INTELLIGENCE, PERSONALITY AND GAINS FROM COOPERATION IN REPEATED INTERACTIONS

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Abstract: We study how intelligence and personality affect the outcomes of groups, focusing on repeated interactions that provide the opportunity for profitable cooperation. Our experimental method creates two groups of subjects who have different levels of certain traits, such as higher or lower levels of intelligence, Conscientiousness and Agreeableness, but who are very similar otherwise. Intelligence has a large and positive long-run effect on cooperative behavior. The effect is strong when at the equilibrium of the repeated game there is a tradeoff between short-run gains and long-run losses. Conscientiousness and Agreeableness have a natural, significant but transitory effect on cooperation rates.
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1. Introduction

The effect of intelligence and personality and outcomes in single-agent decision problems is straight-forward. For example, the relationship between intelligence and outcomes for a single individual is natural and clear. Higher intelligence functions as a technological factor; it allows larger, faster and better levels of production. This prediction is natural and is also supported by extensive research in psychology and economics (Heckman, Stixrud, and Urzua, 2006; Jones and Schneider, 2010). Similarly, when the task requires consistent application of effort, we can expect higher consistency in subjects with higher Conscientiousness score. When the interaction is strategic, instead, the link may be complex. This is what we study here.

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A possible conceptual link between intelligence and behavior in social situations follows if we view choice in economic and social interactions as a cognitive task; the link follows as a corollary. This view produces the general idea that intelligence reduces behavioral biases (e.g. Frederick, 2005; Dohmen et al., 2010; Benjamin, Brown, and Shapiro, 2013). For example, higher intelligence may reduce violations of transitivity; or, in choice under uncertainty, the behavior of subjects with higher intelligence is better described by expected subjective utility. When we apply this intuition to behavior in strategic environments, we are led to the conjecture that more intelligent individuals in real life - and in an experiment - will exhibit a behavior closer to the game theoretic predictions. When refinements of the Nash concept, such as sub-game perfection, are relevant, then one should expect behavior more in line with the prediction of the refinement for individuals of higher intelligence. This prediction finds some support when games are strictly competitive (such as the Hit 15 game in Burks et al., 2009). Palacios-Huerta and Volij (2009) show that individuals who are better trained (or better able) to solve complex problems by backward induction make choices that are closer to game theoretic predictions in the centipede game. In a repeated beauty contest experiment, Gill and Prowse (2016) show that more intelligent individuals demonstrate better analytic reasoning and thus converge faster to the unique Nash equilibrium.

While these contributions provide important insights into the way cognition affects reasoning on strategic interactions, fundamental questions remain. First, in games that are not strictly competitive, which are perhaps more relevant for social behavior, the prediction fails. This occurs already in the case of one-shot games. In Burks et al. (2009), the authors study the behavior of subjects in a sequential trust game. Using a strategy method to identify choices of subjects as first and second mover, and relating this behavior to the intelligence of the subjects, the authors find that initial transfers are increasing with the IQ score, a behavior which is further from the prediction of the sub-game perfect equilibrium, and so the opposite of what we should expect according to the general hypothesis. Similarly, transfers as second movers among the more intelligent subjects are higher when the first mover transfers more, and smaller in the opposite case. A second and more important consideration is that the prediction of a unique strategic behavior is rare: for example, repeated games generally present a multiplicity of equilibria. Thus, games with a unique Nash equilibrium cannot address the crucial issue for the social sciences of how individuals coordinate to reach one among many possible equilibria. Game theory and the initial intuition of modeling strategic behavior as a cognitive task leave us with few useful predictions.

Strategies and Rules. To progress, we think of strategies as composed of rules. A rule is a conditional statement prescribing an action given a relevant condition. In our experimental setup, relevant conditions are the histories available to players. These histories include the partial histories of play in the all the matchings that have occurred until the current round. An example of a rule is: "If the other player defects, defect for one period". A strategy is a complete set of rules – complete because an action is prescribed by the set of all rules in all possible contingencies.

When we consider performance of players in isolation, evidence suggests that intelligence may affect implementation of rules even in simple tasks. For example Duncan et al. (2008) study a specific form of failure called *goal neglect*; this occurs when an individual knows he should apply a rule, and, if asked, is even able to state, but nevertheless fails to apply it. Such failures occur more frequently in individuals with lower intelligence. Goal neglect is identified in a task in which subjects have to consider pairs of numbers and letters presented sequentially (for example, $(A, 7)$, (S, M), $(2, 6)$.) They initially have to follow this rule: "Read the item on the right, if it is a letter, and ignore it, if a number". So, in our example they should read the letter M in the second pair and nothing from the other two pairs. At some random interval, a plus or a minus sign appears that may modify the rule. The plus means "Continue as before", and the minus means "Read the item on the left," again, only if it is a letter. With subjects of lower intelligence, the modifier of the rule (the plus or the minus) tends to be ignored. The result indicates a high correlation between IQ score and the ability to adjust to the switch required by the appearance of the minus sign. We model this error in decision making by relying on a new axiomatic theory of stochastic choice (Cerreia-Vioglio et al., 2017); the model allows for precise estimation of the way in which intelligence and personality traits affect the frequency of error.

Experimental design. The main hypothesis we test is the potential association between intelligence, personality and strategic behavior in groups. The strategic interaction takes place between two players, but within a pool of subjects who are similar in intelligence or personality. We rely on a well-established methodology in the experimental analysis of repeated games, and use the same setting as in Dal Bó and Fréchette (2011), where the authors show how, with appropriate probability of continuation and payoffs, subjects in a repeated Prisoner's Dilemma game with a random probability of termination may collectively converge to cooperation equilibria. We test whether higher intelligence in such an environment favors a more flexible and precise behavior that allows processing of richer information; that is, whether higher intelligence allows for more efficient equilibria to be reached. We use the same methodology to test whether other personality traits (Conscientiousness and Agreeableness) have similar effects.

Paper layout. The paper is organized as follows: In section 2 we formulate our hypotheses on the role on intelligence and personality of the strategic behavior. In section 3 we present the experimental design and our model of error in decision making. The next two sections analyze the role of intelligence: in section 4 we discuss how intelligence affects errors in implementation and thus cooperation, while in section 5 we show how differences in intelligence affect strategic reasoning. The role of Conscientiousness and Agreeableness is discussed in section 6. The effect of intelligence on response time is discussed in section 7. Section 8 presents our conclusions. Additional technical analysis, robustness checks, details of the experimental design and descriptive statistics are in the appendix.

2. Intelligence, Personality and Strategic Behavior: Hypotheses

In a repeated game with high discount factor the set of sub-game perfect equilibrium outcomes may be large, so the analysis of the effect of personality on choice may seem hard at first sight. However, experimental evidence on subjects' behavior indicates that the set of observed outcomes is considerably smaller than the entire one predicted by sub-game perfect equilibria. Typically subjects reach a tacit (the only communication occurs through history of actions) agreement on outcomes that are efficient within the equilibrium set (constrained efficient). The outcomes are also simple to implement; for example, a formulation of the strategy profile with a finite state automaton is natural, and the number of the states of the automaton is small. Finally, the agreement is usually reached on outcomes that give at least approximately equal payoffs, within the limits imposed by the payoff of the game. We summarize these criteria into an assumption to organize our analysis:

Assumption 2.1. *Subjects try to achieve a constrained efficient, simple outcome with minimum difference among final payoffs of the players.*

Our data in this paper offer additional support for assumption 2.1. Under this simplifying assumption, we proceed to formulate more substantial predictions.

2.1. Intelligence and Strategic Behavior.

We investigate how intelligence affects strategic behavior in repeated interactions, and hypothesize that intelligence may affect behavior in two different ways:

(i) Intelligence may affect the choice of strategies by affecting the set of strategies that are conceived by the individual. For example, a strategy like Always Defect (AD) in a repeated PD is very simple to conceive. By contrast, a strategy prescribing cooperating in the first round, defecting against a defection of the partner for three periods, and then returning to cooperation only after the partner has cooperated for the past three periods, is more complex to ideate. Thus, more intelligent individuals may choose more profitable strategies in a larger set.

(ii) Intelligence may affect the implementation of the strategies. More complex strategies are more difficult to implement; for example the AD strategy does not require a record of actions of the two players, and does not require a check of a sequence of conditional statements, whereas Tit-for-Tat (TfT) does. We hypothesize that the performance failure of lower intelligence players is related to that observed in goal neglect.

We formulate the general hypothesis:

Hypothesis 2.1. *Higher intelligence subjects (i) find a better strategy – that is, with higher payoff – and conceive a larger set of strategies in a given environment; and (ii) are more consistent in their implementation. Given the aim stated in assumption 2.1 (which holds independently of the intelligence level), higher intelligence subjects will achieve, in general, higher rates of cooperation.*

We will test part *(ii)* of the hypothesis in section 4 and part *(i)* in section 5; in the rest of this section we will derive more specific predictions from these hypotheses.

2.2. **Intelligence and Rule Implementation.** The next hypotheses are easier to present if we describe the games we use in our experiments. We consider repeated games with a symmetric two-player two-action stage game. These are now well understood experimentally. After re-labeling of the action choices of one or both players, this game can be written in the standard form:

$$\begin{array}{ccc} & L & R \\ T & a, a & c, b \\ B & b, c & d, d \end{array} \tag{1}$$

where a, b, c and d are four possibly different numbers. Again re-labeling, if necessary, we can assume $a \geq d$ and $b \geq c$. In appendix A we present a detailed and simple analysis of the equilibria of repeated games with discount $\delta \in (0, 1)$ with such stage games. We will formulate our specific hypotheses on the basis of this analysis. Here are our main conclusions.

The four different repeated games we use in the paper are representative of different and very specific strategic situations. They are Prisoner's Dilemma *PD* (where $(a, b, c, d) = (48, 50, 12, 25)$), Battle of Sexes *BoS* ($(0, 48, 25, 0)$), Stag Hunt *SH* ($(48, 25, 0, 25)$) and a new game that we call *the Battle of the Sexes with Compromise BoSC* ($(48, 52, 12, 10)$) (see tables A.1 to A.4 in the appendix). *BoSC* may be considered as a modification of the Hawk-Dove game, requiring the payoff from *(Hawk,Dove)* to be strictly larger than the mean of *(Hawk,Dove)* and *(Dove, Hawk)*. Actions are labeled in the paper with mnemonic letters: C and D for the *PD*, B (allowing the players' best payoff) and W (worst non-zero payoff) for *BoS* and *BoSC* and finally S (stag) and H (hare) for *SH*.

In the analysis (appendix A) we show that the stage games we consider in this paper cover the interesting cases of repeated games with stage games of the form (1) above. The few (two) cases we do not address have no substantial independent interest. The first is a stage game with a single equal outcome Nash equilibrium which is efficient (this is case *3* in appendix A); we consider this game too trivial to be worth analyzing experimentally, since the efficient equilibrium is obvious. The other is mentioned in *4 (b)*, namely the *PD* with an efficient alternating equilibrium: but the essential point of this game is covered by the *BoSC*.

The games we consider have natural and simple equilibria: the corresponding action profiles outcomes are *(S,S)* in every round giving the *SH* efficient outcome; an alternation between the action profiles giving the best outcome for one player and the worst (among the positive ones) outcome for the second, that is *(B, W)* and *(W, B)* for *BoS*, and joint cooperation *(C, C)* in every round for *PD*, when the parameters make cooperation sustainable. In these equilibria the outcome in every round is either a repetition of the same action profile, or an alternation between two action profiles (in *BoS*). The new game, the *BoSC*, has a simple outcome mirroring that of the *BoS* of alternating between *(B, W)* and *(W, B)*; but the *compromise* action profile *(W, W)* in every round gives a payoff $(48, 48)$ that is higher than the average of the two outcomes $(52, 12)$ and $(12, 52)$ given by alternating. The positive and symmetric payoff outcome $(10, 10)$ for the (B, B) profile (rather than $(0, 0)$, as in *BoS*) was chosen to make the coordination on the constant outcome (W, W) more difficult. In all cases, an equilibrium that satisfies assumption 2.1 is easy to discover after simple inspection of the stage game; that is, within the class of symmetric two-player two-action stage games, a typical college student can easily identify the equilibrium, and safely assume that the partner does too. The existing literature on experimental repeated games confirms for *PD*, *BoS* and *SH* that the equilibria we describe as natural are indeed typically the outcome. In light of these considerations, it is possible that, when subjects are college students, there is no substantial difference in the ideation of the possible strategies in the class of repeated games with a symmetric two-player two-action stage game. To see these differences, research will have to adopt different groups of subjects or a different class of games.

There is a specific difficulty in the case of the *BoS* that is clearer when we compare the game with the *SH*, a game where (as we see later) there should be no difference in implementation. The efficient equilibrium outcome in *SH* is particularly simple to see, and achieving coordination on it is easy: the only tempting feature of the choice of action *H* is the lack of risk associated with it. By comparison, the alternating equilibrium in *BoS* is more complex. First, subjects have to understand that alternation is a way to avoid the zero payoff outcomes, and they have to communicate this idea to their partner. Second, they have to agree on the order of the alternation, and the only symmetric way to do this is to play randomly either action in the early rounds, starting the alternation at the first instance of coordination on a positive payoff outcome. Although these considerations are within the intellectual reach of a college student, the details of the coordination process are more complex in the *BoS*, hence there might be a difference in the speed at which subjects of different intelligence reach coordination, and there is the possibility that players of lower intelligence never reach that point. Thus, we formulate:

Hypothesis 2.2. *Subjects of higher intelligence are faster in achieving coordination in the efficient alternating equilibrium in BoS, whereas there is no substantial difference in SH.*

From the point of view of strategy implementation, instead, there are two classes of games with a substantial difference concerning the tradeoff between gain from deviation in the current round and loss from deviation in the continuation game. In a first group (which includes *BoS*, *SH*, and in general the class *1, 2a, 3* in appendix A) there is no tradeoff between gain from deviation in current round and change in the continuation value: a deviation induces a loss in both. The other group (which includes *PD* and *BoSC*, and in general classes *2b* and *4* in appendix A) there is a tradeoff: deviating from the equilibrium action profile induces a gain in the current payoff, and a loss in the continuation value.

This opens the possibility of errors depending on the intelligence level of the subjects, similar to the "goal neglect" concept described in section 1. When there is a tradeoff between short-term gain and long-term loss, subjects of lower intelligence may neglect to follow the rule dictated by the chosen strategy, and may play to maximize their earnings in the short term. Accordingly, a fundamental difference between *SH* and *BoS* on one hand and *PD* and *BoSC* on the other is that at the equilibrium action profile there is a tradeoff present in every round between short-run gain from deviation and long-run loss. Instead, there is no such tradeoff in *SH* and *BoS*. This justifies a specific hypothesis in our environment:[1]

Hypothesis 2.3. *The tradeoff between current gain and continuation value loss from deviation in PD and BoSC produces a difference in cooperation rates across IQ groups in these games. In SH and BoS, there is no tradeoff, and, thus, no difference in the implementation between the IQ groups, once coordination is reached.*

2.3. **Strategic Behavior and Personality.** Two of the Big Five factors are more likely to be relevant for strategic behavior: Agreeableness and Conscientiousness. Agreeableness directly affects the social behavior of individuals; Conscientiousness influences the effectiveness and orderliness of execution of tasks, in particular of cognitive tasks like strategy implementation.

In the *IPIP-NEO-120* inventory (Johnson, 2014) that we use for conceptualization and measurement of personality, Conscientiousness has six facets. Four are potentially relevant in fostering equilibrium cooperation in our context, because they insure an effective and mindful implementation of the strategy, considered here as a rule of individual behavior; they are *Self-Efficacy*, *Orderliness*, *Achievement-Striving* and *Self-Discipline*. Two other facets are more specific to the strategic side of our experiment: a higher score in *Dutifulness* might prevent a subject from defecting; whereas a higher score in *Cautiousness* might induce the individual to refrain from cooperation in *PD*, because it exposes her to a risk of defection of the other. Part of this effect may be captured by risk aversion, but Cautiousness might have a distinct effect, and be particularly relevant when the individual has experienced past defection. In summary, the first five facets might induce a more cooperative behavior; while Cautiousness might have an opposite effect on the willingness of the individual to cooperate.[2]

Hypothesis 2.4. *The facet Cautiousness of Conscientiousness may decrease unconditional cooperative behavior in Repeated PD; the other facets may increase it; thus the overall effect of Conscientiousness is ambiguous, and may require analysis of the facets.*

[1] In section C of the appendix, we offer the historical evolution of hypothesis formulation and design.

[2] All the questions we used to assess the personality traits and their facets can be found in the Experimental Documents at `https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxwcm9ob3Jlc2VhcmNofGd4OjE0YTU4MjcxMzliNDI1OGQ`.

Agreeableness has six facets; three of them are particularly relevant for behavior in repeated games. One, *Altruism* may indicate how much the payoff to the other player matters to the subject. The other two, *Trust* and *Cooperation*, should affect how likely they expect cooperative behavior from others (for example when choosing C in PD), and how inclined they are to cooperate with others. All these facets should clearly provide a motivation to cooperate. Our natural hypothesis is then:

Hypothesis 2.5. *Agreeableness increases unconditional cooperative behavior in Repeated PD through the facets of Altruism, Trust and Cooperation.*

3. Experimental Design and Estimation

Our design involves a two-part experiment administered over two different days separated by one day in between. Participants are allocated into two groups according to some individual characteristic that is measured during the first part, and they are asked to return to a specific session to play several repetitions of a repeated game. Each repeated game is played with a new partner. The individual characteristics that we consider are: intelligence, Agreeableness and Conscientiousness, across different treatments that we will define as IQ-split, A-split and C-split, respectively. In one treatment, participants are not separated according to any characteristic, but rather allocated to ensure similar groups across characteristics; we define this the combined treatment.

