An Experimental Study of Coarse Correlated Equilibrium for Delegation to Connected Autonomous Systems*

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Abstract

In a coarse correlated equilibrium, individuals have an incentive to delegate to a device that selects outcomes according to a known probability distribution. This delegation is made before the specific outcome is selected, analogous to a commitment to allow an autonomous vehicle to take actions on the human driver's behalf. This experiment studies individuals' willingness to delegate to such correlating devices across a range of payoff and correlating device treatments. These include games with multiple Pareto-rankable pure strategy equilibria that differ in their associated risk, as well as games without a pure strategy equilibrium in which a correlating device can raise expected payoffs relative to the unique mixed strategy equilibrium. We find that subjects seldom delegate their decision-making authority, and the rate of committing to the device decreases over time. Average earnings are significantly higher when both parties commit to it than in cases without a device. However, in games we study with multiple pure strategy Nash equilibria, one-sided commitment yields substantially lower average earnings.

Keywords: *Games, Economics Experiment, Coordination, Delegation, Automobile*

JEL Codes: *C70, D70, D80*

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1 Introduction

Humans often make imperfect or sub-optimal decisions, such as when driving if confronted with unexpected challenges, and when distracted or inattentive. The life-threatening consequences of their errors could be made less likely by new technologies that allow them to avoid these mistakes. Emerging automobile applications, particularly connected and autonomous transportation systems (CATS), are designed to help prevent these human errors. These can be autonomous vehicles that operate without human driver input, real-time traffic rerouting devices for extreme cases such as wildfire evacuations, and automated emergency braking systems that can prevent imminent crashes. These technologies promise significant improvements in efficiency and safety, in part by correlating vehicle movements.

An obvious and fundamental behavioral question for the adoption of these technologies is: when are people willing to let an automated system override human control, and what trade-offs are they willing to accept in doing so? In particular, do individuals choose to avoid risky actions by accepting lower expected payoffs in exchange for reduced risk, and how does this preference interact with the availability of automation or external recommendations? In this study, we use a laboratory experiment to investigate individuals' willingness to delegate to such correlating devices in several stylized games across a range of payoff and device treatments. We find that subjects seldom delegate their decision-making authority, even when mutual delegation can raise expected profits and reduce risk.

A correlation device μ in the present context is a probability distribution over S that sends a private recommendation s_i to player i. The device μ is a Correlated Equilibrium (CE) if following the recommendation s_i is the best response when all others also follow recommendations from S. Previous experimental studies have investigated behavioral aspects of correlated equilibrium and how subjects respond to recommendations, including how payoff structure, learning, and beliefs affect compliance (Cason and Sharma, 2007; Duffy and Feltovich, 2010; Anbarcı et al., 2018; Arifovic et al., 2019; Bone et al., 2024; Cason et al., 2026; Grant and Stauber, 2022).[1] In all cases, players choose whether to adhere to recommendations after receiving them. By contrast, a device μ is a Coarse Correlated Equilibrium (CCE) if *committing* to the device is the best response when all others are also committing to it. Here, commitment means following all recommendations without the option of non-adherence. The benefits of coordination are realized only when all parties commit. Several studies have discussed the set of CCE (first introduced by Moulin and Vial (1978)) in static one-shot games (Forgó et al., 2005; Forgó, 2010; Ray and Gupta, 2013; Moulin et al., 2014).

[1] Other experiments have studied how correlated equilibrium play could emerge without explicit recommendations (Friedman et al., 2022), through payoff-irrelevant public messages (Bone et al., 2025) and how individuals design correlating devices (Anufriev et al., 2026).

In some environments, CCE commitment can increase payoffs relative to Nash equilibrium payoffs, when CE cannot.

Our study is most closely related to Georgalos et al. (2020), who also studied Coarse Correlated Equilibrium. They find that subjects do not commit to the correlation device in an asymmetric game in which commitment to the correlation device is payoff-dominant but not risk-dominant. Unlike our experiment, they did not consider games with mixed strategy or multiple pure strategy equilibria. We examine two three-by-three symmetric games, labeled MixedNE and PureNE, representing two different types of coordination problems. The devices solve coordination problems by reducing risk and, in some cases, increasing expected payoff. The MixedNE game has a unique mixed strategy Nash equilibrium and no pure strategy Nash equilibria. The experiment includes two devices in different sessions for the MixedNE game, Ω and Ω', such that committing to either device increases expected payoffs and reduces risk. The device Ω is a CCE in the extended game, whereas device Ω' is not. We predict that individuals commit to device Ω more often since it is a CCE. The PureNE game has multiple Pareto-rankable pure strategy Nash equilibria, and one of them is payoff-dominant but with high risk. This game introduces a device Φ that can constitute a pairwise risk-dominant (Morris et al., 1995; Maruta, 1997) CCE in the extended game. We predict that subjects will commit to the device to mitigate the risk they face, particularly those who are more risk-averse and loss-averse.

We report results from 24 independent groups with 296 total human subjects in controlled laboratory conditions. Each session includes 40 rounds: some begin with 20 rounds of the PureNE game, followed by 20 rounds with the MixedNE game, or vice versa; and other sessions with 40 rounds of the MixedNE game but with two different devices Ω and Ω' (each for 20 rounds). In both cases, the order was varied randomly across sessions. Subjects within groups of size 12 (on average) are randomly re-paired each round. In each round, subjects first choose whether to commit to the device independently. When they commit, the device selects an action for them based on the announced probability distribution over joint outcomes. Otherwise, the subjects manually select their action directly. If both the subject and the counterpart choose to commit, the device selects the same action for both in these symmetric games. No correlating device is offered in the baseline control sessions. At the end of each session, we elicit subjects' risk and loss preferences.

Subjects in the experiment seldom delegate their decision-making authority, and their rate of committing to the devices decreases over time. This low preference for delegation indicates limited empirical support for CCE. This result echoes existing literature that individuals often intrinsically value decision rights beyond their instrumental benefits (Bartling et al., 2014; Owens et al., 2014; Ferreira et al., 2020; Meemann, 2023) and may resist external control even when it is payoff-improving (Falk and Kosfeld, 2006; Ziegelmeyer et al., 2012).[2] By refusing the correlating device, they expose themselves to greater risk and, in the MixedNE game, lower expected payoffs. Even with the observed low commitment rates, bilateral commitment improves payoffs. When both parties commit to the device, average earnings are significantly higher than in the case without a device or commitment. Relative to the no-device condition, bilateral commitment reduces the incidence of costly miscoordination outcomes and thereby increases average payoffs.

However, the benefits of delegation are not realized under asymmetric adoption. When only one party commits, the device cannot ensure coordination. For the games studied here, the non-committing party's manual action choice interacts with the device-induced action to often produce low-payoff mismatches. As a result, one-sided commitment yields substantially lower earnings than mutual commitment and frequently fails to improve on the no-device benchmark. This pattern is particularly pronounced in the PureNE games, where non-commitment is an empirical best response to the observed low commitment rates of others. This suggests a need for mechanisms that promote *mutual* adoption.

2 Coarse Correlated Equilibrium

A correlation device μ is a probability distribution over outcomes S that sends a private recommendation s_i to player i consistent with some drawn $s \in S$. The device μ is a Correlated Equilibrium (CE) if following the recommendation s_i is the best response when all others also follow their recommendations (Aumann, 1974, 1987). The device μ is a Coarse Correlated Equilibrium (CCE) if committing to the device before s is realized is a best response when all others also commit. *Commit* here means following the device's recommendation regardless of what is prescribed, and a player choosing *Not Commit* does not observe the recommendation and must choose actions without any opportunity to correlate choices with others.

In their empirical study of Coarse Correlated Equilibrium, Georgalos et al. (2020) found that subjects do not commit to the correlation device in several related asymmetric games in which commitment to the correlation device is payoff-dominant but not risk-dominant. We examine two three-by-three symmetric games called MixedNE and PureNE, representing two different types of coordination problems.[3] The devices we study provide potential solutions

[2] In some contexts, however, people seem to prefer delegation to an automated device over delegation to another human (Ivanova-Stenzel and Tolksdorf, 2026), and Cox et al. (2016) find that physicians are more likely to delegate to a hospital discharge recommendation when the decision support system is the default. See Chugunova and Sele (2022) for a survey, who conclude that this preference for delegation arises more often when (unlike the present experiment) the individual can override the recommended choice.

[3] As the second laboratory study of CCE, our symmetric setting is simpler than the asymmetric games in Georgalos et al. (2020). Symmetry is also natural for many traffic situations motivating our study. A

to these coordination problems. The experiment reveals whether individuals commit to the device to coordinate their actions to raise expected payoffs or reduce risk.

2.1 The MixedNE game

The MixedNE game shown in Table 1 has cyclical best response dynamics and no pure strategy Nash equilibrium, analogous to rock-paper-scissors (Cason et al., 2014). This game admits a unique symmetric mixed strategy Nash equilibrium $\sigma_i(A) = \sigma_i(B) = \sigma_i(C) = \frac{1}{3}$, with an expected payoff of 20. The MixedNE game captures a tactical coordination problem with no stable convention, and equilibrium behavior is inherently mixed and risky. This is analogous to dense merging or lane-changing conflicts, in which the best response changes frequently depending on the actions of other drivers.

We propose two devices for the MixedNE game, Ω and Ω', such that committing to either device increases expected payoffs and is less risky. The device Ω is a CCE in the extended game, whereas the other device, Ω', is not. If the CCE concept has empirical substance, we should observe individuals commit to the device Ω more often than the device Ω'. Commitment is analogous to adopting a connected and autonomous transportation system (CATS), where shared and incentive-compatible protocols align expectations across road users and thereby reduce strategic volatility. For example, at a roundabout, the best responses can cycle as drivers react to others' moves; CATS shares real-time position and intent and enforces a common right-of-way rule to prevent conflicts. Analogously, Ω commitment is a self-enforcing equilibrium, whereas Ω' leaves profitable deviations through non-adoption.

	A	B	C
A	40, 40	-20, 60	40, 0
B	60, -20	20, 20	-20, 40
C	0, 40	40, -20	20, 20

Table 1: Payoff table of the MixedNE game

2.1.1 The MixedNE$_\Omega$ treatment

The device Ω assigns probability $\frac{1}{3}$ each to outcomes (A, A), (B, B) and (C, C). Although this set of outcomes on the diagonal does not include the highest payoff of 60, it also eliminates the "minor accident" possibility of a -20 payoff. Table 2 shows the device Ω and the MixedNE

more simplified two-by-two game offers limited scope for meaningful variation across outcomes, making a three-by-three game the simplest setting while remaining easy for participants to understand.

game extended by the device Ω.[4] The label *Com* refers to commitment to the device. (Com, Com) is a pure strategy Nash equilibrium with an expected payoff of $26\frac{2}{3}$. Therefore, committing to the device (Com, Com) is a CCE for risk-neutral players. And, since $26\frac{2}{3} > 20$, committing to the device yields a higher expected payoff than the unique equilibrium of the game without commitment. It is also less risky, avoiding the low payoffs of 0 or -20.

