Time Pressure and Focal Points in Coordination Games: Experimental Evidence

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Abstract

How does time pressure affect the power of focal points in coordination games? We experimentally examine the effects of varying time pressure in a coordination game with a label-salient focal equilibrium. We consider both a payoff symmetric (pure) coordination game and a payoff asymmetric battle of the sexes coordination game with conflict of interest. The data show that in the symmetric game the label-salient outcome is highly focal regardless of how much time subjects have to decide. In the asymmetric game, in contrast, higher time pressure makes it significantly more likely that coordination is on the label-salient outcome. Our findings suggest that the results from the existing literature on focal points in coordination games with conflict of interest, which did not control for explicit time constraints, may underestimate the power of focal points when decision makers are time-constrained.

Keywords: Coordination game; focal point; time pressure; conflict of interest; payoff asymmetry; experiment.

JEL Classification: C70; C72; C92.

1 Introduction

Coordination games capture many important economic situations, such as market entry, macroeconomic policy coordination, choice of product standards, contract agreement, as well as everyday life situations such as when and where to meet someone else. Coordination situations have multiple equilibria, hence strategic uncertainty, and so it is not a priori clear exactly how coordination can be ensured. Consequently, there is a risk of coordination failure (see Devetag and Ortmann, 2007; Van Huyck et al., 1997).

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More than fifty years ago, Thomas Schelling (see Schelling, 1960) suggested that players facing a coordination situation might be able to coordinate their behavior by finding a *focal point* of the game, i.e., a salient contextual aspect of how the game is described (the game's 'labels') that points to an equilibrium outcome.[1] Following most of the literature, we refer to such focal points as *label-salient*.

Schelling's hypothesis has been examined experimentally in several studies (see for example Schelling, 1960; Mehta et al., 1994; Crawford et al., 2008; Bardsley et al., 2009; Sugden, 2011; Isoni et al., 2013, 2014; Parravano and Poulsen, 2015; Sitzia and Zheng, 2019; Isoni et al., 2020). A rough summary of the findings from this literature is that people are able to identify focal points in 'pure' coordination games (games where players get the same payoff in any equilibrium – what we call *symmetric* games), but when there is a *conflict of interest* (players prefer to coordinate on different equilibria – *asymmetric* games), then the power of focal points is significantly weakened.

The motivation that led to the experiment described in this paper is straightforward. We believe the literature cited above has overlooked an important aspect that we conjectured may matter for how likely people are to rely on a focal point in a coordination game: people may have *limited time* to think and decide. The resulting *time pressure* is arguably a fundamental economic aspect of decision making.[2] The existing experiments on label salient focal points in coordination games do not address this issue, since they do not give subjects an explicit amount of time to decide.[3] It is consequently not known in the literature what the power of focal points is when subjects are so time pressured that the time constraint 'binds', i.e., it forces people to decide faster than they would otherwise do, when not constrained by time pressure. Our experiment seeks to shed empirical light on exactly this issue: does the distribution of choices 'shift' when time pressure is increased, such that the time constraint for decision-making becomes binding?

In our experiment two subjects play a simultaneous-move one-shot coordination game without communication. Each player chooses between two options, labeled 'A' and 'B'. Each player choosing A is an equilibrium, as is both choosing B. We consider two versions of this game. In the *symmetric* coordination game (a 'pure coordination game'), the players are indifferent between coordinating on A or on B. Since however A is predicted to be more label-salient than B, the (A,A) equilibrium is more focal than (B,B). We therefore expect that there will be more coordination on A than on B, as has been verified in previous work (see for example Crawford et al., 2008; Isoni et al., 2013; Parravano and Poulsen, 2015). The *asymmetric* (conflict of interest) game is of the battle of the sexes type (see, e.g., Crawford et al., 2008). Here each player prefers to coordinate on a different equilibrium. Intuitively, this conflict of interest interferes with the label-salience of A. As already mentioned, previous research have found that the focality of label-salience is weaker in asymmetric than in symmetric games.

[1] More generally, a focal point can also refer to payoff-based properties that make an equilibrium of the game attractive to the players (see for example Isoni et al., 2014; Galeotti et al., 2018).

[2] Time pressure has been studied in many economic settings (for a survey see Spiliopoulos and Ortmann, 2018).

[3] The only exception we are aware of, Bilancini et al. (2018) (described below), do not consider coordination games with conflict of interest which are the main focus of our paper.

We exogenously vary how much time subjects have to decide. Our ex-ante conjecture was that higher time pressure would *increase* the focality of the label salient (A,A) equilibrium. We based this on the following hypothesis: subjects would tend to notice and process the labels (A,B) first, and based on this information alone, the intuitive choice would therefore be to choose A. Furthermore, it would take more time to consider and work out the implications of numerical payoff information. It follows from this hypothesis that the less time people have to think and decide, the less likely they are to consider the structure of money payoffs and so the decision is affected by the salience of the labels; this would lead to A being more likely to be chosen. Conversely, giving decision makers more time would make it more likely that subjects would deliberate based on payoffs, and this would, especially in the asymmetric game with conflict of interest, where the players prefer to coordinate on different outcomes, tend to 'erase' the focality of the label-salient A outcome.

Our hypothesis about how varying time pressure affects the power of focal points was inspired by a large literature on time pressure, response times and reasoning processes in individual and interactive settings (see the survey in Spiliopoulos and Ortmann, 2018). We think of intuition as involving relatively fast (superficial) reflection, possibly based on analogy, rules of thumb, or heuristics, while deliberation is more resource-intense, slower, and involving explicit analytical consideration of relevant variables (here monetary payoff information); see Kahneman (2011), Alós-Ferrer and Buckenmaier (2019), Alós-Ferrer and Garagnani (2020), Belloc et al. (2019) and Kuo et al. (2009) for some evidence and further references.[4] Our work contributes to this literature by examining if in coordination situations payoff asymmetry moderates the impact of changes in time pressure on label-salience.

The data show that the effects of varying time pressure on label-salience depend on whether there is a conflict of interest (payoff asymmetry) in the game or not. In the symmetric coordination game, there is no effect of changes in time pressure on coordination behavior. The vast majority of subjects (more than 90%) choose the label-salient action, A, regardless of how much time they have. In the asymmetric game, we observe that while higher time pressure does not affect the overall level of coordination, it makes it significantly more likely that coordination is on A rather than B. Higher time pressure therefore affects the distribution of payoffs between the players. Our data are consistent with an interpretation that reducing the amount of time people have to decide causes a 'strategy shift' (see Spiliopoulos et al., 2018; Spiliopoulos and Ortmann, 2018), namely a change in the kind of reasoning people engage in, from relatively deliberative to one more based on intuition.[5]

Our work demonstrates that a structural variable, how much time there is to think and decide, is important for the outcomes of coordination games with focal points. Recall that in the existing experimental studies subjects were not given a fixed and known amount of time to think and decide. In these stud-

[4]For example, Li and Camerer (2019) observe that players under higher time pressure are more likely to choose more label-salient locations in hide and seek games and that higher time pressure limits what levels of strategic reasoning the players can achieve; Spiliopoulos et al. (2018) report that more heuristic behavior is observed in normal form games when time pressure increases.

[5]Our finding that payoff asymmetry matters for the effects of time pressure is similar to other findings in the literature demonstrating that certain variables 'turn on' or 'turn off' the impact of time pressure, such as the framing of the game or whether subjects are experienced or not (see Cone and Rand, 2014; Rand et al., 2014).

ies subjects were therefore not explicitly time pressured. In our experiment we capture this by a condition where subjects know they have plenty of time available, and where the data show that the time constraint is not binding. We observe that introducing time pressure (a binding time constraint) generates a behavioral shift towards the focal outcome when the game has conflict of interest. If one adopts the view that time constraints outside the lab are more likely to be binding than not, this suggests that the existing studies may underestimate the power of label salient focal points in coordination games with conflict of interest.

The rest of the paper is organized as follows. Section 2 describes some recent literature on time pressure in coordination situations. Section 3 introduces the coordination game and the experimental design. Hypotheses are presented in Section 4 and our results are described in Section 5. Section 6 concludes. Instructions and additional findings are in the Online Appendix.

