

Appendix

A Additional Results

This sections breaks down the main results for each of the rounds type, adding some additional controls. Table 5 presents the results of an analysis of whether the fear treatments cause lower levels of mobilization in the standard rounds. Column 1 presents the difference in means without any control variables, Column 2 adds controls for factors that are randomly assigned such as order of the standard rounds and the average signal by participant, and Column 3 adds controls for participant characteristics including pre-treatment cooperation, gender, and age.

Table 5: Effect of fear treatment in standard rounds

	<i>Dependent variable: Mobilization</i>		
	(1)	(2)	(3)
Fear Treatment	0.022 (0.028)	0.016 (0.028)	0.016 (0.027)
Order of Round		-0.003 (0.017)	0.003 (0.016)
Signal		-0.070*** (0.011)	-0.076*** (0.012)
Average Pre-Treatment Mobilization			0.260*** (0.078)
Female			0.012 (0.030)
Age			-0.002 (0.005)
Intercept	0.613*** (0.021)	0.690*** (0.031)	0.572*** (0.129)
Observations	1,810	1,810	1,740
R ²	0.001	0.045	0.060

*p<0.1; **p<0.05; ***p<0.01

Standard errors clustered at the session level in parentheses.

The dependent is the mobilization rate by participant during the five standard (noise, human co-player) post-treatment rounds. Order of Round is a session-level randomly assigned variable indicating the sequence in which the standard rounds appeared (first, second, or third after treatment). Signal is the value of the signal of the regime's strength in the standard rounds, randomly assigned at the individual level. The average pre-treatment mobilization is the average mobilization rate by participant during the five pre-treatment rounds. Female is a dummy indicating gender and age is the participant's age. The unit of analysis is the participant.

In addition to the main effect of the treatment, control variables have logical relationships with participants' mobilization choices. Participants who receive higher signals of the regime's strength on average mobilize less. In addition, participants who mobilize more in the pretreatment period continue to have higher mobilization rates during the post-treatment period. The order in which the standard round appears, gender, and age have no relationship with mobilization rates (Table 6 and Table 7).

Table 6: Effect of fear treatment in full information rounds

	<i>Dependent variable: Mobilization</i>		
	(1)	(2)	(3)
Fear Treatment	0.039 (0.031)	0.057* (0.031)	0.048 (0.030)
Order of Round		0.033* (0.018)	0.022 (0.019)
Signal		-0.066*** (0.018)	-0.068*** (0.019)
Average Pre-Treatment Mobilization			0.270*** (0.042)
Female			0.021 (0.027)
Age			0.003** (0.001)
Intercept	0.630*** (0.015)	0.612*** (0.045)	0.411*** (0.039)
Observations	1,950	1,950	1,880
R ²	0.002	0.026	0.042

*p<0.1; **p<0.05; ***p<0.01

Standard errors clustered at the session level in parentheses.

The dependent is the mobilization rate by participant during the five noiseless post-treatment rounds. Order of Round is a session-level randomly assigned variable indicating the sequence in which the standard rounds appeared (first, second, or third after treatment). Signal is the value of the signal of the regime's strength, randomly assigned at the individual level. Average pre-treatment mobilization is the average mobilization rate by participant during the five pre-treatment rounds. Female is a dummy indicating gender and age is the participant's age. The unit of analysis is the participant.

Finally, 8 presents the results for all three kinds of rounds when interacting the treatment with the spread between the R and $-c$ payoffs in the game.

Table 7: Effect of fear treatment in computer rounds

	<i>Dependent variable: Mobilization</i>		
	(1)	(2)	(3)
Fear Treatment	-0.028 (0.028)	-0.021 (0.027)	-0.022 (0.025)
Order of Round		-0.005 (0.017)	0.002 (0.016)
Signal		-0.062*** (0.013)	-0.066*** (0.012)
Average Pre-Treatment Mobilization			0.231*** (0.054)
Female			0.049* (0.025)
Age			0.004*** (0.001)
Intercept	0.633*** (0.022)	0.698*** (0.039)	0.454*** (0.056)
Observations	1,950	1,950	1,880
R ²	0.001	0.032	0.051

*p<0.1; **p<0.05; ***p<0.01

Standard errors clustered at the session level in parentheses.

The dependent is the mobilization rate by participant during the five computer co-player post-treatment rounds. Order of Round is a session-level randomly assigned variable indicating the sequence in which the standard rounds appeared (first, second, or third after treatment). Signal is the value of the signal of the regime's strength, randomly assigned at the individual level. Average pre-treatment mobilization is the average mobilization rate by participant during the five pre-treatment rounds. Female is a dummy indicating gender and age is the participant's age. The unit of analysis is the participant.