	A	B	C
A	0.33	0	0
B	0	0.33	0
C	0	0	0.33

	Com	A	B	C
Com	$26\frac{2}{3}$, $26\frac{2}{3}$	$33\frac{1}{3}$, 20	$13\frac{1}{3}$, 20	$13\frac{1}{3}$, 20
A	20, $33\frac{1}{3}$	40, 40	-20, 60	40, 0
B	20, $13\frac{1}{3}$	60, -20	20, 20	-20, 40
C	20, $13\frac{1}{3}$	0, 40	40, -20	20, 20

Table 2: Device Ω (left) and the extended MixedNE game induced by Device Ω (right)

2.1.2 The MixedNE$_{\Omega'}$ treatment

Using the same MixedNE game shown in Table 1, in another treatment we offer device Ω' that assigns probabilities of 0.3, 0.1, and 0.6 to outcomes $(A, A), (B, B)$ and (C, C). Table 3 displays the device Ω' and the extended MixedNE game. Like device Ω, device Ω' avoids payoffs of 0 or -20, and it results in similar, higher expected payoffs (26). But for this device, (Com, Com) is not a Nash equilibrium, because deviating to A is a best response to Com. This implies that committing to the device Ω' is not a CCE.

	A	B	C
A	0.30	0	0
B	0	0.10	0
C	0	0	0.60

	Com	A	B	C
Com	26, 26	18, 34	20, 8	22, 16
A	34, 18	40, 40	-20, 60	40, 0
B	8, 20	60, -20	20, 20	-20, 40
C	16, 22	0, 40	40, -20	20, 20

Table 3: Device Ω' (Left) and the extended MixedNE game by Device Ω' (Right)

[4]The extended game presented here aims to clarify to the reader the expected payoffs of the device. Participants see only the MixedNE game and the device Ω, not the extended game. The same applies for two other extended games presented below for treatments MixedNE$_{\Omega'}$ and PureNE$_{\Phi}$.

2.2 The PureNE game

Table 4 shows the PureNE game, which includes a strictly dominated action C. (A, A) and (B, B) are both pure strategy Nash equilibria, and (B, B) is payoff-dominant. However, choosing B is risky because if the counterpart chooses C, the payoff is a "large accident" with payoff -80. Thus, the PureNE game captures equilibrium selection between two self-enforcing conventions, where the efficient convention is attractive but exposes players to severe losses under miscoordination (e.g., choosing B against C yields -80), much like adopting efficient driving norms or protocols that perform well only when they are shared.

We propose a device Φ that avoids this large loss and can implement a pairwise risk-dominant (Morris et al., 1995; Maruta, 1997) CCE in the extended game. We predict that subjects commit to the device to reduce risk, especially those who are relatively more risk-averse and loss-averse. A wildfire evacuation is a possible example, if it instructs drivers to reroute orderly to unconventional exit paths that may flow more slowly. The efficient convention works well only when widely shared, but under perturbations (or malicious behavior), the shared understanding can break down, leading to catastrophic conflicts. This motivates introducing an outside coordination aid that can prevent the large-loss outcome by guiding players toward a safe, consistent pattern of play, even if doing so entails some reduction in expected payoff relative to the payoff-dominant equilibrium.

	A	B	C
A	42, 42	30, 40	40, 30
B	40, 30	48, 48	-80, 20
C	30, 40	20, -80	35, 35

Table 4: Payoff table of the PureNE game

2.2.1 The PureNE$_\Phi$ treatment

A device Φ assigns probabilities of 0.25, 0.50 and 0.25 to outcomes (A, A), (B, B) and (C, C). Table 5 shows the device Φ and the PureNE game extended by the device Φ. Clearly, committing to the device (Com) is the best response to the counterpart's commitment.

The device Φ provides a coordination aid that trades off some payoffs for protection against catastrophic miscoordination. Three pure strategy Nash equilibria exist for the extended game: (Com, Com), (A, A), and (B, B). As already noted, (B, B) is payoff-dominant. The (Com, Com) equilibrium is pairwise risk-dominant (Morris et al., 1995; Maruta, 1997)

	A	B	C
A	0.25	0	0
B	0	0.50	0
C	0	0	0.25

	Com	A	B	C
Com	$43\frac{1}{4}$, $43\frac{1}{4}$	38, $35\frac{1}{2}$	$36\frac{1}{2}$, 14	-$21\frac{1}{4}$, $26\frac{1}{4}$
A	$35\frac{1}{2}$, 38	42, 42	30, 40	40, 30
B	14, $36\frac{1}{2}$	40, 30	48, 48	-80, 20
C	$26\frac{1}{4}$, -$21\frac{1}{4}$	30, 40	20, -80	35, 35

Table 5: Device Φ (Left) and the extended PureNE game by Device Φ (Right)

over (A, A) because

$$43\frac{1}{4} + 38 = 81\frac{1}{4} > 77\frac{1}{2} = 35\frac{1}{2} + 42.$$

The (Com, Com) equilibrium is also pairwise risk-dominant over (B, B) because

$$43\frac{1}{4} + 36\frac{1}{2} = 79\frac{3}{4} > 60 = 14 + 48.$$

If risk dominance is a predictive refinement here, as it is in some other coordination games such as stag hunt (e.g., Dal Bó et al. (2021) and Cooper et al. (1992)), our human subjects may choose to adopt the device.

3 Experimental Design

We conducted the experiment at the Vernon Smith Experimental Economics Laboratory (VSEEL) at Purdue University from August to November 2025 (Purdue IRB-2025-519), with experimental software implemented using oTree 5.11 (Chen et al., 2016). Subjects were Purdue students studying a wide range of different disciplines recruited by email using ORSEE (Greiner, 2015). Most (91%) were undergraduates. Each subject participated in only one session; sessions lasted 45-60 minutes, including time for instructions and payment distribution. Subjects were paid for one (randomly drawn) round from each of the two sets of 20 rounds, as well as for their choices over lotteries designed to elicit their risk and loss aversion preferences. They also completed a paid comprehension quiz after the experiment instructions.[5] Subjects received their earnings in cash, which averaged \$21.53 per person, with an interquartile range [\$15.50, \$27.50]. We conducted sessions with 24 independent groups of (approximately) 12 subjects each, for a total of 296 participants. Experimental sessions typically included two independent groups.

Each laboratory session lasted 40 rounds: some begin with 20 rounds of the PureNE

[5]Appendix A1 contains the written instructions and A2 displays the screen interface used by subjects.

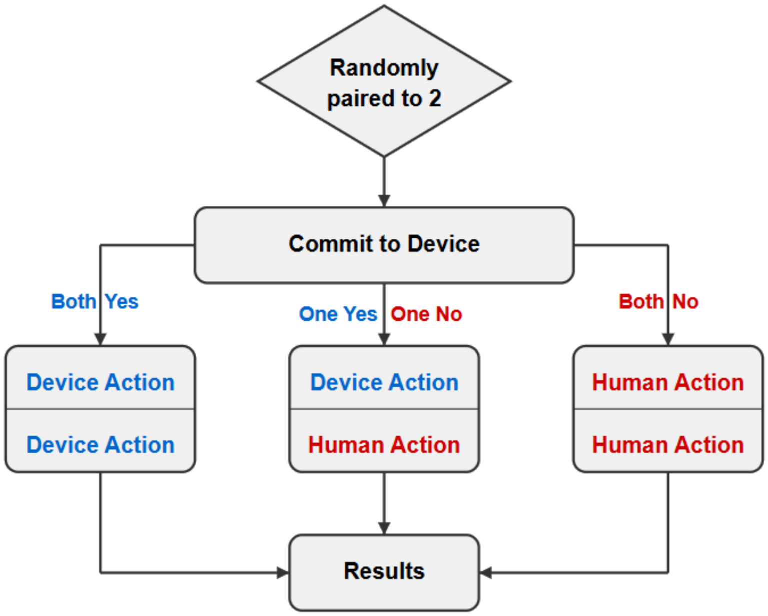


Figure 1: Diagram of each round in the treatment sessions (With a device)

game, followed by 20 rounds of the MixedNE game, or vice versa; and others begin with 40 rounds of the MixedNE game but with two different devices Ω and Ω' (each for 20 rounds). In both cases, the order is randomly determined across sessions. Subjects are randomly re-paired with another in their matching group each round. Figure 1 shows the diagram of each round in the treatment sessions, i.e., those rounds with access to a device. Subjects are provided with the game's payoff table and the device information, which is common knowledge. In each round, subjects first choose whether to commit to the device. If they commit, the device selects an action for them based on the announced probabilities. If a subject does not commit, they manually select among actions A, B, and C. Note that if both the subject and the counterpart choose to commit, the device selects the same action for both parties. Thus, for this symmetric game and the chosen devices, players effectively received public recommendations.

Subjects do not have access to the correlating device in baseline control sessions. In these sessions, subjects make choices among A, B, and C using the same payoff tables as in the treatment sessions. In both the treatment and control sessions, we elicit subjects' risk and loss preferences using multiple price lists[6] after they complete 40 rounds of stationary repetition of the MixedNE and PureNE games. Subjects also complete a short survey at the end of each session that provides demographic information.

Table 6 displays the number of independent groups and the ordering of the games and

[6]See the experimental interface in Appendix A2

Table 6: Treatment and Control Sessions

	First 20 rounds	Second 20 rounds	# Sessions	# Total Subjects
Treatment	MixedNE_{Ω}	PureNE_{Φ}	3	38
	PureNE_{Φ}	MixedNE_{Ω}	3	36
	MixedNE_{Ω}	$\text{MixedNE}_{\Omega'}$	3	36
	$\text{MixedNE}_{\Omega'}$	MixedNE_{Ω}	3	36
	$\text{MixedNE}_{\Omega'}$	PureNE_{Φ}	3	36
	PureNE_{Φ}	$\text{MixedNE}_{\Omega'}$	3	36
Control	PureNE	MixedNE	3	38
	MixedNE	PureNE	3	40
	Total		24	296

devices. The first part of the labels, MixedNE and PureNE, indicates the payoff game, and the subscripts denote the device (if any). Specifically, Ω and Φ represent a device that can implement a Coarse Correlated Equilibrium, while Ω' represents a device that is not part of a Coarse Correlated Equilibrium. The MixedNE and PureNE without a suffix refer to the controls, with no correlating device.

The experimental design allows us to test the following hypotheses concerning the adoption of the correlating devices.

Hypothesis 1: In the MixedNE game, subjects commit to the device Ω more frequently since it is a CCE than device Ω' which is not a CCE.