The matching of partners is done within each session under an anonymous and random re-matching protocol. The group size of different sessions varies depending on the numbers recruited in each week.[3] Unless specified otherwise the length of play of the repeated game during the second day was 45 minutes. As usual, we define as a supergame each repeated game played; period refers to the round within a specific supergame; and, finally, round refers to an overall count of number of times the stage game has been played across supergames during the session.

Subjects in the two different groups based on the specific characteristic of the different treatments are otherwise reasonably similar (see tables A.61 to A.67 in the appendix). We observe systematic differences only in one treatment, the C-split; this is unlikely to generate confounding as will be clear from the econometric analysis below.

[3]The bottom panels of tables A.5 up to A.11 in the appendix list the sample size of each session across all treatments. Participants were not directly informed of the number of subjects in their session, but they could see how many people would take part prior to their entry to the lab.

Across all treatments, the subjects are not informed about the basis upon which the split was made.[4] In a subset of our sessions (IQ-split sessions only) we ask the participants during the de-briefing stage (i.e., after all the tasks were completed during the second day) whether they understood the basis upon which the allocation to sessions was made. Only one or two participants out of the approximately 100 asked mentioned intelligence as the possible determining characteristic; the rest appeared to be unaware of the allocation procedure. (Many participants believed that the allocations were done randomly).[5] A complete list of the treatments is reported in section D.2 of the appendix.

Unless stated otherwise, all participants were non-economists who had not taken any game theory modules or classes.[6] A total of 792 subjects participated in the final experimental sessions. They earned on average around 20 GBP each; the participation payment was 4 GBP. The Ethical Approval for the design was granted by the Humanities and Social Sciences Research Ethics Committee at the University of Warwick under the DRAW (Decision Research at Warwick) Umbrella Approval (Ref: 81/12-13). All details about the design are in appendix D, descriptive statistics of the different sessions and treatments, are in appendix H.

3.1. **Strategy of analysis.** In the experiment we generally collect multiple data for each subject $i \in \{1, ..., N\}$ making choices or achieving a payoff in different periods $t \in \{1, ..., T_i\}$, that we aim to explain. Hence our raw data have a panel structure. In section E.1.1 of the appendix we present three types of models we estimate in the analysis of the effect of intelligence and personality traits on the cooperative choices.

In what follows, we give a precise and testable formulation of the second part of hypothesis 2.1 relying on the axiomatic characterization (Cerreia-Vioglio et al., 2017) of choice probabilities of the *softmax* form which depend on a parameter t

[4]We initially ran two sessions where we informed participants about their Raven scores as well as the average in the session. The cooperation rates of these sessions are presented in section K of the appendix and do not seem to be different from the other sessions in which participants did not have this information.

[5]How intelligent players adjust their strategy if they know that they interact only with high-IQ-types or with heterogeneous types in our experimental setting would be an interesting subject for further research. Palacios-Huerta and Volij (2009), analyzing this issue in an experimental analysis based on the centipede game, show that there is an effect.

[6]The recruitment was conducted with the DRAW (Decision Research at Warwick) system, based on the SONA recruitment software. The recruitment ensured that the participants were selected from across the university student population and represented a wide variety of degree courses, which were evenly divided across sessions. Some examples of the participants' degree courses are: Accounting & Finance, Business, Film Studies, Physics, Psychology (see tables A.12 up to A.18 in appendix D for the full list of degree courses across the different treatments).

describing a characteristic or type of the subject:

$$p_t(x, X) = \frac{e^{\lambda(t)u(x)}}{\sum_{z \in X} e^{\lambda(t)u(z)}} \tag{2}$$

where $p_t(x, X)$ is the probability that alternative x is selected from the set X of feasible alternatives. The function λ takes non-negative values; the utility function u in equation (2) is cardinally unique and, if u is nonconstant, the function λ is unique given u. In the original interpretation (Cerreia-Vioglio et al., 2017) the parameter t is time, which can be interpreted as experience or reflection time. In the interpretation proposed here, t is the type of the decision maker. At the lowest value of $\lambda(t)$ all alternatives have the same chance of being selected. At its highest value, $+\infty$, u which is maximized over A. At intermediate values, u is soft-maximized with intermediate accuracy. As $\lambda(t)$ increases (for example if $t =$ IQ score increases) the probability that the true optimal alternative according to the utility u is chosen increases monotonically. We adapt the formulation to our current environment of choice in repeated games, restricting the attention to the two actions case, labeled x and y. The value of each action in a round is defined given (i) a history preceding the trial and (ii) the strategy of the players. So $u_G(x)$ is the value for a player of choosing the action x in the game G in the set $\{PD, BoS, SH, BoSC\}$ (representing Prisoners' dilemma, Battle of Sexes, Stag-Hunt and Battle of Sexes with Compromise, respectively). It includes the expected current payoff, given the belief on the action of the other, and the continuation value after that action given history and strategy. We assume $u_G(x) < u_G(y)$ (so x is the error); the probability of error is defined as the probability of choosing x given the characteristics t and the values of each action, and given by:

$$Pr(Ch = x|G, t) = \frac{1}{1 + e^{-\lambda(t)(u_G(x) - u_G(y))}}. \tag{3}$$

so that the probability of error is higher with lower value of $\lambda(t)$ and with lower difference $u_G(x) - u_G(y)$.

4. Path of Cooperation and Errors in Implementation

In our general hypothesis 2.1 we identified two possible main directions of the effect of intelligence. As we are going to see, consistency in strategy implementation (point *(ii)*) has the strongest effect, and we begin from that point. We provide two main tests of this hypothesis.

The first test we present in the section below relies on an experimental manipulation: our main substantive hypothesis 2.3 predicts a difference in behavior between the two groups of subjects with different intelligence in games (such as, in our design, *PD* and *BoSC*) where the natural equilibria (those satisfying assumption 2.1 and described in section 2.2 and appendix A) exhibit a tradeoff between short-term gain from deviation and long-term loss. We then compare these results with games where this tradeoff does not exist (such as, in our design, *SH* and *BoS*) that we analyze in section 4.2.

The second test is an analysis of the probability of error in choice (in the precise sense of equation 3), testing the prediction that error is more likely in subjects with lower IQ score; this test is provided in the descriptive analysis of section 4.3 and in the model based analysis of section 4.3.1.

4.1. **Games with Tradeoffs.** We present here the evidence supporting hypothesis 2.3, focusing first on the repeated *PD*, where cooperation is likely in general groups of subjects (as shown in Dal Bó and Fréchette, 2011), and on the *BoSC*, both with high continuation probability, $\delta = 0.75$. The natural equilibria we consider are those giving (C, C) outcome in all periods in *PD* (for example a pair of Grim Trigger strategies for each player: the analysis of the empirical frequency of the strategies is developed later), and those giving (W, W) outcome for the *BoSC* (for example, a pair of strategies where both players play W until either defects, and then play the mixed strategy equilibrium). The feature common to the two games is the short-run gain (of 2 points in *PD* and 4 points in *BoSC*) at the equilibrium choice and the continuation value loss from deviating. The difference between the two games is that for *PD* a continuation strategy is easy to identify (for example, play (D, D) in all periods); whereas what to do after the agreement to play (W, W) fails is harder to identify. Some natural possibilities are switching to the mixed strategy or to alternate between (B, W) and (W, B), but coordinating on one of these is harder.

4.1.1. *Differences in Cooperation and Compromise.* In the top left panel of figure 1, we present the evolution of cooperation in the low- and high-IQ sessions of the PD.[7] The initial cooperation rates (first five supergames) are similar in the two groups, but they progressively diverge until the rate reaches between 80 and 90 percent for the high-IQ group, while remaining at about 40 percent for the low-IQ group. The average individual payoff per round follows that of the cooperation rates (right panel of figure 1). In figure 2 we report the cooperation rates for *PD* sessions where individuals are not separated according to IQ (i.e. the combined treatment); in the analysis of these sessions, we group players into statistical partitions of high (Raven score larger than the specific session median) and low IQ. Here the cooperation rate

[7] Similar patterns replicate when we consider each individual IQ session, see appendix K.

increases over time in both partitions but it is consistently higher among the high-IQ partition's subjects, who also earn higher payoffs per supergame.[8] This pattern lends support to the hypothesis that individuals with higher intelligence may try to teach individuals with lower intelligence, as in Hyndman et al. (2012). We will see below more evidence consistent with this hypothesis. The payoffs of both partitions tend to grow and converge in the end, which seems to rule out the possibility that more intelligent individuals might extract surplus from those less intelligent.

The top left panel of figure 3 reports the percentage of subjects reaching the compromise outcome in the *BoSC*;[9] the data are aggregated as in figure 1.[10] The figure clearly illustrates a difference in long-run behavior in compromise rates of the two IQ groups. In the high-IQ group the fraction of subjects playing the compromise outcome (W, W) is higher than in the low-IQ group, with an overall positive trend in the high-IQ group and negative for those in the low-IQ group. The bottom panel of figure 3 shows that the behavior in the first period is similar in the two groups. The top middle panel of figure 3 shows that the low-IQ group more frequently plays the coordination outcomes (W, B) or (B, W), which constitute a lower average payoff. The difference in this frequency is approximately of the same size as the difference in the two groups' compromise rates.

Therefore, in summary, we can say that:

Result 4.1. *In PD and in BoSC the high-IQ group has larger rates of cooperation and (respectively) compromise than the low-IQ group, as hypothesis (2.3) predicts.*

4.1.2. *Effect of individual intelligence on cooperation and compromise.* In section E.2.1 of the appendix, we estimate the effect of individual IQ and show that the effect of intelligence is not due to observable confounding factors at the individual levels and/or environmental factors at the session levels (observable or not).

To disentangle the effects of individual intelligence from that of group intelligence, we compare in table 1 the effect of the treatment of separating individuals according to their IQ group with the combined sessions. The cooperation rate in the low-IQ sessions is about 14 percent lower than in the combined sessions, costing about 3.5 units per round. There is no significant difference between high-IQ sessions and combined sessions. From column 3 we derive an estimate of the loss, in terms

[8]Similar patterns replicate when we consider each individual session, see appendix K.

[9]In the *BoSC* and later in the *BoS* we consider outcome rather than choice as the dependent variable. In both games there are different natural equilibria: for example in *BoSC* alternating between (W, B) and (B, W), or compromising on (W, W). So, it is easier to identify whether they have coordinated on the first or on the second by considering outcomes.

[10]Similar patterns replicate when we consider each individual session, see appendix L.

of payoffs, for any individual with a given level of IQ, in participating in a low-IQ session. This is about 3 experimental units per round, not considering the experience effect of being able to play more rounds (column 3). This becomes about 3.9 units if we consider also the effect of the experience (column 6).

4.1.3. *Evolution of Behavior over the Session.* We cannot make specific predictions for initial rates of cooperation in the two groups: subjects in the early stages of the session only know that they are facing repeated interactions within a match, and with repeated partners within the session, so it is difficult to predict what they are thinking about the behavior of others before they see how the others are playing. For example, if the natural strategies in a game were complex, some initial difference in behavior according to intelligence might be possible. It is a fact however that in our sessions we consistently observed a very similar behavior in the initial periods in the two groups. In our sample, the difference in behavior follows almost entirely from the experience acquired during the session.[11]

The bottom panels of figure 1 show that there is no significant difference in the first period.[12] Similarly in the *BoSC*, figure 3 shows no difference in the rate of compromise outcomes in the initial period. Recall however that in the *BoSC* we are considering the outcome rather than the choice, thus the interpretation is less straightforward because of the difficulty of achieving coordination in period 1 between pairs.

In the section E.2.2 of the appendix we examine how the difference in cooperation and compromise rates between the two groups develops taking as benchmark the first-round choice of a player, who is facing a new partner, and, hence, cannot rely on a history of play. Players in high-IQ groups are increasingly more likely to open with a cooperative choice if compared with the benchmark represented by the combined sessions; this trend in the low-IQ session is smaller. In the *BoSC* we cannot detect any significant difference in the trends of the 1st rounds outcomes

[11]The behavioral attitude to cooperate also is similar in the two groups: in the debriefing questionnaire we asked subjects about their intrinsic motivation to cooperate, and found no significant difference between the two IQ groups. Participants were asked whether they agreed that they cooperate because: "I feel that is the right thing to do" and "It makes me feel nice"; there are no significant differences in the responses between the two IQ groups ($p-value = 0.7402$ and $p-value = 0.2443$ respectively).

[12]The first period cooperation choice for the *PD* is examined in detail in table A.20 in the appendix, where we consider all *PD* data together to increase the power of our estimation. In these regressions we include all data concerning the *PD*. Hence, we also use the low continuation probability treatment data, and the personality split treatments that will be illustrated below. From column 1, there is no significant effect due to the IQ level; considering the other individual characteristics, only Agreeableness has a significant positive effect in the expected direction of increasing the initial cooperation rate. This effect, as we will argue later, is transitory.

between the high- and low-IQ groups. The reason could be that in the *BoSC* the difference between high- and low-IQ groups appears faster than in the *PD* because coordination is probably more difficult in the *BoSC* than in the *PD*; we discuss the difficulty of achieving coordination more extensively in section 5.2.

4.1.4. *Cooperation with Low Continuation Probability.* We have seen substantial differences in the long-run rate of cooperation of the two groups of players, with more intelligent groups achieving higher rates of cooperation. This could be explained by an *unconditional* attitude: more intelligent players could have a generalized inclination to cooperate in strategic environments. We reject this hypothesis by considering repeated games with the same *PD* stage game (payoffs again as in table A.1), but lower continuation probability, $\delta = 0.5$. Figure 4 aggregates the different sessions; the dotted line represents an anomalous behavior we observed only in one session (session 7). If we exclude that exception, cooperation rates in the two groups are similar, and low, as in Dal Bó and Fréchette (2011) when they use the same parameters we use in this treatment (Dal Bó and Fréchette, 2011, p. 419: figure 1, 3rd panel in top row).[13] We conclude that:

Result 4.2. *Subjects of higher intelligence are not unconditional cooperators. In some cases they fail to establish high rates of cooperation or even an upward trend.*

4.2. **Games without Tradeoffs.** The second prediction of our substantive hypothesis 2.3 is the similarity in behavior of the two groups of subjects with different intelligence in games where the natural equilibria do not have the tradeoff between short term gain and long term loss (*BoS* and *SH*).

Our data provide strong support for the hypothesis that intelligence has a very different effect in games with tradeoff if compared with games without tradeoff. In the treatment where subjects – separated according to their IQ – play a repeated Stag Hunt (*SH*) game (payoffs in table A.3) and continuation probability $\delta = 0.75$, cooperation is reached soon and maintained throughout the session; this is true independently of the intelligence group as we illustrate in figure 7.[14] The stability

[13]From panel *B* of figure A.7 in appendix K, we note that cooperation rates in all low-IQ sessions decline from an initial 50 per cent to very low values. In the high-IQ sessions high rates of cooperation occur, but are infrequent. In only one session (session 7) cooperation rates increase. In the other high-IQ sessions (sessions 1, 3 and 5) cooperation declines or it is roughly stable as in the low-IQ sessions.

[14]In figure A.16 of appendix L, we see similar patterns replicated in each pair of contiguous sessions. Tables A.26 and A.27 in appendix M confirm what figure 7 suggests: IQ is a non-significant predictor of the rate of S choice, payoffs and the S choice in period 1.

of the agreement hinges on the small deviations from past successes in implementing cooperation on (S, S): see left panel of figure 9; this holds for both groups.[15]

In the *BoS*, (payoffs in table A.2) and $\delta = 0.75$, coordination is more complex because players have to find an agreement on how to implement the alternation; lacking communication, and absent a natural symmetric way to reach an agreement, players have to rely on chance, for example waiting until the first time coordination on a positive outcome occurs and then alternating. In the top panel of figure 8, where we aggregated the level of coordination and payoffs of all sessions by IQ group, we see that a very similar pattern between the two groups is realized, with the high-IQ group achieving coordination slightly faster.[16] However, right panel of figure 9 suggests that once coordination is achieved by alternation both groups of subjects deviate very little from the alternating strategy and in a way that is not statistically different. Hence we conclude:

Result 4.3. *As the hypothesis 2.3 predicts, in games with no tradeoff between short-run gain and continuation less – in SH and BoS– no significant coordination differences occur between the two intelligence groups.*

Instead, we find that the high and low-IQ groups undergo a different process (in *BoS* and *SH*) to reach agreement. We discuss this below in section 5.2.

4.3. **Errors in the Strategy Implementation.** We have seen that, in games with the tradeoff, cooperation and compromise rates in the low and high-IQ groups are initially similar and diverge later. Our hypothesis 2.3 predicts that the two groups differ in consistency of strategy implementation. Here we test the prediction and the hypothesis that such inconsistency explains the divergence in behavior. The hypothesis is supported: we see a cumulative effect of a small but significant difference in cooperation and compromise induced by the choices of the partner in the past; these small differences cumulate to produce large differences between the two groups. Panels A and D of figure 5 illustrate how low-IQ groups choose cooperation less frequently following cooperation of the partner in the previous period.

This lower C response to C of the partner in the previous period might be due either to a higher general inclination to choose D, or more specifically to a switch to D after a joint (C, C), choice. Panels C and F of figure 5 show that a significant part

[15] In table A.73 of the appendix, we present the estimation of the individuals strategies in the two groups.

[16] See figure A.15 in appendix L for the plots of coordination per single session, where similar patterns per each group are displayed. Table A.28 in appendix M shows that IQ has no effect in the coordination rate (column 1 and 2).

the decline in cooperation is explained by a defection after a joint cooperation in the low-IQ group, as goal neglect theory would suggest (the number of observations of joint cooperation in this group is small, hence the higher standard errors). Following defection, we see a very high rate of D choice in both groups; if anything, the rate is higher in high-IQ group (see panels B and E of figure 5): more intelligent players are better at disciplining behavior of defectors, and, thus, they are better teachers.