2 Related Literature

After having collected our data, we became aware of three recent experimental studies of time pressure in coordination situations. Bilancini et al. (2018) consider the effects of time pressure in pure coordination games but not in games with conflict of interest. They observe that the focal point is stronger when people have unlimited time to think than when they are time constrained (in which case they have 6 seconds to decide), and even stronger if people are forced to wait 10 seconds before deciding. The interpretation is that deliberation is needed for the focal point to be used as a coordination device. In our pure coordination game, in contrast, the focal point is almost universally selected regardless of the degree of time pressure. There are several differences between their and our study (the number of strategies, the framing, and how much time players have for deciding), which makes a comparison hard.[6]

Li and Camerer (2019) consider visually framed pure coordination games ('matching games') and hide-and-seek games. They vary time pressure in the latter (but not former) class of games and find that less time makes both hiders and seekers more likely to choose the label-salient location. This suggests that hiders cannot inhibit a natural tendency to choose the label salient location. These findings are consistent with ours in that an increase in time pressure increases the power of label salience.[7]

Finally, Belloc et al. (2019) observe that having less time to decide in a Stag-Hunt game makes subjects choose stag more frequently. In their design subjects face a series of stag hunt games and either decide under a time constraint

[6]One way to reconcile their and our findings is to note that Bilancini et al.'s game without a focal point already has other cues that can be salient, so when a focal point is added to the game it has to 'compete' with these alternative sources of salience. It is then only when people have enough time that they realise that the added focal point is the best way to coordinate. So in their setting some deliberation is needed in order to 'unlearn' relying on 'home grown' cues. In our game, in contrast, there is arguably only one candidate for label salience, and both intuition and deliberation make it salient. Taken together, Bilancini et al's and our study therefore show that the effects of time pressure in a pure coordination game depends on whether there is a unique or several candidates for label salience.

[7]One fascinating feature of Li and Camerer's study is the use of eye tracking data. It would be very relevant to employ the same methods for coordination games with asymmetric payoffs in future experiments.

(10 seconds), or have unlimited time. They observe that the subjects under the time pressure treatment are more likely to play stag than those with unlimited time. One interpretation of the data offered by the authors is that the intuitive choice is stag and that less time to decide increases reliance on intuition rather than deliberation (although the authors are careful to point out other interpretations). Viewed in this light, their results support an interpretation that in stag hunt games intuition favours payoff dominance, and therefore, intuition might as well favour label salience in the coordination situations with conflict of interest (battle of the sexes games) that we study.

3 Experimental Design

3.1 The Coordination Games

The coordination games were one-shot simultaneous-move games without any communication. Each experimental subject played only one game.

In the symmetric game, both players get the same payoff, €10, if they both choose A, and the same if both choose B. Otherwise, each player gets no money (see Table 1a). In the asymmetric game, Player 1 (2) gets €12 (€10) if both choose A, and the opposite if both choose B. A failure to coordinate on A or B again means that no one gets anything. There is thus conflict of interest, in that Player 1 prefers coordination on A while Player 2 prefers coordination on B (see Table 1b).

Table 1: The coordination games

	P2	
P1	A	B
A	10, 10	0, 0
B	0, 0	10, 10

(a) symmetric

	P2	
P1	A	B
A	12, 10	0, 0
B	0, 0	10, 12

(b) asymmetric

Notes: The numbers are money amounts in Euros.

3.2 The Task

Subjects were shown two cards on their computer screens, one labelled 'A', and the other 'B'. The A (B) card was always shown to the left (right).[8] Subjects were informed that they each had to choose one of the cards without knowing the other subject's choice. All money payoffs were common knowledge.

[8]Thus the properties of 'being labelled A' and 'being shown on the left' were perfectly correlated. We chose this design on purpose, since we are interested in label salience and both symbols and relative positions might play a role in that respect. A possible control treatment where only 'leftness' and 'rightness' properties can act as potential label based focal points would be easy to implement by removing the letters 'A' and 'B'. We suspect this framing would be much weaker than using letters. Another control would show the option 'A' and 'B' on the right and left side, respectively. However, the latter seems quite artificial: given that the framing of the options is in terms of letters, it seems natural that these should be listed in the order of the alphabet.

Figure 1 shows the decision screens. In Experiment 1 (part *a* of the figure), subjects saw a single screen that showed how much time was remaining and all the instructions, and subjects made their decision by clicking on the desired option at the bottom of the same screen. Thus everything was made subject to time pressure (reading instructions, understanding, thinking, and deciding).

In Experiment 2, subjects first read the instructions on a separate screen under no time pressure. The instructions explained that there would be a card selection task and that subjects would earn money only if they chose the same card, but subjects were not shown the cards and were not told what the money amounts were. When all subjects had read the instructions and had asked any questions, they were presented with a decision screen where, with time counting down, they saw the cards and the money payoffs for each card, and they made their decision (see part *b* of Figure 1, for full set of screenshots see Online Appendix). Thus, participants in the two experiments had exactly the same information when they made their decisions. The only difference between Experiment 1 and 2 was whether the reading and understanding phase of the game was subjected to time pressure (Experiment 1) or not (Experiment 2). In both experiments it was made clear that in case no decision is made before time runs out, neither player received any money. We see Experiment 1 as the more externally valid implementation of time pressure, and Experiment 2 as controlling for the potential issue (to inference drawn from Experiment 1 data) that in Experiment 1 subjects may have rushed through the instructions (or believe others had), which could have affected their understanding and coordination behavior.

After subjects had chosen the card, but before they knew what the other subject had done and thus whether they had managed to coordinate or not, they were asked a number of questions, such as whether they thought they had time enough, and whether they believed they had understood the task plus a few questions on demographics (see Online Appendix). In Experiment 2 we also asked subjects to state what card they thought the other subject had chosen. As a measure of cognitive sophistication, we also asked them in both Experiment 1 and 2 to do the Raven's progressive matrices task (Raven, 1941). In Experiment 2 subjects additionally took part in a version of the Cognitive Reflection Test (Frederick, 2005) – for details, see Online Appendix, Section 2.2.[9]

3.3 Time Constraints

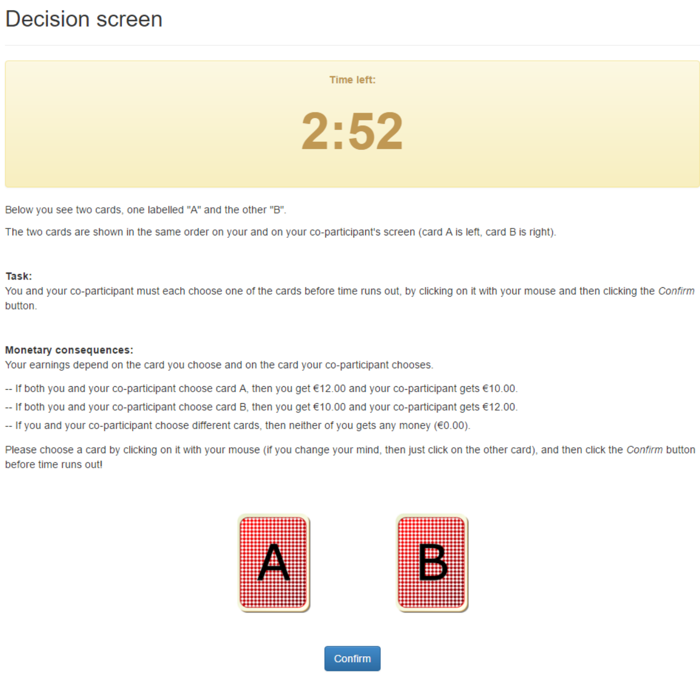
In Experiment 1, subjects had 180 seconds in the *low* time pressure condition, and 45 seconds in the *high* time pressure condition. In Experiment 2, subjects had 180 seconds in the *low* time pressure condition, and 15 seconds in the *high* time pressure condition.