Hypothesis 2: In the PureNE game, subjects who are more risk averse and loss averse are more likely to commit to the device.

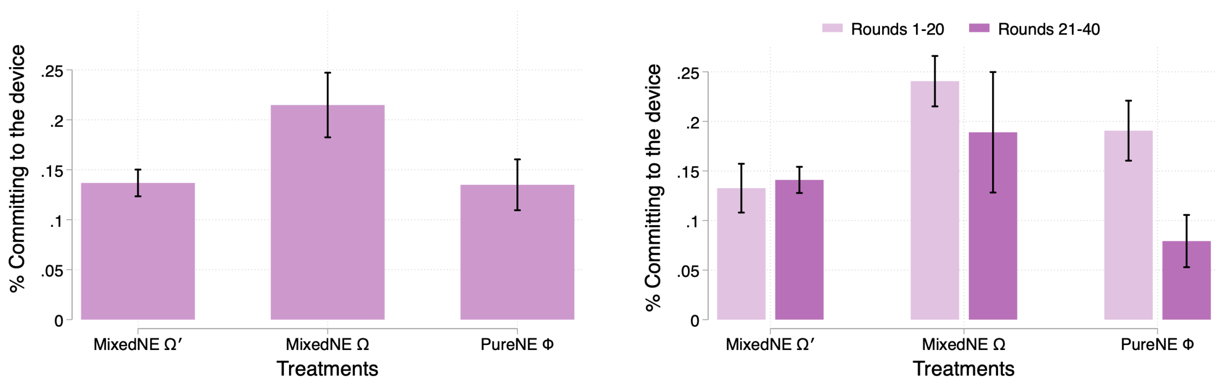
The greater adoption frequency for risk- and loss-averse subjects in the PureNE game arises from the negative payoffs from miscoordination and risk dominance of the (Com, Com) equilibrium, and was part of the experiment's preregistration. The next section also tests secondary hypotheses regarding the payoff consequences of these primary hypotheses concerning device adoption. For example, we test whether those subjects who adopt the device Ω in the MixedNE game earn higher payoffs than those who do not.

4 Results

Table A3.1 in Appendix A3 summarizes the demographic and preference (risk and loss averse) characteristics of the participants. Because of random assignment, the characteristics are well balanced across treatments, except for a modestly higher proportion of engineering or science majors in the control treatment.

4.1 Proportion of committing to the device

The first question we address is how often subjects commit to the device. Panel A of Figure 2 shows that commitment rates are infrequent overall. The MixedNE$_{\Omega}$ treatment has the highest commitment rate of 21%. The device Ω' is not part of a Coarse Correlated Equilibrium in the MixedNE$_{\Omega'}$ treatment, and the commitment rate of 14% in this case is lower than that in the MixedNE$_{\Omega}$ treatment. The commitment rate in the PureNE$_{\Phi}$ treatment is also lower than in the MixedNE$_{\Omega}$ treatment. Panel B separates the commitment rates into the first half (Rounds 1-20) and the second half (Rounds 21-40), corresponding to the midsession treatment change. For the MixedNE$_{\Omega}$ and PureNE$_{\Phi}$ treatments, in which the device supports a Coarse Correlated Equilibrium in the extended game, the commitment rate is lower in the second half of the sessions. A nonparametric Wilcoxon signed-rank test, using independent matching groups as the unit of observation, indicates significantly lower commitment rates for MixedNE$_{\Omega'}$ than MixedNE$_{\Omega}$ in the first half (two-tailed p-value = 0.016), and marginally significantly lower rates for PureNE$_{\Phi}$ than MixedNE$_{\Omega}$ in the second half (two-tailed p-value = 0.092).



Panel A. By treatment *Panel B. By treatment and order*

Figure 2: Proportion of committing to the device

Figure 3 displays the time trends of commitment rates across all 40 rounds. The commitment rates start high in all three treatments, at around 35% to 45%, and then decline rapidly during the first 20 rounds. Although commitment rates show a small jump in Round 21 (the first round of the second half of the session), they also decrease in the second half. Recall that subjects experience two different treatments in their sessions (see Table 6), so (for example) the subjects in the MixedNE$_\Omega$ treatment in the first half are not the same subjects in the MixedNE$_\Omega$ treatment in the second half.

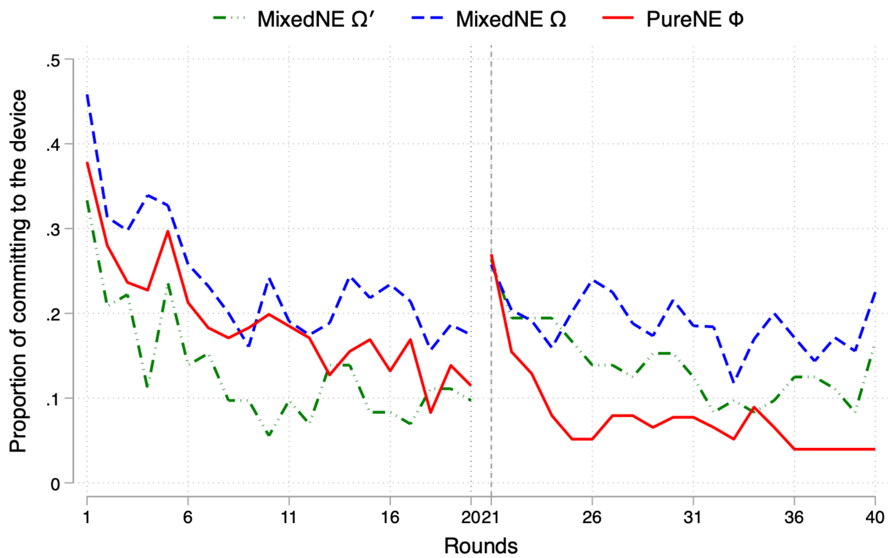


Figure 3: Proportion of committing to the device by treatment and rounds

Table 7 reports linear probability models of the commitment rates, controlling for subjects' elicited risk preferences, loss preferences, and demographics (gender, ethnicity, and major). Columns (1)-(2) focus on data from the first half (Rounds 1-20) of the sessions, Columns (3)-(4) from the second half (Rounds 21-40), and Columns (5)-(6) for all 40 rounds. The odd columns include full data, and the even columns focus on MixedNE games only. Commitment rates decline significantly over time, especially in the first 20 rounds. Relative to the omitted benchmark treatment MixedNE$_\Omega$, the MixedNE$_{\Omega'}$ treatment exhibits substantially lower commitment; consistent with the nonparametric tests, this difference is only statistically significant in the early rounds. By contrast, the commitment rate in PureNE$_\Phi$ does not differ significantly from that of MixedNE$_\Omega$. Interaction terms between the round number and treatment indicators are small and insignificant, providing little evidence that the rate of decline differs across treatments. Logit models generate the same conclusions, as shown in Appendix A3.

Result 1: Consistent with Hypothesis 1, subjects in the MixedNE game commit to the device Ω more frequently when it is a CCE than they commit to device Ω', which is not a CCE, but only during rounds 1-20.

Turning to Hypothesis 2, Table 8 reports linear probability models of commitment rates in the PureNE$_\Phi$ treatment. Column (1) includes the first half (Rounds 1-20) of the sessions,

Table 7: Linear Regression Results of committing to the device

	First 20 Rounds		Last 20 Rounds		All Rounds	
	(1)	(2)	(3)	(4)	(5)	(6)
PureNE$_\Phi$	-0.053		-0.041		-0.037	
	(0.061)		(0.054)		(0.063)	
MixedNE$_{\Omega'}$	-0.132**	-0.123**	-0.020	-0.014	-0.128**	-0.126**
	(0.053)	(0.052)	(0.056)	(0.070)	(0.054)	(0.053)
First 20: PureNE			0.053	0.052		
			(0.053)	(0.072)		
First 20: MixedNE			0.025	0.022		
			(0.042)	(0.089)		
Round	-0.009***	-0.009***	-0.002	-0.002	-0.004*	-0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Round $\times$ PureNE$_\Phi$	-0.001		-0.004		-0.002	
	(0.003)		(0.002)		(0.003)	
Round $\times$ MixedNE$_{\Omega'}$	0.002	0.002	-0.003	-0.003	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Risk-averse	0.043	0.055	-0.049	-0.046	-0.003	0.005
	(0.044)	(0.049)	(0.041)	(0.056)	(0.034)	(0.042)
Risk-seeking	-0.024	0.014	-0.060	-0.102**	-0.041	-0.042
	(0.040)	(0.048)	(0.041)	(0.051)	(0.033)	(0.039)
Loss-averse	-0.028	-0.004	0.005	-0.008	-0.012	-0.007
	(0.044)	(0.048)	(0.037)	(0.056)	(0.034)	(0.039)
Male	-0.046	-0.038	-0.066**	-0.071	-0.055*	-0.053
	(0.036)	(0.045)	(0.033)	(0.044)	(0.030)	(0.034)
White	-0.047	-0.094**	-0.045	-0.028	-0.048*	-0.067**
	(0.034)	(0.038)	(0.033)	(0.044)	(0.027)	(0.031)
Major	-0.000	-0.002	-0.007	-0.013	-0.003	-0.010
(Engineering/Science)	(0.037)	(0.045)	(0.032)	(0.044)	(0.029)	(0.034)
Constant	0.403***	0.380***	0.270***	0.292***	0.362***	0.365***
	(0.066)	(0.071)	(0.062)	(0.074)	(0.057)	(0.061)
Observations	4,360	2,920	4,360	2,880	8,720	5,800
R-squared	0.045	0.058	0.048	0.037	0.040	0.034

(i) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

(ii) Round numbers are 1 to 20 for columns (1) to (4), and 1 to 40 for columns (5) and (6).

Column (2) the second half (Rounds 21-40), and Column (3) includes all 40 rounds. Commitment rates decline significantly over time in both session halves, with a steeper decline in the first 20 rounds. Across specifications, the coefficients on risk aversion and loss aversion are small and statistically insignificant, providing little evidence that these preference measures are associated with commitment rates in PureNE$_\Phi$. Demographic controls are also insignificant. Logit models yield the same qualitative conclusions, as shown in Appendix A3.

Result 2: Contrary to Hypothesis 2, in the PureNE$_\Phi$ treatment there is no evidence that more risk-averse or loss-averse subjects are more likely to commit to the device.