The bottom panels of figure 5 show the corresponding results for compromise rates in *BoSC*. The pattern matches what we have seen in the *PD*, as hypothesis 2.3 predicts. In this case the low-IQ group subjects are less likely to respond to a W choice of the partner in the previous period by making the same W choice in turn (panel G of figure 5). After a choice of the best-outcome action B by the partner the response is, in both groups, a choice of B. The deviation to a B choice after a joint compromise choice (W, W) is significantly and clearly higher for the low-IQ group (panel I of figure 5), as the goal neglect hypothesis 2.3 proposes.[17]

Figure 6 shows the effect of individual intelligence on the probability of defection in *PD* and failure to compromise in *BoSC*. We graph the fraction of deviating choices following successful cooperation or compromise in the previous round; hence, representing the propensity to exhibit goal neglect. The probability of goal neglect declines with intelligence. Comparing the histograms in figure 6 between the IQ-split and the combined treatments, we can argue that in the combined treatment, the choices that individuals make in the second lowest IQ quantile are less inconsistent than those in the IQ-split treatment, suggesting that they benefit from being combined with subjects of higher intelligence. It is also interesting to note that in the *BoSC* subjects seem to be more inconsistent than in the *PD*, which is reasonable given that the *BoSC* is a more complex game, as we have argued above.

We conclude this section by stating that in the *BoSC* and in the *PD* subjects of higher intelligence are more consistent in strategy implementation. In the next section we provide a formal presentation of these results by estimating the model of errors presented in section 3.1.

4.3.1. *Errors: Test and estimates.* In table 2 we estimate equation 3 by postulating a linear functional form for the function λ, with coefficients λ^0 and $\lambda^{IQ} > 0$ (λ increasing). In the table we report coefficients rather than odds ratios (as we do elsewhere in the paper) because we focus here on the structural estimation of equation 3.

[17]In section E.2.3 of the appendix we analyze how subjects react to partners' choices using a variation of the econometric model A-2 presented in section E.

The dependent variable is the error choice; for the *PD* it is set equal to 1 if the subject chooses defect (D) after a round of mutual cooperation (C, C), and equal to 0 if the subject chooses cooperate (C) after a round of mutual cooperation (C, C). We classify a choice of D after a last period action profile (C, C) an error, that is, as providing a total payoff smaller than the alternative, since for none of the strategies that we have identified choosing D is optimal. Using a similar reasoning for the *SH*, the dependent variable (error) is set equal to 1 if subject chooses H after a round of (S, S), and set equal to 0 if subject chooses S after a round of S, S. For the *BoSC*, dependent variable (error) is set equal to 1 if subject chooses best option, B, after a round of mutual compromise (W, W), it is set equal to 0 if subject chooses compromise after a round of mutual compromise. For the *BoS*, the dependent variable (error) is set equal to 1 if subject makes the same choice in $t-1$ and t after two rounds of alternation at $t-1$ and $t-2$, it is set equal to 0 if subject makes a different choice in t and $t-1$ after two rounds of alternation at $t-1$ and $t-2$.

In table 2 we see that in all 4 games the coefficient of IQ is negative, but of much greater magnitude in the *PD* and the *BoSC*, while it is not significant in the *SH* and *BoS*. Therefore, we conclude:

Result 4.4. *In BoSC and in PD subjects of lower intelligence make a larger number of errors in strategy implementation, while there is no significant difference in the SH and in the BoS, as hypothesis 2.3 predicts.*

From the estimates of costs in terms of utility of making a mistake (the values of Δu_G on top of the table) we observe that there is no increasing relationships between Δu_G and the coefficient of IQ like the more restrictive model 3 (or A-10 in the section E.3 of the appendix) would suggest. Results in table 2 clearly suggest a difference in the effect of the intelligence between games with a tradeoff and games without a tradeoff as in the general form A-9 presented in section E.3 of the appendix, where we also provide a further test of this difference. Overall, we summarize as follows:

Result 4.5. *Subjects in higher intelligence are more consistent in strategy implementation, as point (ii) of the general hypothesis 2.1 predicts.*

5. Strategic Reasoning

The second general way in which intelligence may affect strategic behavior is in the ability to identify the most profitable strategies in an environment, as we state in our general hypothesis 2.1.

5.1. **Best Response and Intelligence.** A direct test of the hypothesis that intelligence affects the ability to identify the most profitable strategies is the test of whether subjects' choices are the best responses to the empirical frequency of the strategy of the other participants in the session. We consider, consistently with Dal Bó and Fréchette (2011), the set (Always Defect, Always Cooperate, Grim Trigger, Tit for Tat, Win Stay Lose Shift, Tit for 2 Tats) of strategies in the repeated game, respectively denoted as {*AD, AC, GT, TfT, WSLS, TfT2* }. For each pair of such strategies we can compute the payoff in a repeated game if the two players adopt that pair. We call Sophisticated Cooperation, SC, any strategy in the set different from AD and AC. A very useful simplification of the analysis is possible because the payoff to each player is the same for any representative strategy we choose in this set. For instance, the profile (AD, GT) gives a profile of payoffs $((1-\delta)50+\delta 25, (1-\delta)12+\delta 25)$, which is the same as the payoff induced by (AD, TfT). We have thus defined a new normal form game, that we call the *strategy choice* game. The payoff matrix for the row player is:

	AD	AC	SC
AD	25	50	$(1-\delta)50+\delta 25$
AC	12	48	48
SC	$(1-\delta)12+\delta 25$	48	48

An entry in the row labeled SC means that any strategy in the SC set gives to row player the payoff in the corresponding entry against the respective strategy in the column, including the case where in the column we have SC, again to be interpreted "for any strategy in the set SC." The strategy AC is weakly dominated by SC if $\delta > 0$. Note that the strategy choice game restricted to actions AD and SC is a symmetric two-by-two coordination game with two pure Nash equilibria (AD, AD) and (SC, SC).

To assess the optimality of the strategy chosen by our subjects in both the low-IQ and high-IQ groups we need to estimate the empirical frequency they played the different strategies. This will allow us to compute the expected returns from playing each strategy. We use the same method used in Dal Bó and Fréchette (2011). The likelihood of each strategy is estimated by maximum likelihood, assuming that the subjects have a fixed probability of choosing one of the six strategies in the time horizon under consideration. We focus on the last five and first five interactions. The likelihood that the data correspond to a given strategy was obtained by allowing the subjects some error in their choices in any round, where error is defined as a deviation from the prescribed action according to their strategy. A detailed description of the estimation procedure is in the online appendix of DBF.[18] In appendix M (tables A.68, A.69 and A.70) we report the results of the estimation, for the high continuation probability, low continuation probability and combined treatments.

Table 3 reports the expected payoffs and empirical frequencies in the two groups (high- and low-IQ) across the two continuation probabilities we used for the *PD*, for the last five supergames played respectively. Consider first the case $\delta = 0.75$. For the high-IQ group, AC and SC give the same payoff, 43 percent larger than AD; the frequency is concentrated on the two best responses (87 percent). For the low-IQ group, SC is the best response (28 percent higher than AD and 13 percent higher than AD), but the best response is played 53 percent of the time, the worst 44 percent of the time. In the case $\delta = 0.5$: for the high-IQ group SC and AD give approximately the same payoff, 15 percent higher than the AC; and the best responses are the only strategies played. The low-IQ group plays the best response AD (giving a payoff 8 percent higher than the second-best response, SC) 77 percent of the time.

The above comparison does not adequately take into account the fact that players with higher intelligence play a larger number of games; so, if experience comes from the number of rounds played, rather that clock time elapsed, they are more experienced in the last games. A way to compensate for this is to consider the frequency at rounds where players of the two groups have equivalent experience measured by number of rounds. Table 4 reports the same analysis for the last five supergames with equivalent experience. It shows that the difference in ability to best respond is already in place. For example, in the case $\delta = 0.75$, SC gives the highest payoff, 5 percent larger than AC and 38 percent larger than AD; the frequency is already concentrated in the responses (74 percent), with the inferior strategy AD chosen 21 percent of the time. For the low-IQ group the highest payoff strategy (SC) is played 50 percent of the time, the worst strategy (AD) 43 percent of the time. If we consider the low δ case: in the high-IQ group, the best response is AD or SC (the payoff from these two strategies is approximately equal, and 20 percent higher than AC, and it is played 91 percent of the time. In the low-IQ group, the best response is AD (9 percent higher than SC, and it is played 73 percent of the time).

The average payoff per round in the high IQ-group is higher than in the low-IQ group. For example, in table 4 the expected payoff (from empirical frequency

[18]See p. 6-11, available online at `http://cess.nyu.edu/frechette/print/Dal_Bo_2011a_oa.pdf`

against empirical frequency) for the high-IQ group is 39.86, while for the low-IQ group it is 33.57. We can think of this difference as the outcome of two separate effects. The first effect is on individual choice: a subject in a group can increase his payoff by choosing the best response to the frequency of the group. In the high-IQ group, shifting from AD to SC gives a large gain (a gain of 11.68 over the 30.75 from using AD); while in the low-IQ group the shift gives a smaller gain (a gain of 6.8 over the 29.99 from using AD). The reason for the smaller gain is, of course, that a large fraction of subjects in the latter group are playing AD. The second effect is on group choice. We measure this effect with the difference between the maximum payoffs that a subject can achieve in the two groups at the best response within his group. This difference is only due to the group behavior. In the high-IQ group the difference is 42.43, in the low-IQ group it is 36.79.

In conclusion, independently of the fact that higher total payoffs will accrue to highly intelligent players simply because they play a larger number of rounds, we can state that:

Result 5.1. *Subjects in the high IQ sessions have a higher payoff* per round*, in part because they are closer to the best response and in substantial part because they are coordinating closer to the* (SC, SC) *equilibrium of the strategy choice game. This is as point (i) of the general hypothesis 2.1 predicts.*

This is particularly noticeable in the last five supergames, where the fraction of AD in the high-IQ group has fallen below 5 percent. An additional benefit of higher intelligence in our experiment, and likely in real life, is the ability to process information faster, hence to accumulate more extensive experience, and to learn from it.[19]

5.2. **Achieving Coordination.** As we argued in section 2.2, achieving coordination on the natural alternating equilibrium in *BoS* is harder than coordinating on (S, S) in *SH*. Achieving coordination at the alternating equilibrium is not easy without communication. This provides a test of the hypothesis that more intelligent players identify efficient equilibria more rapidly. Figure 8 shows that although the two groups are virtually identical in the frequency of achieving coordination on a

[19]One has to consider these results with some care, considering the difference between the analyst's situation and that of the subjects. In estimating the best response we are using information on frequency of strategies that subjects do not have; they do not observe the entire sequence of plays. Instead, they only observe the sequence of plays for the games in which they are participants. Limiting the identification of the strategies to the sample observed by each subject is impossible because the sample is too small.

positive payoff outcome (and thus on payoffs), they differ in the frequency of alternating coordination, even in the long run, with a difference of more than 10 percent (bottom left panel). The bottom right panel indicates that subjects in low-IQ sessions achieve coordination more frequently for a substantial part of the session by imposing B and conceding with W, and only later are they able to alternate coordination. Subjects in the low-IQ group are more likely to replicate the same outcome between two consecutive periods, as we can see from the right bottom panel of figure 8.[20]

Clearly, in the first round of a repeated game with a new partner, subjects have no way to coordinate, even if they have a history of successful coordination with previous partners, and are very intelligent, or inclined to cooperation. But in the second round of a repeated game, the successful start of an alternating equilibrium may take place, and this depends crucially on the correct choice of the move: the player who played B should now play W and vice versa.[21] We summarise this observation as the following:

Result 5.2. *Subjects of higher intelligence are faster in achieving coordination in the efficient alternating equilibrium in BoS, whereas there is no substantial difference in SH, as predicted by hypothesis 2.2.*

6. Personality and Strategic Behavior

6.1. **Conscientiousness.** In section 2.3 we hypothesized that, in general, the effect of Conscientiousness may be different for different facets, making the net effect that can be predicted on theoretical grounds ambiguous. In our data, the net effect in the C-split treatment is clear in figure 10: Conscientiousness reduces cooperation rates, and it does so from the first period, even before interaction takes place and learning modifies behavior. The reduction is particularly strong in one of the sessions of high-Conscientiousness (high-C); the trend relative to this session is singled out in figure 10.[22] The histogram at the bottom of figure 10 shows that the difference is substantial and significant in the first period. The effect is in the same direction

[20]Similar reasoning applies for the *BoSC*: from figure 3 we note that in the high-IQ groups more participants reach the most efficient outcome (i.e. compromise) almost from the beginning.

[21]This is significantly more likely when the player has higher intelligence, as shown by the coefficient of the interaction between intelligence and choice of W of partner in the previous period in table A.24 in the appendix. This also is confirmed by table A.28, which shows that IQ has a very strong and significant effect on alternating (see column 3), and no effect on coordination (column 2).

[22]In appendix K we present a more detailed analysis of all sessions of the C-split treatments in figure A.10.

for payoffs. The econometric analysis in the appendix shows that the pooled data of subjects in the low-Conscientiousness (low-C) sessions show an increase of more than 15 percent in the cooperation rate, and an increase of four experimental units in payoff (see the last three columns of table A.31 in the appendix).[23]

The effect of Conscientiousness on cooperative choices appears smaller (and non-significant) if we consider the data in the combined treatment (see figure A.12 in the appendix). Clearly, as was the case for the role of intelligence, the effect of Conscientiousness on behavior is stronger when individuals with a similar score interact. However, Conscientiousness appears to be distinct from intelligence in that the presence of two highly conscientious players – rather than one individual – seems a necessary condition for the trait to have a measurable impact on outcomes.[24] Why this negative net effect of Conscientiousness?

Our hypothesis 2.4 identifies the Cautiousness facet as possibly producing a reduction of cooperation rates in our environment, with all the other facets having the opposite effect. We test this explanation by considering the specific effect of each facet. We first perform factor analysis on the answers provided to the questionnaire, and identify four main factors (those with eigenvalue larger than 1). Analyzing the coefficients of each question we identify the first factor as the Cautiousness facet.[25] We then regress cooperation rate and payoff on the four factors we have identified and the Conscientiousness score. The analysis reported in table 5 confirms the role of Cautiousness: the corresponding factor 1 is the only significant factor, and its effect is a reduction of cooperation rate by between 35 to 42 percent. In conclusion:

Result 6.1. *Conscientiousness has a negative impact on cooperation due to the Cautiousness facet, as predicted by hypothesis 2.4.*

6.2. **Agreeableness.** Agreeableness as a factor is naturally associated with cooperative behavior, and so are all its facets (see hypothesis 2.5); this should translate to higher cooperation rates, independent of experience, and should be realized from

[23]The effect is also evident from table A.21, where we note that in the low-C sessions the odds ratio for the trend is bigger than in the combined sessions.

[24]This could explain why we do not observe any significant effect of individual Conscientiousness when we include session fixed-effects, as table A.19 in the appendix shows. The negative effect of Conscientiousness in the C-split treatment is clear from the strategy table A.72 that we include in appendix; the table shows the frequency of strategies used by different groups in early and late supergames. Subjects in the high-C group start with a larger fraction of the always defect (*AD*) strategy, 31 percent compared to 12 percent of the low-C group; this is consistent with the first-period behavior shown in figure 10.

[25]For example, the two items with highest coefficient for the first factor are "Jump into things without thinking" and "Make rush decisions" (both reverse coded). Table A.30 in appendix M reports the items, facets and the coefficients for each item.

first periods. Our data, as seen in figure 11, confirm this. The bottom histograms show a large and significant positive difference in the first period cooperation rates of high-Agreeableness (high-A) groups compared to low-Agreeableness (low-A) groups, with a difference of approximately 10 percent, giving support to hypothesis 2.5 that Agreeableness increases unconditional cooperation.[26]

From the top left panel of figure 11 (where we exclude an anomalous session represented by the broken line – see appendix K for details), we note that both groups have a positive trend of cooperation. In the long run, however, the difference is small, both in cooperation rates and payoffs, this can as well be observed in the econometric analysis we report in the appendix.[27] The effect of Agreeableness on cooperative choices is similar if we consider the two partitions in the combined treatment, from figure A.13 that we report in the appendix, we can clearly observe a difference between the high- and low-A partitions in the beginning and their convergence towards the final rounds. In conclusion:

Result 6.2. *Agreeableness has a positive impact on cooperation, but the effect is strong in magnitude only in the early stages, as hypothesis 2.5 predicts.*

7. Response Time

The time to decide has minor direct interest for economic analysis, but provides very useful information on the decision process and thus on how the observed differences in cooperation rates and payoffs originate.

Our first hypothesis concerns equilibrium choices and deviations, or response to deviations. After convergence to a natural equilibrium has occurred the implicitly agreed behavior becomes the natural choice, and thus the output of a decision that should not require specific attention. On the contrary, a choice of deviation or the response to a deviation of others is slower:

[26]This strong initial effect is confirmed in table A.20 of the appendix. There we find a significant effect for Agreeableness even after including session fixed effects (i.e. controlling for "environmental" effects; and, more specifically, for the effect of being in a high-A group as well). The odds that a more agreeable person cooperates are 4.5 times greater than those for a less agreeable person. This is the only significant predictor in the regression.

[27]As shown in table A.31 (first three columns) the effect of being in a low- or high-A group on all periods is small on payoffs and insignificant on cooperation rates. Consistently, table A.19 (in which we consider all the sessions) reports similar effects of Agreeableness in columns 1 and 3. Furthermore, from column 2 of table A.21, we note that there is no difference in the trend of cooperation between low- and high-A groups and the combined groups. From column 2 of table A.22, we note that subjects scoring higher on Agreeableness are less likely to reciprocate more as they acquire more experience, again suggesting that Agreeableness mostly has an effect on unconditional cooperation.