We decided on these parameters based on informal pre-testing. We sought to create an environment where low time pressure allowed for plenty of time to decide such that, in effect, there was no time pressure (i.e., no binding time constraint; see Lindner and Sutter, 2013, for a similar design choice). In fact, the data show that in the low time pressure condition all subjects decide well

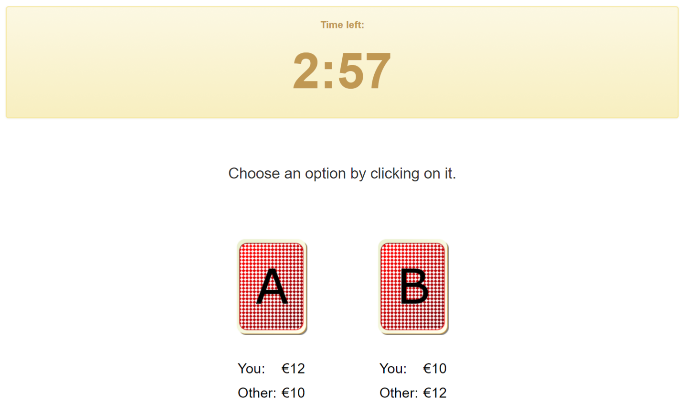
[9] We used the 3 original items, but added 3 new items (Primi et al., 2016) because the original items – due to their frequent use – might had become known by the subjects.

Figure 1: Decision screens

(a) Experiment 1



(b) Experiment 2



before the 180 seconds deadline.[10] We wanted high time pressure to be behaviorally relevant, yet we also had to avoid giving participants too little time, in which case they might not even be able to fully understand the consequences of their actions in terms of game payoffs and to implement their choice. We seem to have succeeded in balancing these opposing considerations, since we do indeed observe that subjects under low time pressure on average take more time to decide than what they have available under the high time pressure condition (45 or 15 seconds); so the high time pressure constraint is 'binding'. At the same time, the answers to our survey questions indicate that participants felt they had been given enough time to understand the task, also under high time pressure. See Figures 2 and A.1 as well as Table 3 below for more details on response times.

3.4 Experimental Logistics

The experiment was conducted at the Vienna Center for Experimental Economics (VCEE) lab of the University of Vienna. Participants were recruited via ORSEE (Greiner, 2015) and the experiment was implemented using oTree (Chen et al., 2016). In total 336 subjects participated in 17 sessions and earned an average of €9.70 for about 40 minutes of their time.[11]

Table 2: Treatments and number of subjects

	Time pressure	
Symmetry	Low	High
Sym (exp.1)	48	50
Asym (exp.1)	48	68
Asym (exp.2)	62	60

4 Hypotheses

The hypothesis that, based on previous findings, motivated our experiment is that higher time pressure increases coordination on a label-salient focal point:

Hypothesis 1. *Higher time pressure raises the proportion of subjects in either player role who choose A in the asymmetric game. In the symmetric game, higher time pressure has the same, or no, effect.*

The intuition is that players will tend to first notice the A and B labels, and find A to be more attractive than B, in both the symmetric and the asymmetric games; it is only if players have more time available that they begin to consider

[10] In our data the slowest subject in a 180 second condition took 124 seconds to make his/her choice, i.e., the time limit of 180 seconds did indeed not seem to restrict our subjects.

[11] Despite the simple one-shot nature of the game, and that each subject played one game only, the overall duration of a session was 40 minutes. This included time for instructions, questions, check for understanding, a questionnaire and the payment of subjects.

the payoffs; since in the asymmetric game each player prefers a different equilibrium, this would lead to dispersion in behavior away from the focal point. So higher time pressure makes it more likely that there is coordination on A in the asymmetric game. In the symmetric game, we predict the same effect, but also note that since players are indifferent between the equilibria, labels can serve as tie breakers also under low time pressure; in this case labels can already be strong under higher time pressure, so giving players less time may not have any discernible effect.

Hypothesis 1 implies that the expected coordination rate on (A,A) increases, and that the one on (B,B) goes down. What is the effect on the overall expected coordination rate and players' earnings? Let p (q) denote the proportion of Player 1s (2s) who play A, where $p, q \in [0, 1]$. Then the expected coordination rate (ECR) can be calculated as the sum of the probability of coordination on A and on B, that is, $ECR = pq + (1-p)(1-q)$. The expected total earnings of two players in the asymmetric game equals $ECR \times$ €22, and in the symmetric game $ECR \times$ €20.

Hypothesis 2. *An increase in time pressure raises the expected coordination rate and players' total earnings in the asymmetric game, and (possibly weakly so) in the symmetric game.*

This hypothesis is more restrictive than Hypothesis 1: an increase in play of A does not necessarily increase the expected coordination rate; this only happens if sufficiently many people are already playing A, or equivalently if the increase in play of A is sufficiently large given the existing proportions of A play. To see this, let p (q) denote the probability that Player 1 (2) chooses A, and suppose that in the low time pressure condition $(p, q) = (.4, .4)$. Then $ECR = (.4)(.4) + (.6)(.6) = .52$. If higher time pressure raises A play to, say, $(p, q) = (.6, .5)$, then $ECR = (.6)(.5) + (.4)(.5) = .5$, so coordination drops. It is not difficult to see that if at least half of the players in each role choose A, then an increase in play of A always raises the expected coordination rate.

5 Results

Table 3 provides a summary of descriptive statistics on choices, expected coordination rates, and response times.[12]

5.1 Are the Time Constraints Under High Time Pressure Binding?

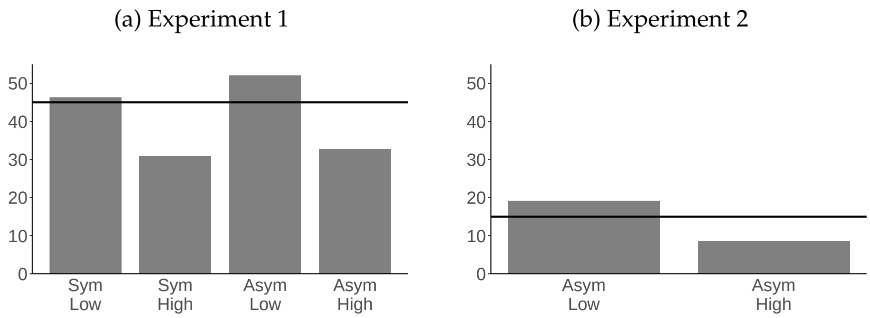
We first consider subjects' response times (cf. Table 3 and Figure 2; histograms can be found in the Online Appendix). Response times are significantly shorter when subjects have less time to decide (Ranksum test: $p < 0.001$).[13] Moreover, average response times under low time pressure are higher than the time subjects have available under high time pressure. In the symmetric game, subjects

[12] Descriptive statistics for the Raven Progressive Matrices and the Cognitive Reflection Test can be found in the Online Appendix. It turns out that neither of these are correlated with choices. The same holds for subjects' age and gender. See Tables A.1, A.2, A.3 and A.4 in the Appendix for details.

[13] Unless otherwise stated, we report the results of two-sided tests.

on average decide after 46.29 seconds, which exceeds the 45 seconds available under high time pressure, and where people spend around 31 seconds to decide. In the asymmetric game (Experiment 1), subjects under low time pressure on average spend more than 45 seconds to decide, which is the maximum time available under high time pressure, and where subjects on average spend around 33 seconds to decide. Similarly, in Experiment 2 subjects under low time pressure on average spend more than the 15 seconds they have available under high time pressure. The time constraints under high time pressure are thus binding (on average). As was discussed in the Introduction, this is a desirable if not necessary feature of our experiment.[14]

Figure 2: Average response times, conditional on game



Notes: The horizontal lines indicate the amount of time subjects had to decide under conditions of high time pressure, i.e., 45 and 15 seconds in Experiment 1 and Experiment 2, respectively.

5.2 The Symmetric Game

We next consider the outcomes of the symmetric coordination game.

Result 1. *In the symmetric game, there are no significant effects of higher time pressure on choices: almost everyone chooses A, both under low and high time pressure.*

Over 90% of all players choose A (see Table 3), and the proportion of A choices does not differ between the high and the low time pressure condition (χ^2-test: $p = 0.674$, see also Table A.1). The expected coordination rates are much higher than the expected coordination rates according to the mixed strategy Nash equilibrium (MSNE) of 50% (see Table 3). The finding that labels are strong in a pure coordination game regardless of time pressure is consistent with the hypothesis that the intuitive choice is to rely on labels, and that deliberation uses labels as tie breakers.