Table 8: Linear Regression Results on Rates of Committing to the Device (PureNE$_\Phi$ Only)

	First 20 Rounds	Last 20 Rounds	All Rounds
	(1)	(2)	(3)
Round	-0.010***	-0.006***	-0.006***
	(0.002)	(0.002)	(0.002)
Risk-averse	0.004	-0.037	-0.018
	(0.087)	(0.059)	(0.050)
Risk-seeking	-0.111	0.028	-0.038
	(0.070)	(0.069)	(0.050)
Loss-averse	-0.092	0.030	-0.022
	(0.087)	(0.037)	(0.047)
Male	-0.053	-0.060	-0.058
	(0.056)	(0.052)	(0.040)
White	0.079	-0.064	-0.011
	(0.063)	(0.040)	(0.039)
Major	0.034	-0.004	0.008
(Engineering/Science)	(0.060)	(0.043)	(0.038)
Constant	0.379***	0.196**	0.319***
	(0.096)	(0.079)	(0.072)
Observations	1,440	1,480	2,920
R-squared	0.058	0.055	0.051

(i) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(ii) Round numbers are 1 to 20 for columns (1) and (2), and 1 to 40 for column (3).

4.2 Action Proportions Without Commitment

Table 9 shows the proportion of action choices in the MixedNE and PureNE games for the control sessions (no device) and the treatment sessions for rounds that subjects choose not to commit to a device. The MixedNE game has no pure strategy Nash equilibrium, and a unique mixed strategy Nash equilibrium of $\sigma_i(A) = \sigma_i(B) = \sigma_i(C) = \frac{1}{3}$. For this game, the proportions of choosing A, B, and C are close to 33%. When subjects choose not to commit to the device in the treatment sessions, they choose A most often, followed by B and C.

In the PureNE game, there are two pure strategy Nash Equilibria: (A, A) and (B, B), and (B, B) is payoff-dominant. The proportions of subjects choosing A and B are similar, indicating substantial strategic uncertainty in this setting with multiple equilibria. These frequencies of A and B are much higher than those for the dominated action C. Since subjects choose C about 6 percent of the time when not committing and device Φ chooses C one-quarter of the time when committing, subjects receive the -80 payoff in 8.88 percent of the rounds without commitment in the PureNE$_\Phi$ treatment.

Table 9: Action Proportions Without Commitment

Action	MixedNE (No device)	MixedNE$_{\Omega'}$ (Device Ω')	MixedNE$_\Omega$ (Device Ω)	PureNE (No device)	PureNE$_\Phi$ (Device Φ)
A	36.7%	42.5%	43.2%	43.5%	47.1%
B	35.0%	30.7%	32.6%	51.0%	46.8%
C	28.3%	26.8%	24.2%	5.5%	6.2%

Note: The Device columns only include data when subjects choose not commit to the device.

4.3 Average Token Earnings

Tables 1 and 4 display payoffs in experimental tokens, and these are converted to USD for cash payment at the end of the experiment. Figure 4 shows the average token earnings of subjects in the MixedNE$_{\Omega'}$, MixedNE$_\Omega$, and PureNE$_\Phi$ treatments and corresponding control sessions. The leftmost bar in each figure reports average earnings in the corresponding "No device" control sessions, serving as a benchmark. The remaining four bars display earnings for various commitment decisions of the pairs. The "Both commit" categories have higher average token earnings than those in the corresponding "No device" categories, since the correlation introduced by the devices elminates the lowest payoff outcomes. Note that each figure displays the expected payoff line of (Com, Com) and the expected payoff lines of either the mixed or the pure strategy Nash equilibria. For all categories other than "Both commit" when subjects have access to the device, average token earnings are much lower than the expected payoff line of (Com, Com). This highlights that subjects clearly fail to obtain the benefit of mutual device adoption.

Table 10 reports linear regressions of average token earnings within each treatment: MixedNE$_{\Omega'}$ (Columns (1)-(3)), MixedNE$_\Omega$ (Columns (4)-(6)), and PureNE$_\Phi$ (Columns (7)-(9)). The omitted category is 0 = No device. Across all three treatments, 1 = Both commit is associated with substantially higher earnings relative to the no-device baseline, and this positive association remains statistically significant after adding preference controls and demographics. This pattern is consistent with Figure 4, and suggests that mutual device adoption consistently increases payoffs.

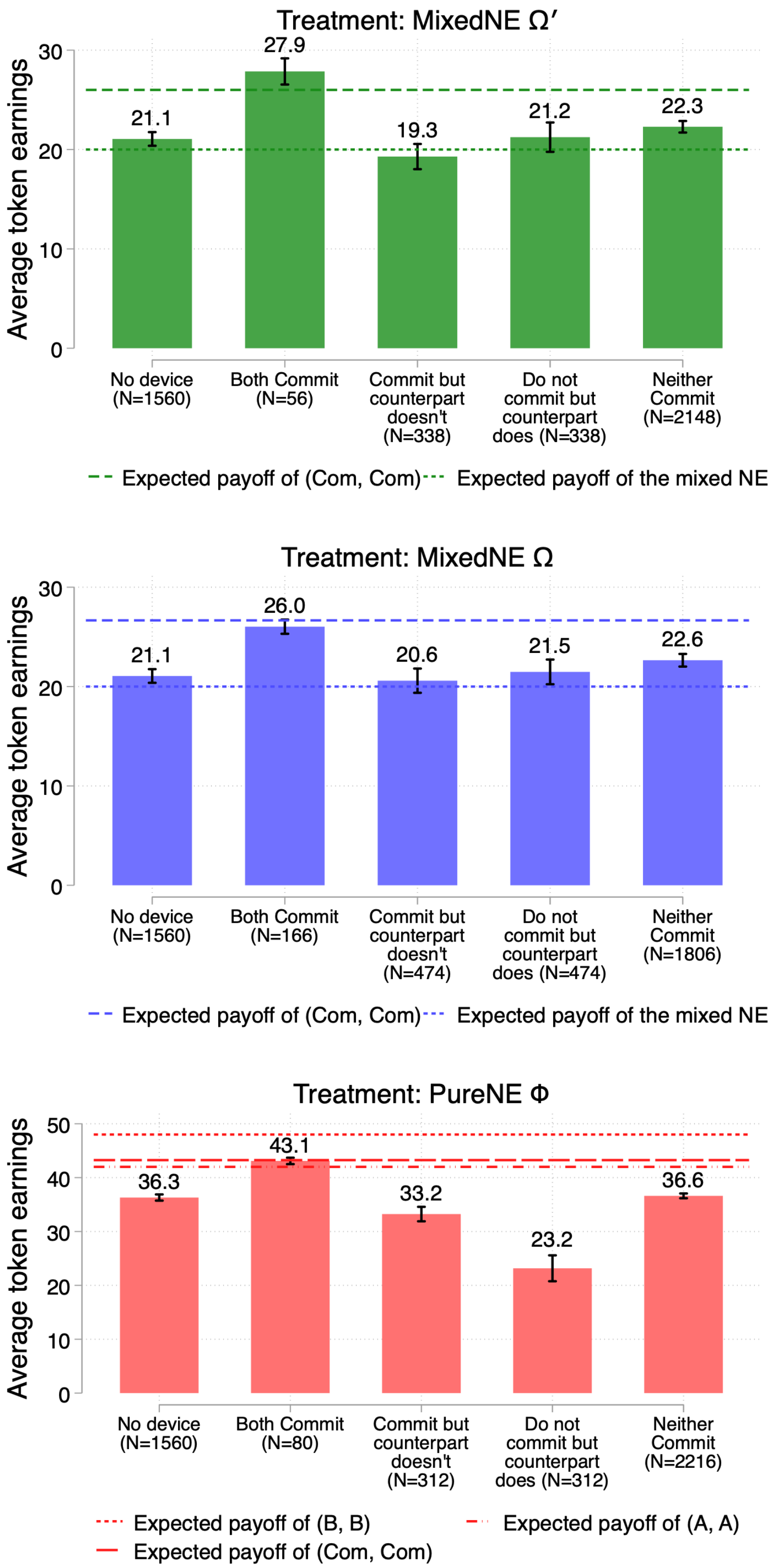


Figure 4: Average token earnings in $\text{MixedNE}_{\Omega'}$, MixedNE_{Ω}, PureNE_{Φ} treatments and corresponding control sessions

Table 10: Linear Regression Results on Average Token Earnings

	MixedNE$_{\Omega'}$			MixedNE$_{\Omega}$			PureNE$_{\Phi}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i. Category									
0 = No device									
1 = Both commit	6.247***	5.753***	5.864***	4.785***	4.720***	4.672***	6.610***	6.361***	6.547***
	(1.586)	(1.677)	(1.711)	(1.032)	(1.040)	(1.036)	(0.978)	(0.970)	(0.946)
2 = Commit but	-1.929	-2.278	-2.248	-0.588	-0.620	-0.687	-3.150**	-3.265**	-3.114**
counterpart doesn't	(1.733)	(1.756)	(1.756)	(1.376)	(1.364)	(1.372)	(1.539)	(1.479)	(1.500)
3 = Do not commit	0.023	-0.206	-0.248	0.298	0.257	0.307	-13.214***	-13.138***	-13.024***
but counterpart does	(1.593)	(1.576)	(1.580)	(1.461)	(1.455)	(1.470)	(2.466)	(2.460)	(2.463)
4 = Neither commit	1.289	0.994	0.938	1.659*	1.614*	1.654*	0.338	0.254	0.393
	(0.949)	(0.938)	(0.952)	(0.938)	(0.921)	(0.918)	(0.884)	(0.902)	(0.903)
Round	-0.128*	-0.129*	-0.128*	-0.146*	-0.146*	-0.146*	-0.050	-0.050	-0.050
	(0.076)	(0.076)	(0.076)	(0.075)	(0.075)	(0.076)	(0.064)	(0.064)	(0.064)
Risk-averse		1.724*	1.815*		0.196	0.176		0.354	0.417
		(1.012)	(1.004)		(1.092)	(1.090)		(0.869)	(0.890)
Risk-seeking		1.283	1.277		0.376	0.407		-1.213	-1.160
		(1.028)	(1.048)		(0.887)	(0.895)		(1.063)	(1.055)
Loss-averse		-3.022***	-3.146***		-0.532	-0.473		-0.824	-0.718
		(1.087)	(1.114)		(1.170)	(1.167)		(0.855)	(0.832)
Male			0.673			-0.271			0.430
			(0.860)			(0.790)			(0.847)
White			0.550			-0.517			-0.764
			(0.941)			(0.870)			(0.876)
Major			0.001			0.022			0.402
(Engineering/Science)			(0.863)			(0.787)			(0.806)
Constant	22.413***	24.131***	23.660***	22.598***	22.885***	23.137***	36.832***	37.790***	37.423***
	(1.058)	(1.421)	(1.616)	(1.052)	(1.447)	(1.659)	(0.953)	(1.213)	(1.424)
Observations	4,440	4,440	4,440	4,480	4,480	4,480	4,480	4,480	4,480
R-squared	0.003	0.005	0.006	0.003	0.003	0.003	0.023	0.023	0.024

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

A notable asymmetry emerges in the PureNE$_\Phi$ treatment (Columns (7)-(9)). Relative to the no-device baseline, both asymmetric commitment payoffs (2 = Commit but counterpart doesn't, 3 = Do not commit but counterpart does) are significantly lower, while 1 = Both commit leads to significantly higher earnings. Thus, the device is only beneficial under mutual adoption: one-sided commitment does not improve outcomes and can even lower payoffs. In particular, when the counterpart commits, but the subject does not, the non-committing pair member earns significantly less on average because of frequent miscoordination (i.e., both A and B are played frequently) and a nontrivial chance of earning the -80 payoff due to an opponent choosing C. Both parties must commit to the device when it is available for correlation gains to materialize, and unilateral commitment harms both players in this game.

