Appendices A and B . The full set of comparisons of Table 2 using all measures are reported in Table A.1.

Table 2: Pre-COVID vs During-COVID MTurk Sample Comparisons

	During-COVID MTurk (1)	Pre-COVID MTurk (2)	Difference: No Controls (3)	Difference: With Controls (4)
First Risky Project	51	44	7.5***	2.7*
(out of 100)	(0.99)	(0.85)	(1.3)	(1.5)
First Risky Urn	49	56	-7.3***	-6.7***
(20 balls)	(0.61)	(0.63)	(0.88)	(1.0)
Qualitative Risk Aversion	7.0	4.9	2.1***	1.6***
	(0.08)	(0.08)	(0.12)	(0.13)
First Dictator Game	38	26	13***	11***
(given out of 100)	(0.64)	(0.71)	(0.95)	(1.1)
Prisoner's Dilemma	48	57	-9.4***	-8.3***
(% dominant strat.)	(1.2)	(1.3)	(1.8)	(2.1)
Reported Heads	3.6	3.0	0.6***	0.4***
(out of 5)	(0.03)	(0.03)	(0.05)	(0.05)
CRT	0.8	1.4	-0.5***	-0.4***
(out of 3)	(0.03)	(0.04)	(0.05)	(0.06)
Competition	32	29	2.9	1.1
(% competing)	(1.5)	(1.4)	(2.1)	(2.4)
N	1,000	995		

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021). Differences between samples are presented in columns (3) and (4) without any controls and with demographic controls, respectively. Control variables are gender, age, white (dummy variable equal to 1 if white and 0 otherwise), education (categorical variable for 5 different levels of education reported in Table 3), marital status (dummy variable equal to 1 if partnered and 0 otherwise), employment (dummy variable equal to 1 if employed and 0 otherwise), and income (categorical variable for 6 different levels of income reported in Table 3).
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

be *less* risk seeking (i.e. their certainty equivalents for risky urns are lower) according to the incentivized multiple price list risk elicitation method. The fact that these disparate measures of risk move in different directions between the two samples is not entirely surprising, given the body of literature on inconsistencies across risk elicitation tasks (see, e.g., Dave et al., 2010; Crosetto and Filippin, 2016; Holzmeister and Stefan, 2020).

Correlations Between Measures:

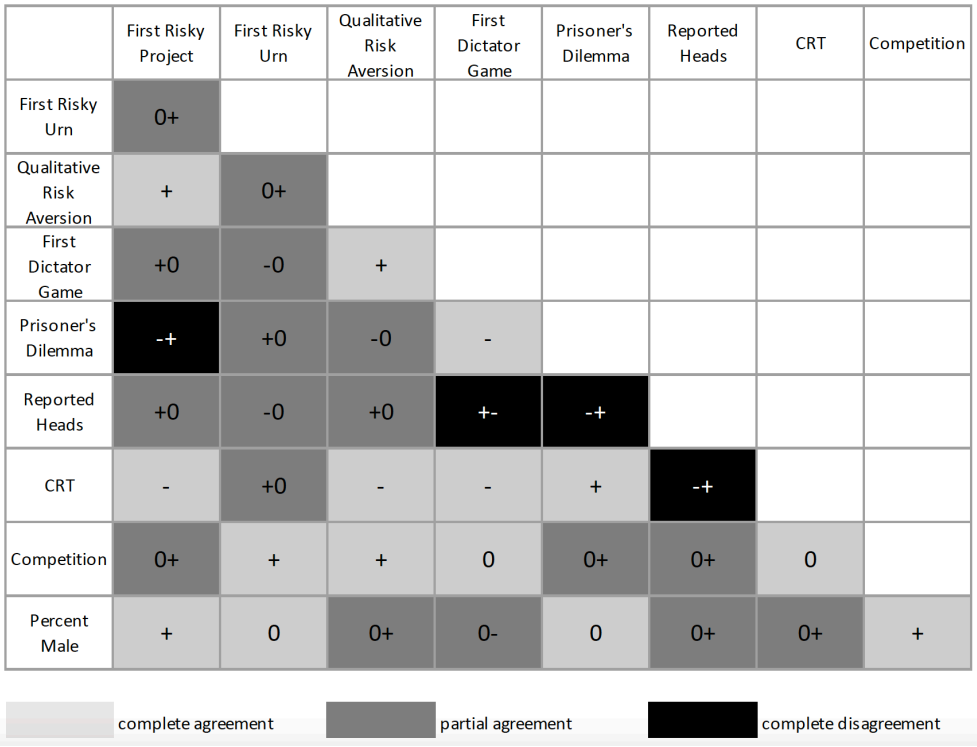
Following Snowberg and Yariv (2021), we also investigate the within-sample correlations between these behavioral measures. By studying the correlation between these measures, we can have a better understanding of the underlying mechanisms behind certain behaviors.

Figure 1 presents the correlation between behaviors and whether the During-COVID and Pre-COVID MTurk samples agree on the sign of these correlations. Each cell presents the direction and significance of the correlation between the column and row variables. The sign and the direction of correlations are obtained by running a set of OLS regressions for each given pair. If the coefficient is not significant at the 10% level, it is indicated as "0". The first item in each cell corresponds to the During-COVID MTurk sample while the second item corresponds to the Pre-COVID MTurk sample. The agreement between these two samples is highlighted using three colors: Light grey indicating agreement (either both significant and in the same direction or both insignificant), dark grey indicating partial agreement (one significant and one insignificant), and black indicating total disagreement (both significant and in opposite directions).

We see some significant differences between the two MTurk samples. Across 36 correlations between measures, 15 of them are in complete agreement, 17 of them are in partial agreement, and the remaining 4 are in complete disagreement across the two samples. First, while the three risk measures are positively and significantly correlated for Pre-COVID MTurkers, the correlations between these measures are weaker for During-COVID MTurkers. A puzzling finding is the difference in the correlates of lying (measured by the number of reported heads in a coin flip task) between the two samples. For During-COVID MTurkers, lying is positively correlated with pro-social behavior: Dictator game giving behavior, and cooperative behavior in the Prisoner's Dilemma game (as evidenced by negative correlation with playing the dominant strategy). However, both correlations are reversed for Pre-COVID MTurkers.

At first glance, we find that During-COVID MTurkers behave substantially differently

Figure 1: Correlation between Measures for During-COVID MTurk and Pre-COVID MTurk Samples



Notes: +(-): indicates that the behaviors are significantly positively (negatively) correlated at the at the 10% significance level, 0 otherwise. Light grey indicates that the two samples have the same signed correlation between the relevant behaviors and that both are significant or that both correlations are insignificant. Black indicates that the two samples have differently signed correlations and that both are significant. Dark grey indicates otherwise.

from earlier MTurkers. However, these differences do not take into account the demographic differences between these two samples. We explore these differences in the next section.

Changes in MTurk Demographics do not Explain Behavioral Differences:

In this section, we study the differences in the MTurk demographics and investigate whether the behavioral differences discussed above between the two MTurk samples can be explained by changes in demographics. First, we find that the samples differ in terms of their demographics (e.g. During-COVID MTurkers are more white, female, highly educated than Pre-COVID MTurkers). Next, we show that most of the behavioral differences that we

Table 3: Demographics

		During-Covid MTurk	Pre-Covid MTurk	*p-values*
Gender	Male	0.42	0.50	0.001
	Female	0.58	0.50	0.001
Age	18-25	0.09	0.18	0.000
	26-54	0.80	0.72	0.000
	55-64	0.09	0.07	0.080
	65+	0.02	0.02	0.639
Race / Ethnicity	White	0.82	0.74	0.000
	Black	0.08	0.08	0.477
	Hispanic	0.04	0.06	0.020
	Asian	0.03	0.07	0.000
Education	High School or Less	0.05	0.10	0.000
	Some College	0.06	0.30	0.000
	Associates Degree	0.04	0.11	0.000
	Bachelors Degree	0.67	0.38	0.000
	Post Graduate Degree	0.17	0.12	0.001
Employment Status	Employed	0.91	0.67	0.000
	Unemployed	0.03	0.10	0.000
	Out of Labor Force	0.00	0.11	0.000
	Online Worker	0.04	0.10	0.000
	Retired	0.01	0.02	0.072
Income	Less than $20K	0.10	0.32	0.000
	Between $20K and $30K	0.13	0.16	0.053
	Between $30K and $50K	0.24	0.23	0.402
	Between $50K and $70K	0.30	0.13	0.000
	Between $70K and $150K	0.20	0.14	0.000
	More than $150K	0.02	0.02	0.544
Marital Status	Single	0.19	0.50	0.000
	Partnered	0.75	0.42	0.000
	Separated / Divorced / Widowed	0.06	0.09	0.023
	N	1,000	995	

Notes: P-values are computed using a test of proportions

documented above persist even after controlling for these demographic differences. This implies that there have been considerable preference and behavior shifts for workers on MTurk during the pandemic.