Hypothesis 7.1. *For all types of subjects, the equilibrium choice takes less time than a deviation or a response to a deviation.*

The relationship between cognitive and non-cognitive skills and time to decide is provided by the conceptual structure that we have developed, differentiating games with respect to the existence of a tradeoff between short run gains and long run losses. We hypothesize that less intelligent players who have to avoid the goal neglect error will need more time when they have to evaluate this tradeoff. Thus:

Hypothesis 7.2. *In PD and BoSC, namely games with a tradeoff between short-run gain and long-run loss from deviation at the natural equilibrium, response time is shorter for players of higher intelligence when they choose cooperation for PD and compromise for BoSC than when they choose otherwise. There is little difference in response time in the two choices in BoS and SH.*

We now turn to the test of the hypotheses. In *PD* and in the *BoSC*, high-IQ groups have a shorter response time, as we see from figure 12.

Result 7.1. *In line with hypothesis 7.1, subjects think longer when they decide to deviate from cooperation to defection in the PD.*

In figure 12 we observe that this difference is large and significant for the high-IQ group, and small and not statistically significant in the low-IQ group, which has lower cooperation rates, as predicted in hypothesis 7.1.[28]

In *BoSC*, the analysis is complicated by the fact that we have more than one natural equilibrium. Subjects can coordinate on compromise (i.e. outcome (W, W) in table A.4) or alternate between the two outcomes (W, B) and (B, W), or finally settle on one of the (W, B), (B, W) outcomes. The analysis is unambiguous for equilibria yielding the (W, W) outcome. From the bottom panels of figure 12: more intelligent players that saw the compromise (W, W) outcome at $t-1$ have a shorter response time for when they choose W (aiming at a compromise outcome) than when they choose B, confirming hypothesis 7.2.

Table A.33 in the appendix confirms the result illustrated in figure 12 for the *BoSC*: individuals in general respond faster when they are playing the compromise (W, W) outcome (column 1) and this decision is quicker for higher IQ individuals (column 2). This last effect is not significant but is quite high in magnitude, this is possibly due to the rarity of event B at t, if (W, W) at $t-1$. For games with

[28]Furthermore, table A.32 of the appendix confirms this: individuals choosing C take less time to make the choice (sign of cooperate in column 1) and this effect is stronger the higher is the subjects' IQ (column 2).

no tradeoff between short-term and long-term advantages there is little difference in response time between the two actions both in the high-IQ and low-IQ groups for *BoS* (see figure 13).[29] We summarize the above discussion as:

Result 7.2. *In PD and BoSC response time is shorter for players of higher intelligence when they choose cooperation for PD and compromise for BoSC than when they choose otherwise. There is little difference in response time in the two choices in BoS and SH. This confirms hypothesis 7.2*

A trait that might affect the length of response time is Conscientiousness. We discuss this briefly in section G of the appendix, where we show that response time is shorter for the subjects in high-Conscientiousness groups.

8. Conclusions

Our experiment tested the hypothesis that groups of individuals with different levels of intelligence or different personalities, but who are otherwise similar, will exhibit different levels of cooperation in bilateral interactions with others from their group. The interactions were repeated, giving time and opportunity for each participant to observe and to reflect on the past behavior of the other.

The outcome of games with a tradeoff between short-run gain and continuation value loss was strikingly different when played by subjects with higher or lower levels of intelligence. Higher intelligence resulted in significantly higher levels of cooperation and earnings. The failure of individuals with lower intelligence to appropriately estimate the future consequences of current actions accounts for these difference in outcomes. Personality also affects behavior, but in smaller measure, and with low persistence. These results have potentially important implications for policy. For example, while the complex effects of early childhood intervention on the development of intelligence are still currently being evaluated (e.g. Heckman, 2006), our results suggest that any such effect would potentially enhance not only the economic success of the individual, but the level of cooperation in society (at least when interactions are repeated).

More in detail, our main conclusions for the class of simple repeated games are:

Everything else being equal, groups composed of individuals with higher levels of intelligence exhibit higher or equal levels of cooperation in the class of games we consider. In our data, intelligence is associated with different long-run behavior in

[29]From figure 13, note that in *SH* the lower payoff action *H* takes longer for both types, and particularly for the low-IQ group. Given that this is a complex tradeoff (between riskiness and payoff), the difference is natural.

a sequence of repeated games played within the group, and higher cooperation rates are associated with higher intelligence.

Higher cooperation rates are produced by interaction over time in group of individuals with higher intelligence. Cooperation rates in the initial rounds (approximately 20 rounds) are statistically equal in the two groups. Thus, the experience of past interaction, not a difference in attitude in the initial stages, explains the higher cooperation rate.

Higher cooperation is sensitive to the continuation probability, so it is not the result of an unconditional inclination of higher intelligence individuals to cooperate. Intelligence operates via strategy implementation and strategic thinking.

We have identified a crucial distinction among games in which the gain from deviation from a given strategy has to be weighed against future losses, and those in which it does not. When a non trivial tradeoff has to be evaluated, individuals with higher intelligence achieve a substantially higher rate of cooperation; the difference in intelligence levels becomes irrelevant when this tradeoff is absent. In the low continuation probability game, cooperation is less profitable in the long-run, and subjects in the higher intelligence groups also experience large and growing rates of defection over time. In conclusion, both environment and incentives matter: intelligence modulates the response to incentives, rather than directly determining behavior.

Intelligence matters substantially more in the long run than other factors and personality traits. Our method allows for a direct and an indirect test. The direct test is based on examining the cooperative behavior of groups systematically differing in a given trait. The indirect test is based on the analysis of the statistical relationship of traits with the choice to cooperate. We find a transitory association of cooperation rates with personality traits: intelligence is the determining factor in long-run cooperative behavior.

Intelligence operates through thinking about strategic choices. Differences in behavior could arise for different reasons. For instance, intelligence might be associated with a cooperative attitude, either as a result of a behavioral inclination, or as the result of utility that individuals might derive from the outcome, such as winning approval of others or avoiding conflict. Our data instead provide support for the idea that intelligence is mostly likely to influence the way in which subjects think about the behavior of others, how they learn from it, and how they try to modify it. Intelligence is relevant for learning and teaching. We have produced two pieces of evidence supporting this interpretation. The first is the difference in the evolution over time of the response of individuals to the choices made by their partner in the past. A small, but significant difference in the choice to cooperate with the current partner in the last period builds up over the session, and this eventually produces a substantial difference in cooperation rates. The second piece of evidence comes from response times. Among subjects of higher intelligence, cooperation after the initial stages becomes the default mode; defection and response to defection instead requires a specifically dedicated and careful balancing of current gains and future losses. For groups composed of lower intelligence individuals there is no difference.

Conscientiousness affects strategic behavior in the direction of cautiousness, thus reducing cooperation. Theoretical analysis suggests an ambiguous effect of Conscientiousness, predicting an increase of cooperation due to facets like Dutifulness and Orderliness, but a decrease due to Cautiousness. We find that the second dominates. This effect is clear in a game such as the *PD*, in which the tradeoff between the short-run gain and continuation loss may be perceived as risky, thus leading a cautious individual to make the safe choice of always defecting.

Agreeableness induces a transitory increase in cooperation. The effect is natural; it is, however, small and transitory compared to that induced by intelligence.

Our results suggest important questions for the theory of learning in games, as well as on the link between intelligence and strategies' ideation and implementation. The extension to the ability of subjects to conceive different sets of strategies will require an extension of the design to a more general class of games, particularly with non-symmetric stage games. These are the subjects of current and future research.

FIGURE 1. **PD with High Continuation Probability: cooperation and payoffs per period in the low and high IQ sessions** The top panels report the averages computed over observations in successive blocks of five supergames of all high and all low IQ sessions, aggregated separately. The black and grey lines report the average cooperation for high and low IQ subjects in each block. The bottom panels reports the average of cooperation and payoffs in the first round (of a repeated game) that occurs in the two IQ sessions separately. Bands represent 95% confidence intervals.

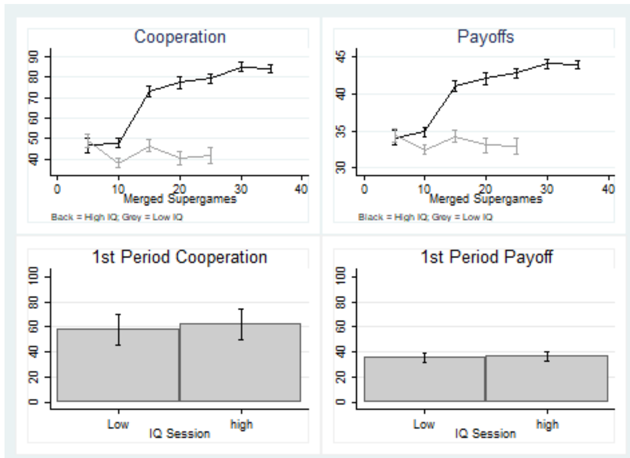

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FIGURE 2. **PD with High Continuation Probability and combined Sessions: Cooperation and payoffs per period in the low and high IQ partitions** The top panels report the averages computed over observations in successive blocks of five supergames of all high and all low IQ sessions, aggregated separately. The dashed lines represent the average cooperation in each block; the black and grey lines report the average cooperation for high and low IQ subjects in each block. The bottom panels reports the average of cooperation and payoffs in the first round (of a repeated game) among the two groups. Bands represent 95% confidence intervals.

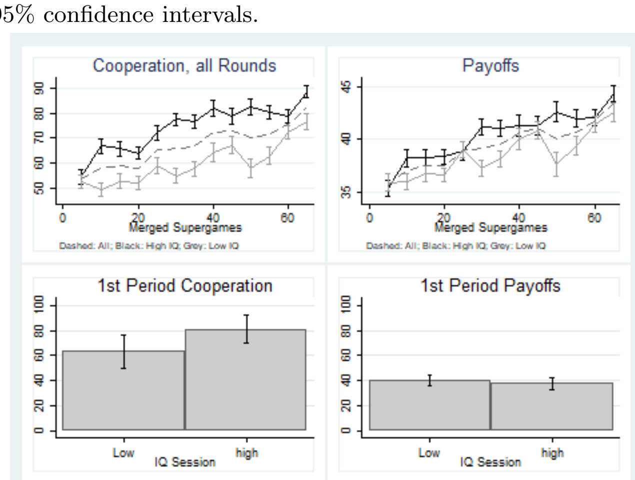

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Figure 3. **BoSC: Compromise, Coordination and payoffs per period in the low and high IQ sessions** Top panels report averages computed over observations in blocks of five supergames of all high and all low IQ sessions, aggregated separately; the black and grey lines report the percentage of subjects achieving a compromise outputs, coordination output and average payoffs for high and low IQ sessions. The bottom panels reports the averages in the first period among the two group of sessions. Bands represent 95% confidence intervals.

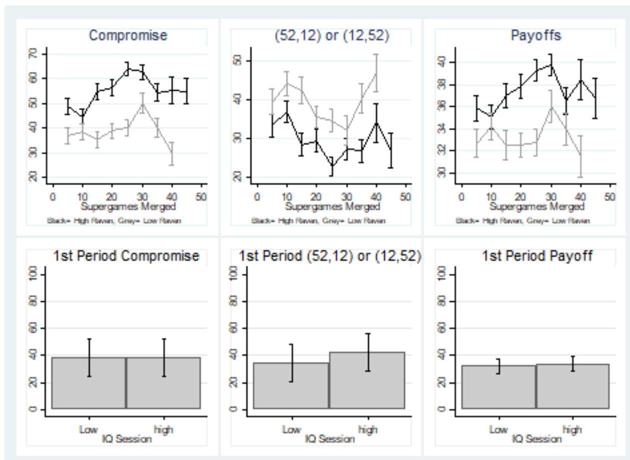


Figure 4. **PD with Low Continuation Probability: cooperation and payoffs per period in the low and high IQ sessions** Top panels report averages computed over observations in blocks of five supergames. The grey lines represent all low IQ sessions, the black line represent the high IQ sessions featuring a downward or stable trend of cooperation, the dotted line represents the high IQ session with an upward trend of cooperation (session 7). Bottom panels report average of cooperation and payoffs in the first round (of a repeated game) that occurs in the three different groups of sessions separately. Bands represent 95% confidence intervals.

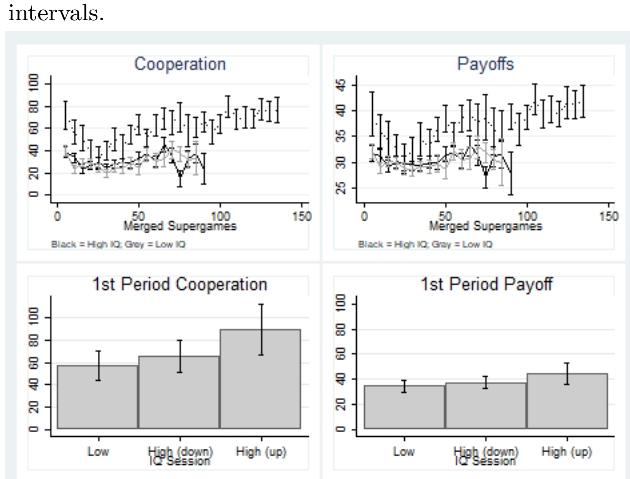
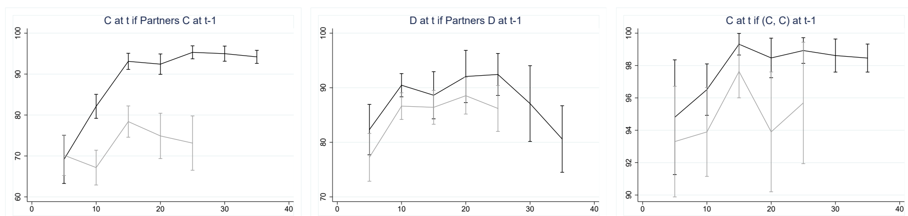


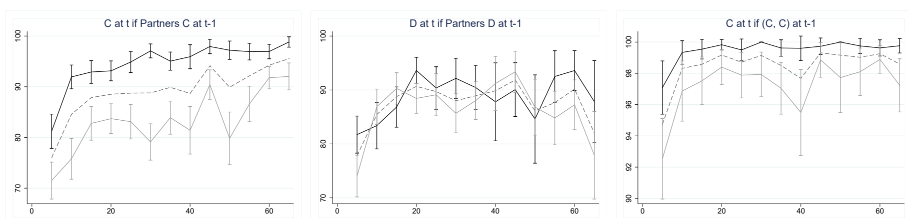
FIGURE 5. **Conditional cooperation and coordination per period.** We report the averages computed over observations in successive blocks of five supergames. For PD IQ-Split, the black and grey lines report the average cooperation for high and low IQ subjects in each block. For PD Combined Treatment, the dashed lines represent the average cooperation in each block; the black and grey lines report the average cooperation for high and low IQ partitions in each block. For BoSC, the grey line represents all low IQ sessions and the black line represents the high IQ sessions.

PD IQ-Split with High Cont. Prob.



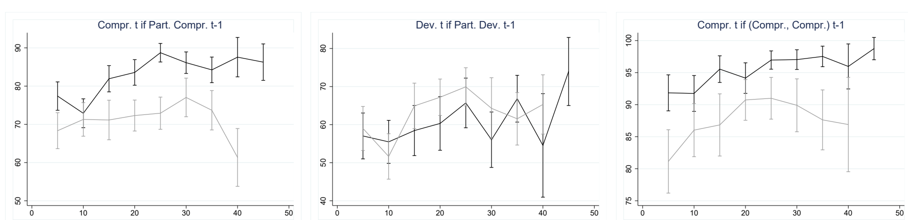
(A) (B) (C)

PD Combined Treatment



(D) (E) (F)

BoSC



(G) (H) (I)

FIGURE 6. **PD and BoSC: Deviation from natural equilibrium if natural equilibrium is the outcome at time t-1 by subjects sorted in IQ quantiles.** Vertical axis: fraction of D choice when the action profile in the previous period was (C, C) for PD and fraction of B choice when the action profile in the previous period was (W, W) . Bands represent 95% confidence intervals.

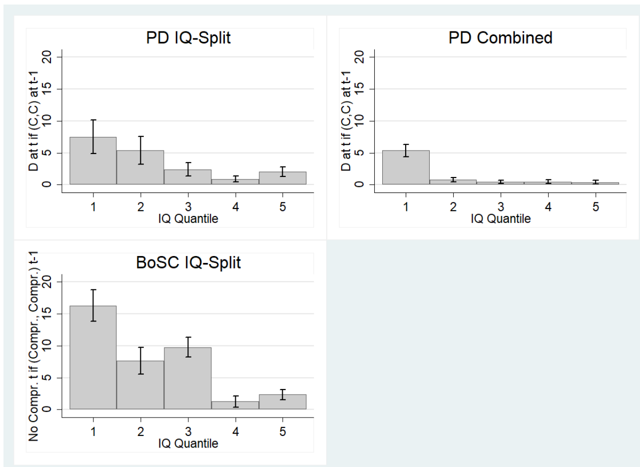


FIGURE 7. **SH: stag choice and payoffs per period in the low and high IQ sessions** The top panels report the averages computed over observations in successive blocks of five supergames of all high and all low IQ sessions, aggregated separately; the black and grey lines report the average stag choices for high and low IQ subjects in each block respectively. The bottom panels report the stag choices and payoffs in the first period in the two IQ sessions separately. Bands represent 95% confidence intervals.

