# Term Paper:
# Coordination Through Introspection

Horia Guias

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## 1 Introduction

How do people coordinate their actions? Since Schelling's (1960) idea of focal points that may foster coordination of players in settings with multiple equilibria Game Theory has been mostly agnostic about how different equilibria are reached by the players. Either it assumed the coordination problem away by positing that the equilibrium is selected *naturally* by the players or it provided first attempts to select multiple equilibria such as perturbing the payoffs by introducing a little amount of payoff uncertainty (Carlsson and van Damme, 1993). However, the former approach is ignorant about the fact that the payoff structure is not able to pin down behaviour even if the highest level of players' sophistication is assumed. The second approach does a better job by achieving unique equilibria, yet it relies on the assumption that players are uncertain about the game they are facing.

How can we better understand equilibrium selection? One mechanism, which is well-known among sociologists, is cultural cognition. Exposure to the same cultural pattern may and should affect agent's beliefs about the behaviour of other agents. When interacting with people from the same culture or country, people have a better idea about what behaviour is appropriate and what not. When interacting with people from more distant culture, it becomes less clear what the other agent considers as appropriate.

Using the sociologists' knowledge that a shared culture anchors beliefs and has a coordination function and combining it with the result from Psychology that in order to anticipate the other's behaviour people tend to project their state of mind onto them (Apperly, 2010), Kets and Sandroni (2021) develope a theoretical framework in which equilibria are selected by players applying a reasoning process of introspection in which players use their exposure to the cultural cognition to understand the way the other players think and thus behave.

This project aims to test the concept of introspective reasoning in a laboratory experiment in order to contribute to the understanding of how strategic players overcome problems of multiple equilibria. Therefore, it designed an experiment in which players were assigned to one of two possible populations à 10 players who consisted of at most two different "cultures". The cultures were defined as *teams* and each player was assigned to either the team of "The Painters" or "The Swimmers". Cultural beliefs were simulated by a joint impulse distribution which were action recommendations drawn from an unknown state that pinned

down a certain action to be culturally salient as a majority of players from that culture received that action recommendation. These states of culturally salient actions were imperfectly correlated between the two cultures, thus introducing a cultural distance between the two. In this Experiment, subjects played a series of stag-hunt and threshold games which are characterized by multiple equilibria.

The results are mixed, also because the experiment was not well designed in the end. However, one result highlights that a shared cognition may indeed improve coordination as people who played a stag-hunt game with a partner from the same culture were better able to coordinate their actions with than player pairs that were from two different cultures. Future work should think more carefully about properly designing such an experiment.

The paper is structured as follows: Section 2 discusses the related literature, Section 3 sketches the Theoretical Framework of Kets and Sandroni (2021), Section 4 presents the experimental design, Section 5 presents preliminary results and Section 6 discusses and provides future paths for research.

## 2 Literature Review

Sociologists know well that culture is shaping our cognition and promoting coordination within groups that are experiencing the same cultural patterns (DiMaggio, 1997). This characterizes and differentiates culture from identity, the latter which serves the purpose of an individual to differentiate herself from others (Tajfel and Turner, 1986). A shared cultural belief may also explain why people have a preference for *homophily*, that is a preference for interacting with other people similar to themselves (McPherson et al., 2001).

The role of culture and diversity in economics is not well studied. Culture is thus far best understood in terms of social preferences that are group contingent. A bulk of the literature has focused on the role of diversity on preferences. Chen and Chen (2011) show that a common social preference (or identity) favouring in-group members fosters coordination on high-payoff equilibria whereas lack thereof will lead to coordination on Pareto inferior equilibria. An application of this result constitutes organizational culture where the results in Chen and Chen (2011) imply that under a heterogeneous workforce a common preference or identity is promoting economic prosperity. However, different social preferences may also lead to conflicts as Esteban and Raj (1994) show. These conflicts in group-contingent preferences can also affect economic prosperity after a merger of two companies with strong and different corporate cultures (Van Den Steen, 2010).