Table 3 presents demographics of During-COVID MTurkers and Pre-COVID MTurk-

ers. Overall, During-COVID MTurkers are more female, white, higher earners, and highly educated. They also have a higher likelihood of being employed and being partnered (e.g. married, domestic partnership) and are older than Pre-COVID MTurkers. Given that many of the behavioral outcomes we measure in this experiment are known to correlate with certain demographic characteristics (e.g., women are typically more risk averse on average than men), we repeat the comparison between these samples, controlling for demographics via OLS regressions.

Returning to Table 2, columns (3) and (4) present comparisons of behaviors for During-COVID MTurkers and Pre-COVID MTurkers by reporting the coefficients for a *During-COVID* dummy variable from OLS regression specifications without and with demographic controls, respectively. Many of the aggregate differences between behaviors across During-COVID MTurkers and Pre-COVID MTurkers are at least partially explained by demographic differences, leading to subdued difference after accounting for demographics. For example, the uncontrolled difference between dictator game giving behavior was 13 tokens, but this shrinks to 11 tokens after accounting for demographic differences. In all comparisons, the signs and significance levels of the differences between During-COVID and Pre-COVID MTurkers' behaviors are the same, but the magnitudes are smaller. Thus, column (4) tells a similar story to column (3) in every behavioral dimension.

From all this, we conclude that there are considerable preference and behavior differences for workers on MTurk during the pandemic that cannot be completely explained by accompanying demographic shifts.

3.2 How does the new MTurk data compare to student and representative samples?

Given that MTurkers during the pandemic behave differently than previous MTurkers, we now ask how During-COVID MTurkers' behaviors compare to a student sample and a representative sample of the United States. In Spring 2015, Snowberg and Yariv (2021) conducted their experiment with the student population at Caltech through the Caltech Cohort

Study (CCS) and in Spring 2017, they partnered with Survey Sampling International (SSI) and repeated their experiment with the SSI participant pool that was a representative sample of the US population across age, income, and gender. We study the differences between the During-COVID MTurkers and these two non-MTurk samples reported in Snowberg and Yariv (2021). We find that the During-COVID MTurk sample is more often similar to the representative sample than to the student sample.

Differences in Behavior:

Table 4 presents the average behavior in and the comparison between the During-COVID MTurk sample and the two non-Mturk samples of Snowberg and Yariv (2021).[7] In general, the average level of behavioral measures of the During-COVID MTurk sample is located in between the representative and the student samples. The exceptions to this are lying and the survey measure of risk aversion, which are the highest in the During-COVID MTurk sample.

During-COVID MTurkers are very similar to the representative sample based on their social preferences. The representative sample and the During-COVID MTurkers have high levels of generosity as measured by their giving behavior in the dictator game. Both of these samples also show high levels of cooperation (i.e. they have the lowest percentages of participants who choose the dominant strategy in the prisoner's dilemma game). Comparing During-COVID MTurkers to the student population, the only similarity comes from their competitiveness measure. The percentage of participants who choose the competitive payment scheme in the During-COVID MTurk is similar to the student population.

Overall, we find that During-COVID MTurkers are more similar to the representative sample. During-COVID MTurkers' behaviors are closer to the representative sample in terms of risk preferences, social preferences and cognition, and closer to the student sample in terms of lying and competitiveness.

[7]The full set of comparisons using all measures are reported in Table A.2 in Appendix A.

Table 4: Comparison Across Samples

	Samples			Differences	
	During-COVID MTurk	CCS	SSI	During-COVID MTurk vs. CCS	During-COVID MTurk vs. SSI
First Risky Project	51	59	46	-8.1***	4.8***
(out of 100)	(0.99)	(1.2)	(0.89)	(1.5)	(1.3)
First Risky Urn	49	59	49	-10.5***	-0.02
(20 balls)	(0.61)	(0.52)	(0.76)	(0.81)	(0.98)
Qualitative Risk Aversion	7.0	5.8	5.0	1.2***	2.0***
	(0.08)	(0.08)	(0.08)	(0.12)	(0.12)
First Dictator Game	38	14	39	24***	-0.9
(given out of 100)	(0.64)	(0.84)	(0.58)	(1.0)	(0.86)
Prisoner's Dilemma	48	68	46	-20***	1.4
(% dominant strat.)	(1.2)	(1.5)	(1.2)	(1.9)	(1.7)
Reported Heads	3.6	3.3	2.9	0.3***	0.7***
(out of 5)	(0.03)	(0.04)	(0.03)	(0.05)	(0.05)
CRT	0.8	1.7	0.5	-0.8***	0.4***
(out of 3)	(0.03)	(0.04)	(0.03)	(0.05)	(0.04)
Competition	32	33	40	-1.2	-7.7***
(% competing)	(1.5)	(1.6)	(1.5)	(2.2)	(2.1)
N	1,000	819	1,000		

Notes: CCS: Caltech Cohort Study student sample (Snowberg and Yariv, 2021). SSI: Survey Sampling International representative sample (Snowberg and Yariv, 2021)
* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Is During-COVID MTurk Sample or Pre-COVID MTurk Sample Closer to the Representative Sample?

We next investigate whether MTurkers during the pandemic are getting closer to the representative sample (or the student sample) compared to the MTurk sample before the pandemic. We do this by comparing the differences in behavioral measures across the two MTurk samples using a difference in difference analysis. We compute the differences between the sample of interest (representative sample or student sample) and each MTurk sample (During-COVID or Pre-COVID) and then compare the differences to each other. Table 5 shows whether the difference in differences are significant across behavioral mea-

Table 5: Difference-in-Difference Distances to Student vs. Representative Samples

	Closer to CCS	Closer to SSI
First Risky Project (out of 100)	During-COVID	Equal
First Risky Urn (20 balls)	Pre-COVID	During-COVID
Qualitative Risk Aversion	Pre-COVID	Pre-COVID
First Dictator Game (given out of 100)	Pre-COVID	During-COVID
Prisoner's Dilemma (% dominant strat.)	Pre-COVID	During-COVID
Reported Heads(out of 5)	Equal	Pre-COVID
CRT (out of 3)	Pre-COVID	During-COVID
Competition (% competing)	Equal	Equal

sures.[8] If the difference is not significant at 10% level, the corresponding cell in Table 5 is depicted as "Equal"; otherwise, the name of the sample (During-COVID or Pre-COVID) is depicted based on which is closer to the sample in the corresponding column (representative or student).

As reported in Table 5, we find that During-COVID MTurkers are moving closer to a representative sample in terms of social preferences (as measured by the Dictator Game giving behavior and the cooperation level in the Prisoner's Dilemma game) and cognitive ability relative to Pre-COVID MTurkers. They are moving farther away from the representative sample in terms of lying, and are stagnant in competitiveness. As before, what happens to risk preferences is less clear as it depends on which elicitation method is being used. Looking at the comparison of the MTurk samples to the student sample, we see that Pre-COVID MTurkers are more similar to the student sample relative to the During-COVID MTurkers.

Correlations Between Measures:

Figure 2 presents the correlations between behavioral measures across During-COVID MTurk and the previous two non-MTurk samples. A scan of Figure 2 gives the impression,

[8]The full set of comparisons using all measures are reported in Table A.3 in Appendix A.

again, that the During-COVID MTurk sample is more consistent with the representative sample than the student sample. Looking at the 36 correlations between measures in the During-COVID MTurk vs the representative sample, only 3 are in disagreement (both are significant and the signs do not match). Of the remaining 33, 17 are in complete agreement (both are significant and the signs match or both are insignificant) and 16 are in partial agreement. In contrast to this, we see that only 11 of these measures are in complete agreement when we compare the During-COVID MTurk sample to the student sample.

Figure 2: Correlation between Measures Across Samples

(a) During-COVID MTurk vs CCS

	First Risky Project	First Risky Urn	Qualitative Risk Aversion	First Dictator Game	Prisoner's Dilemma	Reported Heads	CRT	Competition
First Risky Urn	0+							
Qualitative Risk Aversion	+	0+						
First Dictator Game	+0	-	+-					
Prisoner's Dilemma	-0	+	-0	-				
Reported Heads	+0	-0	+	+-	-+			
CRT	-+	+-	-0	-0	+0	-0		
Competition	0+	+	+	0-	0+	0+	0+	
Percent Male	+	0	0+	0	0+	0+	0+	+

complete agreement partial agreement complete disagreement

(b) During-COVID MTurk vs SSI

	First Risky Project	First Risky Urn	Qualitative Risk Aversion	First Dictator Game	Prisoner's Dilemma	Reported Heads	CRT	Competition
First Risky Urn	0+							
Qualitative Risk Aversion	+	0+						
First Dictator Game	+-	-0	+-					
Prisoner's Dilemma	-0	+0	-0	-				
Reported Heads	+	-0	+	+-	-0			
CRT	-	+0	-	-0	+0	-		
Competition	0+	+0	+	0	0	0	0	
Percent Male	+	0	0+	0	0	0	0+	+0

complete agreement partial agreement complete disagreement

Notes:

+(-): indicates that the behaviors are significantly positively (negatively) correlated at the %10 significance level, 0 otherwise. Light grey indicates that the two samples have the same signed correlation between the relevant behaviors and that both are significant or that both correlations are insignificant. Black indicates that the two samples have differently signed correlations and that both are significant. Dark grey indicates otherwise.