Result 3: Across all treatments, mutual commitment substantially increases earnings relative to the no-device baseline. In the PureNE$_\Phi$ treatment, unilateral commitment significantly lowers earnings for both parties.

5 Conclusion

This experimental study investigates individuals' willingness to delegate decision-making authority to correlating devices across several payoff and device treatments. These include games with multiple Pareto-rankable pure strategy equilibria that differ in their associated risk, as well as games without a pure strategy equilibrium in which a correlating device can raise expected payoffs relative to the unique mixed strategy equilibrium. We find that (1) Subjects are reluctant to delegate their decision-making authority even when the devices can reduce risk and sometimes increase expected payoffs, and commitment declines over time; (2) Commitment is higher in the MixedNE$_\Omega$ treatment than in MixedNE$_{\Omega'}$, consistent with the fact that only the former device can implement a Coarse Correlated Equilibrium (CCE); (3) Both parties committing to the device results in significantly higher average earnings compared to the case without a device; (4) In the game with multiple Pareto-rankable pure strategy Nash equilibria, one-sided commitment fails to improve outcomes and actually reduces earnings relative to the case without a device.

Our findings have several design and policy implications. First, institutions may need to facilitate coordinated adoption, especially when the benefits of automation rely on mutual commitment. In our setting, delegation improves outcomes primarily under mutual commitment, whereas one-sided commitment may fail to help or even reduce earnings by introducing mismatch risks that do not arise in cases without a device. The entire point of the coordination device in this setting is to introduce correlation that raises expected payoffs. This suggests that automation in strategic environments should be evaluated as a system rather than as an individual "opt-in," and that policies or interfaces may be needed to increase the likelihood of joint adoption. Sequential adoption is one possibility. A contingent commitment mechanism, where an intended commitment is implemented only if it is mutual, is another way to potentially resolve the commitment correlation problem. Alternatively, for the transportation application, commitment could be the default device settings of an automobile that increases the likelihood of commitment, particularly under system perturbations (e.g., when orderly evacuations are needed). More broadly, evaluating a device only under full adoption can overstate its value if partial adoption is common.

Second, designers should consider the strategic credibility of committing to the device. The higher commitment rate in MixedNE_{Ω} relative to $\text{MixedNE}_{\Omega'}$ is suggestive, given that only the former device can implement a CCE in the extended game. This suggests that devices with higher strategic credibility attract higher adoption: when committing to the device is consistent with equilibrium incentives, subjects are more willing to delegate. The practical implication is that not any device will work. Planners need to ensure that the correlation device is incentive-compatible rather than only payoff-improving under full adoption.

Third, the observed decline in commitment over time suggests that delegation decisions evolve with experience. This pattern is consistent with the possibility that subjects learn about the strategic consequences of commitment, update beliefs about others' willingness to commit, or become increasingly averse to surrendering autonomy as they interact with the device repeatedly. From a design perspective, this implies that sustaining adoption may require dynamic rather than static incentives. For example, device interfaces and institutional rules could be structured to maintain trust and perceived control, or to make the benefits of commitment salient throughout the interaction.

This study has limitations that also point to directions for future work. Our laboratory setting necessarily abstracts from important features of real transportation contexts, including heterogeneous characteristics, repeated interactions with known counterparts, or communication in larger groups and networks. These extensions would help identify which institutional and technological features can mitigate reluctance to delegate and reduce the inefficiencies associated with partial adoption.

Overall, our results suggest a simple but important message: correlating devices can substantially improve outcomes when commitment is mutual, but adoption frictions and asymmetric commitment can limit these gains and sometimes reverse them. Understanding the behavioral determinants of delegation and designing policies and interfaces that promote coordinated adoption appear essential for realizing the potential benefits of automation in strategic settings.

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Appendix A1: Experimental Instructions

A1.1 Instructions for Treatments: With-device

This experiment is a study of group and individual decision-making. The amount of money you earn depends partly on the decisions that you make and so you should read the instructions carefully. The money you earn will be paid privately to you, in cash, at the end of the experiment. A research foundation has provided the funds for this study.

This part of the experiment is divided into **40 decision "rounds"**. At the end of the experiment, the computer will randomly pick one round from the first set of 20 rounds, and one round from the second set of 20 rounds. **You will be paid based on your point earnings in these 2 rounds picked by the computer**. Each decision you make is, therefore, important because it has a chance to affect the amount of money you earn. The earnings will be in the form of points, and are converted to US Dollars at the end of the experiment at **1 point = 0.2 US Dollar**.

You will be randomly re-paired with a counterpart in each round. Hence, your counterpart will typically change from round to round. Everyone's identities will remain concealed throughout the session. You will make decisions privately, without consulting others. Please do not attempt to communicate with other participants in the room during the experiment. If you have a question as we read through the instructions or anytime during the experiment, raise your hand, and an experimenter will come by to answer it.

After reading these instructions and instructions for the other parts, you will complete comprehension quiz questions and earn $0.50 for every correct answer.

Sequence of Steps Each Round

Every decision round will have the following steps:

1. You are randomly grouped with another person in this room. Call this person your "counterpart".
2. The computer asks you (and your counterpart) whether you wish the computer to choose for you (and your counterpart), using a specific device described later. You both decide at the same time, without knowing the other's decision, whether to accept the computer device to determine your decision for the round.
3. If you accept and allow the computer device to make your choice, there is nothing else for you do to in the round.
4. If instead you do not accept the device, you will make your own choice (explained below).

5. You will find out the choices of your counterpart, and your earnings for that round.

This part ends after the 40th round.

Choices and Earnings

Everyone has 3 choices available: A, B, and C. In the payoff table, your choices are indicated in the rows, and your counterpart's choices are indicated in the columns. You can think of this as you choose the row and your counterpart chooses the column. Your earnings are shown in the left-most entries in each of the 9 possible combinations of A, B, and C, as indicated in red.

For example, if you choose (row) A and your counterpart chooses (column) B, then you would earn 20 points for the round and your counterpart would earn -10 points (that is, lose 10 points). Or, if you choose C and your counterpart chooses C, you both earn 30 points for the round. Based on the 9 possible combinations, you can earn -10, 10, 20, 30, or 40 points in a round.

		Counterpart's Choice		
		A	B	C
Your Choice	A	30, 30	20, -10	40, 20
	B	-10, 20	40, 40	-10, 10
	C	20, 40	10, -10	30, 30

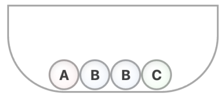
The payoff table here is just an example. You may see just one, or two different payoff tables in the experiment. Within the first 20 rounds, the payoff table is the same; within the second 20 rounds, the payoff table is the same.

The Computer Device

As mentioned earlier, you (and your counterpart) have the option to let the computer make an A, B, or C choice for you using a specific "device." This device can help ensure that the A, B, and C choices match for both individuals so that both people earn either 30 or 40 for the round. **This requires both you and your counterpart to choose to use the device.** The possibilities that the device chooses either (A, A), (B, B), or (C, C) for both you and your counterpart are shown and marked blue in the device table. You can think of this as drawing a ball from an urn with replacement each time. See the two different devices below.

Device

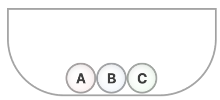
	A	B	C
A	0.25	0	0
B	0	0.50	0
C	0	0	0.25



For this device, the possibilities of choosing either (A, A), (B, B), or (C, C) are 0.25, 0.50, and 0.25. This corresponds to an urn with four balls: one A, two B, and one C ball. If an A ball is picked, the device has chosen A for both you and your counterpart. The ball will be put back in the urn before the next draw.

Device

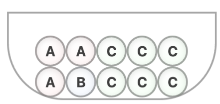
	A	B	C
A	0.33	0	0
B	0	0.33	0
C	0	0	0.33



For this device, the possibilities of choosing either (A, A), (B, B), or (C, C) are 0.33, 0.33, and 0.33. This corresponds to an urn with three balls: one A, one B, and one C ball. If an A ball is picked, the device has chosen A for both you and your counterpart. The ball will be put back in the urn before the next draw.

Device

	A	B	C
A	0.30	0	0
B	0	0.10	0
C	0	0	0.60



For this device, the possibilities of choosing either (A, A), (B, B), or (C, C) are 0.30, 0.10, and 0.60. This corresponds to an urn with ten balls: three A, one B, and six C balls. If an A ball is picked, the device has chosen A for both you and your counterpart. The ball will be put back in the urn before the next draw.

The device (and the corresponding urn) will be the same for each set of 20 rounds. You may see TWO different devices in this experiment.

What if Only 1 Person Chooses the Device?

Whenever someone chooses the device for a round, their choice of A, B, or C is determined by whether the device drawn for that round is (A, A), (B, B), or (C, C). The possibilities of the device drawing A, B, or C are explained above.

A person who does not choose the device will simply be asked to choose between A, B and C. At this point, he doesn't learn whether his counterpart chose the device for the round. Once he makes a choice, he will see the point earnings according to the payoff table shown earlier, determined by his own choice and the A, B, or C choice selected for his counterpart who decided to choose according to the computer device.

Of course, if both you and your counterpart choose not to adopt the device, you each choose A, B, or C directly and all nine sets of point earnings shown in the payoff table are possible for the round.

End of the Round

After each round, a result screen will summarize the decisions of you and your counterpart, as well as the point earnings for the round. Let's call it Round Summary. You will see it in a light blue area. The results of previous rounds will be called Round History. You will see it since Round 2 when you are making decisions.

Summary

1. **You will be randomly re-paired with a counterpart in each round.**
2. Each round, your earnings (marked red in the left-most entries in the payoff table) are determined by the combination of A, B, and C choices made by you and your counterpart.
3. You and your counterpart decide whether to allow the computer to make your choice using a random device.
4. The possibilities of the computer device select outcomes (A, A), (B, B), or (C, C), are marked blue in the device table. If you adopt the computer device, this determines your choice, to match the counterpart's choice if that counterpart also chose the device.
5. You do not learn whether your counterpart chose to use the computer device until the end of the round. If you do not use the device, you will choose among A, B, or C on your own.

A1.2 Instructions for Controls: No-Device

This experiment is a study of group and individual decision-making. The amount of money you earn depends partly on the decisions that you make and so you should read the instructions carefully. The money you earn will be paid privately to you, in cash, at the end of the experiment. A research foundation has provided the funds for this study.