Another important field where culture is studied is the one on labour skills. Lazear (1999b) highlights that policies promoting migration and from diverse small groups will improve a country's welfare as these migrants have a higher value to assimilate than if migration was running from a small set of countries. Assimilation implies adoption of the country's language and culture and hence, more economic interactions. At the corporate level, Lazear (1999a) shows that the benefit of cultural diversity in companies outweighs the "transaction costs" associated with integrating people from different countries and cultures into the

workforce. Prat (2002) shows that positive complementary skills on a job imply an optimal homogeneous workforce for the team whereas negative complementarity of skills on a job imply an optimal heterogeneous workforce and hence, benefits of diversity. Hong and Page (2001) study the effect of diversity on problem-solving as measured by the way workers internalize a problem. They show that an optimal solution is found when the workers are heterogeneous in the way they tackle the problem and thus, can combine their skills in order find the best solution to it.

Yet, the way how sociologists view culture has not been adopted in Economics and therefore, thinking about how culture affects (strategic) reasoning is a promising gap which should be studied. Kets and Sandroni (2021) propose a framework and a solution concept of *introspective equilibrium* that captures very well the interaction of culture and economic payoffs.[1] This framework is able to link cultural cognition to strategic settings and can reconcile many aggregate patterns of behaviour. One of these is excessive conformism and preference falsification. Bursztyn et al. (2018), for example, document that Saudi Arabian men are actually favouring promoting females in the labour force but they believe that all other men have a different attitude to it. This example clearly shows how exposure to a homogeneous cultural cognition may falsify preferences and crowd out individual preferences.

Clearly, the main role of cultural reasoning is endogenizing equilibrium selection. Indeed, papers have thought about this role of culture (Kreps, 1990; Myerson, 2004) but they are too strict in their assumption that culture always selects an equilibrium. Interacting culture with economic incentives clearly pins down when and when not culture selects an equilibrium. We need to understand why the same strong homogeneous groups may coordinate on different equilibria even if the economic environment is identical. The solution concept that Kets and Sandroni (2021) introduce accounts for this endogenous equilibrium selection. They use a process of iterated reasoning which is different from level-k reasoning (Nagel, 1995; Stahl and Wilson, 1995; Costa-Gomes et al., 2001; Crawford et al., 2013) and cognitive hierarchy models (Camerer et al., 2004; Crawford et al., 2013) in two ways: first, it assumes that players are able to reason ad infinitum – such that the equilibria are not resulting from players' bounded rationality – and second, that it incorporates culture into the reasoning about the other player's action. This solution concept also can be differentiated from the literature on global games (Carlsson and van Damme, 1993; Heinemann et al., 2004) which assumes equilibrium selection as a result of "preference shocks" or payoff uncertainty. The structure of global games also implies unique equilibrium selection; however the introspective reasoning is able to capture how different equilibria can get selected even if the payoffs do not change.

As the small literature review shows, understanding how exposure to cultural cognitions shapes our reasoning is a promising avenue for research. The next section briefly highlights the main idea and predictions of the solution concept after which this paper is going to refer to the experiment that has been conducted.

[1] The main idea of the framework is going to be presented in Section 3.

# 3 Overview: The Framework of Introspective Reasoning

The starting point for thinking about the effects of culture on and its interaction with economic outcomes is the fact that many economic environments do not exactly pin down equilibrium behaviour as there are *multiple equilibria* present. Thus, assuming common belief in rationality is not sufficient to explain behaviour. Every player has to form a conjecture about what the other player(s) is (are) going to take. So far in Game Theory, it was mostly assumed that players hold the *right* beliefs and thus are perfectly able to anticipate the other players' actions. But in a setting with multiple equilibria, even if a player was completely rational and best responded to her beliefs, it is not straightforward to assume that she forms the correct conjecture about the opponent's behaviour.[2]

One class of games where the problem of multiple equilibria is common are monotone games with strategic complementarities (Vives, 2005; Milgrom and Roberts, 1990). The solution concept incorporates the intuition from sociology that experiencing the same culture shapes the players' cognition. If we "endow" a player with a cultural cognition, then what this player is trying to do is to project his mental state or cognition on the other player - this concept is understood as "Theory of Mind" among psychologists (Apperly, 2010). But if they share the same cultural beliefs, they should be better able to know what the other player is thinking, and hence anticipate her behaviour (Kets and Sandroni, 2021).