Table 8: Effect of fear treatment by payoff spread

	<i>Dependent variable: Mobilization</i>		
	Standard	Computer	Full Information
Fear Treatment	.073 (.095)	-.148* (.084)	-.201 (.124)
Spread	.073*** (.022)	.088*** (.027)	.059 (.041)
Fear treatment \times spread	-.018 (.035)	.054 (.032)	.092* (.049)
Constant	.430*** (.063)	.402*** (.068)	.481*** (.105)
Observations	1810	1934	1936
R ²	.01	.03	.03

*p<0.1; **p<0.05; ***p<0.01

Standard errors clustered at the session level in parentheses.

The dependent is the mobilization rate by participant during the five noiseless post-treatment rounds. Spread is the difference between R and $-c$. The unit of analysis is the participant.

B Equilibrium Strategies

B.1 Threshold

In addition to analyzing the decision to mobilize, we also estimate the mean threshold at which people decide to mobilize in each round. Following Heinemann, Nagel and Ockenfels (2004); Treviño and Szkup (2015) we estimate the threshold using the logistic regression

$$prob(Mobilize) = \frac{1}{1 + \exp(a + bX)}$$

where X is the signal received. Figure 6 shows the probability of mobilization as a function of the signal for each type of round. In each case $-\frac{a}{b}$ can be interpreted as the mean threshold used.

Figure 6: Probability of Mobilization by Round

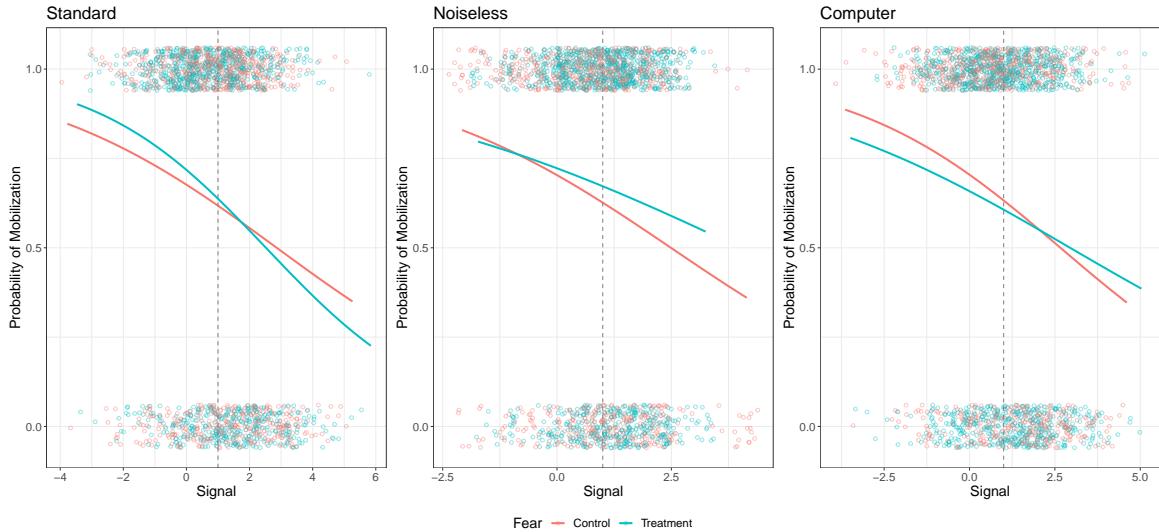


Table 9 shows the estimated Thresholds using the method proposed by Treviño and Szkup (2015)¹²

¹²Treviño and Szkup (2015) first select the subjects that actually play a threshold strategy and