This part of the experiment is divided into **40 decision "rounds"**. At the end of the experiment, the computer will randomly pick one round from the first set of 20 rounds, and one round from the second set of 20 rounds. **You will be paid based on your point earnings in these 2 rounds picked by the computer**. Each decision you make is, therefore, important because it has a chance to affect the amount of money you earn. The earnings will be in the form of points, and are converted to US Dollars at the end of the experiment at **1 point = 0.2 US Dollar**.

You will be randomly re-paired with a counterpart in each round. Hence, your counterpart will typically change from round to round. Everyone's identities will remain concealed throughout the session. You will make decisions privately, without consulting others. Please do not attempt to communicate with other participants in the room during the experiment. If you have a question as we read through the instructions or anytime during the experiment, raise your hand, and an experimenter will come by to answer it.

After reading these instructions and instructions for the other parts, you will complete comprehension quiz questions and earn $0.50 for every correct answer.

Sequence of Steps Each Round

Every decision round will have the following steps:

1. You are randomly grouped with another person in this room. Call this person your "counterpart".
2. Make your choice between A, B, and C
3. You will find out the choices of your counterpart, and your earnings for that round.

This part ends after the 40th round.

Choices and Earnings

Everyone has 3 choices available: A, B, and C. In the payoff table, your choices are indicated in the rows, and your counterpart's choices are indicated in the columns. You can think of this as you choose the row and your counterpart chooses the column. Your earnings are shown in the left-most entries in each of the 9 possible combinations of A, B, and C, as indicated in red.

For example, if you choose (row) A and your counterpart chooses (column) B, then you would earn 20 points for the round and your counterpart would earn -10 points (that is, lose 10 points). Or, if you choose C and your counterpart chooses C, you both earn 30 points for the round. Based on the 9 possible combinations, you can earn -10, 10, 20, 30, or 40 points in a round.

		Counterpart's Choice		
		A	**B**	**C**
Your Choice	**A**	30, 30	20, -10	40, 20
	B	-10, 20	40, 40	-10, 10
	C	20, 40	10, -10	30, 30

The payoff table here is just an example. You will see two different payoff tables in the experiment: one for the first set of 20 rounds, the other for the second set of 20 rounds.

End of the Round

After each round, a result screen will summarize the decisions of you and your counterpart, as well as the point earnings for the round. Let's call it Round Summary. You will see it in a light blue area. The results of previous rounds will be called Round History. You will see it since Round 2 when you are making decisions.

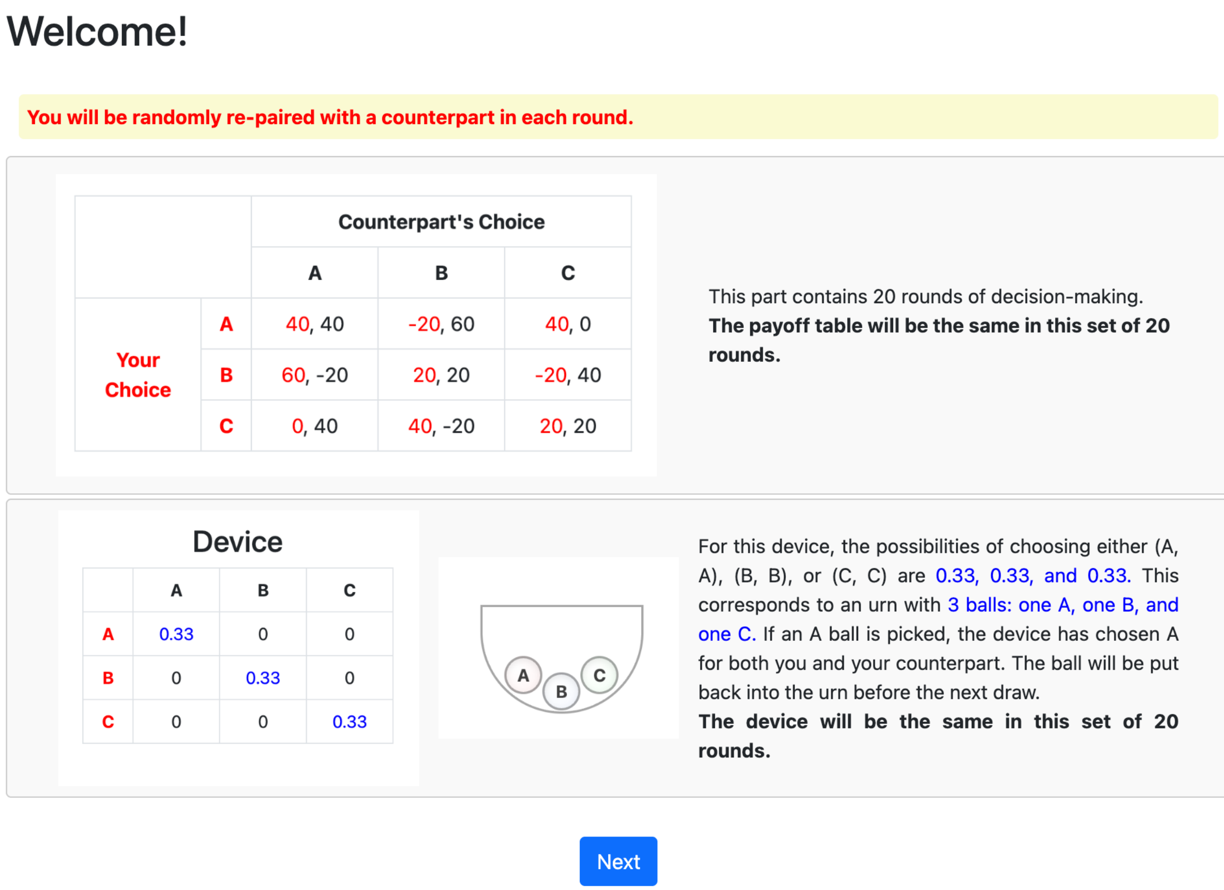
Summary

1. **You will be randomly re-paired with a counterpart in each round.**
2. Each round, your earnings (marked red in the left-most entries in the payoff table) are determined by the combination of A, B, and C choices made by you and your counterpart.
3. One random round out of the first set of 20 rounds and one random round out of the second set of 20 rounds will be selected for payment.

Appendix A2: Experiment Interfaces

A2.1 Treatments: With a device

We display the screenshots from the MixedNE$_\Omega$ treatment as an example. The screenshots for other treatments are similar, except that the payoff and device tables are replaced to match the treatment.



Welcome!

You will be randomly re-paired with a counterpart in each round.

		Counterpart's Choice		
		A	B	C
Your Choice	A	40, 40	-20, 60	40, 0
	B	60, -20	20, 20	-20, 40
	C	0, 40	40, -20	20, 20

This part contains 20 rounds of decision-making.
The payoff table will be the same in this set of 20 rounds.

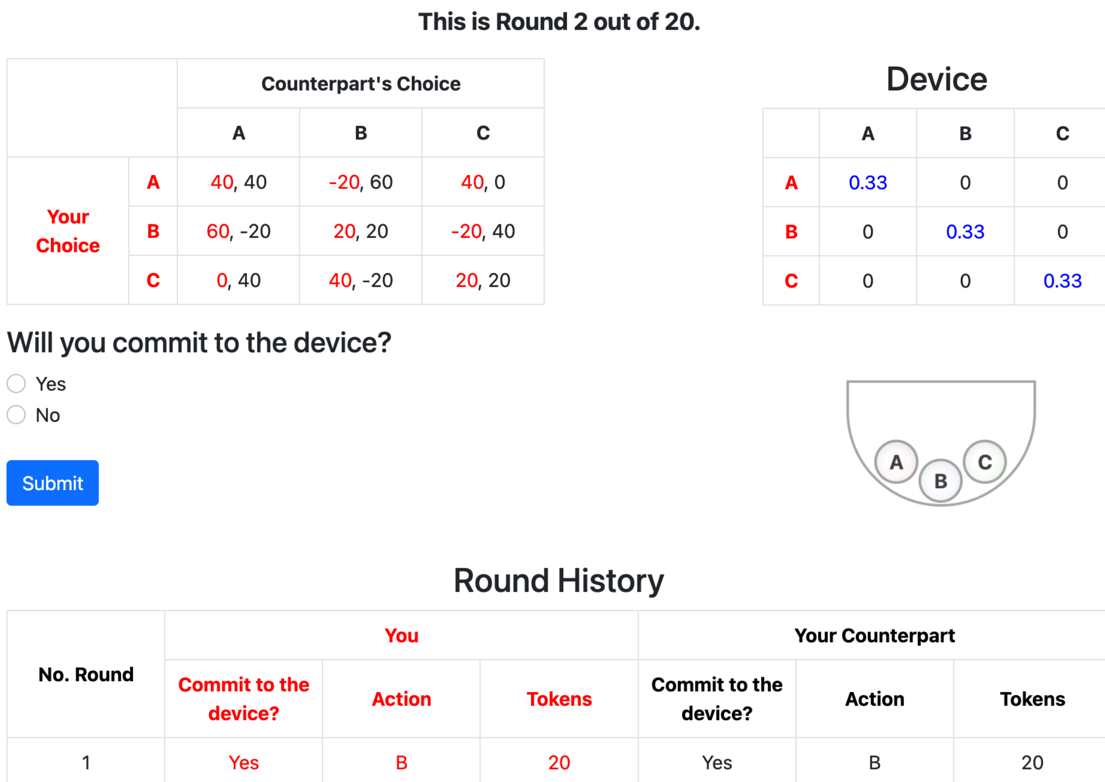
Device

	A	B	C
A	0.33	0	0
B	0	0.33	0
C	0	0	0.33

For this device, the possibilities of choosing either (A, A), (B, B), or (C, C) are 0.33, 0.33, and 0.33. This corresponds to an urn with 3 balls: one A, one B, and one C. If an A ball is picked, the device has chosen A for both you and your counterpart. The ball will be put back into the urn before the next draw.
The device will be the same in this set of 20 rounds.

Next

Figure A2.1: Welcome page of MixedNE$_\Omega$



This is Round 2 out of 20.

		Counterpart's Choice		
		A	B	C
Your Choice	A	40, 40	-20, 60	40, 0
	B	60, -20	20, 20	-20, 40
	C	0, 40	40, -20	20, 20

Device

	A	B	C
A	0.33	0	0
B	0	0.33	0
C	0	0	0.33

Will you commit to the device?