Formally, Kets and Sandroni (2021) consider a game played by a set $N = \{1, \dots, n\}$ players, where payoffs are characterized by strategic complementarities; this means that - given a partial order on the players' action space - if all other players $j \neq i$ increase their action, the incentive for player $i$ to increase her action increases. In the framework, actions are characterized by two categories: "high" (H) and "low" (L) actions. Players are part to one of two cultures $g \in \{A, B\}$. Without loss of generality, group $B$ is assumed to be the minority group and its share in the population is given by $\beta \leq \frac{1}{2}$. There is no uncertainty about the payoffs. However, there exists strategic risk and the loss from miscoordination conditional on playing H can be substantial for a player.

Before taking an action, each player receives an *impulse* $(I_i)_{i \in N}$ from a joint distribution of impulses in the population. This impulse is nothing else but a signal to take a certain action, either $L$ or $H$. The concept of introspective equilibrium works as follows: upon receiving the impulse, the *first* intuition player $i$ has is to follow this impulse, without any strategic reflection. This strategy is defined as a player's level-0 strategy. In the next step of reasoning, player $i$ is reflecting about the impulses and thus level-0 strategies of the other players. In other words, she is trying to apply her mental state to the other players à la Theory of Mind. The best response to this belief defines player $i$'s level-1 strategy. Noticing that the other players also form a level-1 strategy, in the next step player $i$ forms a conjecture about the other players' level-1 strategy and formulates a best response (level-2 strategy). This reasoning is now iterated. If there exists a strategy profile $\sigma = (\sigma_i)_{i \in N}$ such that it can be defined as the limit of a sequence of level-k strategy profiles, i.e. $\sigma = \lim_{k \to \infty} \sigma_k = \lim_{k \to \infty} (\sigma_{i,k})_{i \in N}$, then $\sigma$ constitutes an *introspective equilibrium*. In other words, if $\sigma$ is an action profile such that after finitely many steps of iterated reasoning no player wishes to revise her choice,

[2] In fact, we *do* observe miscoordination, so anticipation may go wrong.

then $\sigma$ is an introspective equilibrium.[3]

The role of culture arguably is to *reduce* this strategic uncertainty (Kets and Sandroni, 2021), and its interaction with strategic reasoning is studied for the aggregate behaviour of all players. Culture interacts with the economic environment by making one action *culturally salient* meaning that a majority of players from a culture $g$ have an inclination to play a certain action. This inclination comes from a distribution of *impulses* $(I_i)_{i\in N}$. The distribution is state-dependent, and each culture $g$ is going to be in a state where action $H$ (or $L$) is culturally salient and a fraction $q > 0.5$ of players from culture $g$ receive an impulse to play action $H$ $(L)$. The two states are equally likely. However, the states are imperfectly correlated, and therefore what action culture $g$ perceives to be culturally salient must not be culturally salient for the other culture $g' \neq g$. Formally, this idea is captured by a joint distribution of the states $\theta_a^g$ which encode that action $a \in \{L, H\}$ is culturally salient for group $g \in \{A, B\}$. Table 1 presents the joint distribution which assumes an imperfect positive correlation of the states between groups $A$ and $B$:

| | $\theta_H^B$ | $\theta_L^B$ |
|---|---|---|
| $\theta_H^A$ | $\frac{1}{4}(1+\eta)$ | $\frac{1}{4}(1-\eta)$ |
| $\theta_L^A$ | $\frac{1}{4}(1-\eta)$ | $\frac{1}{4}(1+\eta)$ |

Table 1: Joint Distribution of Culturally Salient States for Groups $A$ and $B$. Source: Kets and Sandroni (2021).

The parameter $\eta \in (0, 1)$ governs the correlation between the states for groups $A$ and $B$. It's imperfect correlation implies a certain cultural distance $d = 1 - \eta$ between the two groups. Upon receiving an impulse $I_i$, player $i$ forms the following posterior beliefs about the probability of the other players having the same inclination, contingent on group membership:

$$Q_{\text{in}} = q^2 + (1-q)^2 > \frac{1}{2} \tag{1}$$

$$Q_{\text{out}} = \frac{1}{2}d + (1-d)Q_{\text{in}} > \frac{1}{2} \tag{2}$$

Once a player receives her impulse, she is going to expect the action recommendation to be culturally salient in the entire population. Thus, through a salience mechanism, cultural cognition is going to shape people's reasoning and select one equilibrium profile of actions. This interaction is beneficial if there is substantial strategic uncertainty. In this case, a strong culture is guiding the players to one equilibrium. Holding cultural strength constant, a higher share of the minority group $\beta$ (or, in other words, a higher diversity) is going to increase miscoordination since the impulse is relatively less informative about the impulse of players from a different culture. However, culture can also be costly. If the payoff structure is such that the high-payoff equilibrium is pay-off salient, a strong culture (holding diversity constant at 0) may imply inefficient coordination on the low pay-off equilibrium, and reduces strategic uncertainty in a "bad" way.

[3]It can be shown that this solution concept implies common belief in rationality (Kets and Sandroni, 2021).

The Experiment, whose design is presented in Section 4 is going to test the predictions whether (i) a strong culture enhances coordination on equilibria, and (ii) whether a strong culture becomes costly when it makes coordination on the low-payoff equilibrium salient.

# 4 Experimental Design

The Experiment was supposed to test the interaction of cultural cognition with strategic reasoning and whether it mediates selection on unique equilibria. The experiment also was supposed to shed light on whether culture interacts with the economic environment through making an action more salient.

The experiment was conducted with 20 students from the Experimental class. In a between-subject design, participants were first randomized into one of two populations with size of 10 players. They belonged either to population 1 or population 2 The population was thought to capture the size $N$ of players that are playing a game with complete information. The two different populations were chosen in order to study two societies that are different in their diversity. Population 1 was fully homogeneous. In this population, all 10 players were assigned to the team of "The Painters". Population 2, instead, was supposed to be heterogeneous and was composed by 5 players who were assigned to the team of "The Painters" and 5 players from the team of "The Painter". The assignment to different teams was supposed to capture different cultures $g$. It was chosen according to the *minimal group paradigm* in the spirit of Tajfel et al. (1971).[4] The minimal group paradigm assigns subjects to different identities controlling for norms and stereotypes from the real world. Results should not be contaminated by different identities or social expectations.

Culture was simulated by an impulse distribution. Before making a choice, each player received an impulse in the form of an action recommendation. Each player was informed that the other players also were receiving an impulse. To simulate cultural salient actions, each player was told that members from her *team*, i.e., "The Painters" or "The Swimmers", would be in a state were one action was culturally salient. Details on cultural salience follow when the games are presented. The players were also informed that the states of cultural salience of actions are imperfectly correlated between "The Painters" and "The Swimmers". Table 2 shows the joint distribution of the culturally salient states which all participants received:

| | $\theta_H^{\text{Swimmers}}$ | $\theta_L^{\text{Swimmers}}$ |
|---|---|---|
| $\theta_H^{\text{Painters}}$ | $\frac{3}{8}$ | $\frac{1}{8}$ |
| $\theta_L^{\text{Painters}}$ | $\frac{1}{8}$ | $\frac{3}{8}$ |

Table 2: Joint Distribution of Culturally Salient States for "The Painters" and "The Swimmers"

Population 1 simulated a weak culture with $q = 0.6$. Population 2 simulated a strong culture with $q$ set to 0.8.

[4] See also Chen and Chen (2011); Currarini and Mengel (2016).

Each player and each population was playing two types of games, both from the class of monotone games with strategic complementarities. The first set of games was played with 2 players and was an investment game. The investment game mimicked a stag-hunt game and each player had to choose between investing into a risky or a safe asset. The general payoff structure of the investment game is given in Table 3:

| | Invest Risky | Invest Safe |
|---|---|---|
| Invest Risky | **a,a** | c,b |
| Invest Safe | b,c | d,d |

Table 3: General Payoff Matrix of the Stag-Hunt Game

Thus, there were two different equilibrium profiles $(a, a)$ and $(d, d)$. The players from population 1 were randomly matched among themselves, implying 5 in-group matches. In population 2, 3 matches were made such that players from "The Painters" were playing the investment game with a player from "The Swimmers". 2 Matches were in-group matches again, and consisted of a pair of "Painters" and a pair of "Swimmers" playing the investment game. Each player played a total of 21 investment games.