5.3 The Asymmetric Game

An increase in time pressure causes the proportion of A choices to increase from 56% to 71% in Experiment 1, and from 46% to 56% in Experiment 2. This

[14] At the same time, very few subjects ran out of time. As is evident from Table 3 only 4 out of 178 subjects (2%) in high time pressure conditions did not submit their choice in time (timed-out). Figure A.1 in the Appendix has more details on response times by player roles.

difference is marginally significant for Experiment 1, but not for Experiment 2 (χ^2-tests: $p = 0.098$ and $p = 0.314$ for Experiment 1 and 2, respectively).

Result 2. *The proportion of A choices increases when time pressure goes up (marginally significantly in Experiment 1, and not significant in Experiment 2).*

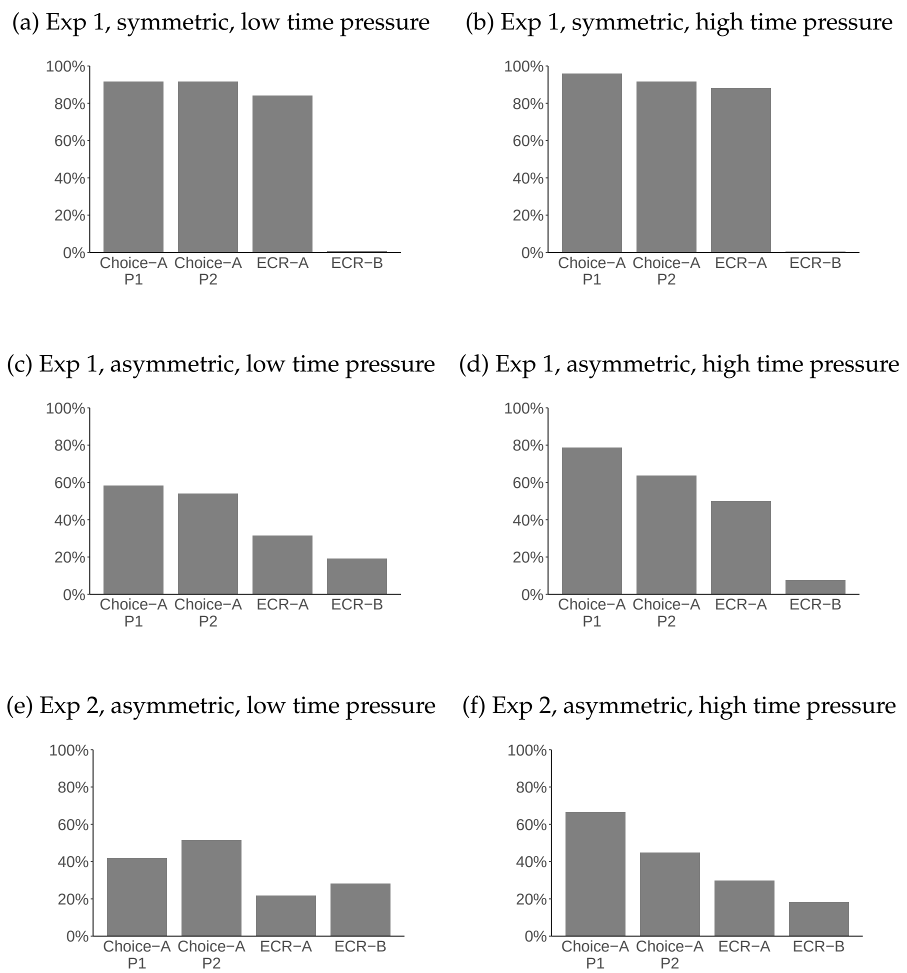
We can also consider the player roles separately. In Experiment 1 under low time pressure Player 1s choose A in 58.33% of cases. Under high time pressure the propensity of choosing A increases to 78.79% (χ^2-test: $p = 0.096$). For Player 2s, the proportion of A choices slightly increases under high time pressure, but this difference is not significant (54.17% vs. 63.64%, χ^2-test: $p = 0.472$). A similar pattern can be observed in Experiment 2: under low time pressure Player 1s choose A in 41.94% of all cases, and under high time pressure 66.67% do so (χ^2-test: $p = 0.053$). For Player 2s the proportion of A choices decreases from 51.61% to 44.83%, but this change is not significantly different (χ^2-test: $p = 0.599$).

Table 3: Summary statistics

	Exp 1 - Symmetric		Exp 1 - Asymmetric		Exp 2 - Asymmetric	
Time pressure	Low	High	Low	High	Low	High
N	48	50	48	68	62	60
Choices made on time	48	49	48	66	62	60
Number choosing A (%)	44 (91.67%) pooled 22 (91.67%) P1 22 (91.67%) P2	46 (93.88%) pooled 24 (96.00%) P1 22 (91.67%) P2	27 (56.25%) pooled 14 (58.33%) P1 13 (54.17%) P2	47 (71.21%) pooled 26 (78.79%) P1 21 (63.64%) P2	29 (46.77%) pooled 13 (41.94%) P1 16 (51.61%) P2	33 (55.93%) pooled 20 (66.67%) P1 13 (44.83%) P2
ECR	84.72%	88.33%	50.69%	57.85%	49.74%	48.28%
ECR_A	84.03%	88.00%	31.60%	50.14%	21.64%	29.89%
ECR_B	0.69%	0.33%	19.10%	7.71%	28.10%	18.39%
MSNE ECR	50%	50%	49.59%	49.59%	49.59%	49.59%
Exp. payoff (in EUR, excl. part. fee)	8.47	8.83	5.70 P1 5.45 P2	6.79 P1 5.94 P2	5.41 P1 5.54 P2	5.43 P1 5.20 P2
Av. response time (secs)	46.29	30.92	56.79 P1 47.29 P2	33.45 P1 32.00 P2	18.00 P1 20.19 P2	8.23 P1 8.93 P2
Av. response time (secs) cond. on A	46.59	31.13	57.86 P1 43.77 P2	33.92 P1 29.90 P2	21.62 P1 18.56 P2	7.95 P1 8.69 P2
Av. response time (secs) cond. on B	43.00	27.67	55.30 P1 51.45 P2	31.71 P1 35.67 P2	15.39 P1 21.93 P2	8.80 P1 9.13 P2

Notes: N: number of observations, ECR: expected coordination rate, ECR_A: expected coordination rate on outcome (A,A), ECR_B: expected coordination rate on outcome (B,B), MSNE ECR: expected coordination rate according to the mixed strategy Nash equilibrium (MSNE), and Exp. payoff: Expected Payoff in Euros

Figure 3: Proportions of A-choices and Expected Coordination Rates

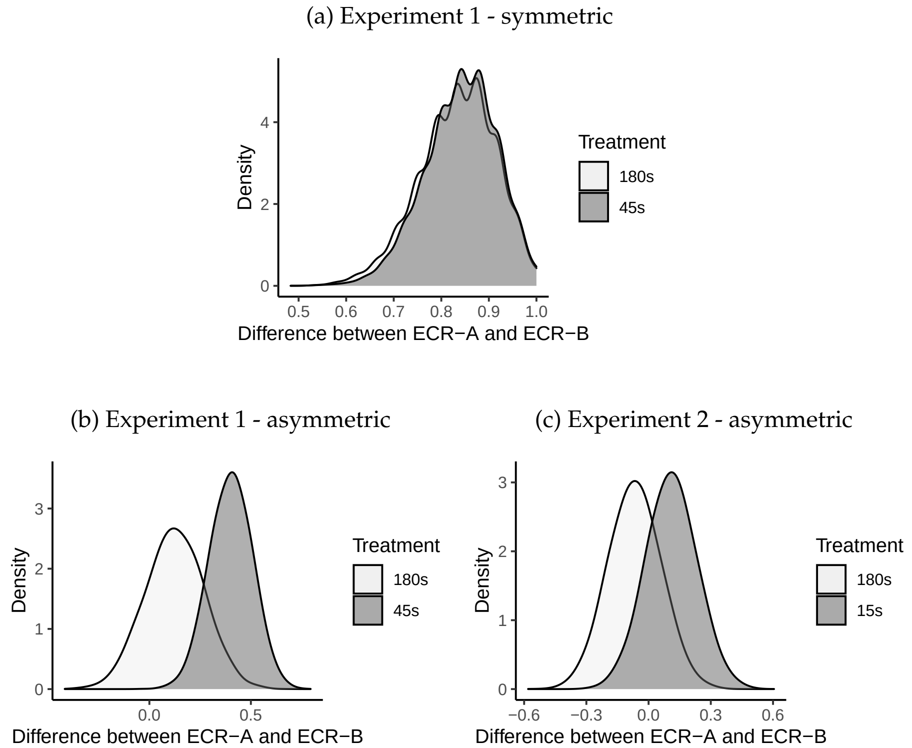


Notes: Choice-A P1 and Choice-A P2 denote the proportion of 'A' choices of Players 1 and 2, respectively. ECR-A and ECR-B denote the expected coordination rates on option 'A' and 'B', respectively.