Table 9: Estimated Threshold by Type of Round

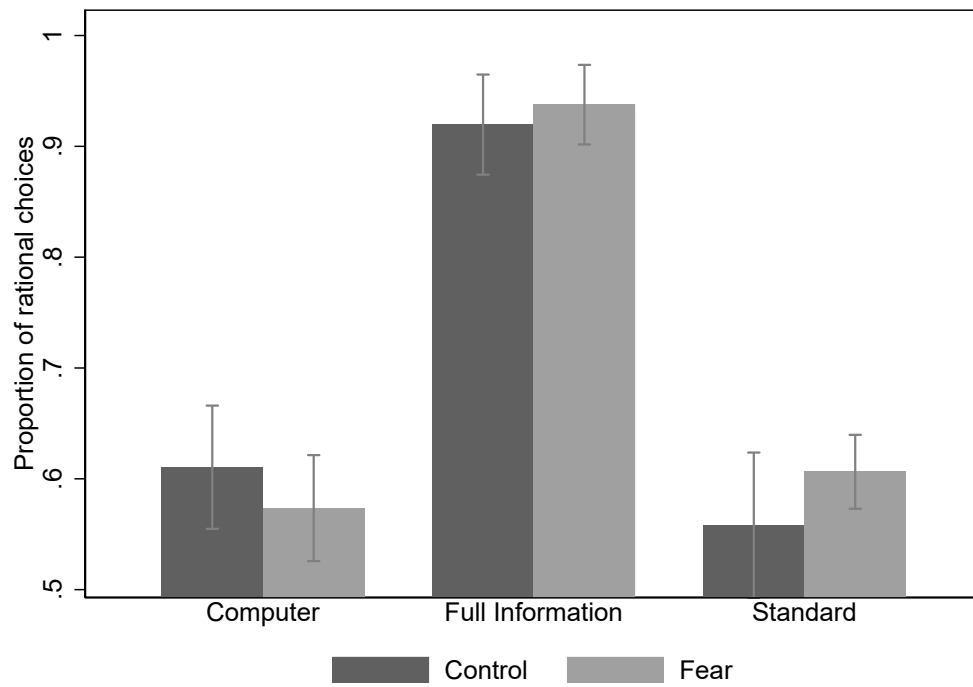
	Standard	Computer
Fear	2.52	2.95
Control	2.86	2.66

B.2 Rational Play

Following Figure 1 we establish a fully rational choice to be one in which a subject choose to mobilize if she receives a signal smaller than 1, and abstain if the signal is larger than 1 in the rounds in which subjects play a game with a noisy signal. For the game without noise we define a choice as being rational if it is rationalizable. Figure 7 shows the mean of rational choices in each type of round. The results are similar to those in Figure 3. They show that in standard rounds subjects that are in the fear condition make slightly more choices that are rational, but there is no such effect in full information or computer rounds.

then estimate the threshold across treatment conditions. We report here the estimated result for all subjects.

Figure 7: Rational choices by type of round



C Alpha-Amylase

In this section we report our results for subjects that provided saliva samples before and after the experiment. We see that conditional on levels of alpha-amylase measure previous to the emotional induction, our treatment had no effect on the amount of unites per mililiter (U/ml) of salivary alpha-amylase.

Table 10: Effect of Treatment on levels of Alpha-Amylase

	<i>Dependent variable:</i>
	Amylase
Fear Treatment	7.620 (5.377)
Amylase Baseline	0.894*** (0.044)
Constant	16.768*** (3.508)
Observations	298
R ²	0.639

Note: *p<0.1; **p<0.05; ***p<0.01

D Alpha-Amylase as Predictor

Table 11: Alpha-Amylase as Predictor

	<i>Dependent variable:</i>		
	Mobilization		
	(1)	(2)	(3)
Amylase Difference	-0.0002 (0.0002)	-0.0002 (0.0002)	-0.0002 (0.0002)
Signal		-0.036 (0.024)	-0.035 (0.024)
Female			0.016 (0.020)
Age			0.004* (0.002)
Intercept	0.629*** (0.009)	0.663*** (0.026)	0.559*** (0.047)
Observations	361	361	361
R ²	0.003	0.007	0.017
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01		

E Post Hoc Power Calculations

Did the fear inductions in this experiment actually induce meaningful levels of fear? We measured fear in two ways: 1) using self-reports following the PANAS Scale (Clark, Tellegen et al., 1988), and 2) using alpha-amylase levels taken from saliva samples before and after the fear induction (Nater et al., 2005). We find that the fear inductions did cause large, statistically significant increases in self-reported fear, but not in alpha-amylase levels. Which of these two contradictory manipulation checks should we believe?

One consideration in this decision is how well-powered each of the two analyses are. Alpha-amylase has been validated as a biomarker of fear experiences (Buchanan, Bibas and Adolphs, 2010), but it varies greatly across individuals, with the time of day, and based on activities like exercise or eating and drinking (Nater et al., 2007).

In this appendix we conduct a reverse power calculation to determine whether our two manipulation checks are both well-powered to detect reasonably sized effects in our experiment. We use the `DeclareDesign` package to conduct the power simulations. We test the power to detect a treatment effect of half the mean levels of fear and alpha-amylase in the control group using the actual level of variability in the observed measure in our data (control group standard error). For fear, we calculate the power to detect an effect of 0.7 on our five-point scale, and for amylase, this is the power to detect an effect of ~ 3.3 . For fear, the control group standard deviation is 0.6, and for alpha-amylase, the control group standard deviation is 35.