The 21 investment games were divided into three blocks. The first block of investment games had a payoff structure that was characterized by a high strategic risk of investing into the risky asset, meaning that miscoordination was particularly costly and the player must be quite certain that the opponent is investing into the risky asset as well. This block was supposed to capture the benefit of strong culture when it selects the high-payoff equilibrium even in an environment with high strategic risk. The second block of games made the equilibrium of investment into the risky asset highly payoff salient. However, upon receiving an impulse to invest into the safe asset, the theoretical prediction was that in introspective equilibrium the weak culture invested into the risky asset whereas the strong culture got locked into the equilibrium profile of investing into the safe asset. This block of game was supposed to measure the cost of having a strong culture using the coordination rates on the equilibrium profile that invests into the safe asset. Finally, the third block was simply characterized by strategic uncertainty and the impulse always selected the equilibrium in each population. In the investment game, each player received an impulse to invest into the risky or safe asset. When investing into the risky asset was culturally salient for one team, the team members received an impulse to invest into the risky asset with probability $q$ ($q = 0.6$ and $q = 0.8$ for weak and strong cultures, respectively). Similarly, if investing into the safe asset was culturally salient.

Using the investment game I wanted to compare coordination rates along two dimensions: First, I wanted to compare coordination rates between in-group and in-/out-group matches as a measure for the effect of diversity on coordination. The prediction in line with Kets and Sandroni (2021) is that diversity increases *mis*coordination. Second, by comparing in-group matches across a strong and weak culture, I wanted to measure the effect of cultural strength on coordination. Here, the hypothesis is that a stronger culture implies higher coordination rates.

The second class of games was played with all players from the same *population*.[5] The game selected was a threshold game where players had to decide whether they want to attack a regime or not. If a player

[5]It was insured that players did not know who belonged to the same population with them.

chose to attack the regime, the payoff was determined conditional of the number of players attacking ($m$) exceeding a certain threshold $T$. If $m \geq T$, then positive payoff $B$ was realized for player $i$ if she chose to attack. If $m < T$, player $i$ who chose to attack received a payoff of $-C$. Choosing not to attack guaranteed a payoff equal to 0. The payoff structure can be summarized as follows:

$$u(H, m, \rho) = \begin{cases} B, & \text{if } \ m \geq T \\ -C, & \text{if } \ m < T \end{cases} \tag{3}$$

$$u(L, m, \rho) = 0 \tag{4}$$

The payoff structure $(B, C)$ and the threshold $T$ was designed such that in introspective equilibrium it was always optimal to follow her impulse. One set of threshold games simulated a weak regime; $T = 4$. The second set a strong regime, i.e., $T = 7$. In total, all players played 12 threshold games. If attacking was culturally salient for a team, then 80% (or 60% in the weak culture, respectively) of players were randomly selected to receive an impulse to attack. Similarly, for the state where not attacking is culturally salient.

Using the threshold game, I wanted to compare the probability of successful attacks between a homogeneous and heterogeneous population. The theoretical predictions on the probability of successful attacks are conditional on the regime type. If the regime is weak, then diverse societies succeed more often in their attack as attacking is payoff salient. Whereas strong cultures will often get locked into not attacking. If the regime is strong, however, then homogeneous societies outperform heterogeneous ones in attacking the regime as high coordination is required to overturn the regime. By comparing the probabilities of success between populations 1 and 2 for both regime types, I wanted to test whether culture indeed is mediating players into the predicted behaviour.

# 5 Results

The results seem to confirm *some* of the theoretical predictions. First, the results from the investment game are presented. Figure 1 shows the comparison of coordination rates between in-group and in-group/out-group matches:

It clearly shows that generally, coordination rates are indeed higher when players are from the same team whereas the latter decrease when players played against someone from the opposite team. Indeed, diversity seems to introduce more miscoordination among players, as they have more uncertainty about what is culturally salient for the opposite team. Also, coordination rates on the high-payoff equilibrium seem to be higher in in-group matches.