3.3 Gender Differences

It is well documented that women and men behave differently in several key preference domains (e.g. risk preferences, social preferences, competition) (see, e.g., Eckel and Grossman, 2008; Croson and Gneezy, 2009; Niederle, 2015). Given that we document behavioral differences in a sample collected during the COVID-19 pandemic, coupled with the fact that respondents' gender is correlated with several measures in our earlier analyses, it is natural to revisit these gender differences to see if they are measurably different during the pandemic. There is also early evidence that the pandemic disproportionately affected women. For example, Deryugina et al. (2021) provide evidence of the disproportionate burden placed on female academics in economics during the COVID-19 pandemic. Moreover, the Center for Global Development has released a series of working papers documenting the gendered dimensions of the COVID-19 crisis and discussing the asymmetric impacts of the pandemic on women around the world. Additionally, Alsharawy et al. (2021) find that women perceived stronger health risks from the pandemic than men. In this section, we present comparative statistics on gender for the During-COVID and Pre-COVID MTurk samples. We find evidence that During-COVID MTurkers exhibit fewer (and smaller) gender differences in behaviors than Pre-COVID MTurkers.

Table 6 reports these comparative statistics for a relevant subset of our full list of elicited behaviors.[9] As one may anticipate based on the aggregate results presented above, the results for elicited risk preferences depend on the measure under consideration. Gender differences are smaller, though significant, for the During-COVID MTurkers than for Pre-COVID MTurkers using the Gneezy and Potters (1997) investment task: Pre-COVID men invested 4.72 tokens more than women, which shrunk to a difference of 3.31 tokens during the pandemic. When measured by the Dohmen et al. (2011) survey method, we find a similar result: the gender difference observed before the pandemic shrinks such that the resulting gap is no longer statistically significant for the During-COVID sample. When we look at the multiple price list method (First Risky Urn in the first row of Table 6), we do

[9] The full set of comparisons using all measures are reported in Tables A.4 - A.7 in Appendix A.

Table 6: Comparative Statistics on Gender Across Samples

	First Risky Project (out of 100)		**First Risky Urn (20 balls)**	
	During-COVID	Pre-COVID	During-COVID	Pre-COVID
Male	53	46	48	57
	(1.3)	(1.3)	(0.80)	(0.86)
Female	49	41	49	55
	(1.5)	(1.1)	(0.94)	(0.92)
Difference	3.3*	4.7***	-1.1	1.8
	(2.0)	(1.7)	(1.2)	(1.3)
	Qualitative Risk Aversion		**First Dictator Game (given out of 100)**	
	During-COVID	Pre-COVID	During-COVID	Pre-COVID
Male	7.1	5.3	38	22
	(0.11)	(0.10)	(0.88)	(1.0)
Female	6.9	4.5	39	29
	(0.14)	(0.11)	(0.93)	(0.97)
Difference	0.16	0.80***	-1.8	-7.4***
	(0.17)	(0.15)	(1.3)	(1.4)
	Prisoner's Dilemma (% dominant strat.)		**Reported Heads (out of 5)**	
	During-COVID	Pre-COVID	During-COVID	Pre-COVID
Male	47	59	3.6	3.1
	(1.6)	(1.9)	(0.04)	(0.05)
Female	48	55	3.6	2.9
	(1.8)	(1.9)	(0.05)	(0.05)
Difference	-1.2	3.8	0.05	0.24***
	(2.5)	(2.7)	(0.07)	(0.07)
	Competition (% competing)			
	During-COVID	Pre-COVID		
Male	35	34		
	(2.0)	(2.1)		
Female	29	25		
	(2.2)	(2.0)		
Difference	5.3*	8.9***		
	(3.0)	(2.9)		
N	1,000	995	1,000	995

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021).
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

not find any significant gender differences for either sample.

For social preferences (First Dictator Game and Prisoner's Dilemma in Table 6), gender differences are generally smaller During-COVID than Pre-COVID. Though During-COVID women give more than men in the Dictator Game and cooperate less in the Prisoner's Dilemma game, neither difference is statistically significant. This is consistent with

behavior before the pandemic for the Prisoner's Dilemma, but not for the Dictator Game, where Snowberg and Yariv (2021) find that women give more. Finally, men lie more than women before the pandemic (as seen for Reported Heads in the third row of Table 6), but this does not remain true during the pandemic. The gender gap in competitiveness also shrinks During-COVID (from 8.9 to 5.3 percentage points).[10]

Overall, we conclude that, while some gender differences exist during the pandemic, they are generally smaller than those measured in the Pre-COVID sample.

4 Conclusion

In this paper, we explore how the behavior of MTurk workers was measurably different during the COVID-19 pandemic compared to a pre-pandemic benchmark. We find significant shifts in the MTurk population in terms of their economic behavior. These changes in workers' behavior cannot be explained by the changes in the demographic characteristics. Given the increased popularity of online experiments during the pandemic, this paper guides researchers on how comparable their research during the current pandemic is to the existing literature. We caution researchers who conducted economic experiments with MTurk workers during the pandemic when comparing their findings to the literature.

We also explore whether the MTurk population during the pandemic behaves more similarly to a representative sample or a student sample, and find that the MTurk workers during the pandemic behave more similarly to a previous representative sample. This finding helps address some of the external validity concerns of MTurk experiments.

Finally, we revisit the gender differences in many economic domains and find that these differences are either smaller or no longer significant. While it is beyond the scope of this research to explore the underlying mechanisms behind this finding, future research could investigate this further and also explore gender differences in other economic contexts.

[10] In the appendix, we also report how these gender differences compare to the previous student and representative samples. The behavior of During-COVID MTurkers approach the representative sample point estimates of the gender differences and these findings can be seen in Tables A.4 - A.7 in Appendix A.

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Appendix A Additional Tables

Table A.1: Pre-COVID vs During-COVID MTurk Sample Comparisons (Full List)

	During-COVID MTurk (1)	Pre-COVID MTurk (2)	Difference: No Controls (3)	Difference: With Controls (4)
First Risky Project	51	44	7.5***	2.7*
(out of 100)	(0.99)	(0.85)	(1.3)	(1.5)
Second Risky Project	105	98	7.4***	-0.8
(out of 200)	(1.8)	(1.7)	(2.5)	(2.9)
First Risky Urn	49	56	-7.3***	-6.7***
(20 balls)	(0.61)	(0.63)	(0.88)	(1.0)
Second Risky Urn	68	78	-10***	-9.2***
(30 balls)	(0.95)	(0.96)	(1.4)	(1.6)
Qualitative Risk Aversion	7.0	4.9	2.1***	1.6***
	(0.08)	(0.08)	(0.12)	(0.13)
Monthly Discount	0.72	0.67	0.05***	0.04***
Rate (δ)	(0.01)	(0.01)	(0.01)	(0.01)
First Dictator Game	38	26	13***	11***
(given out of 100)	(0.64)	(0.71)	(0.95)	(1.1)
Second Dictator Game	112	74	38***	33***
(given out of 300)	(1.9)	(2.0)	(2.8)	(3.2)
Dictator, Tokens Given	40	30	10***	8***
are Doubled	(0.71)	(0.79)	(1.1)	(1.2)
Dictator, Tokens Given	37	25	13***	11***
are Halved	(0.70)	(0.74)	(1.0)	(1.2)
Prisoner's Dilemma	48	57	-9.4***	-8.3***
(% dominant strat.)	(1.2)	(1.3)	(1.8)	(2.1)
Reported Heads	3.6	3.0	0.6***	0.4***
(out of 5)	(0.03)	(0.03)	(0.05)	(0.05)
Reported Switches	5.7	4.5	1.2***	1.0***
(out of 9)	(0.07)	(0.06)	(0.09)	(0.10)
Raven's Matrices	1.3	1.3	0.00	0.03
(out of 5)	(0.03)	(0.04)	(0.05)	(0.06)
CRT	0.8	1.4	-0.5***	-0.4***
(out of 3)	(0.03)	(0.04)	(0.05)	(0.06)
Confidence in Guesses	3.9	2.9	1.0***	0.8***
	(0.03)	(0.03)	(0.05)	(0.05)
Competition	32	29	2.9	1.1
(% competing)	(1.5)	(1.4)	(2.1)	(2.4)
N	1,000	995		

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table A.2: Comparison Across Samples (Full List)