The estimated power curves are in Figures 8 and 9, which plot power for each tests for different sample sizes.

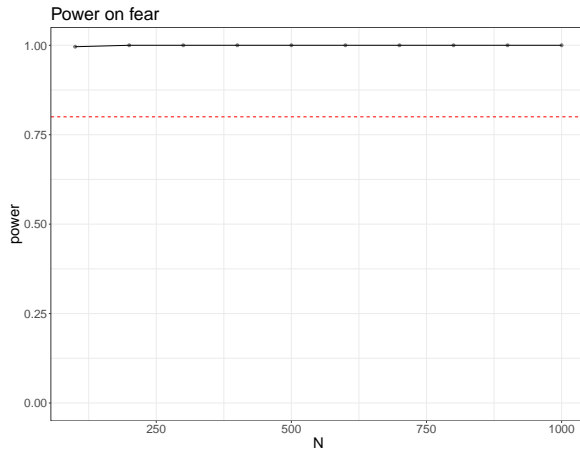


Figure 8:
Power Analysis Fear

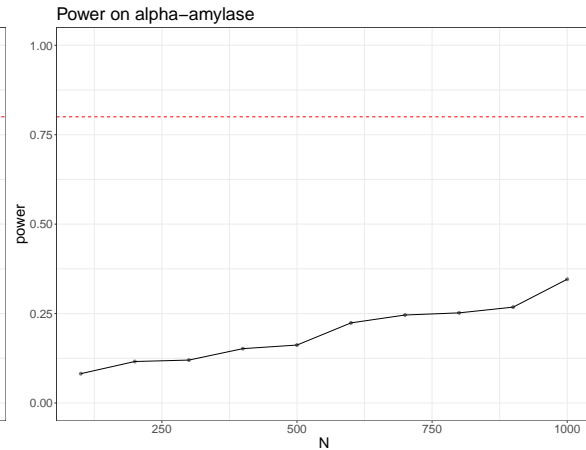


Figure 9:
Power Analysis Alpha-amylase

Based on these assumptions, to achieve 80% power to do a test with these two measures, we have a large enough sample for self-reported fear but not for alpha-amylase. That means we are well powered in our study to detect an effect on self-

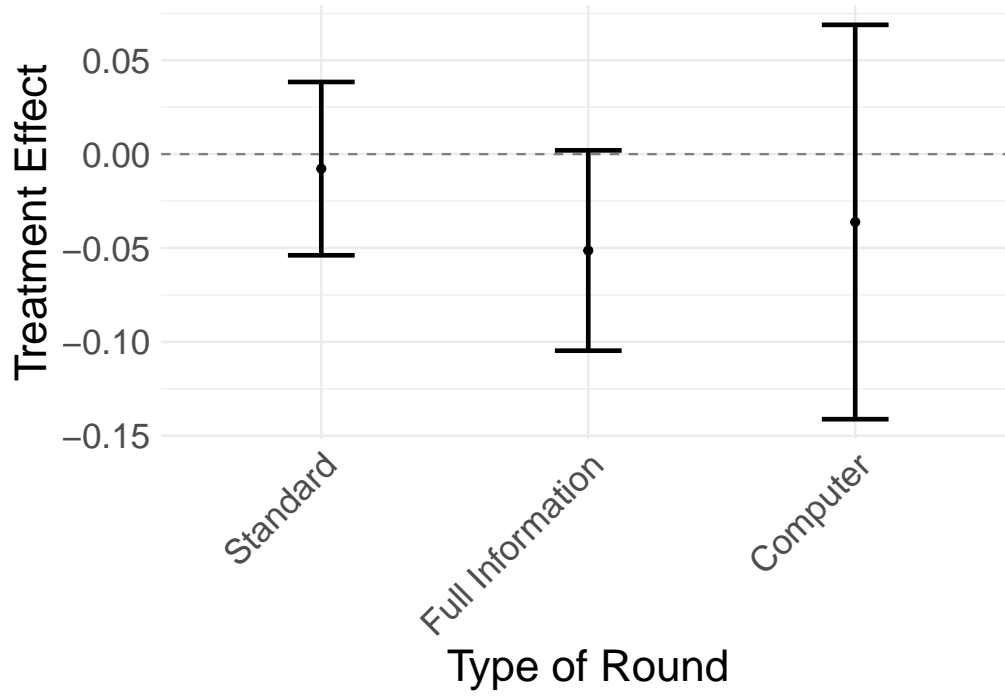
reported fear but under-powered to detect an effect on alpha-amylase. Even with a sample of 1,000 participants we are below 40% power.