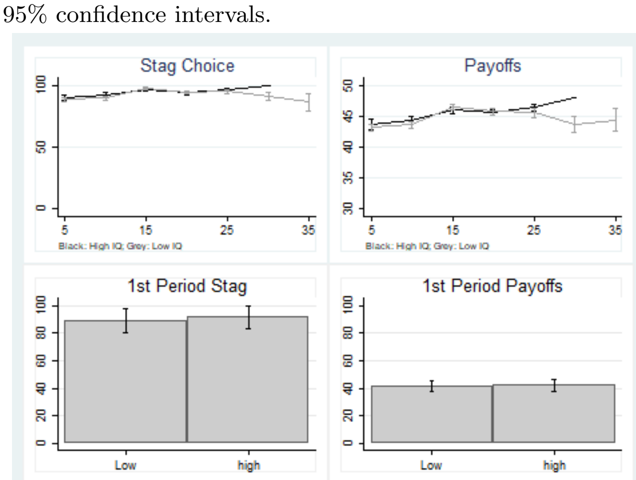


FIGURE 8. **BoS: outcomes and payoffs in the low and high IQ sessions** The four panels report the averages computed over observations in successive blocks of five supergames of all high and all low IQ sessions, aggregated separately. The black and grey lines report the average choices for high and low IQ subjects in each block respectively. Alternating occurs when subjects in the same match choose (B, W) and (W, B) in two consecutive periods; repeating when (B, W) or (W, B) happens consecutively for two periods in the same mach. Bands represent 95% confidence intervals.

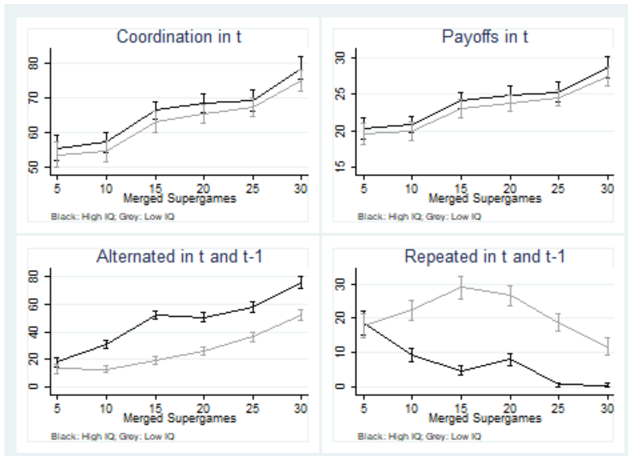
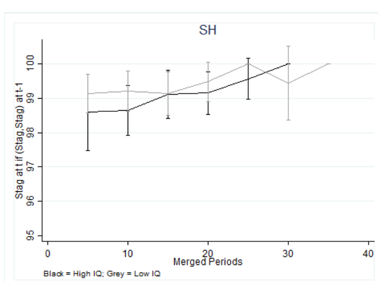
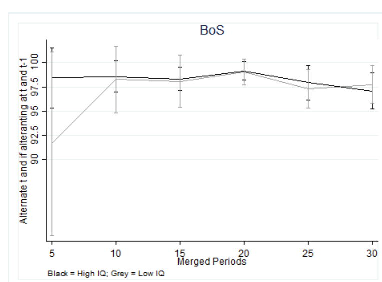


FIGURE 9. **Consistency in SH and BoS:** Stag Hunt: The left panel reports the percentage of the Stag choices if the same pair coordinated on $(Stag, Stag)$ in period $t-1$, computed over observations in successive blocks of five supergames, of all high and all low IQ sessions aggregated separately. Battle of Sexes: The right panel reports the percentage of the alternating choices if the same pair coordinated on an alternated outcome in periods $t-1$ and $t-2$ computed over observations in successive blocks of five supergames, of all high and all low IQ sessions aggregated separately. The black and grey lines refer to the high and low IQ subjects in each block respectively. Bands represent 95% confidence intervals.



(A) Stag choice in t.



(B) Alternating choice at t.

Figure 10. **PD with High Continuation Probability: Cooperation and payoffs per period in the low and high Conscientiousness sessions.** The top panels report the averages computed over observations in successive blocks of five supergames of all high and all low Conscientiousness sessions, aggregated separately; the black and grey lines report the average cooperation and average payoffs for high and low Conscientiousness sessions respectively. The dotted line represents session 5 that has not been aggregated with the other High C sessions. The bottom panels report the average of cooperation and payoffs in the first period among the two groups of sessions. Bands represent 95% confidence intervals.

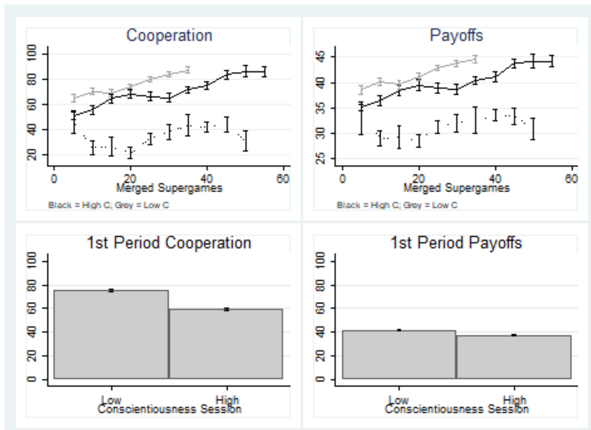


Figure 11. **PD with High Continuation Probability: Cooperation and payoffs per period in the low and high Agreeableness sessions** The top panels report the averages computed over observations in successive blocks of five supergames of all high and all low Agreeableness sessions, aggregated separately; the black and grey lines report the average cooperation and average payoffs for high and low Agreeableness sessions. The dotted line represents session 7 not been aggregated with the other High A sessions. The bottom panels reports the average of cooperation and payoffs in the first period among the two group of sessions. Bands represent 95% confidence intervals.

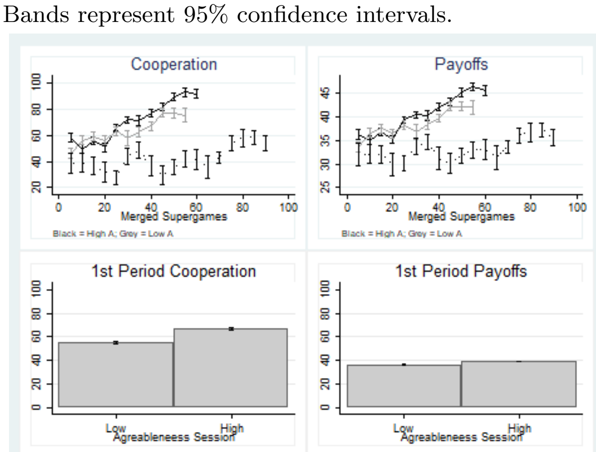


FIGURE 12. **PD and BoSC: Response Time in the different treatments by IQ groups and choice** C, D, W and B represents the different choices in the two games. For the BoSC the choices are conditional to the fact that at t-1 the two players compromised (i.e. played (W,W)). The grey line represents all low IQ sessions, the black line represents the high IQ sessions. Bands represent 95% confidence intervals.

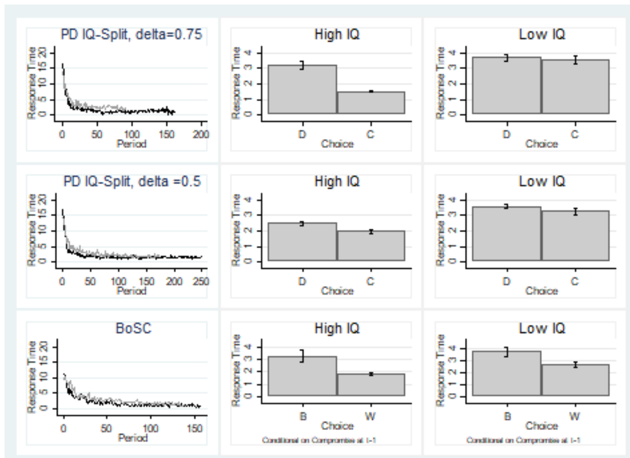


FIGURE 13. **SH and BoS: Response Time in the different treatments by IQ groups and choice** In the Battle of Sexes, the "Alternate" choice denotes a choice different from the one taken at $t-1$. The grey line represents all low IQ sessions, the black line represents the high IQ sessions. Bands represent 95% confidence intervals.

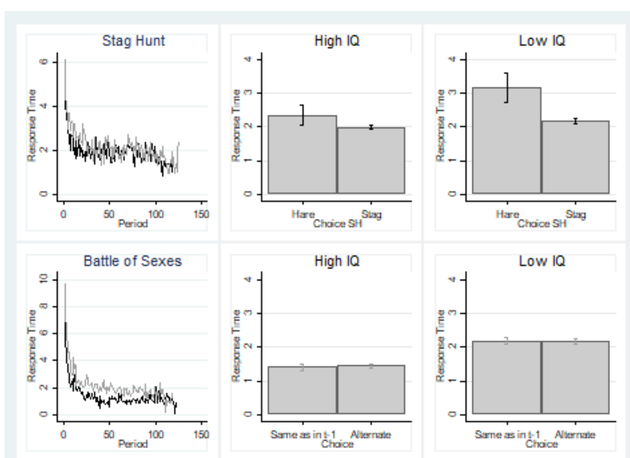


Table 1. **Effect of IQ-split treatment in PD with high continuation probability.** The regressions include the data from PD (high δ), IQ-split and combined treatments. The dependent variables are average cooperation and average payoff across all interactions. In columns 1-3, the averages are calculated over the same number of supergames played by every individual, so that the longer sessions are truncated. Columns 4-6 use all supergames. OLS estimator. Standard errors in brackets; * $p\!-\!value < 0.1$, ** $p\!-\!value < 0.05$, *** $p\!-\!value < 0.01$

	Supergame ≤ 12			All		
	Cooperate	Payoff	Payoff	Cooperate	Payoff	Payoff
	b/se	b/se	b/se	b/se	b/se	b/se
IQ			6.7522***			9.1196***
			(2.1469)			(1.9667)
High IQ Session	–0.0242	–0.3979	–1.5384	0.0395	1.0376	–0.5039
	(0.0511)	(0.8920)	(0.9477)	(0.0522)	(0.8939)	(0.9195)
Low IQ Session	–0.1430***	–3.5286***	–2.9563***	–0.1831***	–4.6319***	–3.8919***
	(0.0504)	(0.8807)	(0.8834)	(0.0481)	(0.8239)	(0.8061)
# Subjects	–0.0101	–0.2275	–0.2448	–0.0139*	–0.3234**	–0.3502**
	(0.0087)	(0.1527)	(0.1500)	(0.0084)	(0.1441)	(0.1383)
Av. Rounds Supergames	0.0605**	1.5867***	1.5302***	0.0351	0.8658	0.8088
	(0.0279)	(0.4872)	(0.4786)	(0.0390)	(0.6677)	(0.6405)
r2	0.055	0.104	0.140	0.115	0.217	0.283
N	240	240	240	240	240	240

TABLE 2. **Errors of strategy implementation for PD, SH, BoS, BoSC: effects of IQ, personality, other characteristics and groups.** The regressions include the data in the high δ treatments. For the PD, the dependent variable (error) is set equal to 1 if subject chooses defect (D) after a round of mutual cooperation (C,C), and equal to 0 if the subject chooses cooperate (C) after a round of mutual cooperation (C,C). For the SH, the dependent variable (error) is set equal to 1 if subject chooses hare after a round of stag equilibrium, it is set equal to 0 if subject chooses stag after a round of a round of stag equilibrium. For the BoS, the dependent variable (error) is set equal to 1 if subject makes the same choice in t and t-1 after two round of alternation at t-1 and t-2, it is set equal to 0 if subject makes a different choice in t and t-1 after two round of alternation at t-1 and t-2. For the BoSC, dependent variable (error) is set equal to 1 if subject chooses best option (B) after a round of mutual compromise, it is set equal to 0 if subject chooses compromise after a round of mutual compromise. Data with different histories are ignored. Δu_G are estimates of costs in terms of the Utilities of making a mistake. Logit with individual random effect estimator. Coefficients displayed. IQ, personality traits and risk aversion are normalised between 0 and 1; Standard Errors in brackets are clustered at the individual levels $^{*}\ p-value < 0.1$, $^{**}\ p-value < 0.05$, $^{***}\ p-value < 0.01$

	PD	BoSC	SH	BoS
	b/se	b/se	b/se	b/se
Errors	0.0248	0.0738	0.0081	0.0192
Δu_G	-16.75	-13.14	-23	-16.107
Constant	–4.39020**	0.31035	4.33101	–3.78149*
	(1.8656)	(3.3263)	(3.5788)	(2.2222)
IQ	–5.28479***	–6.12849***	–1.73294	–3.26260*
	(1.0094)	(1.7425)	(3.2501)	(1.8357)
Openness	1.09335	1.60513	–1.30327	0.99838
	(0.8488)	(1.6059)	(3.2827)	(2.1065)
Conscientiousness	1.11803	–0.25533	–9.58399***	–0.17029
	(0.9245)	(1.2196)	(2.9917)	(1.6033)
Extraversion	1.35014	0.17331	3.01258	–0.19362
	(0.9491)	(1.3762)	(2.0499)	(1.2930)
Agreeableness	–0.16864	1.04193	–7.03396**	0.55189
	(0.8353)	(1.2148)	(3.1563)	(1.4925)
Neuroticism	0.86062	–0.56918	–4.34203	0.44175
	(0.9595)	(1.3762)	(2.9467)	(1.4534)
Risk Aversion	–1.89355**	–1.32862	3.93315	–0.25920
	(0.8900)	(1.5058)	(2.8547)	(1.4665)
Female	0.22983	0.56763	0.18144	0.69519
	(0.3423)	(0.5559)	(0.9453)	(0.5163)
Age	0.00177	0.01746	–0.04414	0.02335
	(0.0554)	(0.0948)	(0.0972)	(0.0429)
lnsig2u				
Constant	2.18462***	1.55227***	2.05973***	0.66884
	(0.1509)	(0.1890)	(0.2959)	(0.6140)
Culture Fixed-Effects	Yes	Yes	Yes	Yes
Type	No	Yes	No	Yes
N	29982	4998	7252	2411

TABLE 3. **Payoff at empirical frequency and frequency.** The *Frequency* column reports the empirical frequency of each strategy in the set {*AC, AD, SC*} in the last 5 supergames, as reported in table A.68 of the appendix for the high δ and A.69 for the low δ. The *Payoff* column reports the expected payoff using the strategy against the empirical frequency. The Expected payoff is computed using the empirical frequency against the empirical frequency. Top panel: high δ, bottom panel: low δ.

	High IQ		Low IQ		
	payoff	frequency	payoff	frequency	
AC	46.49	0.089	32.03	0.027	
AD	32.65	0.042	28.97	0.443	$\delta = 0.75$
SC	46.90	0.869	36.36	0.530	
Exp. Payoff	46.27		32.97		
AC	26.33	0	20.21	0	
AD	29.97	0.602	27.85	0.772	$\delta = 0.5$
SC	30.24	0.398	25.22	0.228	
Exp. Payoff	30.08		27.25		

TABLE 4. **Payoff at empirical frequency and frequency.** The *Frequency* column reports the empirical frequency of each strategy in the set {*AC, AD, SC*} in the last 5 equivalent experience supergames, as reported in table A.68 of the appendix for the high δ and A.69 for the low δ. The *Payoff* column reports the expected payoff using the strategy against the empirical frequency. The Expected payoff is computed using the empirical frequency against the empirical frequency. Top panel: high δ, bottom panel: low δ.

	High IQ		Low IQ		
	payoff	frequency	payoff	frequency	
AC	40.36	0.044	32.62	0.075	
AD	30.75	0.212	29.99	0.427	$\delta = 0.75$
SC	42.43	0.743	36.79	0.498	
Exp. Payoff	39.86		33.57		
AC	25.79	0.081	21.45	0.037	
AD	30.81	0.616	28.74	0.737	$\delta = 0.5$
SC	29.80	0.301	26.24	0.226	
Exp. Payoff	30.09		27.91		

TABLE 5. **Analysis of facets in the Conscientiousness -split treatments PD with high continuation probability.** The regressions include the data from PD C-split treatment. The dependent variables are average cooperation and average payoff per interaction. The factors represent the principal factor deriving from the Conscientiousness questions in the 120 items big 5 questionnaire. We identify Factor 1 with the Cautiousness facet on the basis of the survey items with largest (in absolute value) scoring coefficient. Averages are calculated over the same number of supergames played by every individual; thus, the longer sessions are truncated. IQ, personality traits, factors and risk aversion are normalized between 0 and 1. OLS estimator. Standard errors clustered at the individual levels in brackets; * $p-value<0.1$, ** $p-value<0.05$, *** $p-value<0.01$

	C-Split Cooperation b/se	C-Split Cooperation b/se	C-Split Cooperation b/se	C-Split Payoff b/se
Factor 1 (Cautiousness)	–0.3358***		–0.4011***	–8.4645***
	(0.1109)		(0.1281)	(2.1373)
Factor 2	0.0654		0.0421	–0.8574
	(0.1529)		(0.1693)	(2.8243)
Factor 3	–0.1223		–0.1053	–1.7562
	(0.1572)		(0.1671)	(2.7881)
Factor 4	0.0096		–0.0338	–0.3650
	(0.1311)		(0.1390)	(2.3189)
Conscientiousness		–0.5652***		
		(0.1837)		
IQ	0.2168	0.1419	0.1450	3.6958
	(0.1685)	(0.1756)	(0.1779)	(2.9674)
Openness		–0.0574	–0.0070	–0.1371
		(0.1564)	(0.1660)	(2.7697)
Extraversion		–0.0689	–0.0896	–0.0110
		(0.1604)	(0.1726)	(2.8790)
Agreeableness		0.2614	0.2901	0.5439
		(0.1750)	(0.1846)	(3.0787)
Neuroticism		0.0853	0.0664	3.0796
		(0.1600)	(0.1797)	(2.9977)
Risk Aversion	0.0512	0.0262	0.0426	3.2139
	(0.1324)	(0.1326)	(0.1341)	(2.2374)
Female	–0.0209	–0.0304	–0.0326	–0.3221
	(0.0549)	(0.0613)	(0.0640)	(1.0674)
Age	0.0075	0.0061	0.0054	0.1590
	(0.0075)	(0.0077)	(0.0078)	(0.1300)
# Subjects	–0.0229	–0.0212	–0.0215	–0.4517*
	(0.0139)	(0.0138)	(0.0141)	(0.2347)
Culture Fixed-Effects	Yes	Yes	Yes	Yes
r2	0.169	0.182	0.190	0.318
N	122	122	122	122

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Intelligence, Personality and Gains from Cooperation in Repeated Interactions

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Appendices

Appendix A. Repeated games with symmetric two by two stage games

We present here the analysis of the structure of equilibria in repeated games with symmetric two players two actions stage games. The exposition is easier if we organize it according to the type of the Nash equilibria *of the stage game*. Given that $a \geq d$ and $b \geq c$, the possible orders between the four numbers are only of four types. We write (a, bd, c) to mean that the inequalities $a \geq \max\{b, d\} \geq \min\{b, d\} \geq c$ hold, and (a, b, d, c) to indicate that the linear order $a > b > c > d$ holds. We consider only cases where all the Nash equilibria of the stage game are strict.