	Samples			Differences	
	During-COVID MTurk	CCS	SSI	During-COVID MTurk vs. CCS	During-COVID MTurk vs. SSI
First Risky Project	51	59	46	-8.1***	4.8***
(out of 100)	(0.99)	(1.2)	(0.89)	(1.5)	(1.3)
Second Risky Project	105	143	95	-38***	10***
(out of 200)	(1.8)	(2.1)	(1.8)	(2.8)	(2.6)
First Risky Urn	49	59	49	-10.5***	-0.02
(20 balls)	(0.61)	(0.52)	(0.76)	(0.81)	(0.98)
Second Risky Urn	68	86	67	-18***	0.9
(30 balls)	(0.95)	(0.73)	(1.2)	(1.2)	(1.6)
Qualitative Risk Aversion	7.0	5.8	5.0	1.2***	2.0***
	(0.08)	(0.08)	(0.08)	(0.12)	(0.12)
Monthly Discount	0.72	0.77	0.67	-0.04***	0.06***
Rate (δ)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First Dictator Game	38	14	39	24***	-0.9
(given out of 100)	(0.64)	(0.84)	(0.58)	(1.0)	(0.86)
Second Dictator Game	112	38	115	74***	-3.0
(given out of 300)	(1.9)	(2.4)	(1.7)	(3.0)	(2.6)
Dictator, Tokens Given	40	26	39	13***	0.6
are Doubled	(0.71)	(1.2)	(0.62)	(1.3)	(0.94)
Dictator, Tokens Given	37	9.0	39	28***	-1.4
are Halved	(0.70)	(0.68)	(0.61)	(0.99)	(0.92)
Prisoner's Dilemma	48	68	46	-20***	1.4
(% dominant strat.)	(1.2)	(1.5)	(1.2)	(1.9)	(1.7)
Reported Heads	3.6	3.3	2.9	0.3***	0.7***
(out of 5)	(0.03)	(0.04)	(0.03)	(0.05)	(0.05)
Reported Switches	5.7	5.5	4.4	0.2**	1.3***
(out of 9)	(0.07)	(0.07)	(0.06)	(0.10)	(0.09)
Raven's Matrices	1.3	1.8	1.2	-0.5***	0.2***
(out of 5)	(0.03)	(0.04)	(0.03)	(0.05)	(0.05)
CRT	0.8	1.7	0.5	-0.8***	0.4***
(out of 3)	(0.03)	(0.04)	(0.03)	(0.05)	(0.04)
Confidence in Guesses	3.9	3.1	2.9	0.8***	1.0***
	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)
Competition	32	33	40	-1.2	-7.7***
(% competing)	(1.5)	(1.6)	(1.5)	(2.2)	(2.1)
N	1,000	819	1,000		

Notes: CCS: Caltech Cohort Study student sample (Snowberg and Yariv, 2021). SSI: Survey Sampling International representative sample (Snowberg and Yariv, 2021)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table A.3: Difference-in-Difference Distances to Student vs. Representative Samples (Full List)

	Closer to CCS	Closer to SSI
First Risky Project (out of 100)	During-COVID	Equal
Second Risky Project (out of 200)	During-COVID	Pre-COVID
First Risky Urn (20 balls)	Pre-COVID	During-COVID
Second Risky Urn (30 balls)	Pre-COVID	During-COVID
Qualitative Risk Aversion	Pre-COVID	Pre-COVID
Monthly Discount Rate (δ)	During-COVID	Pre-COVID
First Dictator Game (given out of 100)	Pre-COVID	During-COVID
Second Dictator Game (given out of 300)	Pre-COVID	During-COVID
Dictator, Tokens Given are Doubled	Pre-COVID	During-COVID
Dictator, Tokens Given Are Halved	Pre-COVID	During-COVID
Prisoner's Dilemma (% dominant strat.)	Pre-COVID	During-COVID
Reported Heads(out of 5)	Equal	Pre-COVID
Reported Switches(out of 9)	During-COVID	Pre-COVID
Raven's Matrices (out of 5)	Equal	Equal
CRT (out of 3)	Pre-COVID	During-COVID
Confidence in Guesses	Pre-COVID	Pre-COVID
Competition (% competing)	Equal	Equal

Table A.4: Comparative Statistics on Gender (Part 1)

	During-COVID	Pre-COVID	CCS	SSI
Panel A: First Risky Project (out of 100)				
Male	53	46	67	49
	(1.3)	(1.3)	(1.6)	(1.3)
Female	49	41	48	44
	(1.5)	(1.1)	(1.7)	(1.2)
Difference	3.3*	4.7***	19***	4.5**
	(2.0)	(1.7)	(2.4)	(1.8)
Panel B: Second Risky Project (out of 200)				
Male	110	106	158	97
	(2.4)	(2.5)	(2.5)	(2.8)
Female	99	89	119	93
	(2.8)	(2.2)	(3.2)	(2.4)
Difference	11***	17***	39***	4.4
	(3.7)	(3.4)	(4.0)	(3.7)
Panel C: First Risky Urn (20 balls)				
Male	48	57	60	49
	(0.80)	(0.86)	(0.66)	(1.11)
Female	49	55	58	49
	(0.94)	(0.92)	(0.82)	(1.04)
Difference	-1.1	1.8	1.2	-0.04
	(1.2)	(1.3)	(1.1)	(1.5)
Panel D: Second Risky Urn (30 balls)				
Male	69	79	87	66
	(1.3)	(1.3)	(1.0)	(1.8)
Female	66	77	85	68
	(1.4)	(1.4)	(1.1)	(1.7)
Difference	3.5*	2.2	1.4	-1.2
	(1.9)	(1.9)	(1.5)	(2.4)
Panel E: Qualitative Risk Aversion				
Male	7.1	5.3	6.1	5.5
	(0.11)	(0.10)	(0.10)	(0.11)
Female	6.9	4.5	5.3	4.6
	(0.14)	(0.11)	(0.11)	(0.11)
Difference	0.16	0.80***	0.79***	0.83***
	(0.17)	(0.15)	(0.16)	(0.16)

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021). CCS: Caltech Cohort Study student sample (Snowberg and Yariv, 2021). SSI: Survey Sampling International representative sample (Snowberg and Yariv, 2021)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table A.5: Comparative Statistics on Gender (Part 2)

	During-COVID	Pre-COVID	CCS	SSI
Panel A: First Dictator Game (given out of 100)				
Male	38	22	13	38
	(0.88)	(1.0)	(1.1)	(0.93)
Female	39	29	16	40
	(0.93)	(0.97)	(1.3)	(0.72)
Difference	-1.8	-7.4***	-2.7	-1.8
	(1.3)	(1.4)	(1.7)	(1.2)
Panel B: Second Dictator Game (given out of 300)				
Male	109	62	35	112
	(2.7)	(2.8)	(3.1)	(2.7)
Female	116	86	42	118
	(2.7)	(2.8)	(3.7)	(2.2)
Difference	-6.2	-24***	-6.9	-5.3
	(3.9)	(4.0)	(4.9)	(3.5)
Panel C: Dictator, Tokens Given are Doubled				
Male	40	29	27	39
	(0.97)	(1.2)	(1.6)	(1.0)
Female	39	31	26	39
	(1.0)	(0.97)	(1.8)	(0.77)
Difference	0.78	-2.2	0.70	-0.49
	(1.4)	(1.6)	(2.5)	(1.3)
Panel D: Dictator, Tokens Given are Halved				
Male	36	21	6.6	38
	(0.96)	(1.0)	(0.79)	(0.94)
Female	39	29	13	39
	(1.0)	(1.0)	(1.2)	(0.78)
Difference	-2.5*	-8.2***	-6.3***	-0.72
	(1.4)	(1.5)	(1.4)	(1.2)
Panel E: Prisoner's Dilemma (% dominant strat.)				
Male	47	59	71	44
	(1.6)	(1.9)	(1.9)	(1.8)
Female	48	55	63	48
	(1.9)	(1.9)	(2.5)	(1.6)
Difference	-1.2	3.8	8.5***	-3.3
	(2.5)	(2.7)	(3.1)	(2.4)

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021). CCS: Caltech Cohort Study student sample (Snowberg and Yariv, 2021). SSI: Survey Sampling International representative sample (Snowberg and Yariv, 2021)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table A.6: Comparative Statistics on Gender (Part 3)

	During-COVID	Pre-COVID	CCS	SSI
Panel A: Monthly Discount Rate (δ)				
Male	0.72	0.67	0.78	0.69
	(0.01)	(0.01)	(0.01)	(0.01)
Female	0.72	0.67	0.75	0.65
	(0.01)	(0.01)	(0.01)	(0.01)
Difference	0.00	0.01	0.02	0.04***
	(0.02)	(0.01)	(0.01)	(0.01)
Panel B: Reported Heads (out of 5)				
Male	3.6	3.1	3.4	2.9
	(0.04)	(0.05)	(0.05)	(0.05)
Female	3.6	2.9	3.2	2.9
	(0.05)	(0.05)	(0.07)	(0.04)
Difference	0.05	0.24***	0.18**	-0.02
	(0.07)	(0.07)	(0.09)	(0.07)
Panel C: Reported Switches (out of 9)				
Male	5.7	4.7	5.7	4.4
	(0.09)	(0.08)	(0.09)	(0.09)
Female	5.8	4.4	5.2	4.3
	(0.10)	(0.08)	(0.11)	(0.07)
Difference	-0.10	0.26**	0.55***	0.14
	(0.13)	(0.11)	(0.14)	(0.11)
Panel D: Raven's Matrices (out of 5)				
Male	1.3	1.3	1.9	1.2
	(0.04)	(0.05)	(0.06)	(0.05)
Female	1.4	1.3	1.7	1.2
	(0.05)	(0.05)	(0.07)	(0.04)
Difference	-0.07	-0.01	0.18**	-0.01
	(0.07)	(0.07)	(0.09)	(0.06)
Panel E: CRT (out of 3)				
Male	0.89	1.5	1.9	0.64
	(0.05)	(0.05)	(0.04)	(0.04)
Female	0.79	1.2	1.3	0.31
	(0.05)	(0.05)	(0.06)	(0.03)
Difference	0.10	0.29***	0.63***	0.33***
	(0.07)	(0.07)	(0.07)	(0.05)