Expected Coordination Rates We next consider the expected coordination rates (ECR). Higher time pressure increases ECR from 50.69% to 57.85% in Experiment 1, but reduces it from 49.74% to 48.28% in Experiment 2. This difference is due to the fact that since in Experiment 1 a majority of both Player 1 and 2 play A under low time pressure, the increase in A choices in each role created by high time pressure implies that the expected coordination on A always outweighs the reduced coordination on B, and so overall expected coordination increases (recall that ECR = ECR-A + ECR-B, and see remark in Section 4). This supports Hypothesis 2. In Experiment 2, on the other hand, a minority of Player 1s choose A under low time pressure and although more player 1s choose A when time pressure goes up, the increase in expected coordination on A (by about 8 percentage points) is not large enough to outweigh the decrease in expected coordination on B (about 10 percentage points), and so overall coordination falls (by 2 percentage points).

While higher time pressure does not generally raise the overall level of coordination in the asymmetric game, it affects *how* coordination takes place (i.e., on A or B). Denote again the expected coordination rate on A (B) by ECR-A (ECR-B). In both Experiment 1 and 2 we observe that the difference ECR-A – ECR-B is larger under high than under low time pressure (see also Figure 3 panels c-f). Figure 4 illustrates this shift from coordination on B to A.

Figure 4: The effect of time pressure on ECR-A – ECR-B



Notes: The above distributions result from bootstrapping ECRs by randomly re-matching Player 1s and Player 2s actual choices ($n = 10000$) and computing the differences between the Expected Coordination Rates on A vs. B.

In order to provide a statistical test, we use the approach of Dijkstra et al. (2019). We conduct randomization tests to detect varying ECR-As and ECR-Bs across the time pressure conditions (for details see Appendix A.2.3). We find statistical support for what Figure 4 suggests visually: Time pressure does not affect the difference between ECR-A and ECR-B in the symmetric games ($p = 0.324$), but in the asymmetric games we find a significant shift towards more coordination on A rather than B (Experiment 1 and 2: $p = 0.012$ and $p = 0.093$, respectively; see also Figure A.2 in the Appendix).

Result 3. *In the asymmetric but not symmetric game, an increase in time pressure leads to a shift in coordination from B to A (significant in Experiment 1 and weakly so in Experiment 2).*

Results 2 and 3 show that higher time pressure causes a 'strategy shift' (see Spiliopoulos and Ortmann, 2018; Spiliopoulos et al., 2018), and also what we might call a 'coordination shift' from B to A.

5.4 A Closer Look at Response Times

Our interpretation of the outcome data, that higher time pressure leads to a strategy shift from B to A due to A being the intuitive choice, might lead us to expect that A choosers should also have lower response times than B choosers. Indeed, an important, but controversial, conjecture is that more intuitive decisions tend to be made faster than deliberative ones.[15] In the symmetric game under high time pressure, the average response time of A choosers is 31.13 seconds, while B choosers actually spend less time, namely 27.67 seconds. Of course, very few subjects (8%) choose B, so not too much weight should be assigned to this. In Experiment 1's asymmetric game, Player 1 A choosers are slower than Player 1 B choosers both under high and low time pressure (although this difference is not significant, Ranksum test: p=0.708), while the opposite is true for Player 2s and significantly so (Ranksum test: p=0.020). In Experiment 2, both Player 1 and 2 A choosers are faster than the corresponding B choosers, yet not significantly so (Ranksum tests for Player 1s: p=0.536 and Player 2s: p=0.982). Furthermore, in neither Experiment 1 or 2 do we observe significant differences in response times by player role, neither among A choosers nor B choosers.[16]

We do not however believe that the absence of a systematic tendency for A choosers to make their decisions faster than B choosers invalidates our interpretation of the outcome data, that higher time pressure increases subjects' reliance on intuition. Note that a response time captures not only how quickly a subject made his or her decision but also includes time spent on submitting it. Subjects in our experiment knew how much time they had to decide, so time pressure can potentially affect both time spent on making a decision and on submitting it. An intuitive thinker may reach a decision quickly and so have plenty of time left over; he or she can therefore 'afford' to be slow in submitting the decision. On the other hand, someone who deliberates may spend more time on reasoning, but may submit her decision quickly. Moreover, it is likely that the speed of (deliberative) thinking itself may adjust to the time available.[17] This argument suggests that an intuitive thinker will not necessarily have a lower response time than someone who deliberates.[18] Nevertheless,

[15] See for example Rubinstein (2007); Rand et al. (2012); Tinghög et al. (2013); Rand et al. (2014); Verkoeijen and Bouwmeester (2014); Krajbich et al. (2015); Cappelen et al. (2016); Rubinstein (2016); Bouwmeester et al. (2017); Merkel and Lohse (2019).

[16] Ranksum test for Experiment 1 P1-A vs. P2-A: p=0.133, P1-B vs. P2-B: p=0.329 and Experiment 2 P1-A vs. P2-A: p=0.427, P1-B vs. P2-B: p=0.874.

[17] The finding that the speed of thinking adjusts to how much time is available is referred to as 'acceleration' (Spiliopoulos et al., 2018) or 'pacing' (Sonntag, 2015).

[18] It seems to us that the possibility that both the speed of making a decision and time spent on submitting an already reached decision can vary with the mode of reasoning has not received any attention in the response time literature.

in our setup time available acts as a 'ceiling' for how much time can be spent on reasoning; and our interpretation of the outcome data, that lowering this ceiling increases the relative likelihood of intuition rather than deliberation, does not necessarily imply that intuitive thinkers systematically submit their decisions faster than deliberative ones.

6 Conclusion

The claim that salient features of coordination games can serve as a coordination device even when players disagree about how they should coordinate (conflict of interest) has been investigated for more than half a century (since Schelling, 1960) – but, we believe, without considering an arguably important economic aspect, namely how much time people had to think and decide.

This paper experimentally considers the effects of changes in time pressure on the power of a label-based focal point in both payoff symmetric and asymmetric coordination games. We observe in symmetric games that subjects coordinate almost universally on the focal point regardless of how much time is available. In asymmetric (conflict of interest) games, in contrast, greater time pressure makes it significantly more likely that coordination takes place on the label salient outcome. We interpret our data as showing that an increase in time pressure causes a change in the decision makers' mode of reasoning (a 'strategy shift', cf. Spiliopoulos et al. (2018)), from relatively deliberative payoff-based to relatively more intuitive reasoning based on label salience, and this in turn causes a 'coordination shift' toward the label-salient outcome. We think our findings show that one should in the future, when considering the likelihood of coordination based on salient contextual aspects, explicitly consider how much time people have to think and decide. As stated earlier, the findings of the existing literature on focal points in coordination games with conflict of interest may need to be interpreted as applying mainly to cases where decision makers are not time-constrained, or where this constraint is not binding.

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References

Carlos Alós-Ferrer and Johannes Buckenmaier. Cognitive sophistication and deliberation times. *University of Zurich, Department of Economics, Working Paper*, 292, 2019.

Carlos Alós-Ferrer and Michele Garagnani. The cognitive foundations of cooperation. *Journal of Economic Behavior and Organization*, 175:71–85, 2020.

Nicholas Bardsley, Judith Mehta, Chris Starmer, and Robert Sugden. Explaining focal points : Cognitive hierarchy theory versus team reasoning. *The Economic Journal*, 120:40–79, 2009. doi: 10.1111/j.1468-0297.2009.02304.x.