Figure 2 compares coordination rates of *in-group* matches across the two cultures for the 7 investment games in which players optimally follow their impulse in introspective equilibrium. Again, the results match the theoretical predictions in general. The exception is coordination on low-payoff equilibria, where the rates

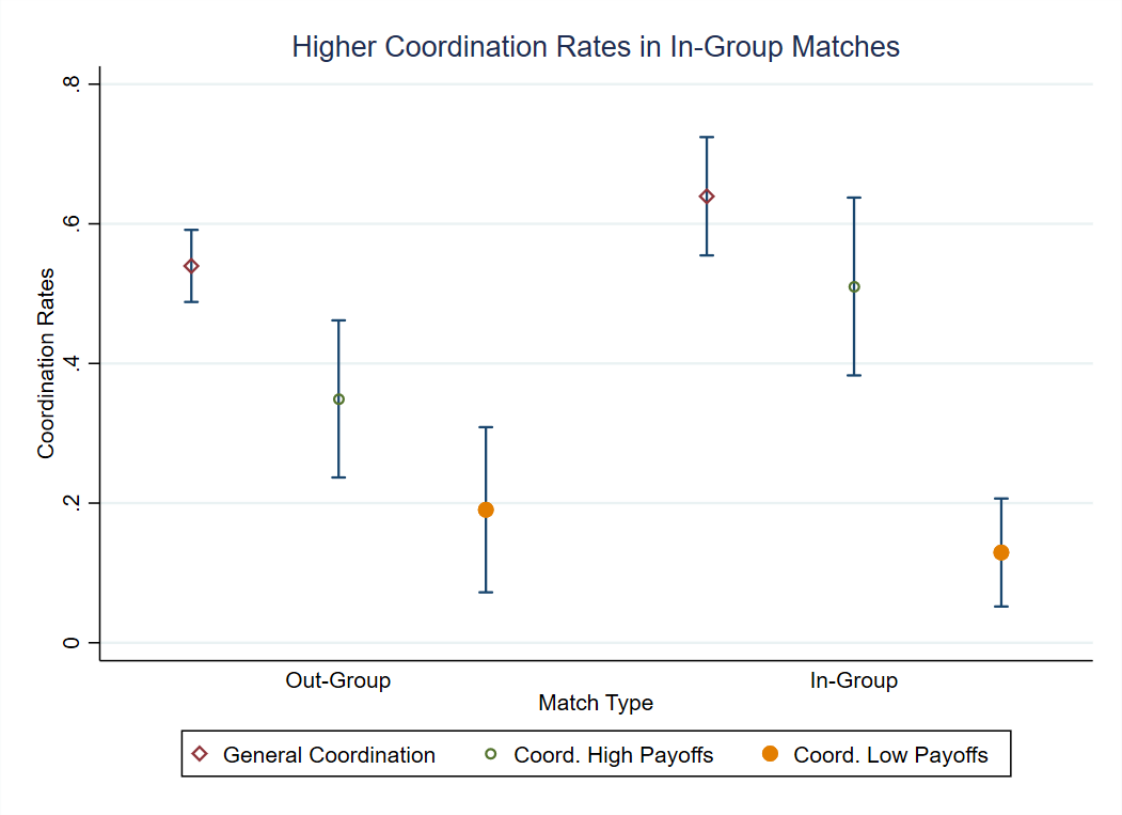



Figure 1: Coordination Rates Between In-Group/Out-Group (left) and In-Group Matches (right).

are higher in the weak culture.

In general, the experiment was not really able to capture the interaction of cultural salience and economic payoffs that implies cultural benefit or cultural lock-in.[6]

Figure 3 shows that the results are exactly the opposite vis-à-vis the theoretical prediction. Players in weaker cultures seem to coordinate more often on the high payoff equilibrium than players from the strong culture. Why this could happen is discussed in the next section. This will be discussed together with the observation why in the threshold games the rates of success were perfectly correlated between population 1 and 2.

[6]That is, blocks 1 and 2 of the investment games, respectively.