This analysis suggests that one plausible explanation for the divergent results on the two manipulation checks is that the alpha-amylase analysis is severely under-powered. However, this raises questions about whether the study is well powered overall. However, we initially relied on other psychological studies that use these measures (alpha-amylase) and, with very similar treatments, found significant effects with even smaller samples than the one we have in our study.

Overall, we think these power calculations support the interpretation that the null effects are real and not a figment of us not moving fear.

F Results for First Five Rounds

Figure 10: Effect of Fear on Mobilization - First Five Rounds



G Mediation

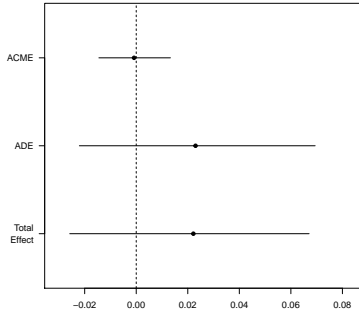


Figure 11:
Mediation Fear

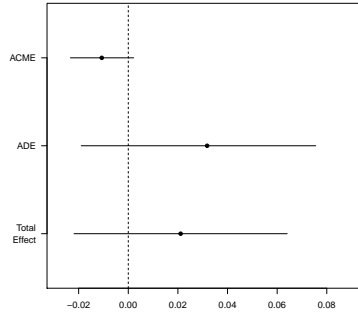


Figure 12:
Mediation Surprise

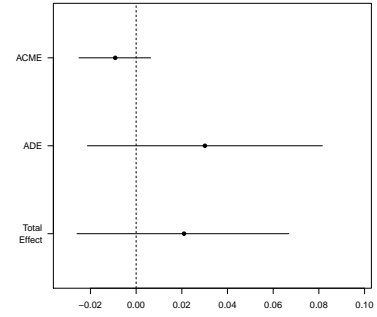


Figure 13:
Mediation Fear & Surprise

H Instructions for the Experiment

Welcome, thank you for your attendance. This activity explores how you make strategic decisions. By coming today, you have already earned \$7 that will be delivered to you at the end of the activity. Please turn off your cell phone. During the experiment you are not allowed to communicate with other participants or with people outside of the room.

The experiment consists of 5 practice rounds followed by three sets of five independent rounds of play (15 rounds in total). In most rounds you will be randomly paired with another person in the room, and in other rounds you will play with a computer. Your payoff for each round will depend on your choice, on the choice of the player you have been paired with (your “pair member”), and on chance. At the end of the activity, the average of three randomly selected rounds, one from each set, will be paid and you will be given your earnings in private. You will be paid the average of the three selected rounds. The currency in this experiment is called experimental currency units (ECU), and will be converted to dollars at the end of the experiment at a rate of:

50 cents of a dollar per ECU

Part 1: Information and Decision making for All Rounds

In each round of the experiment you will have an initial endowment of 4 ECU, which will be added to your earnings in that round. You will have 30 seconds in each round.

In each round both you and your pair member will make a choice based on the information you receive about an unknown number X . The number X is randomly chosen in every round. This number will be relevant for both you and your pair member. Typically, neither you nor the other member of your pair will know what the number X is. The probability distribution from which X is chosen is presented in Figure 1.

The probability distribution depicted in Figure 1 is called a normal distribution with mean 1 and standard deviation of 1.

Figure 1 shows that although you will not be told the value of X , you will know that 95% of the time the value of the number X will be somewhere between $-.96$ and 2.96 and that it is centered around 1. This means that the number X can take one of many possible values, but the numbers that are closer to 1 have a higher probability to be drawn than those numbers that are further away from 1. The spread of the distribution, how *wide* the curved line in Figure 1 is, is called its standard deviation. The smaller the standard deviation, the higher the probability that the number that is drawn will be close to 1, the mean of the distribution.

As stated above, the number X will be the same for you and your pair member and will be relevant for your payoff.