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021). CCS: Caltech Cohort Study student sample (Snowberg and Yariv, 2021). SSI: Survey Sampling International representative sample (Snowberg and Yariv, 2021)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table A.7: Comparative Statistics on Gender (Part 4)

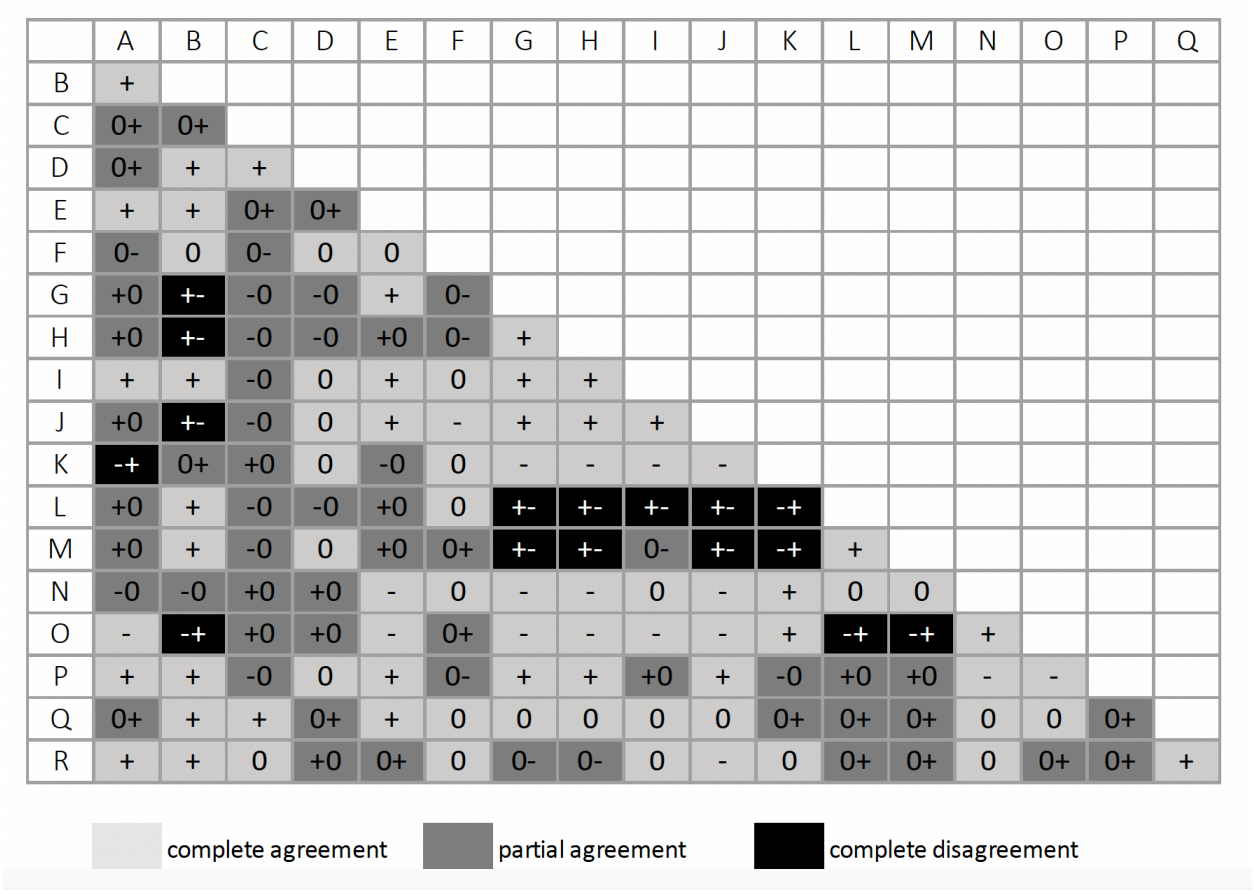
	During-COVID	Pre-COVID	CCS	SSI
Panel A: Confidence in Guesses				
Male	4.0	3.0	3.3	3.0
	(0.04)	(0.04)	(0.04)	(0.05)
Female	3.9	2.8	2.9	2.8
	(0.06)	(0.04)	(0.05)	(0.04)
Difference	0.09	0.20***	0.43***	0.14**
	(0.07)	(0.06)	(0.06)	(0.07)
Panel B: Competition (% competing)				
Male	35	34	41	42
	(2.0)	(2.1)	(2.2)	(2.3)
Female	29	25	21	38
	(2.2)	(2.0)	(2.3)	(2.1)
Difference	5.3*	8.9***	21***	3.2
	(3.0)	(2.9)	(3.3)	(3.1)

Notes: Pre-COVID MTurk sample comes from Snowberg and Yariv (2021). CCS: Caltech Cohort Study student sample (Snowberg and Yariv, 2021). SSI: Survey Sampling International representative sample (Snowberg and Yariv, 2021)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Appendix B Additional Figures

Figure B.1: Correlation between Behaviors for During-COVID MTurk and Pre-COVID MTurk Samples: All Measures



Notes: Each letter on the first column and the first row represents a task in the experiment.

A: First Risky Project (out of 100)
B: Second Risky Project (out of 200)
C: First Risky Urn (20 balls)
D: Second Risky Urn (30 balls)
E: Qualitative Risk Aversion
F: Monthly Discount Rate (δ)
G: First Dictator Game (given out of 100)
H: Second Dictator Game (given out of 300)
I: Dictator, Tokens Given are Doubled
J: Dictator, Tokens Given are Halved
K: Prisoner's Dilemma (% dominant strat.)
L: Reported Heads (out of 5)
M: Reported Switches (out of 9)
N: Raven's Matrices (out of 5)
O: CRT (out of 3)
P: Confidence in Guesses
Q: Competition (% competing)
R: Percent Male

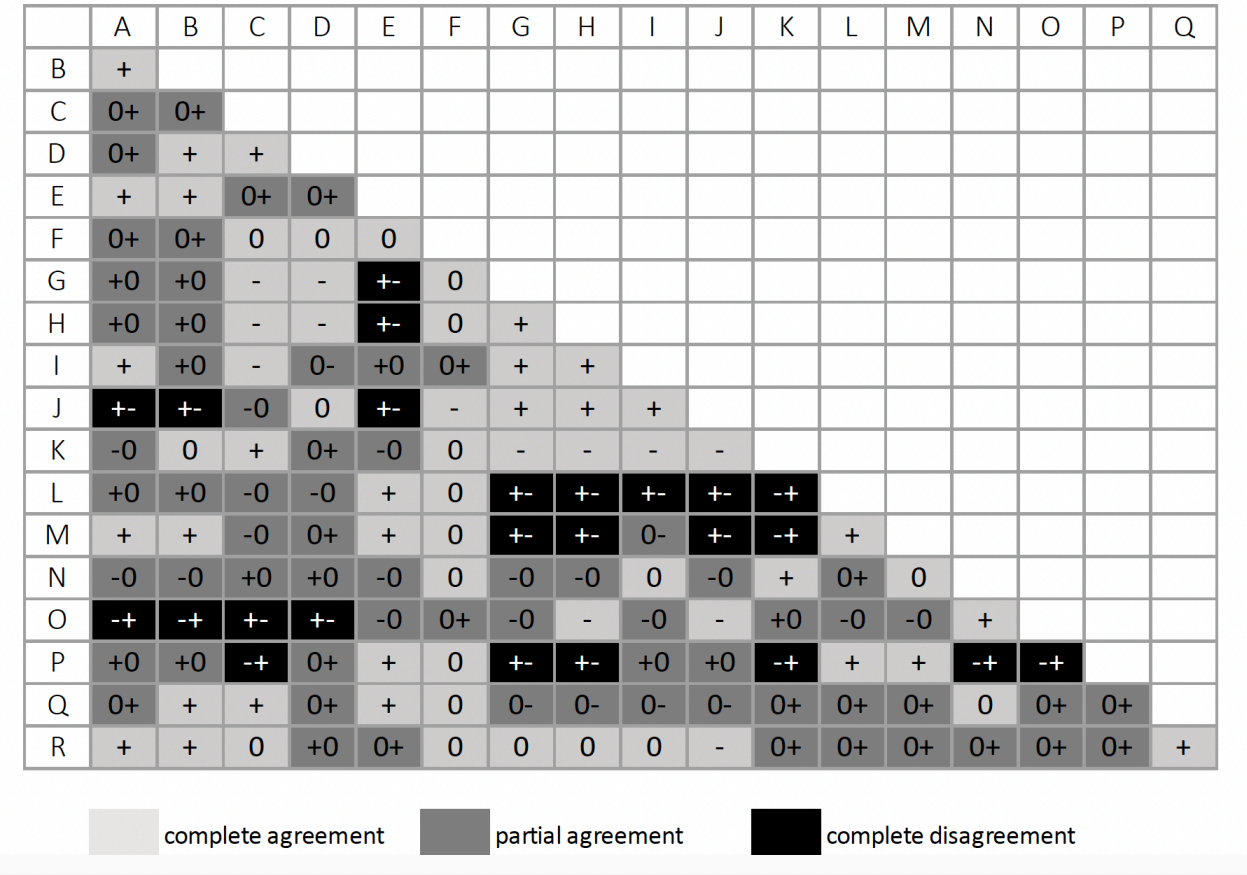
+(-): indicates that the behaviors are significantly positively (negatively) correlated at the $\alpha = 0.10$ threshold, 0 otherwise.