Yes

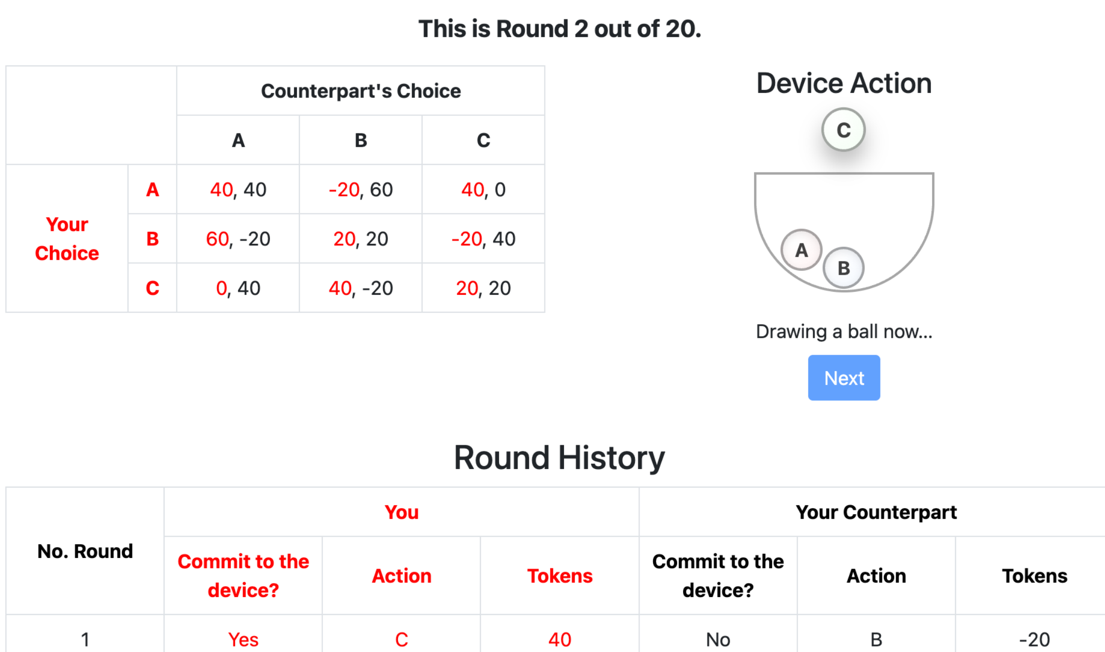
No

Submit

Round History

No. Round	You			Your Counterpart		
	Commit to the device?	Action	Tokens	Commit to the device?	Action	Tokens
1	Yes	B	20	Yes	B	20

Figure A2.2: Commitment page of MixedNE$_\Omega$



This is Round 2 out of 20.

		Counterpart's Choice		
		A	B	C
Your Choice	A	40, 40	-20, 60	40, 0
	B	60, -20	20, 20	-20, 40
	C	0, 40	40, -20	20, 20

Round History

No. Round	You			Your Counterpart		
	Commit to the device?	Action	Tokens	Commit to the device?	Action	Tokens
1	Yes	C	40	No	B	-20

Figure A2.3: Device action page of MixedNE$_\Omega$ if the subject chose commit to the device

This is Round 2 out of 20.

		Counterpart's Choice		
		A	B	C
○	A	40, 40	-20, 60	40, 0
○	B	60, -20	20, 20	-20, 40
○	C	0, 40	40, -20	20, 20

Your Action

Please select your action by clicking the corresponding circle next to the row.

Submit

Round History

No. Round	You			Your Counterpart		
	Commit to the device?	Action	Tokens	Commit to the device?	Action	Tokens
1	Yes	B	20	Yes	B	20

Figure A2.4: Human action page of MixedNE$_\Omega$ if the subject chose not commit to the device

This is Round 2 out of 20.

		Counterpart's Choice		
		A	B	C
Your Choice	A	40, 40	-20, 60	40, 0
	B	60, -20	20, 20	-20, 40
	C	0, 40	40, -20	20, 20

Current Round Result

No. Round	You			Your Counterpart		
	Commit to the device?	Action	Tokens	Commit to the device?	Action	Tokens
2	No	B	60	Yes	A	-20

Round History

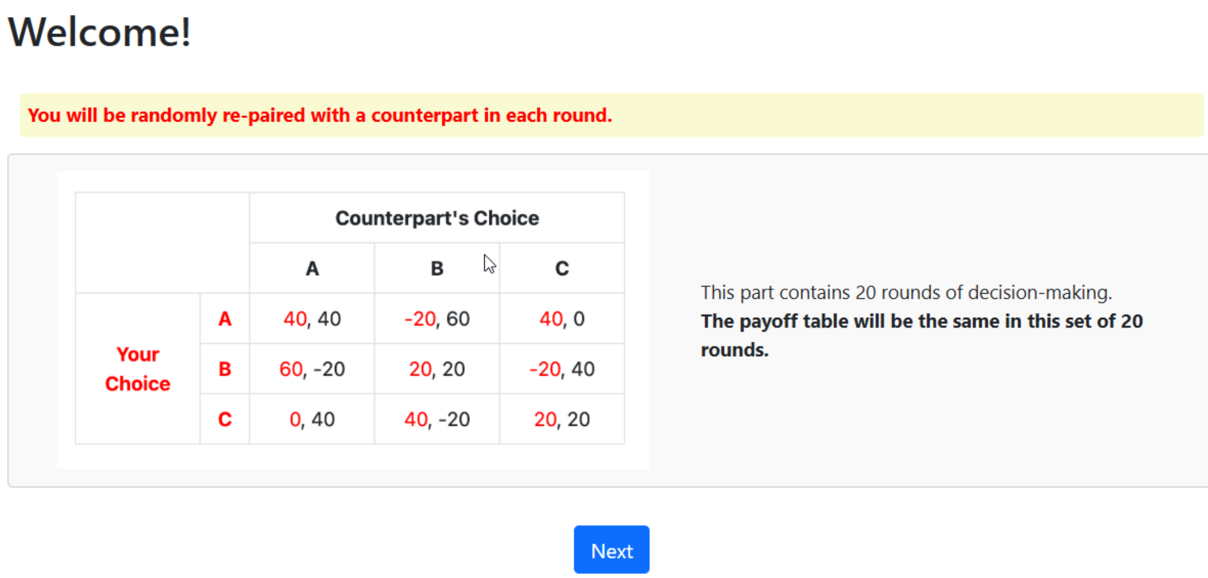
No. Round	You			Your Counterpart		
	Commit to the device?	Action	Tokens	Commit to the device?	Action	Tokens
1	Yes	A	40	Yes	A	40

Next Round

Figure A2.5: Round result page of MixedNE$_\Omega$

A2.2 Control: No device

We display the screenshots from the MixedNE control session as an example. The screenshots for the PureNE control session are similar, except that the payoff table is different.



Welcome!

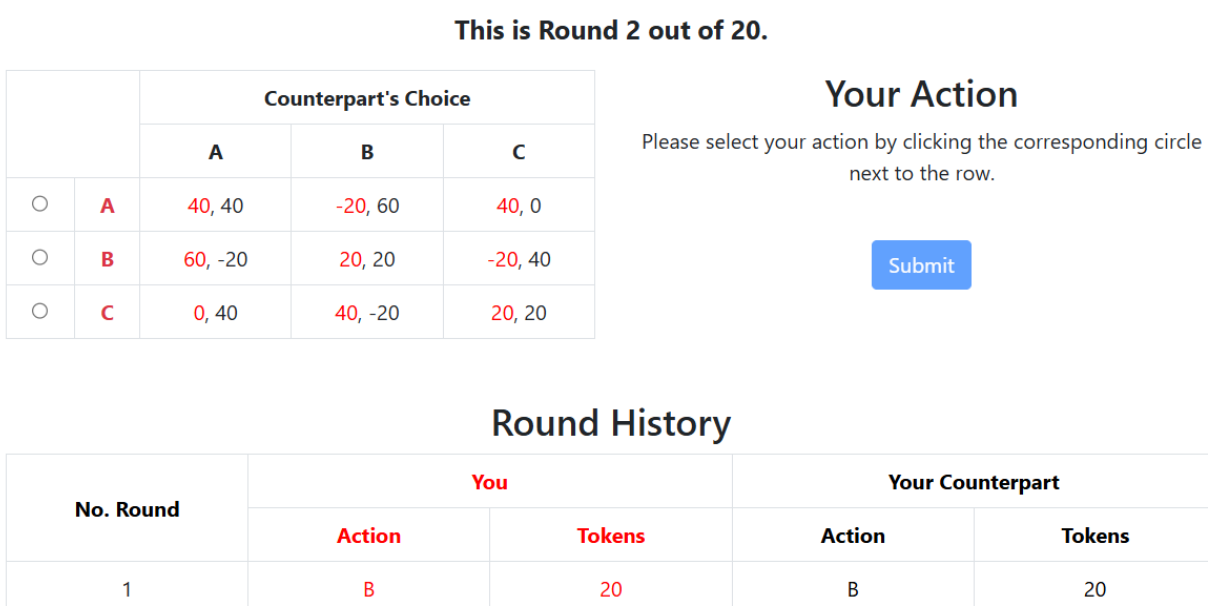
You will be randomly re-paired with a counterpart in each round.

		Counterpart's Choice		
		A	B	C
Your Choice	A	40, 40	-20, 60	40, 0
	B	60, -20	20, 20	-20, 40
	C	0, 40	40, -20	20, 20

This part contains 20 rounds of decision-making.
The payoff table will be the same in this set of 20 rounds.

Next

Figure A2.6: Welcome page of MixedNE



This is Round 2 out of 20.

		Counterpart's Choice		
		A	B	C
○	A	40, 40	-20, 60	40, 0
○	B	60, -20	20, 20	-20, 40
○	C	0, 40	40, -20	20, 20

Your Action

Please select your action by clicking the corresponding circle next to the row.

Submit

Round History

No. Round	You		Your Counterpart	
	Action	Tokens	Action	Tokens
1	B	20	B	20

Figure A2.7: Human action page of MixedNE

This is Round 2 out of 20.

		Counterpart's Choice		
		A	B	C
Your Choice	A	40, 40	-20, 60	40, 0
	B	60, -20	20, 20	-20, 40
	C	0, 40	40, -20	20, 20

Current Round Result

No. Round	You		Your Counterpart	
	Action	Tokens	Action	Tokens
2	B	60	A	-20

Round History

No. Round	You		Your Counterpart	
	Action	Tokens	Action	Tokens
1	B	20	B	20

Next Round

Figure A2.8: Round result page of MixedNE

A2.3 Risk Preference Elicitation

Part 2: Instructions

In Part 2, you will be asked to make a series of decisions. Each decision is a choice between two options -- **Option A** and **Option B**. The decisions will be organized into a table like the one below. Notice that for practice there are a total of 5 decisions (one for each rows of the table). You should think of each row as a separate decision you need to make. At this time, please make your choice for each decision row. Note that your compensation will not depend on the practice task.