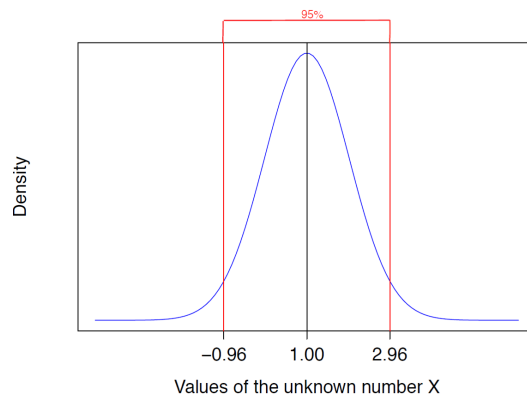


Figure 14: Graph of the probability density function of the unknown number X

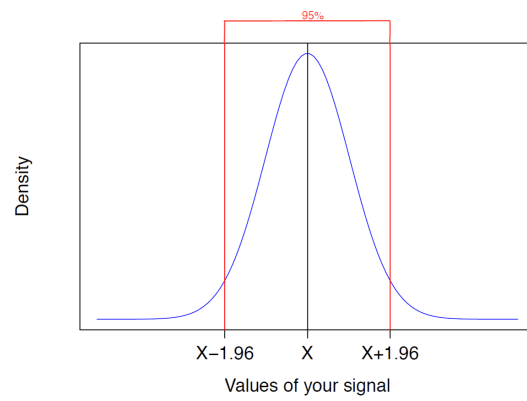


Figure 15: Graph of the probability density function of your signal, for a given unknown number X

In most rounds you will not know the value of X that is drawn, you and your pair member will each receive a different signal giving you a hint as to what X is. This signal will be drawn at random from a similar normal distribution as the one shown in Figure 1 above, except that the mean will now be the number X and the standard deviation will be 1. This means that, for the value of X that is selected in each round, 95% of the times your signal will have a value between $X-1.96$ and $X+1.96$. So if the unobserved number X is 3 for example, your signal will come from a distribution with mean 3 and standard deviation 1, so that 95% of the times your signal will be a number between 1.04 and 4.96. Figure 2 portrays the distribution from which your signal will be drawn, for any number X .

On the basis of your signal you are going to make your decision. This decision consists on choosing between two different alternatives: A or B.

Payoff to Choosing Alternative B

If you decide to choose B, your payoff for the round will be your endowment minus a value C no matter what your pair member does. If you choose B, then you will receive a payoff of

$$- C$$

no matter what your pair member chooses, which will be added to your endowment in that round.

Payoffs to Choosing Alternative A

If you decide to choose A, then your payoff will depend on how large the unknown number X is and on whether your pair member selects A or B.

Choosing alternative A always has a cost to you equal to the value of the unknown number X . Thus, the higher the unknown number X is, the less you will receive from choosing Alternative A.

If you choose A and your pair member decides to choose A, we say that the action is successful, and both participants receive an extra payoff of Y . Therefore, in the case of a successful action, you receive

$$Y - X$$

which will be added to your endowment in that round.

If you choose A and your pair member chooses B, we say that the action is not successful, and neither you nor your pair member receive the extra payoff. Therefore, in the case of a not successful action, you receive

- X

which will be added to your endowment in that round.

The following table explains how the payoff of decision A and B depends on the true value of X, and on the action you and your pair member choose. The table explains that the payoff that you and your pair member will receive depend on the actions you and your pair member choose. The first column shows the relevant information for a round, and the second column shows the possible payoffs. The payoffs are inside the small tables in the second column. Your payoff is the first number in the cell, and your pair member's payoff is the number after the comma. Remind that in each round your final payoffs consist of these payoffs plus the endowment.

Information:	Payoffs Table									
For unknown number X, Given number Y, Given number C	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <th>A</th> <td>Y - X, Y - X</td> <td>-X, -C</td> </tr> <tr> <th>B</th> <td>-C, -X</td> <td>-C, -C</td> </tr> </tbody> </table>		A	B	A	Y - X, Y - X	-X, -C	B	-C, -X	-C, -C
	A	B								
A	Y - X, Y - X	-X, -C								
B	-C, -X	-C, -C								
For unknown number X, Y = 2, C = 0	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <th>A</th> <td>2 - X, 2 - X</td> <td>-X, 0</td> </tr> <tr> <th>B</th> <td>0, -X</td> <td>0, 0</td> </tr> </tbody> </table>		A	B	A	2 - X, 2 - X	-X, 0	B	0, -X	0, 0
	A	B								
A	2 - X, 2 - X	-X, 0								
B	0, -X	0, 0								
For unknown number X, Y = 4, C = - 1	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <th>A</th> <td>4 - X, 4 - X</td> <td>-X, 1</td> </tr> <tr> <th>B</th> <td>1, -X</td> <td>1, 1</td> </tr> </tbody> </table>		A	B	A	4 - X, 4 - X	-X, 1	B	1, -X	1, 1
	A	B								
A	4 - X, 4 - X	-X, 1								
B	1, -X	1, 1								

Notice that your payoff in each round depends on the value of the unknown number X, the values of Y and C, your choice, and the choice of your pair member. Throughout the rounds you will notice that the values of Y and C change.

Let us consider two examples:

First, if you receive $Y = 2$ and $C = 0$, if you choose B, then you receive a payoff of

$$4 - 0 = 4$$

no matter the action of your pair member.