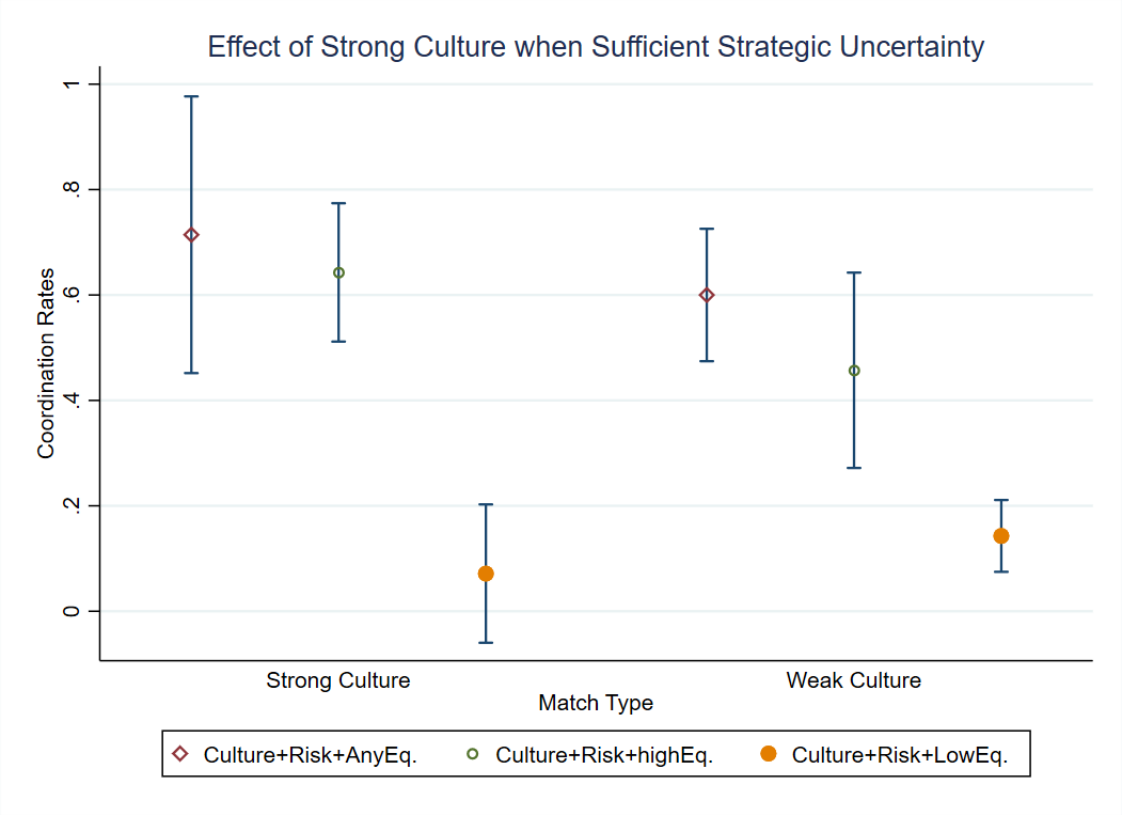



Figure 2: Coordination Rates Between Strong and Weak Cultures in Block 3 of the Investment Game. See Section 4 for an explanation on the design of the investment games.

# 6 Discussion and Improvements

The experiment has only partially succeeded at confirming the theory of introspection. The main result - although lacking statistical significance - is that players who played against someone from their same team ("culture") did better at anticipating her action compared to the pairs of players who were assigned to different teams. In short, anchoring beliefs through a common culture seems to have worked.

Nevertheless, the results are not very powerful and one mistake has been made in not measuring *all* the impulses the players received. Did they actually use them or not? Because of a programming error I could not use this information. So Figure 1 can only be interpreted as suggestive evidence that culture interacts with strategic reasoning. Related to that, when measuring the "cost" of culture by locking players exposed to a strong culture into low payoff equilibria or measuring the "benefit" of cultural cognition by reducing strategic risk, I am not able to control for the impulses that players received.[7] But not controlling for the impulses, I am not able to say whether players did not receive the *right* impulse (in investment games from block 1 (2) this was to invest into the risky asset (safe asset) ) or that they ignore it. If the former is true, the theory is not rejected but if the latter is true, then it is. Yet, from the results the inference is limited.

[7]These impulses were drawn from a joint distribution given by Table 3.