Decision	**Option A**		**Option B**	**Your Choice**
#1	**$10.00** with 50% chance **$0.00** with 50% chance	○ ○	**$0.50**	
#2	**$10.00** with 50% chance **$0.00** with 50% chance	○ ○	**$2.50**	
#3	**$10.00** with 50% chance **$0.00** with 50% chance	○ ○	**$5.00**	
#4	**$10.00** with 50% chance **$0.00** with 50% chance	○ ○	**$7.50**	
#5	**$10.00** with 50% chance **$0.00** with 50% chance	○ ○	**$10.00**	

Part 2: Instructions

For Part 2, you will make 20 decisions. At the end of the experiment, one of these decisions will be chosen at random to be carried out. As an example, we will demonstrate how compensation works with the practice decisions that you just did.

The procedure involves two steps:

- First, one of the decisions will be chosen at random. For example, in the practice task you had 5 decisions, so one will be chosen randomly by the computer (with equal probability).
- Second, depending on the chosen decision in step one, a random draw might be necessary. For example, if you chose Option A over Option B, then a random draw will be made to determine the outcome of the technology. For example, in the practice task, the technology in Option A had 50% of $10 and 50% of $0.

To demonstrate the compensation procedure, we will perform the two steps using the practice task.

Decision	Option A	Option B	Your Choice
#1	**$10.00** with 50% chance; **$0.00** with 50% chance;	$0.50	A
#2	**$10.00** with 50% chance; **$0.00** with 50% chance;	$2.50	A
#3	**$10.00** with 50% chance; **$0.00** with 50% chance;	**$5.00**	B
#4	**$10.00** with 50% chance; **$0.00** with 50% chance;	**$7.50**	**B**
#5	**$10.00** with 50% chance; **$0.00** with 50% chance;	**$10.00**	B

1. The randomly chosen decision is Decision #4

2. For the selected decision have chosen Option B.

-> Therefore, your payoff is $7.5.

To gain further understanding of the compensation procedure, you may try again.

Try Again

In the actual experiment, this procedure will be carried out **only once**. If you are ready to begin, please click **Next**.

Next

Part 2: Decisions

Please make a choice for **each of the 20 decisions**.

Decision	Option A		Option B	Your Choice
#1	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$0.50**	__
#2	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$1.00**	__
#3	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$1.50**	__
#4	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$2.00**	__
#5	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$2.50**	__
#6	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$3.00**	__
#7	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$3.50**	__
#8	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$4.00**	__
#9	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$4.50**	__
#10	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$5.00**	__
#11	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$5.50**	__
#12	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$6.00**	__
#13	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$6.50**	__
#14	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$7.00**	__
#15	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$7.50**	__
#16	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$8.00**	__
#17	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$8.50**	__
#18	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$9.00**	__
#19	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$9.50**	__
#20	**$10.00** with 50% chance; **$0.00** with 50% chance	○ ○	**$10.00**	__

A2.4 Loss Preference Elicitation

Part 3: Instructions

Part 3 will be similar to Part 3, except that **Option A** has a 50/50 chance between a negative amount (in **Red**) and a positive amount (in **Green**). As before, each decision is a choice between two options -- **Option A** and **Option B**. At the end of the experiment, **one** of the decisions from Part 3 will be chosen at random and carried out. Notice that if you select Option A and randomly determined amount is negative, it will be **subtracted** from your total earnings.

For practice there are a total of 5 decisions (one for each rows of the table). You should think of each row as a separate decision you need to make. At this time, please make your choice for each decision row. Note that your compensation will not depend on the practice task.

Decision	Option A		Option B	Your Choice
#1	**$-0.00** with 50% chance, **$10.00** with 50% chance	○ ○	**$0.00**	__
#2	**$-2.50** with 50% chance, **$7.50** with 50% chance	○ ○	**$0.00**	__
#3	**$-5.00** with 50% chance, **$5.00** with 50% chance	○ ○	**$0.00**	__
#4	**$-7.50** with 50% chance, **$2.50** with 50% chance	○ ○	**$0.00**	__
#5	**$-10.00** with 50% chance, **$0.00** with 50% chance	○ ○	**$0.00**	__

Part 3: Decisions

Please make a choice for **each of the 17 decisions** in this task. At the end of the experiment, **one** decision will be selected at random and carried out.

Decision	Option A		Option B	Your Choice
#1	**$-0.00** with 50% chance; **$10.00** with 50% chance	○ ○	**$0.00**	__
#2	**$-0.50** with 50% chance; **$9.50** with 50% chance	○ ○	**$0.00**	__
#3	**$-1.00** with 50% chance; **$9.00** with 50% chance	○ ○	**$0.00**	__
#4	**$-1.50** with 50% chance; **$8.50** with 50% chance	○ ○	**$0.00**	__
#5	**$-2.00** with 50% chance; **$8.00** with 50% chance	○ ○	**$0.00**	__
#6	**$-2.50** with 50% chance; **$7.50** with 50% chance	○ ○	**$0.00**	__
#7	**$-3.00** with 50% chance; **$7.00** with 50% chance	○ ○	**$0.00**	__
#8	**$-3.50** with 50% chance; **$6.50** with 50% chance	○ ○	**$0.00**	__
#9	**$-4.00** with 50% chance; **$6.00** with 50% chance	○ ○	**$0.00**	__
#10	**$-4.50** with 50% chance; **$5.50** with 50% chance	○ ○	**$0.00**	__
#11	**$-5.00** with 50% chance; **$5.00** with 50% chance	○ ○	**$0.00**	__
#12	**$-5.50** with 50% chance; **$4.50** with 50% chance	○ ○	**$0.00**	__
#13	**$-6.00** with 50% chance; **$4.00** with 50% chance	○ ○	**$0.00**	__
#14	**$-6.50** with 50% chance; **$3.50** with 50% chance	○ ○	**$0.00**	__
#15	**$-7.00** with 50% chance; **$3.00** with 50% chance	○ ○	**$0.00**	__
#16	**$-7.50** with 50% chance; **$2.50** with 50% chance	○ ○	**$0.00**	__
#17	**$-8.00** with 50% chance; **$2.00** with 50% chance	○ ○	**$0.00**	__

Appendix A3: Supplementary Tables

A3.1 Subject Characteristics

Table A3.1: Subject Characteristics

Subject characteristic	Control (no device)		Treatments (device)		t-statistic
	Mean	(SE)	Mean	(SE)	
Gender (1 = Male)	0.55	(0.06)	0.50	(0.03)	0.78
Ethnicity (1 = White)	0.32	(0.05)	0.40	(0.03)	-1.29
Major (1 = Engineering/Science)	0.63	(0.06)	0.50	(0.04)	2.02
Risk-averse (1 = Yes)	0.27	(0.05)	0.31	(0.03)	-0.63
Risk-seeking (1 = Yes)	0.29	(0.05)	0.33	(0.03)	-0.57
Loss-averse (1 = Yes)	0.85	(0.04)	0.78	(0.03)	1.33
Number of subjects	78		218		

Standard error of the mean shown in parentheses. t-statistic tests for differences in means or proportions.

A3.2 Logit Regression Results

Table A3.2: Logit Regression Results of committing to the device

	First 20 Rounds		Last 20 Rounds		All Rounds	
	(1)	(2)	(3)	(4)	(5)	(6)
PureNE$_{\Phi}$	-0.235		-0.121		-0.057	
	(0.299)		(0.398)		(0.385)	
MixedNE$_{\Omega'}$	-0.644**	-0.588**	-0.097	-0.013	-0.795**	-0.776**
	(0.285)	(0.288)	(0.383)	(0.431)	(0.352)	(0.350)
First 20: PureNE			0.435	0.360		
			(0.394)	(0.458)		
First 20: MixedNE			0.265	0.100		
			(0.451)	(0.610)		
Round	-0.053***	-0.054***	-0.015	-0.015	-0.022*	-0.022*
	(0.014)	(0.015)	(0.013)	(0.013)	(0.012)	(0.012)
Round × PureNE$_{\Phi}$	-0.015		-0.075**		-0.033	
	(0.023)		(0.031)		(0.021)	
Round × MixedNE$_{\Omega'}$	-0.018	-0.018	-0.033	-0.034	0.012	0.011
	(0.022)	(0.022)	(0.023)	(0.023)	(0.017)	(0.017)
Risk averse	0.278	0.376	-0.396	-0.327	-0.012	0.031
	(0.286)	(0.348)	(0.339)	(0.373)	(0.242)	(0.275)
Risk seeking	-0.170	0.101	-0.523	-0.781**	-0.313	-0.307
	(0.288)	(0.346)	(0.360)	(0.396)	(0.266)	(0.284)
Loss averse	-0.195	-0.057	0.089	-0.026	-0.075	-0.047
	(0.283)	(0.331)	(0.338)	(0.403)	(0.254)	(0.266)
Male	-0.320	-0.282	-0.602**	-0.542*	-0.423*	-0.375
	(0.251)	(0.304)	(0.292)	(0.329)	(0.228)	(0.239)
White	-0.333	-0.673**	-0.427	-0.230	-0.383*	-0.492**
	(0.238)	(0.271)	(0.302)	(0.343)	(0.215)	(0.231)
Major	0.003	-0.004	-0.065	-0.082	-0.026	-0.058
(Engineering/Science)	(0.253)	(0.315)	(0.283)	(0.314)	(0.226)	(0.239)
Constant	-0.191	-0.331	-0.892**	-0.790*	-0.330	-0.346
	(0.372)	(0.434)	(0.425)	(0.452)	(0.344)	(0.363)
Observations	4,360	2,920	4,360	2,880	8,720	5,800

(i) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(ii) Round numbers are 1 to 20 for columns (1) to (4), and 1 to 40 for columns (5) and (6).

Table A3.3: Logit Regression Results on Commitment (PureNE$_\Phi$ Only)

	First 20 Rounds	Last 20 Rounds	All Rounds
	(1)	(2)	(3)
Round	-0.070***	-0.093***	-0.054***
	(0.018)	(0.026)	(0.016)
Risk-averse	0.004	-0.480	-0.151
	(0.510)	(0.798)	(0.432)
Risk-seeking	-0.854	0.341	-0.344
	(0.542)	(0.814)	(0.460)
Loss-averse	-0.650	0.437	-0.176
	(0.527)	(0.552)	(0.409)
Male	-0.391	-0.815	-0.542
	(0.426)	(0.679)	(0.367)
White	0.581	-0.942*	-0.107
	(0.442)	(0.524)	(0.370)
Major	0.327	-0.067	0.075
(Engineering/Science)	(0.429)	(0.617)	(0.350)
Constant	-0.276	-1.117	-0.356
	(0.515)	(0.803)	(0.503)
Observations	1,440	1,480	2,920

(i) Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

(ii) Round numbers are 1 to 20 for Columns (1) and (2), and 1 to 40 for Column (3).