Light grey indicates that the two samples have the same signed correlation between the relevant behaviors and that both are significant.

Black indicates that the two samples have differently signed correlations and that both are significant.

Dark grey indicates otherwise.

Figure B.2: Correlation between Behaviors for During-COVID MTurk and CCS Samples: All Measures



Notes: Each letter on the first column and the first row represents a task in the experiment.

A: First Risky Project (out of 100)
B: Second Risky Project (out of 200)
C: First Risky Urn (20 balls)
D: Second Risky Urn (30 balls)
E: Qualitative Risk Aversion
F: Monthly Discount Rate (δ)
G: First Dictator Game (given out of 100)
H: Second Dictator Game (given out of 300)
I: Dictator, Tokens Given are Doubled
J: Dictator, Tokens Given are Halved
K: Prisoner's Dilemma (% dominant strat.)
L: Reported Heads (out of 5)
M: Reported Switches (out of 9)
N: Raven's Matrices (out of 5)
O: CRT (out of 3)
P: Confidence in Guesses
Q: Competition (% competing)
R: Percent Male

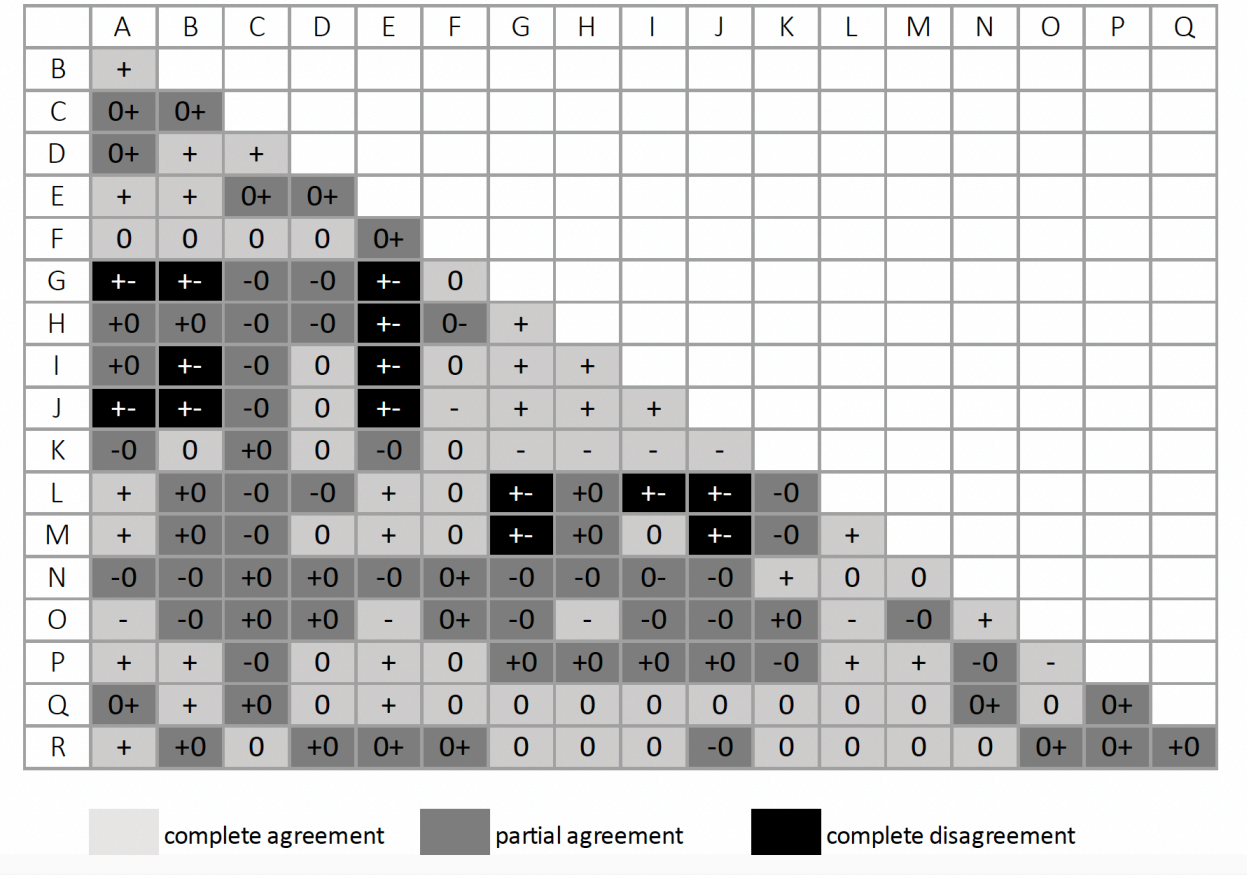
+(-): indicates that the behaviors are significantly positively (negatively) correlated at the $\alpha = 0.10$ threshold, 0 otherwise.

Light grey indicates that the two samples have the same signed correlation between the relevant behaviors and that both are significant.

Black indicates that the two samples have differently signed correlations and that both are significant.

Dark grey indicates otherwise.

Figure B.3: Correlation between Behaviors for During-COVID MTurk and SSI Samples: All Measures



Notes: Each letter on the first column and the first row represents a task in the experiment.

A: First Risky Project (out of 100)
B: Second Risky Project (out of 200)
C: First Risky Urn (20 balls)
D: Second Risky Urn (30 balls)
E: Qualitative Risk Aversion
F: Monthly Discount Rate (δ)
G: First Dictator Game (given out of 100)
H: Second Dictator Game (given out of 300)
I: Dictator, Tokens Given are Doubled
J: Dictator, Tokens Given are Halved
K: Prisoner's Dilemma (% dominant strat.)
L: Reported Heads (out of 5)
M: Reported Switches (out of 9)
N: Raven's Matrices (out of 5)
O: CRT (out of 3)
P: Confidence in Guesses
Q: Competition (% competing)
R: Percent Male

+(-): indicates that the behaviors are significantly positively (negatively) correlated at the $\alpha = 0.10$ threshold, 0 otherwise.

Light grey indicates that the two samples have the same signed correlation between the relevant behaviors and that both are significant.

Black indicates that the two samples have differently signed correlations and that both are significant.

Dark grey indicates otherwise.

[FOR ONLINE PUBLICATION]

Appendix C Instructions and Screenshots

C.1 Instructions

Overview of Study

Welcome! Here is a brief overview of the study.

What will I have to do?

This study consists of multiple games, which will be explained in detail later, and a survey. Your participation and your answers will be kept anonymous. The study will take about 45 minutes to complete. You will be given a completion code after you submit all your answers. The completion code expires 180 minutes after you begin the study.

How much payment will I receive for my participation?

You will be paid $1 for completing the study.

Additionally, you can receive **additional bonus payments** based on your decisions, decisions of others, and luck. Your entire payment ($1 + whatever additional amount you earn) will be paid to you via the MTurk platform once your responses have been validated.

Throughout the study, payments are specified in terms of tokens. The USD/token conversion rate is 1 USD for 600 tokens.

Please note that you will not be paid any amount unless you complete the study. This is to ensure the quality of our data.

Attention Checks

There will be several **Attention Check** questions throughout this study meant to test whether you are paying attention. If you fail to correctly complete any of these Attention Check questions, **you may not be paid**.

Can I participate in this study from my mobile device?

Unfortunately, **you cannot participate in this study from a mobile device**. Some questions will only work with a computer, so you will not be able to complete the study from a mobile device.

Finally, please note that in line with standard economics experiments, your bonus payments will be determined in the manner as described in the instructions.

Continue

C.2 Risk Preferences

Qualitative Risk Question

How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means: 'not at all willing to take risks' and the value 10 means: 'very willing to take risks'

○ 0 ○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10

Submit

Risky Project Question 1

You can invest in a risky project if you would like. You can invest up to 200 tokens, or you can choose to keep them.

The risky project has a 50% chance of success.

- If the project is successful, you will receive 2.5 times the amount you chose to invest.
- If the project is unsuccessful, you will lose the amount invested.

Please choose how many tokens you want to invest in the risky project. Note that you can pick any number between 0 and 200, including 0 or 200:

tokens

You will learn your payoff in this section at the end of the survey.