Marianna Belloc, Ennio Bilancini, Leonardo Boncinelli, and Simone D'Alessandro. Intuition and deliberation in the stag hunt game. *Scientific Reports*, 9(1):1–7, 2019.

Ennio Bilancini, Leonardo Boncinelli, and Luigi Luini. Does focality depend on the mode of cognition? experimental evidence on pure coordination games. *University of Siena working paper*, 2018.

Samantha Bouwmeester, Peter PJL Verkoeijen, Balazs Aczel, Fernando Barbosa, Laurent Bègue, Pablo Brañas Garza, Thorsten GH Chmura, Gert Cornelissen, Felix S Dossing, Antonio M Esp'in, et al. Registered replication report: Rand, greene, and nowak (2012). *Perspectives on Psychological Science*, 12(3):527–542, 2017.

Alexander W Cappelen, Ulrik H Nielsen, Bertil Tungodden, Jean-Robert Tyran, and Erik Wengström. Fairness is intuitive. *Experimental Economics*, 19(4):727–740, 2016.

Daniel L Chen, Martin Schonger, and Chris Wickens. otree—an open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance*, 9:88–97, 2016.

Jeremy Cone and David G Rand. Time pressure increases cooperation in competitively framed social dilemmas. *PLoS one*, 9(12):e115756, 2014.

Vincent P Crawford, Uri Gneezy, and Yuval Rottenstreich. The power of focal points is limited: Even minute payoff asymmetry may yield large coordination failures. *American Economic Review*, 98(4):1443–58, 2008.

Giovanna Devetag and Andreas Ortmann. When and why? a critical survey on coordination failure in the laboratory. *Experimental economics*, 10(3):331–344, 2007.

Jacob Dijkstra, Loes Bouman, Dieko M Bakker, and Marcel ALM van Assen. Modeling the micro-macro link: Understanding macro-level outcomes using randomization tests on micro-level data. *Social science research*, 77:79–87, 2019.

Shane Frederick. Cognitive reflection and decision making. *Journal of Economic Perspectives*, 19:25–42, 2005. ISSN 0895-3309. doi: 10.1257/089533005775196732.

Fabio Galeotti, Maria Montero, and Anders Poulsen. Efficiency versus equality in bargaining. *Journal of the European Economic Association*, 2018. doi: https://doi.org/10.1093/jeea/jvy030.

Ben Greiner. Subject pool recruitment procedures: organizing experiments with orsee. *Journal of the Economic Science Association*, 1(1):114–125, 2015.

Andrea Isoni, Anders Poulsen, Robert Sugden, and Kei Tsutsui. Focal points in tacit bargaining problems: Experimental evidence. *European Economic Review*, 59:167–188, 2013.

Andrea Isoni, Anders Poulsen, Robert Sugden, and Kei Tsutsui. Efficiency, equality, and labeling: An experimental investigation of focal points in explicit bargaining. *American Economic Review*, 104(10):3256–87, 2014.

Andrea Isoni, Robert Sugden, and Jiwei Zheng. The pizza night game: Conflict of interest and payoff inequality in tacit bargaining games with focal points. *European Economic Review*, page 103428, 2020.

Daniel Kahneman. *Thinking, fast and slow*. Macmillan, 2011.

Ian Krajbich, Björn Bartling, Todd Hare, and Ernst Fehr. Rethinking fast and slow based on a critique of reaction-time reverse inference. *Nature communications*, 6:7455, 2015.

Wen-Jui Kuo, Tomas Sjöström, Yu-Ping Chen, Yen-Hsiang Wang, and Chen-Ying Huang. Intuition and deliberation: two systems for strategizing in the brain. *Science*, 324(5926):519–522, 2009.

Xiaomin Li and Colin Camerer. Using visual salience in empirical game theory. *Available at SSRN 3308886*, 2019.

Florian Lindner and Matthias Sutter. Level-k reasoning and time pressure in the 11-20 money request game. *Economics Letters*, 120:542–545, 2013. ISSN 01651765. doi: 10.1016/j.econlet.2013.06.005.

Judith Mehta, Chris Starmer, and Robert Sugden. The nature of salience: An experimental investigation of pure coordination games. *The American Economic Review*, 84:658–673, 1994.

Anna Louisa Merkel and Johannes Lohse. Is fairness intuitive? an experiment accounting for subjective utility differences under time pressure. *Experimental Economics*, 22(1):24–50, 2019.

Melanie Parravano and Odile Poulsen. Stake size and the power of focal points in coordination games: Experimental evidence. *Games and Economic Behavior*, 94:191–199, 2015.

Caterina Primi, Kinga Morsanyi, Francesca Chiesi, Maria Anna Donati, and Jayne Hamilton. The development and testing of a new version of the cognitive reflection test applying item response theory (irt). *Journal of Behavioral Decision Making*, 29(5):453–469, 2016.

David G Rand, Joshua D Greene, and Martin A Nowak. Spontaneous giving and calculated greed. *Nature*, 489:427–430, 2012. ISSN 0028-0836. doi: 10.1038/nature11467.

David G Rand, Alexander Peysakhovich, Gordon T Kraft-Todd, George E Newman, Owen Wurzbacher, Martin A Nowak, and Joshua D Greene. Social heuristics shape intuitive cooperation. *Nature communications*, 5:3677, 2014.

John C Raven. Standardization of progressive matrices, 1938. *British Journal of Medical Psychology*, 19(1):137–150, 1941.

Ariel Rubinstein. Instinctive and congnitive reasoning: a study of response times. *The Economic Journal*, 117:1243–1259, 2007.

Ariel Rubinstein. A typology of players: Between instinctive and contemplative. *The Quarterly Journal of Economics*, 131(2):859–890, 2016.

Thomas Schelling. *The strategy of conflict*. Harvard University Press, 1960.

Stefania Sitzia and Jiwei Zheng. Group behaviour in tacit coordination games with focal points–an experimental investigation. *Games and Economic Behavior*, 117:461–478, 2019.

Axel Sonntag. Search costs and adaptive consumers: Short time delays do not affect choice quality. 113:64–79, 2015. ISSN 01672681. doi: 10.1016/j.jebo.2015.02.024.

Leonidas Spiliopoulos and Andreas Ortmann. The bcd of response time analysis in experimental economics. *Experimental economics*, 21(2):383–433, 2018.

Leonidas Spiliopoulos, Andreas Ortmann, and Le Zhang. Complexity, attention, and choice in games under time constraints: A process analysis. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 44(10):1609, 2018.

Robert Sugden. Salience, inductive reasoning and the emergence of conventions. *Journal of Economic Behavior and Organization*, 79(1-2):35–47, 2011.

Gustav Tinghög, David Andersson, Caroline Bonn, Harald Böttiger, Camilla Josephson, Gustaf Lundgren, Daniel Västfjäll, Michael Kirchler, and Magnus Johannesson. Intuition and cooperation reconsidered. *Nature*, 498:E1–E2, 2013. ISSN 0028-0836. doi: 10.1038/nature12194.

John B Van Huyck, Raymond C Battalio, and Frederick W Rankin. On the origin of convention: Evidence from coordination games. *The Economic Journal*, 107(442):576–596, 1997.

Peter PJL Verkoeijen and Samantha Bouwmeester. Does intuition cause cooperation? *PloS one*, 9(5):e96654, 2014.

A Appendix

A.1 Instructions

All instructions were displayed on computer screens and were also read aloud by the experimenters. The screenshots are available in the Online Appendix.

A.2 Further Results

A.2.1 Choices

Tables A.1 and A.2 contain regression results on the likelihood of choosing A that confirm the results of the non-parametric analysis. As predicted, in Experiment 1, the likelihood of choosing A is substantially lower in asymmetric than in symmetric games. Time pressure in itself did not affect the probability of choosing A, neither in symmetric nor in asymmetric games, both in Experiment 1 and 2.