It is clear by inspection that:

(1) there is no game in this class with a unique mixed strategy equilibrium of the stage game; so the only possible cases are games with 2 pure (and 1 mixed) or 1 pure Nash equilibrium;
(2) the other possibilities are:
  (a) 2 pure Nash equilibrium outcomes $\{aa, dd\}$ if (a, bd, c);
  (b) 2 pure Nash equilibrium outcomes $\{bc, cb\}$ if (b, ac, d);
  (c) 1 pure Nash $\{aa\}$ if (a, b, c, d);
  (d) 1 pure Nash $\{d, d\}$ if (b, a, d, c).

We consider each case in turn. An alternative way to proceed would consider all six possible linear orders among a, b, c, d which complete $a \geq d$ and $b \geq c$; we consider the approach followed here more appealing to intuition.

(1) Two equal outcome Nash: $\{aa, dd\}$. Clearly $a > b$ and $d > c$. Note that $b + c < 2a$, because $a > b$ and $a > d > c$. An example is the *Stag Hunt game*. A natural equilibrium outcome of the repeated game has the (efficient and equal payoff) outcome aa in every round, supported by the natural threat of switching to the stage Nash payoff outcome dd forever; this is an equilibrium for any δ;
(2) Two different outcome Nash: $\{bc, cb\}$. Clearly $a < b$ and $d < c$; two cases are then possible
  (a) $b + c > 2a$. An example is the *Battle of the Sexes game*. A natural equilibrium outcome of the repeated game is the alternation between bc and cb, supported by threat of reverting to the stage Nash payoff outcome cb forever if player 1 deviates to the outcome dd when the outcome cb is to be played; this is an equilibrium for all δ, since $c > d$. The payoffs are $\frac{b+\delta c}{1+\delta}, \frac{c+\delta b}{1+\delta}$ if the outcome in the first round is bc; given that $b \geq c$ then the player who gets b first has a higher payoff; the difference is $\frac{1-\delta}{1+\delta}(b - c)$.

(b) $b + c < 2a$. An example is the *Battle of the Sexes with a Compromise.* An efficient outcome has aa in every round, and this is an equilibrium if $\delta \geq \frac{b-a}{b-c}$ under the threat of switching to the stage Nash payoff outcome cb forever if player 1 deviates, and to bc if player 2 deviates. The classic *Hawk-Dove* game occurs when $b + c = 2a$.

(3) One equal outcome Nash, $\{aa\}$. Clearly $a > b$ and $c > d$, thus since $b \geq c$ we have the linear order (a, b, c, d). Then the equal payoff outcome aa in every round is also a natural Nash equilibrium outcome of the repeated game

(4) One equal outcome Nash, $\{dd\}$. Clearly $b > a > d > c$;

(a) $b+c \leq 2a$. An example is the *Prisoner's Dilemma game.* The aa payoff outcome in every round is an equilibrium under the threat of switching to the stage Nash payoff outcome dd if $\delta \geq \frac{b-a}{b-d}$; this equilibrium is also efficient.

(b) $b+c > 2a$. Again, an example is the *Prisoner's Dilemma* (but with the violation of the usual condition $b + c \leq 2a$); in this case the alternation between the outcomes bc and cb is an equilibrium under the threat of switching to the stage Nash payoff outcome dd if $\delta \geq \frac{d-c}{b-d}$.

Appendix B. Methodological Issues and Related Literature

Earlier related literature (Camerer, Ho, and Chong, 2002; Hyndman et al., 2012) has shown that some subjects in a laboratory setting tend to act with the aim of disciplining the others, and so, it is plausible to link this behavior with intelligence levels. At the same time, it is also plausible to imagine that more intelligent subjects might exploit their cognitive advantage to extract surplus from less intelligent players, rather than trying to coordinate on more efficient equilibria. For this reason we also run a series of sessions where subjects are not separated by any specific characteristic, and we compare the results with the outcomes in settings where subjects are separated by different characteristics. Our results support the first hypothesis that less intelligent subjects seem to benefit from more intelligent participants by learning to play more efficiently.

Earlier experimental work provides some support for some of the hypotheses we test here. Jones (2008) studies the cooperation rates in experiments on repeated Prisoner's Dilemma (PD) games conducted at different universities by analyzing the differences that emerge according to the average SAT score of participating universities at that time. He finds that the cooperation rate increases by 5 to 8 percent for every 100 points in the SAT score. Of course, the evidence is indirect: students at those universities differed on a large variety of characteristics, and each of them could have been used as the variable of interest in the correlation. Furthermore this analysis can provide only limited insights on the mechanism linking intelligence and strategic behavior. However, such evidence is broadly consistent with the findings we present here.

To the best of our knowledge, we are the first to analyze the effect of group intelligence on the level of cooperation in a setting with repeated interactions. There are, however, several strands of literature analyzing the effect of *individual* heterogeneity on strategic behavior.

The literature emphasizes how subjects' heterogeneity in terms of different degrees of sophistication determines whether the strategies adopted are more or less rational (e.g. Nagel, 1995; Stahl and Wilson, 1995; Costa-Gomes, Crawford, and Broseta, 2001; Costa-Gomes and Crawford, 2006; Agranov et al., 2012; Alaoui and Penta, 2015). Our findings are consistent with this literature, but the results also go a step further by showing that intelligence plays a role in the selection of different Nash equilibria.

Kagel and McGee (2014) investigate the role personality plays in finitely repeated PD games, and find that in the first stage of a supergame, cooperative behavior is significantly related to Agreeableness. We find a similar effect in the first period of our experimental sessions, where agents play a series of infinitely repeated PD, but in our experiment this effect vanishes with experience. The effect of risk aversion in an infinitely repeated setting is ambiguous. We – along with Dreber, Fudenberg, and Rand (2014) and Davis, Ivanov, and Korenok (2016) – find no systematically significant effect of risk aversion on the cooperation rates. By contrast, Sabater-Grande and Georgantzis (2002) show that when individuals are grouped according to risk aversion, the effect on cooperation is negative. Our results shed perhaps some light on this apparent contradiction: the *Cautiousness* facet of Conscientiousness, like risk aversion, has a negative effect on cooperation only in the treatment where individuals are more homogeneous along this dimension.

Further to studies of games of cooperation, the experimental literature also extends to various studies of coordination games. Such studies have highlighted how difficult it is to achieve coordination in Battle of Sexes games given the prevalence of coordination failures (e.g. Cooper et al., 1993; Straub, 1995). As expected, pre-play communication can be very helpful in reducing coordination failure as shown by Cooper et al. (1989) in the case of Battle of Sexes and Cooper et al. (1992) for Stag-Hunt. Battalio, Samuelson, and Van Huyck (2001) find that the 'optimisation premium' entailed in the different Stag-Hunt games they implement is what determines whether the risk dominant or the payoff dominant action is played more often. When considering repeated Battle of Sexes games, earlier studies have also documented alternation across actions to maximise social surplus (Rapoport, Guyer, and Gordon, 1976; Arifovic, McKelvey, and Pevnitskaya, 2006).

Our analysis shows that intelligence is the only trait that can affect cooperation in the long run, and only in games with a conflict between short- and long-run gains: this is consistent with the view that individuals in infinitely repeated interactions are motivated primarily by strategic, payment-maximizing considerations.[2]

Appendix C. Historical Record of Hypotheses

The game we used in the initial sessions was the PD, for high and low discount. The choice was motivated by the intrinsic interest of the game (it is the natural test for hypotheses on cooperation). The repeated PD is also the first game to be studied and well understood in the experimental analysis of repeated games.

[2] Dal Bó and Fréchette (2016) survey experimental results in infinitely repeated games.

The hypothesis 2.3 was formulated on the basis of the analysis of behavior of subjects in the repeated *PD*; this analysis is as presented here, revealing that subjects in the lower Intelligence sessions were less likely to implement consistently the equilibrium strategy. The game *BoSC* was identified, on the basis of the analysis presented in section 2.2 and appendix A, as we searched for a game which satisfied two requirements: (1) having (just like the *PD*) a meaningful tradeoff between gain in current payoffs and loss on continuation value at the natural equilibrium; and (2) being qualitatively different from *PD*, to provide an independent test of the hypothesis. The analysis shows that *BoSC* and *PD* are the only interesting games in our class with this property.

A test based on *BoS* and *SH* was the other natural test of hypothesis 2.3, in its second part, since the games have no tradeoff at the natural equilibrium. Hypothesis 2.2 was natural given the higher complexity of the proposed alternating equilibrium in *BoS*.

Appendix D. Experimental Design Details and Implementation

D.1. **Stage Games Payoffs.** Tables A.1 to A.3 report the stage games. Payoffs are in experimental units: see appendix D for the conversion to monetary payoff.

Table A.1. **Prisoner's Dilemma.** C: Cooperate, D: Defect.

	C	D
C	48,48	12,50
D	50,12	25,25

Table A.2. **Battle of the Sexes.** B: Best-outcome action; W: Worst-outcome action.

	W	B
B	48,25	0,0
W	0,0	25,48

Table A.3. **Stag Hunt.** S: Stag, H: Hare.

	S	H
S	48,48	0,25
H	25, 0	25,25

TABLE A.4. **Battle of the Sexes with Compromise.** B: Best-outcome (for the player) action; W: Worst-outcome action; the compromise is (W, W).

	W	B
B	52,12	10,10
W	48, 48	12,52

D.2. **List of Treatments.** The different treatments administered were:

(1) Prisoner's Dilemma *PD*, High Continuation Probability, $\delta = 0.75$, IQ-split
(2) *PD*, Low Continuation Probability, $\delta = 0.5$, IQ-split
(3) Battle of Sexes with Compromise *BoSC* (with $\delta = 0.75$), IQ-split
(4) Battle of Sexes *BoS* (with $\delta = 0.75$), IQ-split
(5) Stag-Hunt *SH* (with $\delta = 0.75$), IQ-split
(6) *PD* (with $\delta = 0.75$), Combined
(7) *PD* (with $\delta = 0.75$), Conscientiousness Split, C-split
(8) *PD* (with $\delta = 0.75$), Agreeableness Split, A-split

The software used for the entire experiment was *Z-Tree.*Fischbacher (2007)

D.3. **High & Low Continuation Probability PD IQ-split.**

Day One. The Raven test

On the first day of the experiment, the participants were asked to complete a Raven Advanced Progressive Matrices (APM) test of 30 tables. They had a maximum of 30 seconds for each table. Before the test, the subjects were shown a table with an example of a matrix with the correct answer provided below for 45 seconds. For each item a 3×3 matrix of images was displayed on the subjects' screen; the image in the bottom right corner was missing. The subjects were then asked to complete the pattern choosing one out of 8 possible choices presented on the screen. The 30 tables were presented in order of progressive difficulty and were selected from Set II of the APM.

The Raven test is a non-verbal test commonly used to measure reasoning ability and general intelligence. Matrices from Set II of the APM are appropriate for adults and adolescents of higher average intelligence. The test is able to elicit stable and sizeable differences in performances among this pool of individuals. The correlation between Raven test scores and measures of intellectual achievement suggests that the underlying processes may be general rather than specific to this one test (Carpenter, Just, and Shell, 1990). In the economic literature, individuals with higher Raven scores feature a learning process closer to Bayesian updating (Charness, Rustichini, and van de Ven, 2011) and have more accurate beliefs (Burks et al., 2009).

Subjects are not normally rewarded for the Raven test. However it has been reported that there is a small increase in Raven scores after a monetary reward is offered to higher than average intelligence subjects similar to the subjects in our pool (e.g. Larson, Saccuzzo, and Brown, 1994). Since we wanted to measure intelligence with minimum confounding with motivation, we decided to reward our subjects with 1 British pound per correct answer from a random choice of three out of the total of 30 matrices. Always with the aim of minimising confounding with other factors, we never mentioned that Raven is a test of intelligence or cognitive abilities and the subjects were never informed that they would be separated on the basis of their performances in this test. We argue below by analysing the distribution of the subjects' characteristics in the two Raven sessions, that confounding is unlikely to be a concern in our experiment and the Raven test allowed the two groups to be separated uniquely according to the subjects' level of cognitive ability.

Other tests and questions

Following the Raven test, the participants were asked to respond to a Holt-Laury task (Holt and Laury, 2002), measuring risk attitudes. The first two experimental sessions of the high delta treatment did not include the Holt-Laury task, while also the first two sessions of the low delta treatment did not either. The participants were paid according to a randomly chosen lottery out of their choices.

Lastly, on the first day participants were asked to respond to a standard Big Five personality questionnaire together with some demographic questions, a subjective well-being question and a question on previous experience with a Raven's test. No monetary payment was offered for this section of the session. The subjects were informed of this fact. We used the Big Five Inventory (BFI); the inventory is based on 44 questions with answers coded on a Likert scale. The version we used was developed by John, Donahue, and Kentle (1991) and has been recently investigated by John, Naumann, and Soto (2008).

All the instructions given on the first day are included in the Experimental Documents.[3]

Day Two. On the second day, the participants were asked to come back to the lab and they were allocated to two separate experimental sessions according to their Raven scores: subjects with a score higher than the median were gathered in one

[3]This is available online at `https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxwcm90b3Jlc2VhcmNofGd4OjE0YTU4MjcxMzliNDI1OGQ`

session, and the remaining subjects in the other. We will refer to the two sessions as *high-IQ* and *low-IQ* sessions.[4] The task they were asked to perform was to play an induced infinitely repeated Prisoner's Dilemma (PD) game. Participants played the game used by DBF, who found convergence of full cooperation after the game was repeated for a sufficient number of times in every repetition of the same experiment (see DBF p. 419, figure 1, bottom right-hand diagram).

Following standard practice in the experimental literature, we induced an infinitely repeated game in the laboratory using a random continuation rule: after each round the computer decided whether to finish the repeated game or to have an additional round depending on the realization of a random number. The continuation probability used in the high continuation probability treatment was $\delta = 0.75$. The stage game used was the PD game in table A.1. The parameters used are identical to the ones used by DBF. They argue that the payoffs and continuation probability chosen (i.e. $\delta = 0.75$) entail an infinitely repeated prisoner's dilemma game where the cooperation equilibrium is both subgame perfect and risk dominant.[5] The low continuation probability treatment that was administered was identical to what has so far been explained with the only difference being that we used a lower continuation probability. Specifically, we used $\delta = 0.5$ which again according to DBF entails an infinitely repeated prisoner's dilemma game where the cooperation equilibrium is both subgame perfect and risk dominant. Note that in their experiment, not all repetitions resulted in convergence of full cooperation (see DBF p. 419, figure 1, bottom middle diagram).

Within each session, participants were randomly and anonymously matched with someone in the lab. They play as partners for as long as the random continuation rule determines that the particular partnership is to continue. Once each match was terminated, the subjects were again randomly and anonymously matched and started playing the game again according to the respective continuation probability for each of the treatments. Each decision round for the game was terminated when every participant had made their decision. After all participants made their decisions, a screen appeared that reminded them of their own decision, indicated their partner's decision while also indicated the units they earned for that particular round.

[4]The attrition rate was small, and is documented in tables A.5 and A.6 for the high and low continuation probability treatments respectively.

[5]The subgame perfect equilibrium set of subgame perfect equilibria are calculated as in Stahl (1991) and assuming risk neutrality. The risk dominant strategy is calculated using a simplified version of the game assuming only two possible strategies following Blonski and Spagnolo (2015). See DBF, p. 415 for more details

The payoffs in table A.1 are in experimental units; the exchange rate applied to the payoff table was 0.004 British pounds per unit. This exchange rate was calculated in order to equalise the payoff matrix with the monetary units used in the DBF experiment. The participants were paid the full sum of points they earned through all the repetitions of the game. The first 4 sessions of the high continuation probability treatment, were stopped once 30 minutes had passed and the last repeated game was concluded. For the last 4 sessions, 45 minutes were allowed to pass instead. The first 2 sessions of the low continuation probability treatment were stopped after 30 minutes had passed, while again the last 6 sessions of the low continuation probability were longer as 45 minutes were allowed to pass.

The subjects in the high-IQ and low-IQ sessions played exactly the same game. The only difference was the composition of each group, as for the high-IQ sessions the subjects had higher Raven scores compared to those in the low-IQ sessions.

Upon completing the PD game, the participants were asked to respond to a short questionnaire about any knowledge they had of the PD game. Additionally, in sessions 5-8 of the high continuation probability treatment and sessions 4-8 of the low continuation probability treatment, the subjects were asked questions about their attitudes to cooperative behaviour and some strategy-eliciting questions.

Implementation. We conducted a total of 8 sessions for the high continuation probability treatment; four-high IQ and four low-IQ sessions. There were a total of 130 participants, with 66 in the high-IQ and 64 in the low-IQ sessions. The low continuation probability treatment was conducted in 8 sessions with 110 subjects: 54 in the high- and 56 in the low-IQ sessions.