Submit

Risky Project Question 2

You can invest in a risky project if you would like. You can invest up to 100 tokens, or you can choose to keep them.

The risky project has a 35% chance of success.

- If the project is successful, you will receive 3 times the amount you chose to invest.
- If the project is unsuccessful, you will lose the amount invested.

Please choose how many tokens you want to invest in the risky project. Note that you can pick any number between 0 and 100, including 0 or 100:

tokens

You will learn your payoff in this section at the end of the survey.

Submit

Risky Urn Question 1

The following choice will involve an urn containing 30 balls, 15 of which are red and 15 of which are black.

Which color would you prefer to be paid 150 tokens for (if it is drawn from the urn in the following questions)? Note that this means you will be paid 0 tokens if the other color is drawn.

- ○ red
- ○ black

Submit

Urn with Equal Number of Red and Black Balls

The urn from which we can draw a ball is composed of 15 red balls and 15 black balls.

The urn gamble pays 150 tokens if the ball drawn is red.

For each row below, think about whether you prefer the urn gamble, or the sure amount on the right. If you prefer some sure amount to the urn gamble, then we will assume that you prefer any amount greater than that to the gamble as well, and fill in the other options accordingly.

However, this automatic filling will often be premature. Therefore, you should keep clicking on options you prefer until the choice in each row indicates exactly what you would prefer. This is important, because when you submit your preferences, we will pick one row at random and pay you accourdingly. If you selected the sure amount in that row, we will pay you that amount. If you selected the urn gamble in that row, we will draw a ball from the urn, and pay you accordingly.

What would you rather receive (make sure a radio button in each row is selected)?

◉ Urn Gamble	○ 0 tokens
○ Urn Gamble	○ 10 tokens
○ Urn Gamble	○ 20 tokens
○ Urn Gamble	○ 30 tokens
○ Urn Gamble	○ 40 tokens
○ Urn Gamble	○ 50 tokens
○ Urn Gamble	○ 60 tokens
○ Urn Gamble	○ 70 tokens
○ Urn Gamble	○ 80 tokens
○ Urn Gamble	○ 90 tokens
○ Urn Gamble	○ 100 tokens
○ Urn Gamble	○ 110 tokens
○ Urn Gamble	○ 120 tokens
○ Urn Gamble	○ 130 tokens
○ Urn Gamble	○ 140 tokens
○ Urn Gamble	◉ 150 tokens

Submit

Risky Urn Question 2

The following choice will involve an urn containing 20 balls, 10 of which are red and 10 of which are black.

Which color would you prefer to be paid 100 tokens for (if it is drawn from the urn in the following questions)? Note that this means you will be paid 0 tokens if the other color is drawn.

- ○ red
- ○ black

Submit

Urn with Equal Number of Red and Black Balls

The urn from which we can draw a ball is composed of 10 red balls and 10 black balls.

The urn gamble pays 100 tokens if the ball drawn is black.

For each row below, think about whether you prefer the urn gamble, or the sure amount on the right. If you prefer some sure amount to the urn gamble, then we will assume that you prefer any amount greater than that to the gamble as well, and fill in the other options accordingly.

However, this automatic filling will often be premature. Therefore, you should keep clicking on options you prefer until the choice in each row indicates exactly what you would prefer. This is important, because when you submit your preferences, we will pick one row at random and pay you accourdingly. If you selected the sure amount in that row, we will pay you that amount. If you selected the urn gamble in that row, we will draw a ball from the urn, and pay you accordingly.

What would you rather receive (make sure a radio button in each row is selected)?

◉ Urn Gamble	○ 0 tokens
○ Urn Gamble	○ 10 tokens
○ Urn Gamble	○ 20 tokens
○ Urn Gamble	○ 30 tokens
○ Urn Gamble	○ 40 tokens
○ Urn Gamble	○ 50 tokens
○ Urn Gamble	○ 60 tokens
○ Urn Gamble	○ 70 tokens
○ Urn Gamble	○ 80 tokens
○ Urn Gamble	○ 90 tokens
○ Urn Gamble	◉ 100 tokens

Submit

C.3 Time Preferences

Suppose you were offered an immediate payment of $100 or a delayed payment 30 days from now. How much would you need to be paid in 30 days in order to forgo $100 immediately?

Suppose you were offered a payment of $150 in 30 days or a delayed payment in 60 days. How much would you require to be paid in 60 days to forgo $150 in 30 days?

Submit

C.4 Preference for Being Truthful

Reported Heads

Please grab a coin that has both a "heads" and a "tails" side. We would like you to flip this coin five (5) times. We will pay you 30 tokens for every "heads" you get.

Please flip the coin five (5) times now, and keep track of how many times it comes up heads.

How many times did it come up heads?

Submit

Reported Switches

Please grab a coin that has both a "heads" and a "tails" side as well as a piece of paper and something to write with. We would like you to flip this coin ten (10) times and write down the outcome of these tosses in sequence. Whenever two consecutive tosses lead to different results ("heads" and then "tails" or vice versa), we will call it a "switch".

For example, in the sequence (Heads, Heads, Tails, Heads, Heads) there are two switches;
In the sequence (Tails, Heads, Tails, Heads, Heads) there are three switches.

We will pay you 30 tokens for every "switch" you get.

Please flip the coin ten (10) times now, and keep track of the number of switches you get.

How many switches did you get?

Submit

C.5 Social Preferences

Dictator Game 1

You now have 100 tokens to be divided between you and another, randomly chosen, survey participant.

All other survey participants will be given the same choice: that is, they will be given 100 tokens to divide between themselves and another participant.

Whichever amount you decide to pass on to another participant will be divided by two. That is, if you decide to pass x tokens and keep 100-x tokens for yourself, one randomly chosen participant will receive x/2 tokens (rounded up).

Your payoff from this section will be how much you allocate to yourself, plus half the amount allocated to you by another randomly chosen participant. Note that the recipient, the participant that receives money from you, and the participant that you receive money from will be different, and both will be chosen randomly.

Amount for you: tokens

Amount for recipient:
(recipient will receive half this amount) tokens

(Amounts entered should be numbers between 0 and 100.)

Submit

Dictator Game 2

You now have 100 tokens to be divided between you and another, randomly chosen, survey participant.

All other survey participants will be given the same choice: that is, they will be given 100 tokens to divide between themselves and another participant.

Your payoff from this section will be how much you allocate to yourself, plus how much is allocated to you by another randomly chosen participant. Note that the recipient, the participant that receives money from you, and the participant that you receive money from will be different, and both will be chosen randomly.

Amount for you: tokens

Amount for recipient: tokens

(Amounts entered should be numbers between 0 and 100.)

Submit

Dictator Game 3

You now have 100 tokens to be divided between you and another, randomly chosen, survey participant.

All other survey participants will be given the same choice: that is, they will be given 100 tokens to divide between themselves and another participant.

Whichever amount you decide to pass on to another participant will be multiplied by two. That is, if you decide to pass x tokens and keep 100-x tokens for yourself, one randomly chosen participant will receive 2x tokens.

Your payoff from this section will be how much you allocate to yourself, plus double how much is allocated to you by another randomly chosen participant. Note that the recipient, the participant that receives money from you, and the participant that you receive money from will be different, and both will be chosen randomly.

Amount for you: tokens

Amount for recipient:
(recipient will receive double this amount) tokens

(Amounts entered should be numbers between 0 and 100.)

Submit

Dictator Game 4

You now have 300 tokens to be divided between you and another, randomly chosen, survey participant.

All other survey participants will be given the same choice: that is, they will be given 300 tokens to divide between themselves and another participant.

Your payoff from this section will be how much you allocate to yourself, plus how much is allocated to you by another randomly chosen participant. Note that the recipient, the participant that receives money from you, and the participant that you receive money from will be different, and both will be chosen randomly.

Amount for you: tokens

Amount for recipient: tokens

(Amounts entered should be numbers between 0 and 300.)

Submit

Prisoner's Dilemma 1

You will now play a simple game. You will have to choose one of two actions: A1 or A2. Once surveys have been submitted, we will randomly pair you with another participant and your payoff will depend on both of your actions. Namely, we will look at the pair of numbers corresponding to both of your actions (A1 or A2 for you, B1 or B2 for your partner). The first (underlined) number of the entry will correspond to your payoff (in tokens), while the second number in that entry will correspond to the payoff your partner would get.

For example, if you pick A1 and the person you are randomly matched with picked B1, then you would both get 95 tokens. If you pick A1 and the person you are matched with picked B2, you get 31 tokens and the other person would get 120 tokens.

Please click on the label of the action you choose to play.

		Other Participant's Actions	
		B1	**B2**
Your Actions	○ **A1**	95, 95	31, 120
	○ **A2**	120, 31	62, 62

Submit

Prisoner's Dilemma 2

You will now play a simple game. You will have to choose one of two actions: A1 or A2. Once surveys have been submitted, we will randomly pair you with another participant and your payoff will depend on both of your actions. Namely, we will look at the pair of numbers corresponding to both of your actions (A1 or A2 for you, B1 or B2 for your partner). The first (underlined) number of the entry will correspond to your payoff (in tokens), while the second number in that entry will correspond to the payoff your partner would get.