Variables used *High time pressure* (1 if high time pressure, 0 otherwise) and *Asymmetric game* (1 if payoffs are asymmetric, 0 otherwise) are treatment dummies. *Player 1* is a dummy that takes the value of 1 for the favored player (Player 1) and 0 for the unfavored player (Player 2). *Raven score* contains the result $\{0, 1, \ldots, 15\}$ of a reduced version of the original Raven's progressive matrices test (Raven, 1941). In particular, instead of the original 60, we only used 15 patterns (for all patterns used, see Section 1 of the Online Appendix). *CRT score* contains the result$\{0, 1, \ldots, 6\}$ of the Cognitive Reflection Test (Frederick, 2005). Since the "rational" vs. "intuitive" answers of the three original CRT items might have become common knowledge among our subjects to some extent, we also added three different items (Primi et al., 2016). While Tables A.2 and A.4 contain estimations using the result of the combination of the old and the new CRT items, only using either the old or the new items does not qualitatively change the picture. Our measure of *Swiftness* follows Cappelen et al. (2016) and indicates the amount of time in seconds a player used to fill the demographic survey questions at the very end of the experiment (see Online Appendix for screenshots of these questions). Swiftness thus provides a control measure for "general speed" in interacting with the computer (typing, clicking etc.) which could be an important component in a time sensitive experiment like ours. *More time wished* is a dummy taking the value of 1 if subjects indicated that they would have liked to have more time to decide, and 0 otherwise. *Feeling time-pressured* contains values $\{1, 2, \ldots, 5\}$ for the subjective feeling how time-pressured subjects felt while making their choice. *Decision time* measures the time in seconds decision makers took to submit their choice (precisely: the time on the decision screen; see Figure 1). *Belief: other player chose A* indicates the subjective belief about the likelihood that the other player chose A $\{0\%, 1\%, \ldots, 100\%\}$. *Age* contains the participant's age in years and *Male* represents the gender dummy (1 if male, 0 otherwise).

Table A.1: Probability of choosing A - Experiment 1

	(1)	(2)	(3)	(4)
Asymmetric game	-0.331***	-0.342***	-0.321***	-0.356***
	(0.0844)	(0.119)	(0.0850)	(0.120)
High time pressure	0.0436	-1.08e-16	0.0676	-0.0140
	(0.104)	(0.139)	(0.111)	(0.142)
Asymmetric game x High time pressure	0.0650	0.0653	0.0460	0.0867
	(0.123)	(0.166)	(0.123)	(0.164)
Player 1		6.73e-17		-0.0266
		(0.139)		(0.137)
Asymmetric game x Player 1		0.0283		0.0802
		(0.170)		(0.169)
High time pressure x Player 1		0.0983		0.184
		(0.209)		(0.212)
Asymmetric game x High time pressure x Player 1		-0.00619		-0.0973
		(0.247)		(0.249)
Raven score			-0.0213	-0.0235*
			(0.0132)	(0.0134)
Age			-0.00655	-0.00855*
			(0.00499)	(0.00509)
Male			0.00891	0.0114
			(0.0563)	(0.0557)
Swiftness			0.00143	0.00188
			(0.00291)	(0.00291)
More time wished			-0.0491	-0.0474
			(0.0677)	(0.0669)
Decision time			-0.000152	-0.000158
			(0.00209)	(0.00209)
Observations	211	211	211	211
Log. Likelihood	-97.56	-96.39	-95.47	-93.59
Chi-squared	28.68	31.04	32.88	36.63

Notes: This Table contains marginal effects from Probit regressions; levels of significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.2: Probability of choosing A - Experiment 2

	(1)	(2)	(3)	(4)
High time pressure	0.0918	-0.0680	0.0969	-0.00223
	(0.0911)	(0.129)	(0.117)	(0.151)
Player 1		-0.0973		-0.0953
		(0.127)		(0.131)
High time pressure x Player 1		0.321*		0.200
		(0.184)		(0.195)
Belief: other player chose A			0.00109	0.000911
			(0.00197)	(0.00198)
Raven score			0.00421	0.00427
			(0.0240)	(0.0242)
CRT score			-0.0195	-0.0164
			(0.0308)	(0.0313)
Age			0.0173	0.0177
			(0.0121)	(0.0123)
Male			0.164	0.144
			(0.108)	(0.112)
Swiftness			-0.00618	-0.00574
			(0.00392)	(0.00396)
Feeling time-pressured			-0.0766	-0.0711
			(0.0509)	(0.0515)
Decision time			0.00174	0.00160
			(0.00412)	(0.00413)
Observations	121	121	121	121
Log. Likelihood	-83.33	-81.60	-77.43	-76.90
Chi-squared	1.016	4.477	12.81	13.87

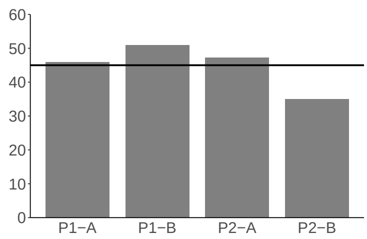
Notes: This Table contains marginal effects from Probit regressions. Scores of the Cognitive Reflection Test (CRT) were only measured in Experiment 2. Standard errors in parentheses; levels of significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.2.2 Response times

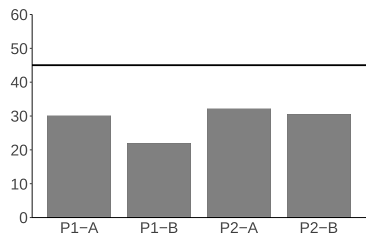
Figure A.1 shows the response times per action and player role. Histograms of response times can be found in the Online Appendix.

Figure A.1: Average response times by choice and player role

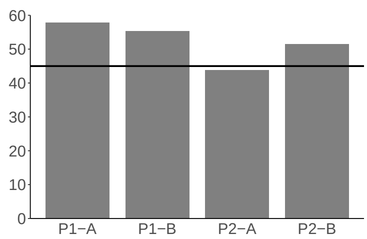
(a) Exp 1, symmetric, low time pressure



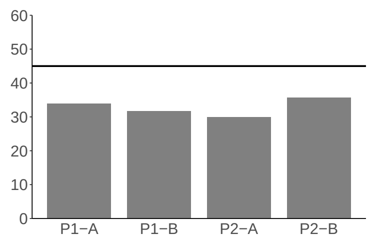
(b) Exp 1, symmetric, high time pressure



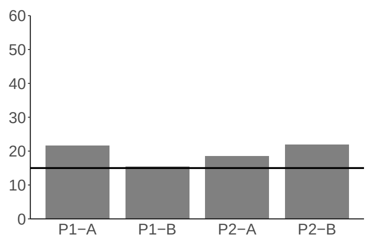
(c) Exp 1, asymmetric, low time pressure



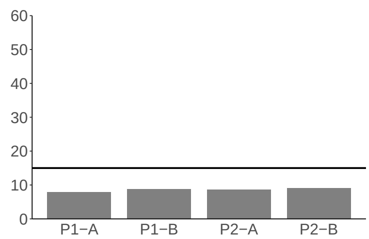
(d) Exp 1, asymmetric, high time pressure



(e) Exp 2, asymmetric, low time pressure



(f) Exp 2, asymmetric, high time pressure



Tables A.3 and A.4 contain regression results of decision times in Experiment 1 and 2, respectively. Decision times are split by choice (A or B).

The results show that, both in Experiment 1 and 2, participants made their choices substantially faster under high than under low time pressure (except for choosing option B in Experiment 1, see Table A.3). Furthermore, in line with the non-parametric analysis, under low time pressure in asymmetric games of Experiment 1, player 1s were significantly slower than player 2s in choosing A.