If both you and your pair member decide for A, we say that the action is successful, and both participants receive the amount of

$$4 + 2 - X = 6 - X$$

If only you choose A (your pair member chooses B), then action A is not successful and you will receive

$$2 - X$$

Second, if you receive $Y = 4$ and $C = -1$, if you choose B, then you receive a payoff of

$$4 - (-1) = 5$$

no matter the action of your pair member.

If both you and your pair member decide for A, we say that the action is successful, and both participants receive the amount of

$$4 + 4 - X = 8 - X$$

If only you choose A (your pair member chooses B), then action A is not successful and you will receive

$$4 - X$$

Each round finishes after both you and your pair member have decided about choosing action A or action B. After a round is over, you will proceed to the next round and face the same decision until we read the instructions for another set of rounds. You will not receive any information about the results of each round. In each round of the experiment, you will be randomly paired with someone in the room, except in the cases you are paired with a computer. The computer will not be given the true value of the number X , and neither will you, but will also receive a signal of its value in the exact same manner as previously explained. Given its signal the computer will always make optimal decisions, supposing you are making optimal decision too, meaning that given the signal that it receives about the number X , it takes action A only when the value of X is low enough to induce a successful action. In other words, the computer chooses action A only when it calculates that you will also choose action

A, given the signal it receives about the value of the number X . If it calculates that the probability of action A being unsuccessful even if it takes action A is too high, it will choose action B. If it calculates that the probability of action A being successful is high enough if it choose action A it will then choose action A.

In some rounds the signal both you and the member of your pair will receive about the number X will come from a normal distribution with mean X and standard deviation 0. In other words the signal you will receive will be the true value of the number X that is drawn from the normal distribution with mean 1 and standard deviation 1.

At the beginning of each set of rounds you will be told whether you are being paired with another person in the room or a computer and whether the signal you are receiving from the number X is its true value or it is noisy.

In order for you to become familiar with the process, we will begin with five practice rounds that will not count towards your final payoff. We will then read another set of instructions before continuing with the activity. As a part of this experiment you will be asked to view a video clip and to answer some questions at the end.

Your answers for the experiment are anonymous and will remain private.

Part 2: Instructions to be read but not delivered

Video

We will now proceed to the video clip. Please watch the video clip in your computer and wear the headphones while doing so. The video last approximately 7 minutes.

Part C: Matching with a computer

In the following 5 rounds you will be matched with a computer. The computer will not be given the true value of the number X , and neither will you, but will also receive a signal of its value in the exact same manner as previously explained. Given its signal the computer will always take optimal decisions, supposing you are taking optimal decision too, meaning that given the signal that it receives about the number X , it takes action A only when the value of X is low enough to induce a successful action. In other words, the computer chooses action A only when it calculates that you will also choose action A, given the signal it receives about the value of the number X .

If it calculates that the probability of action A being unsuccessful even if it takes action A is too high, it will choose action B. If it calculates that the probability of action A being successful is high enough if it choose action A it will then choose action A.

Part V: Knowledge about number X

In the following 5 rounds the signal both you and the member of your pair will receive about the number X will come from a normal distribution with mean X and standard deviation 0. In other words the signal you will receive will be the true value of the number X that is drawn from the normal distribution with mean 1 and standard deviation 1.

Part S: Playing with a human

In the following 5 rounds you will be matched in every round with someone in the room. You and the member of your pair will receive a signal about the number X , but will not know it with certainty.

I Emotion Stimuli

In order to assess the impact of the emotional stimuli we ran two pilot studies ($N = 50$ and $N = 43$). The first pilot ($N = 50$) was used to determine which was the selected stimuli were most fear inducing. The second pilot ($N = 43$) was conducted to confirm the chosen stimuli were effective in the experimental context.