For example, if you pick A1 and the person you are randomly matched with picked B1, then you would both get 80 tokens. If you pick A1 and the person you are matched with picked B2, you get 24 tokens and the other person would get 100 tokens.

Please click on the label of the action you choose to play.

		Other Participant's Actions	
		B1	**B2**
Your Actions	○ **A1**	80, 80	24, 100
	○ **A2**	100, 24	50, 50

Submit

C.6 Cognitive Ability

CRT Questions

This next task asks you to answer five logical questions. You will have up to 20 seconds to answer each question and will be paid 20 tokens for each question answered correctly.

Press Here to Start

Time left for this question: **0:16**

A monitor and a keyboard cost $350 in total. The monitor costs $300 more than the keyboard. How much does the keyboard cost?

Submit

Time left for this question: **0:16**

It takes 10 computers 10 minutes to run 10 simulations. How long does it take 200 computers to run 200 simulations?

Submit

Time left for this question: **0:13**

In a lake, there is a patch of lily pads. The patch doubles in size every day. If it takes 36 days for the patch to cover the entire pond, how many days would it take to cover half the pond?

Submit

Time left for this question: **0:12**

Professor Wiseman spent one-fourth of his life as a boy, one-eight as a youth, and one-half as an active man. If Profesor Wiseman spent 8 years as an old wise man, how many years did he spend as an active man?

Submit

Time left for this question: **0:14**

A 4 foot pole casts a shadow that is 2 feet long on the ground. If the pole was 16 feet in height, how long would the shadow be?

Submit

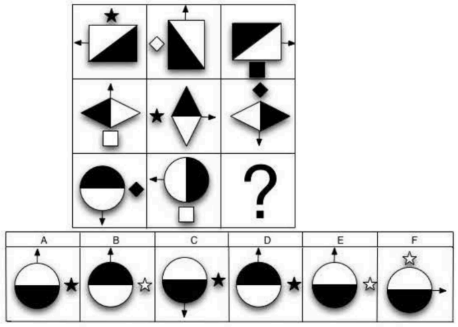
Raven Questions

This next task asks you to solve five logical puzzles. You will be given thirty seconds to complete each puzzle, and will be paid 20 tokens for each puzzle solved correctly.

Press Here to Start

Time left to complete this page: **0:26**

What image completes the pattern?

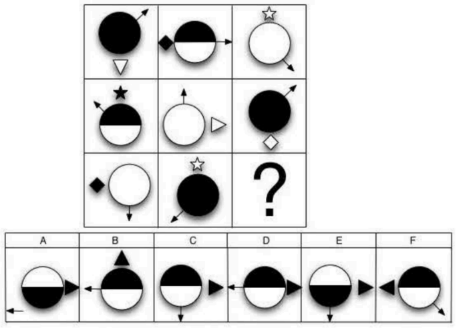


○ A ○ B ○ C ○ D ○ E ○ F

Submit

Time left to complete this page: **0:16**

What image completes the pattern?

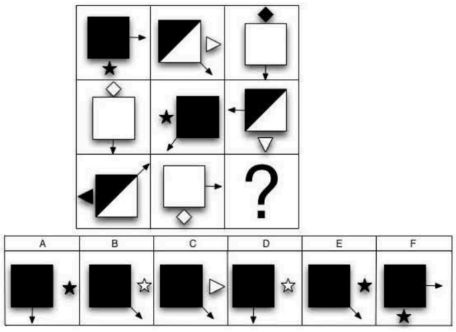


○ A ○ B ○ C ○ D ○ E ○ F

Submit

Time left to complete this page: **0:27**

What image completes the pattern?

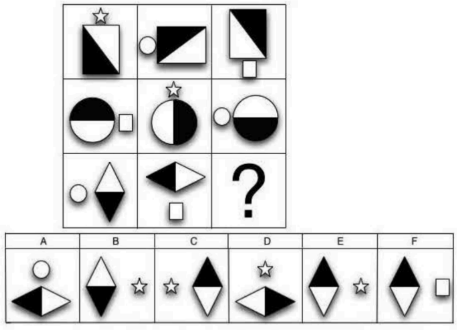


○ A ○ B ○ C ○ D ○ E ○ F

Submit

Time left to complete this page: **0:20**

What image completes the pattern?

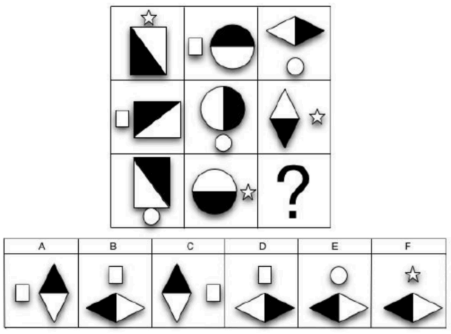


○ A ○ B ○ C ○ D ○ E ○ F

Submit

Time left to complete this page: **0:28**

What image completes the pattern?



○ A ○ B ○ C ○ D ○ E ○ F

Submit

C.7 Confidence

Confidence in Jellybean Counting Questions

We will now measure your ability to assess numbers quickly.

We will show you three pictures of jars of jellybeans. Please give us your best guess as to the number of jellybeans in each jar.

See Pictures

Please enter the number of jellybeans you think are in this jar (between 1 and 3000).

Submit

How confident are you of your answer to this question?

- ○ Not confident at all
- ○ Not very confident
- ○ Somewhat unconfident
- ○ Somewhat confident
- ○ Very confident
- ○ Certain

Submit

Please enter the number of jellybeans you think are in this jar (between 1 and 3000).

Submit

How confident are you of your answer to this question?

- Not confident at all
- Not very confident
- Somewhat unconfident
- Somewhat confident
- Very confident
- Certain

Submit

Please enter the number of jellybeans you think are in this jar (between 1 and 3000).

Submit

How confident are you of your answer to this question?

- Not confident at all
- Not very confident
- Somewhat unconfident
- Somewhat confident
- Very confident
- Certain

Submit

C.8 Competitive Preferences

Instructions

This next task asks you to add together series of numbers. You will be given three minutes to complete as many sums as possible. When all surveys are submitted, we will randomly group you with 3 other people (so you will be in a group of 4). **You will be paid only if you achieve the highest number of correctly answered sums within this group, in which case you will be paid 40 tokens per sum correctly answered.**

In case of a tie between those who completed the highest number of sums, we will randomly determine the participant who will be paid.

Press Here to Start

Summation Task

Time left to complete this task **2:57**

67 + 24 + 43 + 18 + 23 =

Submit

Choice Between Payment Schemes

You will be given an additional three minutes to correctly answer as many sums as possible. Please pick how you would like to be paid from the following two options:

- ○ 10 tokens per sum correctly answered; or
- ○ When all surveys are submitted, we will randomly group you with 3 other people (so you will be in a group of 4). We will compare the number of sums you correctly answer now with the number of sums the other 3 correctly answered in the previous stage you just concluded. You will be paid only if you achieve the highest number of correctly answered sums within this group, in which case you will be paid 40 tokens per sum correctly answered. In case of a tie, we will randomly determine the participant who will be paid.

Press Here to Start

C.9 Attention Check Questions

Attention Check Question 1

When a big news story breaks people often go online to get up-to-the-minute details on what is going on. We want to know which websites people trust to get this information. We also want to know if people are paying attention to the question. To show that you've read this much, please ignore the question and select ABC News and The Drudge Report as your two answers.

When there is a big news story, which is the one news website you would visit first? (Please only choose one)

☐ New York Times website	☐ The Drudge Report	☐ The Associated Press (AP) website
☐ Huffington Post	☐ Google News	☐ Reuters website
☐ Washington Post website	☐ ABC News website	☐ National Public Radio (NPR) website
☐ CNN.com	☐ CBS News website	☐ USA Today website
☐ FoxNews.com	☐ NBC News website	☐ New York Post Online
☐ MSNBC.com	☐ Yahoo! News	☐ None of these websites

Submit

Attention Check Question 2

People are very busy these days and many do not have time to follow what goes on in the government. Some do pay attention to politics but do not read questions carefully. To show that you've read this much, please ignore the question below and just hit the k key on your keyboard. That's right, just press the k key and ignore the choices below.

How interested are you in information about what's going on in government and politics?

- ○ Extremely interested
- ○ Very interested
- ○ Moderately interested
- ○ Slightly interested
- ○ Not interested at all

Submit

Attention Check Question 3

We would like to get a sense of your general preferences.

Most modern theories of decision making recognize that decisions do not take place in a vacuum. Individual preferences and knowledge, along with situational variables can greatly impact the decision process. To demonstrate that you've read this much, just go ahead and select both red and green among the alternatives below, no matter what your favorite color is. Yes, ignore the question below and select both of those options.

What is your favorite color?

- ☐ White
- ☐ Pink
- ☐ Black
- ☐ Green
- ☐ Red
- ☐ Blue

Submit