Table A.3: Response times - Experiment 1

	Choice A				Choice B			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High time pressure	-15.46***	-15***	-14.65***	-13.18***	-15.33*	-4.500	-7.442	3.837
	(3.027)	(4.276)	(3.053)	(4.274)	(8.359)	(10.98)	(9.713)	(11.94)
Asymmetric game	4.483	-3.458	5.306	-1.966	10.29*	16.45*	13.22**	18.94**
	(3.510)	(4.962)	(3.454)	(4.960)	(5.970)	(8.438)	(6.298)	(8.751)
Asymmetric game × High time pressure	-3.486	1.136	-3.493	0.407	-3.742	-11.29	-10.67	-17.98
	(4.602)	(6.583)	(4.576)	(6.524)	(9.048)	(11.90)	(9.916)	(12.51)
Player 1		-1.273		-0.447		16.00		16.38
		(4.276)		(4.189)		(10.98)		(11.16)
High time pressure × Player 1		-0.830		-2.625		-24.50		-26.90
		(5.984)		(5.904)		(17.36)		(19.72)
Asymmetric game × Player 1		15.36**		13.86**		-12.15		-12.75
		(6.938)		(6.936)		(11.98)		(12.17)
Asymmetric game × High time pressure × Player 1		-9.240		-8.084		16.70		17.44
		(9.109)		(9.244)		(18.75)		(20.60)
Raven score			0.589	0.361			-0.370	0.174
			(0.510)	(0.527)			(0.904)	(0.962)
Age			0.545**	0.528**			-0.157	0.0223
			(0.212)	(0.214)			(0.294)	(0.342)
Male			0.181	0.509			-1.217	-0.390
			(2.243)	(2.227)			(3.508)	(3.582)
Swiftness			0.176*	0.175*			-0.139	-0.173
			(0.106)	(0.105)			(0.201)	(0.209)
More time wished			-1.052	-0.953			-7.466*	-6.740
			(2.691)	(2.669)			(4.409)	(4.528)
Constant	46.59***	47.23***	20.95**	23.97***	43.00***	35.00***	54.51***	36.02*
	(2.164)	(3.024)	(8.463)	(8.922)	(5.472)	(7.762)	(15.31)	(18.19)
Observations	164	164	164	164	47	47	47	47
Adjusted R^2	0.245	0.263	0.284	0.298	0.423	0.419	0.409	0.407
Log. Likelihood	-667.6	-663.5	-660.7	-656.9	-177.1	-174.9	-174.7	-172.2

Notes: This Table contains coefficients from linear regressions. Standard errors in parentheses; levels of significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Response times - Experiment 2

	Choice A				Choice B			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
High time pressure	-11.69***	-9.870**	-12.33***	-11.50**	-9.364***	-12.81***	-10.52***	-12.56***
	(3.264)	(4.852)	(3.728)	(5.509)	(2.864)	(3.891)	(3.124)	(4.055)
Player 1		3.053		3.711		-6.544*		-4.988
		(4.852)		(5.065)		(3.785)		(3.720)
High time pressure x Player 1		-3.795		-2.231		6.219		3.158
		(6.706)		(7.212)		(5.777)		(5.983)
Raven score			0.364	0.299			0.0494	-0.0462
			(0.813)	(0.829)			(0.753)	(0.761)
CRT score			0.616	0.768			0.492	0.557
			(1.120)	(1.155)			(0.860)	(0.890)
Age			0.00443	0.000484			-0.260	-0.202
			(0.333)	(0.338)			(0.406)	(0.408)
Male			-0.730	-1.164			6.892**	6.717*
			(3.741)	(3.847)			(3.291)	(3.510)
Swiftness			-0.154	-0.156			0.130	0.121
			(0.181)	(0.186)			(0.0930)	(0.0938)
Feeling timepressured			3.025	3.193			1.434	1.396
			(2.038)	(2.178)			(1.293)	(1.294)
Constant	19.93***	18.56***	12.07	10.64	18.36***	21.93***	12.75	15.49
	(2.381)	(3.248)	(15.50)	(15.93)	(1.901)	(2.795)	(12.58)	(12.75)
Observations	62	62	62	62	59	59	59	59
Adjusted R^2	0.162	0.140	0.123	0.100	0.143	0.158	0.229	0.230
Log. Likelihood	-245.1	-244.9	-243.3	-242.9	-223.7	-222.2	-217.3	-216.1

Notes: This Table contains coefficients from linear regressions. Standard errors in parentheses; levels of significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.2.3 Expected Coordination Rates

Figure A.2 shows that in asymmetric games, the expected coordination rates on the focal (A,A) equilibrium were statistically significantly higher under high than under low time pressure. To arrive at this conclusion we apply an approach recently developed by Dijkstra et al. (2019). The general procedure is as follows: Since expected coordination rates are macro level outcomes in the sense that there is only one ECR-A and one ECR-B for each treatment, one cannot apply standard statistical tests to compare the numbers for inferring statistical differences. Instead, ECRs are modeled as a result of the underlying individual behavior at the micro level, i.e., we computed the ECR-As and ECR-Bs based on the actually observed A or B choices per treatment.

In order to analyse whether the treatment (low vs. high time pressure) has an effect on the overall ECR-As and ECR-Bs, we repeatedly ($n = 10000$) draw sample distributions of A and B choices under the null hypothesis that time pressure has no effect on the likelihood of choosing A or B. That is, for each of the games (Experiment 1 - symmetric, Experiment 1 - asymmetric and Experiment 2 - asymmetric) we disregarded the actual treatment allocation with respect to time-pressure and randomly re-matched all experimental subjects (and their role-specific actions) across time-pressure conditions. Using these random pairs, we compute ECR-As and ECR-Bs and compute an even higher level test statistic from which we can directly infer any influence time pressure might have on ECR-As and ECR-Bs.

The test statistic we use is $S = (ECR_A - ECR_B)_{high} - (ECR_A - ECR_B)_{low}$. S denotes the test statistic computed with the actual behavior observed in the experiment. For each random re-matching ($n = 10000$) of two players (disregarding their original treatment allocation), we compute a new test statistic, resulting in a vector of test statistics S^*. In a next step, we compare the original statistic S with the obtained distribution of all S^* and infer how frequently the original S is greater than or equal to any element any element of S^*.

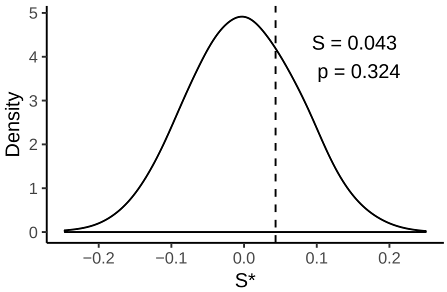
The density plots in Figure A.2 show the distributions of S^* and the vertical lines indicate the value of the test statistic S we actually observed in our experimental data. If time pressure had no effect on the test statistic, the density plots would be centered around the actual value of S. In fact, we find in the symmetric game that 32.4% of the test statistics $S^*_{exp1.sym}$ are greater than or equal to (i.e., lie to the right of) the original test statistic of $S_{exp1.sym} = 0.043$. In other words, when rejecting the null hypothesis that high time pressure does not increase ECR-As over ECR-Bs, we would be wrong 32.4% of the times. That is, for symmetric games, we cannot reject the null of no difference across time pressure conditions.

In contrast, for the asymmetric games we can reject the the null hypothesis of no effect of time pressure at $p = 0.012$ and $p = 0.093$ in experiments 1 and 2, respectively.[19] Consequently, we find (mild) evidence for high time pressure causing a shift towards more coordination on A rather than B. For details on the micro-macro link procedure used see Dijkstra et al. (2019).

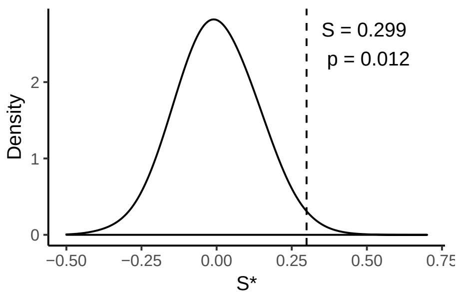
[19]Note that the results of the procedure applied are not susceptible to variations in the number of random samples n. That is, in contrast to other statistical procedures, increasing n does not 'mechanically' reduce the observed p-values.

Figure A.2: Testing for significantly different ECRs

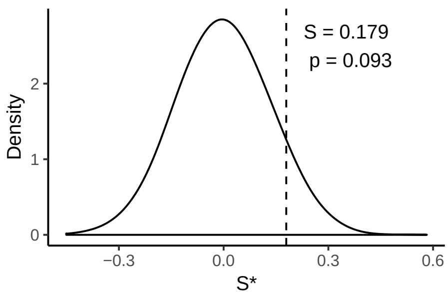
(a) Experiment 1 - symmetric



(b) Experiment 1 - asymmetric



(c) Experiment 2 - asymmetric



Notes: S denotes the test statistic computed with behavior observed in the experiment. The density plots show the distributions of S^*, resulting from randomization tests ($n = 10000$).