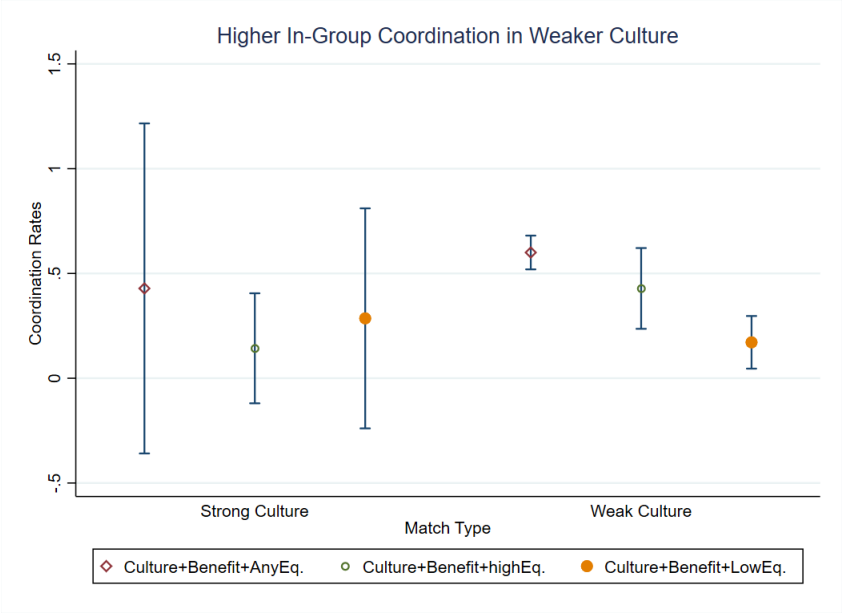



Figure 3: Coordination Rates between Strong and Weak Cultures in Block 1 of the Investment Game. See Section 4 for an explanation on the design of the investment games.

Also, although theoretically a random object, in my opinion ex post, the impulses did not need to be randomly drawn in Blocks 1 and 2 of the investment game and instead, I should have given the right impulses to the players from the beginning; perhaps using the opposite impulse in two or three of the 7 games to see that players also optimally ignore them. The results could have been stronger then, in either direction.

Future work, therefore could think more deeply how to design properly an experiment that tests whether a shared belief among players is able to guide them to play a unique equilibrium and hence, contributing to the problem of multiplicity of equilibria. Some of the results seem to be promising. On a general notice, another future perspective for research is to understand *when* shared beliefs affect economic interactions and when they do not - in a hollistic sense. Does culture shape *any* interaction or a particular set of those? In my view, and this is a critical point to the theory of Kets and Sandroni (2021), cultural beliefs do not always shape player's reasoning. Whether culture does it, depends on whether the cultural *belief* is salient to the players or not. One important determinant of their salience is context, certainly. Bursztyn et al. (2017) show that single women signal less ambition in their labour market aspiration in the presence of (single) men vis-à-vis women. Thus, one conjecture might be that cultural beliefs are salient in certain contexts. Analyzing the relationship between these contexts and the salience of cultural exposure seems to be a promising research agenda.

Another research idea, which I currently pursue, is to think how exposure to socio-cultural patterns affect inference about an unknown state of the world. If people like to maintain their cultural cognition, then they might have an incentive to seek for *escape routes* once they receive information that is conflicting with their desired beliefs. These possible escape routes are understood as some "cheap" signals belonging to the same information structure that informs about the state of the world and might be used to make motivated

inferences. These cheap signals could for example be the party affiliation of the sender in a political context, the fact that the sender is a scientist[8], or perhaps the sender has already been associated with a social group behaving according to is not considered as desirable by the learner.[9] The intuition is that in the end, these "motivated" agents do not process the signal that is supposed to increase their knowledge, only, but also these cheap signals or cues. Forming beliefs about the state of the world *and* the implication for their identity, the best response to the information may not be what the (from a *bird-perspective* unbiased) sender wanted to achieve.

In general, the Economic Literature needs to better understand how people's beliefs are shaped by their exposure to socio-cultural patterns and identity-relevant group, which clearly affects their behaviour. Yet, it is too ignorant to assume that these socio-cultural pattern always do it. A clear understanding of the relationship between cultural or identity-relevant cognition and economic interaction needs to be brought forward in Economics.

[8]Which deeply religious people may not like. They know that God has created the world, and nobody else should be able to explain it.

[9]In this context, it is more suitable to talk about identities, as agents have a desire to maintain "good" identities that differentiate them from "bad" ones.

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