The first two sessions of the high continuation probability treatment and first continuation probability of the low delta treatment contained some economics students. The rest of the sessions did not. The recruitment ensured that the participants were part of a wide variety of degree courses from across the university student population which were evenly split across raven sessions.Some examples of the participants' degree courses are: Accounting & Finance, Business, Film Studies, Physics, Psychology (see tables A.12 and A.13 for the full list for high continuation probability and low continuation probability treatments respectively). Overall, the participants didn't know each other and they were from many different courses hence meaning they could not infer the abilities of others in their session before entry into the lab. The recruitment letter circulated is in the supplementary material. The dates of the sessions and the number of participants per session, are presented in tables A.5 and A.6.

As already noted at the beginning of this section, to allocate participants in the two IQ sessions for Day Two they were first ranked according to their Raven score. Subsequently, the participants were split into two groups. In cases where there were participants with equal scores at the cutoff, two tie rules were used based on whether they reported previous experience of the Raven task and high school grades. Participants who had done the task before[6] (and were tied with others who had not) were allocated to the low-IQ session, while if there were still ties, participants with higher high school grades were put in the high session.

Table A.34 summarises the statistics about the Raven scores for each session in the high continuation probability treatment and table A.35 for the low continuation probability treatment. In the high continuation probability treatment, for all but sessions 3 and 4 the cutoff Raven score was 18. In sessions 3 and 4 the cutoff was 16 because the participants in these sessions scored lower on average than the rest of the participants in all the other sessions (mean Raven score for sessions 3 and 4: 15.69, while the mean Raven score for all sessions: 17.95). The top row of figure A.2 presents the total distribution of the Raven scores and the distributions in the separate IQ sessions for the high continuation probability sessions (tables A.41 and A.42 present a description of the main data in the low- and high-IQ sessions respectively, and table A.54 shows the correlations among individual characteristics). The second row of figure A.2 presents the total distribution of the Raven scores and the distributions in the separate IQ sessions for the low continuation probability sessions (tables A.43 and A.44 present a description of the main data in the low- and high-IQ sessions respectively, and table A.55 shows the correlations among individual characteristics).

Tables A.61 and A.62 show that the samples in the high- and low-IQ sessions have similar characteristics for the high and low continuation probability treatments respectively. Only the differences in Raven scores are statistically different at the 5 percent confidence level. Overall we can say that the subjects in the high- and low-IQ sessions differ only in their intelligence. The two groups are similar in terms of personality. In particular, there is no difference in the conscientiousness score.[7]

[6]Specifically, participants were asked on whether they had completed a similar pattern game in the past. Out of 130 participants in the high continuation probability treatment 60 stated previous experience, while 67 out of the 110 participants in the low continuation probability treatment also did.

[7]This is true even when we consider a non parametric test. The Kolmogorov-Smirnov test for equality of distribution functions cannot reject the hypothesis that the distribution of Conscientiousness is the same in the two groups with a $p - value = 0.985$ for high continuation probability and a $p - value = 0.751$ for low continuation probability.

This lends support to the fact that motivation had a negligible effect on the Raven scores, as is reasonable for subjects with higher than average cognitive ability. If this were not true, subjects with low level of Conscientiousness would disproportionately belong to the low-IQ sessions.[8]

A similar argument applies to the possibility that anxiety to perform well in the Raven test might have affected the performance of some subjects; if this were true more neurotic subjects should have performed worse.[9] From tables A.61 and A.62 we can observe that the average level of neuroticism in the two groups is not statistically different.[10]

We also pay attention to the culture composition of the two raven groups across the two treatments. To do this, we group countries using the ten societal clusters identified by GLOBE.[11] By looking at the bottom panel of table A.61 we can notice that there is no statistical difference in the representation of the different culture groupings across IQ groups. This should make it clear that any results could not be driven by differences in culture across the IQ groups. Looking at the bottom panel of table A.62 instead, we can notice that once again there are no significant differences across the IQ groups other than for the grouping of Sub-Saharan Africa. For this grouping though, we have very few instances in comparison to the whole sample of the low continuation probability treatment (only 4 out of the total of 110 participants), hence making it very unlikely that these few observations could be explaining any differences of behaviour across the IQ groups.

A detailed timeline of the experiment is presented further down this section of the appendix and all the instructions and any other pertinent documents are available online in the supplementary material.[12]

D.4. **Battle of Sexes with Compromise (BoSC) IQ-split.** This treatment was identical to the high continuation probability PD IQ-split treatment with the only

[8]Conscientiousness is usually defined as: *"The degree to which a person is willing to comply with conventional rules, norms, and standards.* The trait is usually measured by survey questions, some of them explicitly asking subjects to report reliability and care in work. The entire questionnaire is in the supplementary material.

[9]Neuroticism is associated with anxiety and fear of failing. Some of the statements contributing to the neuroticism score are: Is relaxed; handles stress well (R); Can be tense; Worries a lot; Remains calm in tense situations (R); Gets nervous easily.

[10]The Kolmogorov-Smirnov test for equality of distribution functions cannot reject the hypothesis that the distribution of neuroticism is the same in the two groups with a $p-value = 0.832$ for high continuation probability and $p-value = 0.473$ for low continuation probability.

[11]GLOBE is the acronym for Global Leadership and Organizational Behavior Effectiveness. This is a cross-cultural research effort in understanding leadership worldwide. We borrow the societal clusters they identify to group our participants in cultural backgrounds.

[12]See note 2

difference being that the stage game that was played during the second day part was the BoSC game (see table A.4) instead of PD.

Implementation. We conducted a total of 8 sessions for the BoSC treatment with a total of 104 participants. The dates of the sessions and the number of participants per session, are presented in table A.10.[13]

Table A.39 summarises the statistics about the Raven scores for each session. Figure A.4 presents the distribution of the raven scores (tables A.50 and A.51 present a description of the main data in different separated sessions and table A.59 show the correlations among individual characteristics).[14]

Table A.66 contrasts the main characteristics of the participants across high- and low-IQ sessions. Overall, we can say that the two pairs of sessions are very similar in all characteristics and have a very similar representation of the different culture groupings as seen in the bottom panel of table A.66. The apparent significant difference on the Conscientiousness trait is controlled for in the statistical analysis of the data.

D.5. **Battle of Sexes (BoS) & Stag-Hunt (SH) IQ-split.** This treatment was identical to the high continuation probability PD IQ-split treatment with the only difference being that the stage games that was played during the second day part were BoS (see table A.2) and SH (see table A.3) instead of PD. Because in this treatment participants played two different games within the same time as other treatments this meant they only played 30 minutes of each game. We reverse the order by which the games were administered across sessions and we highlight which came first in table A.11. The order of play had no effect on decisions.

Implementation. We conducted a total of 8 sessions for the BoS & SH treatment with a total of 102 participants. Some of the sessions were ran at the University of Minnesota, the dates of the sessions, the number of participants per session and location are listed in table A.11.[15] In the sessions that were ran at the University of Minnesota we were not able to restrict recruitment to students that had not studied game theory or who were economists. Despite this, the resulting behavior across sessions ran in Minnesota and those ran in Warwick was qualitatively similar.

Table A.40 summarises the statistics about the Raven scores for each session. Figure A.5 presents the distribution of the Raven scores (tables A.52 and A.53

[13]See table A.17 for the full list of degree courses that the participants were under.

[14]In the interest of completeness, when asked, 71 out of the 104 participants declared previous experience with the pattern game.

[15]See table A.18 for the full list of degree courses that the participants were under.

present a description of the main data in different separated sessions and table A.60 show the correlations among individual characteristics).[16]

Table A.67 contrasts the main characteristics of the participants across high- and low-IQ sessions. Overall, we can say that the two pairs of sessions are very similar in all characteristics and have a very similar representation of the different culture groupings as seen in the bottom panel of table A.66.

D.6. **PD IQ Combined.** This treatment was identical to the high continuation probability PD IQ-split treatment with only the way the participants were allocated into sessions for the second day differing. For this treatment, we made sure to create groups of similar raven scores. To allocate participants to second day sessions, we ranked them by their raven scores and split by median. Instead of having high- and low-IQ groups though, we alternated in allocating participants in one session or the other hence making sure that the raven scores across sessions were similar.

Upon completion of the infinitely repeated PD game during the second day part, we also asked the participants for this treatment to complete a monetary incentivised one-shot dictator game to measure other-regarding preferences as well as a non-monetary incentivised decoding task to measure intrinsic motivation. The decoding task is similar to the one used by Charness, Masclet, and Villeval (2013). Participants were asked to decode sets of letters into numbers from a code key that is displayed on their screen. After every entry the code key was updated and a new letter was asked to be decoded. Since this task was not monetary incentivised and it is a real effort task, we argue that the number of correctly decoded entries gives an index of intrinsic motivation.

Implementation. We conducted a total of 8 sessions for the combined treatment with a total of 110 participants. The dates of the sessions and the number of participants per session, are presented in table A.7.[17]

Table A.36 summarises the statistics of the Raven scores for each session in the combined treatment. The bottom row of figure A.2 presents the total distribution of the Raven scores and the distributions in comparison across all odd numbered and even numbered sessions for the combined treatment (table A.45 presents a description of the main data across the sessions, and table A.56 shows the correlations among individual characteristics).

[16]In the interest of completeness, when asked, 33 out of the 102 participants declared previous experience with the pattern game.

[17]See table A.14 for the full list of degree courses that the participants were under.

Table A.63 contrasts the main characteristics of the participants across odd and even numbered sessions of the combined treatment. Overall, we can say that the two pairs of sessions are very similar in all characteristics and have a very similar representation of the different culture groupings as seen in the bottom panel of table A.63.

D.7. **PD A-split & C-split.** The two personality split treatments were identical in tasks and order as the high continuation probability PD IQ-split treatment. The only difference was that the allocation to separate sessions for day two was done according to personality traits rather than Raven scores. In order to obtain a more precise measure of each of the two traits we separated sessions by (Agreeableness and Conscientiousness) for each of the respective treatments we appended within the personality questionnaire additional 24 questions for the trait in question that we borrowed from Johnson (2014) 120-item IPIP NEO-PI-R.[18]

Implementation. We conducted a total of 8 sessions for each of the A-split and C-split treatments with a total of 114 participants for the A-split sessions and 122 participants for the C-split sessions. The dates of the sessions and the number of participants per session, are presented in table A.8 for the A-split treatment and in table A.9 for the C-split treatment.[19]

To allocate participants to the different personality sessions we ranked them according their long personality scores (i.e. using the longer question versions of each trait score - as measured by the appended 24 questions (see above)). In cases where there were ties we allocated participants according the shorter type personality scores of the respective trait that was being treated. Table A.37 summarises the statistics about the Agreeableness scores for each session of the A-split treatment and table A.38 summarises the statistics about the Conscientiousness scores for each session of the C-split treatment. The top row of figure A.3 presents the distributions of the Agreeableness scores in the A-split treatment and the bottom row the distributions of Conscientiousness scores in the C-split treatment (tables A.46 up to A.49 present a description of the main data in different separated sessions and tables A.57 and A.58 show the correlations among individual characteristics).

Table A.64 contrasts the main characteristics of the participants across high- and low-A sessions. Overall, we can say that the two pairs of sessions are very similar

[18]These additional questions were scattered around the personality questionnaire we originally had administered and is described in the section explaining the high and low continuation probability PD IQ-split treatments.

[19]See tables A.15 and A.16 for the full list of degree courses that the participants were under.

in all characteristics and have a very similar representation of the different culture groupings as seen in the bottom panel of table A.64. There is slight difference in the gender composition in the two groups for which we account for in the statistical analysis of the data. Table A.65 contrasts the main participant characteristics between the high- and low-C sessions. It's apparent that few characteristics have significant differences between the two groups. This could be due to a relationship between Conscientiousness the trait and the characteristics listed here. Nevertheless, we control for these characteristics in the statistical analysis of the data.

D.8. **Timeline of the Experiment.**

Day One.

(1) Participants were assigned a number indicating session number and specific ID number. The specific ID number corresponded to a computer terminal in the lab. For example, the participant on computer number 13 in session 4 received the number: 4.13.
(2) Participants sat at their corresponding computer terminals, which were in individual cubicles.
(3) Instructions about the Raven task were read together with an explanation on how the task would be paid.
(4) The Raven test was administered (30 matrices for 30 seconds each matrix). Three randomly chosen matrices out of 30 tables were paid at the rate of 1 GBP per correct answer.
(5) The Holt-Laury task was explained on a white board with an example, as well as the payment for the task.
(6) The Holt-Laury choice task was completed by the participants (10 lottery choices). One randomly chosen lottery out of 10 played out and paid (Subjects in sessions 1 & 2 of the high continuation probability treatment and sessions 1-2 of low continuation probability treatment did NOT have this).
(7) The questionnaire was presented and filled out by the participants.

Between Day One and Two.

(1) Allocation to *high* and *low* groups made. An email was sent out to all participants listing their allocation according to the number they received before starting Day One.

Day Two.

(1) Participants arrived and were given a new ID corresponding to the ID they received in Day One. The new ID indicated their new computer terminal number at which they were sat.
(2) The game that would be played was explained on a white-board (in the Minnesota sessions no white-board was available so the game was explained by using examples on the participants' screens), as was the way the matching between partners, the continuation probability and how the payment would be made.
(3) The infinitely repeated game was played. Each experimental unit earned corresponded to 0.004 GBP.
(4) In the combined treatment participants completed a decoding task and a one-shot dictator game.
(5) A de-briefing questionnaire was administered.
(6) Calculation of payment was made and subjects were paid accordingly.

D.9. **Dates and Details.** Tables A.5 up to A.11 below illustrate the dates and timings of each session across all treatments. In the top panels the total number of subjects that participated in Day 1 of the experiment is listed and by comparing with the corresponding 'Total Returned' column from the bottom panels it becomes apparent that there is relatively small attrition between Day 1 and Day 2. For example, for the high delta treatment, only 10 subjects out of 140 did not return on Day 2.

Table A.5. **Dates and details for High Continuation Probability PD IQ-split**

Day 1: Group Allocation

	Date	Time	Subjects
1	18/06/2013	10:00	15
2	18/06/2013	11:00	19
	Total		34
3	5/11/2013	11:00	18
4	5/11/2013	12:00	18
	Total		36
5	26/11/2013	10:00	18
6	26/11/2013	11:00	17
7	26/11/2013	12:00	18
8	26/11/2013	13:00	17
	Total		70

Day 2: Cooperation Task

	Date	Time	Subjects	Group
Session 1	20/06/2013	10:00	14	High IQ
Session 2	20/06/2013	11:30	16	Low IQ
Total Returned			30	
Session 3	7/11/2013	11:00	18	High IQ
Session 4	7/11/2013	12:30	16	Low IQ
Total Returned			34	
Session 5	27/11/2013	13:00	18	High IQ
Session 6	27/11/2013	14:30	12	Low IQ
Session 7	28/11/2013	13:00	16	High IQ
Session 8	28/11/2013	14:30	20	Low IQ
Total Returned			66	
Total Participants			130	

Table A.6. **Dates and details for Low Continuation Probability PD IQ-split**

Day 1: Group Allocation

	Date	Time	Subjects
1	11/06/2013	12:00	19
2	11/06/2013	13:00	14
	Total		33
3	25/11/2014	10:00	20
4	25/11/2014	11:00	16
	Total		36
5	23/02/2016	10:00	17
6	23/02/2016	11:00	16
	Total		33
7	03/05/2016	12:00	13
8	03/05/2016	14:00	9
9	04/05/2016	13:00	7
	Total		29

Day 2: Cooperation Task

	Date	Time	Subjects	Group
Session 1	13/06/2013	13:00	16	High IQ
Session 2	13/06/2013	14:30	14	Low IQ
Total Returned			30	
Session 3	27/11/2014	10:00	14	High IQ
Session 4	27/11/2014	11:30	14	Low IQ
Total Returned			28	
Session 5	25/02/2016	10:00	14	High IQ
Session 6	25/02/2016	11:30	14	Low IQ
Total Returned			28	
Session 7	5/05/2016	10:00	10	High IQ
Session 8	5/05/2016	11:30	14	Low IQ
Total Returned			24	
Total Participants			110	

Table A.7. **Dates and details for PD Combined**

Day 1: Group Allocation

	Date	Time	Subjects
1	29/02/2016	10:00	11
2	29/02/2016	11:30	13
	Total		24
3	1/03/2016	10:00	4
4	1/03/2016	11:30	10
5	1/03/2016	16:00	10
	Total		24
6	9/05/2016	10:00	5
7	9/05/2016	11:30	13
8	9/05/2016	16:00	3
	Total		21
9	18/05/2016	14:00	11
10	18/05/2016	15:00	3
11	18/05/2016	16:00	5
	Total		19
12	31/05/2016	10:00	3
13	31/05/2016	11:30	12
	Total		15
14	13/06/2016	15:00	11
15	13/06/2016	16:30	7
	Total		18

Day 2: Cooperation Task

	Date	Time	Subjects
Session 1	2/03/2016	14:00	10
Session 2	2/03/2016	15:30	12
	Total Returned		22
Session 3	3/03/2016	10:00	12
Session 4	3/03/2016	11:45	12
	Total Returned		24
Session 5	11/05/2016	14:00	16
	Total Returned		16
Session 6	20/05/2016	10:00	16
	Total Returned		16
Session 7	2/06/2016	11:45	16
	Total Returned		16
Session 8	15/06/2016	11:45	16
	Total Returned		16
	Total Participants		110

TABLE A.8. **Dates and details for PD A-split**

Day 1: Group Allocation

	Date	Time	Subjects
1	26/1/2016	10:00	12
2	26/1/2016	11:30	11
	Total		23
3	2/2/2016	10:00	13
4	2/2/2016	11:30	11
	Total		24
5	15/2/2016	10:00	18
6	15/2/2016	11:30	20
	Total		38
7	16/2/2016	10:00	16
8	16/2/2016	11:30	18
	Total		34