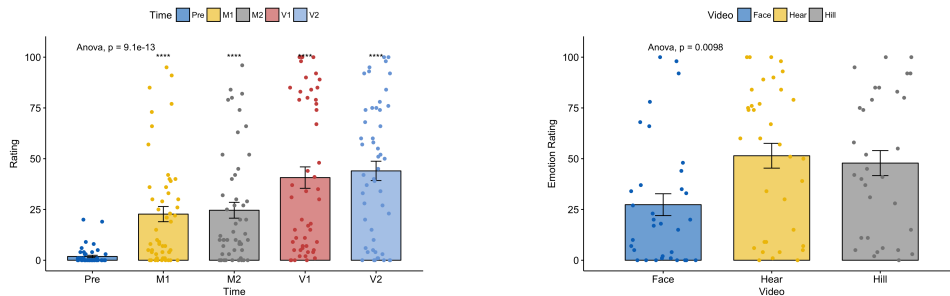
I.1 Selection

To selection audio and video clips that would successfully induce fear we ran a online pilot study through Amazon’s mTurk service in which participants would view audio and video clips, then would rate their emotions after each as well as at baseline. There were four possible audio clips and three video clips of which participants random viewed two video and two audio clips. The audio clips came from the Soundtrack for movie ”The Ritual”: ”Search For Hutch”, ”Piggyback”, ”Through The Trees”, ”Stalker”. The video clips came from a variety of sources including: the horror game ”Silent Hill”; a montage of clips from horror films including ”The Mummy”, ”Signs”, and ”What Lies Beneath”; and a short horror film ”I Hear it Too”. The montage was used in a previous unpublished study to induce facial expression for a database. To the authors knowledge, the other two clips had not been previously tested, but had excellent face validity. All video clips were adjusted to have approximately the same length. Similarly the audio clips were cut to have approximately the same length.

On average, all audio and video clips increase fear ratings above baseline measurements. Additionally, as expected, video clips were more effective compared to the audio clips. Importantly though, there was no evidence that the order of the clips effected rating indicating we could evaluate each without evaluating it’s viewing order (see Figure 16a).

An analysis of variance revealed that ”I Can Hear it Too” and the ”Silent Hill” clips were the most effective in inducing fear, $p < .001$ (see Figure 16b). Although not significant, the former yielded slightly higher emotion ratings as well as slightly more participants voted it as the most fear inducing. For that reason, it was selected to be used for the final experiment.

Although the audio clips all significantly increase fear, there was no clear best choice. This in conjunction with the fact that the clips were relatively long and would increase the total experiment time, we elected not to use these clips in the final experiment. Alternatively, we decided to use a technique used in previous studies, in which a threat response was induced with a loud white noise (Pattwell et al., 2012). This stimulus was provided one major advantage in that it was very quick, approximately one second.



(a) Graph of the Emotion Ratings of Fear over time in the Selection Pilot (b) Graph of the Emotion Ratings of Fear for the Movies in the Pilot

Figure 16: Emotion Ratings of Fear in the Pilot

I.2 Validation

An additional pilot was conducted to ensure the selected stimuli were effective in a similar context for the final experiment (in a large computer lab with multiple people as opposed to online by one's self). This pilot was conducted in the same environment as the final experiment with a moderate sample size ($N = 43$). We used the most effective video clip "I Hear it Too" from the first pilot as well as a loud white noise stimulus (similar to that of Pattwell et al., 2012)

Participants' were significantly more afraid after viewing one of the fearful stimuli compared to baseline, $F(2, 40) = 32.725$, $p < .001$. Specifically, their fear ratings increased in response to both the video, $t(33) = 7.35$, $p < .001$, and the audio clip, $t(42) = 2.688$, $p = .01$ (see Figure 17).

Taken together with the first pilot study, these indicate that the stimuli were effective at inducing fear.

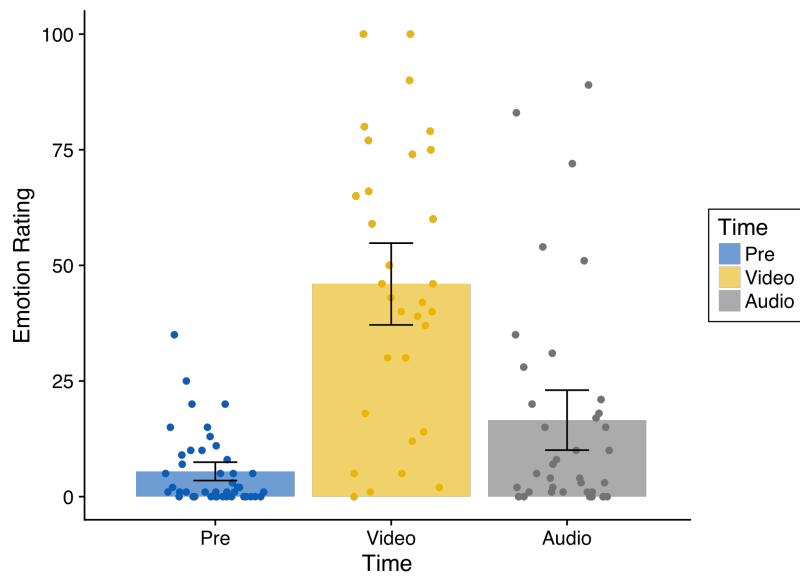


Figure 17: Graph of the Emotion Ratings of Fear over time in the Pilot