Day 2: Cooperation Task

	Date	Time	Subjects	Group
Session 1	28/1/2016	10:00	14	High A
Session 2	28/1/2016	11:30	18	Low A
Total Returned			32	
Session 3	4/2/2016	10:00	12	High A
Session 4	4/2/2016	11:30	10	Low A
Total Returned			22	
Session 5	17/2/2016	14:00	16	High A
Session 6	17/2/2016	15:30	16	Low A
Total Returned			32	
Session 7	18/2/2016	10:00	14	Low A
Session 8	18/2/2016	11:30	14	High A
Total Returned			28	
Total Participants			114	

Table A.9. **Dates and details for PD C-split**

Day 1: Group Allocation

	Date	Time	Subjects
1	20/10/2015	10:00	14
2	20/10/2015	11:00	17
3	20/10/2015	13:00	18
4	20/10/2015	14:00	17
	Total		66
5	27/10/2015	10:00	17
6	27/10/2015	11:00	16
	Total		33
7	10/11/2015	10:00	18
8	10/11/2015	11:00	18
	Total		36

Day 2: Cooperation Task

	Date	Time	Subjects	Group
Session 1	22/10/2015	10:00	14	High C
Session 2	22/10/2015	11:30	18	Low C
Session 3	22/10/2015	13:00	14	High C
Session 4	22/10/2015	14:30	12	Low C
Total Returned			58	
Session 5	29/10/2015	10:00	16	High C
Session 6	29/10/2015	11:30	16	Low C
Total Returned			32	
Session 7	12/11/2015	10:00	18	High C
Session 8	12/11/2015	11:30	14	Low C
Total Returned			32	
Total Participants			122	

TABLE A.10. **Dates and details for BoSC IQ-split**

Day 1: Group Allocation

	Date	Time	Subjects
1	23/11/2015	10:00	14
2	23/11/2015	11:30	19
	Total		33
3	30/11/2015	10:00	11
4	30/11/2015	11:30	13
5	30/11/2015	14:00	16
6	30/11/2015	15:30	15
	Total		55
7	18/1/2016	10:00	14
8	18/1/2016	11:30	12
	Total		26

Day 2: Cooperation Task

	Date	Time	Subjects	Group
Session 1	25/11/2015	14:00	14	High IQ
Session 2	25/11/2015	15:45	14	Low IQ
Total Returned			28	
Session 3	2/12/2015	10:00	12	High IQ
Session 4	2/12/2015	11:45	14	Low IQ
Session 5	2/12/2015	14:00	14	High IQ
Session 6	2/12/2015	11:45	12	Low IQ
Total Returned			52	
Session 7	20/1/2016	14:00	12	High IQ
Session 8	20/1/2016	15:45	12	Low IQ
Total Returned			24	
Total Participants			104	

Table A.11. **Dates and details for BoS & SH IQ-split**

Day 1: Group Allocation

	Date	Time	Subjects	Location
1	22/10/2014	10:15	16	Minnesota
2	22/10/2014	11:15	17	Minnesota
3	22/10/2014	12:15	15	Minnesota
4	22/10/2014	13:15	9	Minnesota
	Total		57	
5	1/12/2014	10:00	13	Warwick
6	1/12/2014	11:30	12	Warwick
7	1/12/2014	12:20	16	Warwick
8	1/12/2014	13:30	17	Warwick
	Total		58	

Day 2: Cooperation Task

	Date	Time	Subjects	Group	Order	Location
Session 1	24/10/2014	09:05	8	High IQ	SH first	Minnesota
Session 2	24/10/2014	10:35	10	Low IQ	SH first	Minnesota
Session 3	24/10/2014	12:05	16	High IQ	BoS first	Minnesota
Session 4	24/10/2014	13:35	16	Low IQ	BoS first	Minnesota
Total Returned			50			
Session 5	4/12/2014	10:00	10	High IQ	SH first	Warwick
Session 6	4/12/2014	11:30	14	Low IQ	SH first	Warwick
Session 7	4/12/2014	13:30	14	High IQ	BoS first	Warwick
Session 8	4/12/2014	15:00	14	Low IQ	BoS first	Warwick
Total Returned			52			
Total Participants			102			

Table A.12. Degree Courses of Participants in High Continuation Probability PD IQ-split

Course	Frequency	Percentage
Accounting & Finance	21	16.15
American Studies	1	0.77
Behavioural Sciences	2	1.54
Biomedical Science	1	0.77
Business	7	5.38
Chemistry	4	3.08
Economics	12	9.23
Engineering	11	8.46
English	2	1.54
Film Studies	1	0.77
Finance	1	0.77
History	1	0.77
Human Resources	3	2.31
Law	10	7.69
Literature	7	5.38
MORSE	1	0.77
Management	8	6.15
Marketing	1	0.77
Mathematics	5	3.85
PPE	1	0.77
Philosophy	3	2.31
Physics	2	1.54
Politics	3	2.31
Psychology	10	7.69
Public Policy	1	0.77
Social Studies	1	0.77
Theatre Studies	2	1.54
N/A	8	6.15
Total	130	100.00

Table A.13. Degree Courses of Participants in Low Continuation Probability PD IQ-split

Course	Frequency	Percentage
Accounting & Finance	12	10.91
Behavioural Sciences	3	2.73
Biology	2	1.82
Biomedical Science	2	1.82
Business	11	10.00
Computer Science	4	3.64
Creative and Media Enterprises	1	0.91
Economics	8	7.27
Engineering	9	8.18
English Literature	3	2.73
Finance	2	1.82
French Studies	1	0.91
History	6	5.45
Human Resources	3	2.73
Law	6	5.45
Linguistics	1	0.91
MORSE	3	2.73
Management	5	4.55
Mathematics	8	7.27
PPE	1	0.91
Philosophy	2	1.82
Physics	2	1.82
Politics	1	0.91
Project Management	1	0.91
Psychology	8	7.27
Sociology	3	2.73
N/A	2	5.00
Total	110	100.00

TABLE A.14. Degree Courses of Participants in Combined

Course	Frequency	Percentage
Accounting & Finance	11	10.00
Behavioural Sciences	1	0.91
Biology	2	1.82
Biomedical Science	5	4.55
Biotechnology	1	0.91
Business	4	3.64
Chemistry	4	3.64
Classical Civilisation	3	2.73
Comparative American Studies	1	0.91
Computer Science	1	0.91
Engineering	6	5.45
English Literature	9	8.18
Film Studies	1	0.91
Finance	3	2.73
Hispanic and French Studies	2	1.82
History	8	7.27
Human Resources	3	2.73
Law	8	7.27
Literature	1	0.91
Management	7	6.36
Marketing	2	1.82
Mathematics	4	3.64
PPE	2	1.82
Philosophy	1	0.91
Physics	6	5.45
Politics	5	4.55
Psychology	6	5.45
Sociology	1	0.91
N/A	2	1.82
Total	110	100.00

TABLE A.15. Degree Courses of Participants in A-split

Course	Frequency	Percentage
Accounting & Finance	11	9.65
Behavioural Sciences	1	0.88
Biomedical Science	2	1.75
Business	8	7.02
Chemistry	4	3.51
Computer Science	2	1.75
Creative and Media Enterprises	2	1.75
Engineering	10	8.77
English Literature	3	2.63
English and French	1	0.88
Finance	1	0.88
History	8	7.02
Human Resources	4	3.51
Law	14	12.38
Literature	1	0.88
MORSE	3	2.63
Management	5	4.39
Mathematics	8	7.02
PPE	2	1.75
Philosophy	1	0.88
Physics	3	2.63
Politics	5	4.39
Psychology	6	5.26
Sociology	2	1.75
N/A	2	1.75
Total	114	100.00

Table A.16. Degree Courses of Participants in C-split

Course	Frequency	Percentage
Accounting & Finance	44	36.07
Behavioural Sciences	4	3.28
Computer Science	2	1.64
Engineering	6	4.92
French Studies	2	1.64
History	2	1.64
Law	22	18.03
MORSE	4	3.28
Management	10	8.20
Mathematics	2	1.64
Medicine	1	0.82
PPE	1	0.82
Philosophy	1	0.82
Physics	1	0.82
Psychology	6	4.92
Sociology	1	0.82
Statistics	1	0.82
Urban Analytics and Informatics	1	0.82
N/A	7	5.74
Total	122	100.00

Table A.17. Degree Courses of Participants in BoSC IQ-split

Course	Frequency	Percentage
Accounting & Finance	16	15.38
Behavioural Sciences	1	0.96
Biochemistry	3	2.88
Business	3	2.88
CAS	1	0.96
Chemistry	1	0.96
Comparative American Studies	3	2.88
Computer Science	1	0.96
Creative Writing	1	0.96
Engineering	3	2.88
English Language Teaching	1	0.96
English Literature	2	1.92
English and French	2	1.92
Finance	2	1.92
French	2	1.92
Global Media and Communication	1	0.96
History	2	1.92
ISMI	1	0.96
Law	15	14.42
MORSE	3	2.88
Management	6	5.77
Mathematics	7	6.73
Modern Languages	3	2.88
PPE	5	4.81
Physics	3	2.88
Policy	1	0.96
Politics	2	1.92
Psychology	9	8.65
N/A	4	3.85
Total	104	100.00

Table A.18. Degree Courses of Participants in BoS and SH IQ-split

Course	Frequency	Percentage
Accounting and Finance	14	11.86
Behavioural Sciences	2	1.69
Business	12	10.17
Chemistry	2	1.69
Computer Science	6	5.08
Economics	22	18.64
Engineering	8	6.78
English	1	0.85
Finance	4	3.39
French	1	0.85
German	1	0.85
History	2	1.69
Human Resources	1	0.85
International Performance Research	1	0.85
Journalism	5	4.24
Law	5	4.24
Linguistics	1	0.85
Management	5	4.24
Marketing	4	3.39
Mathematics	5	4.24
Nutritionist	1	0.85
PPE	1	0.85
Physiology	2	1.69
Politics	1	0.85
Psychology	11	9.32
Total	118	100.00

Appendix E. Econometric Analysis

E.1. **Econometric Models.** In the experiment we will generally collect multiple data for each subjects $i \in \{1, ..., N\}$ making choices or achieving a payoff in different period $t \in \{1, ..., T_i\}$, that we aim to explain. Hence our raw data have a panel structure.

In this section, we present the 3 types of models we estimate in the following analysis.

E.1.1. *Cross Sectional Models.* In order to assess the effect of the individual characteristics on individual cooperation rates, say $\underline{ch}_i$ (or on individual average payoff), we estimate the following model

$$\underline{ch}_i = \alpha + x_i\beta + z_i\gamma_1 + d_i\gamma_2 + \epsilon_i \tag{A-1}$$

where x_i represents is the set of individual characteristics: IQ, personality traits, sex and age; z_i is session fixed effect, i.e. the set of dummy variables indicating the session the individual belongs to; d_i is a set of dummy variables or the culture according to the GLOBE clustering mentioned above; finally ϵ_i represent the error term. Finally note that in some cases we estimate the determinant of $ch_{i,t}$ in period 1, in that case we use a logit model with the same structure in terms of variables of the OLS model presented in A-1.

E.1.2. *Panel models to assess the effect of individual characteristics and trends on choices.* The panel structure of the data allows a more precise control of the effect of the sessions' environment, hence a more precise estimation of the individual characteristics. The dependent variable $ch_{i,t}$ will generally represent a binary choice (e.g. Cooperate or Defect), hence we use a logit model with individual random effect to account for unexplained individual heterogeneity. We choose the logit model because it allows a clear analysis of the effect size of variables (see the discussion of odds ratios below in section E.1.4). Let $p_{i,t}$ the probability of $ch_{i,t} = 1$ conditioned on the set of independent variables, let $\Lambda(z) \equiv \frac{e^z}{1+e^z}$. We will estimate the model:

$$p_{i,t} = \Lambda(\alpha_i + x_i\beta + z_i\gamma_1 + d_i\gamma_2 + tr_i * t * \beta_1 + \beta_0 t + y_{i,t}\theta + \epsilon_{i,t}) \tag{A-2}$$

where as before x_i, z_i, d_i respectively represents is the set of individual characteristics, session and culture; t is the period, tr_i are the dummy variables representing the group of the treatment subject i belongs to (i.e. session: High or Low IQ, High-C or Low-C, High-A or Low-A, and combined, generally set as the baseline), $y_{i,t}$ represent two statistics summarising the time-variant information subjects observe from the previous periods: average supergame length until t, average partner choices from period 1 until $t-1$, and Type 2 indicating whether the player is column as opposed to row;[20] α_i is individual specific random effect taking into account the time invariant individual unexplained characteristics; finally $\epsilon_{i,t}$ represent the error terms. Only data from first rounds of each supergame will be employed to estimate model A-2, so that the effect of partner actions do not affect the choice $ch_{i,t}$. The standard errors are calculated by clustering the errors at the individual levels.

E.1.3. *Panel models to assess the effect of partners' choices on subjects' choices.* The dependent variable is $ch_{i,t}$ as before, and we use a logit model with the individual fixed-effect to account for individual heterogeneity exactly like before. We then estimate the model

$$p_{i,t} = \tag{A-3}$$

$$\Lambda(\alpha_i + \eta_0 Partn.Ch_{i,t-1} + Partn.Ch_{i,t-1} * x_i * \eta_1 + Partn.Ch_{i,t-1} * z_i * \eta_2 + y_{i,t}\theta + \epsilon_{i,t});$$

where $Partn.Ch_{i,t-1}$ is the partner choice at time t-1. Like in the model A-2, x_i represents is the set of individual characteristics; z_i is the set of the characteristics of the session the subject i is located; $y_{i,t}$ represent two statistics summarising the time-variant information subjects observe from the previous periods: average supergame length until t, and average partner choices from period 1 until $t-2$; α_i is the time-invariant individual fixed-effect (taking into account time-invariant characteristics of both individuals and sessions); finally $\epsilon_{i,t}$ represent the error terms. In order to isolate the effect of the partner choices from the subjects' previous choices, only data from second rounds of each supergame will be employed to estimate model A-3.

Finally, the estimates of models A-2 and A-3 will always be presented in terms of odd ratio as it is explained in the next section.

E.1.4. *Odds Ratios Coefficients in the Logit Estimations.* The conditional logit model eliminates individuals-specific effects in the models A-2 and A-3. It is in fact well known that since the logit model is non linear, when we compute the derivative of the probability of a choice with respect to an independent variable, the value of the individual effects are still an argument of the probability. We could of course assume away the difficulty by assuming that the individual effects are equal to zero, and thus estimate the marginal effects, but this would be at the cost of assuming away any unobserved heterogeneity.

[20] This only for *BoS* and *BoSC* games, where there is a difference between column and row, in the other games players see the same matrix.

A way to solve this problem is the use of Odds ratios. For expositional simplicity, we omit the subscript i,t. We recall that given two vectors of independent variables, x^0 and x^1, if we denote by $p(x^y)$ the probability of the outcome y, then the odd is the ratio of the probability of the event and its complement:

$$O(x^y) \equiv \frac{p(x^y)}{1-p(x^y)}, y = 0, 1 \tag{A-4}$$

and the odds ratios is the ratio of the two odds, namely:

$$OR(x^0, x^1) \equiv \frac{\frac{p(x^0)}{1-p(x^0)}}{\frac{p(x^1)}{1-p(x^1)}} \tag{A-5}$$

so a value of $OR(x^0, x^1)$ equal to 1 indicates that the change of the independent variable from x^0 to x^1 induces no change on the odds, and hence no change on the value of $p(x)$.

For sake of simplicity, assume that the probability follows the logit model

$$p(x_i^y) = \frac{e^{\alpha_i + x_i\beta + z_i\delta + z_i x_i \gamma_1}}{1 + e^{\alpha_i + x_i\beta + z_i\delta + z_i x_i \gamma_1}} \tag{A-6}$$

where α_i is the value of the individual effect for subject i, then

$$OR(x^0, x^1) = e^{(x^0 - x^1)\beta + z_i(x^0 - x^1)\gamma_1} \tag{A-7}$$

First of all, equation A-7 clearly indicates that the odds ratios are independent of the fixed effects (both unobserved, u_i and observed, z_i, which cancel when we take the odds ratios). Furthermore, Equation A-7 has a relatively easy interpretation: for example, when the coefficients of β and γ are positive, then an increase in the value of x_i induces an increase of size $e^{(x^0-x^1)\beta}e^{z_i(x^0-x^1)\gamma_1}$ of the odds ratios. The term $e^{(x^0-x^1)\beta}$ is the direct effect of the x variables independent of the values of z_i, while $e^{z_i(x^0-x^1)\gamma_1}$ is the effect proportional to the value of z_i. Finally, note that we said that in equations A-2 and A-3 we sometimes add a term with a triple interaction, if we add a triple interacted term, say $z_i x_i' x_i \gamma_2$ in model A-6; then an increase in the value of x_i induces an increase of size $e^{(x^0-x^1)\beta}e^{z_i(x^0-x^1)\gamma_1}e^{z_i x_i'(x^0-x^1)\gamma_2}$ of the odds ratios, with the same interpretation as before.

E.2. **Regression Analysis.**

E.2.1. *Effect of individual intelligence on cooperation and compromise.* Tables A.19, A.21 and A.25 estimate the effect of individual IQ, and show that the effect of intelligence is not due to observable confounding factors at the individual levels and/or environmental factors at the session levels (observable or not). In table A.19

we use a version of model A-1 to estimate the effect of IQ on cooperation rates and payoffs by controlling for personality, gender, age and performance in a decoding task that we consider to be an index of motivation.[21] Crucially, we include session fixed effects, which allows us to separate in aggregate the effect of IQ from the effect of the sessions' environment, such as the interaction with individuals with similar intelligence.[22] Column 1 of table A.21 that estimates a version of the model A-3 leads to similar conclusions.

Table A.25 reports the same analysis, using model A-3, for the *BoSC*.[23] Intelligence has a highly significant effect on rates of compromise, and no other trait has a significant effect. As we noted, corresponding to a higher frequency of compromise, subjects of higher intelligence have a lower frequency of the outcomes (B, W) or (W, B) (see column 2 of table A.25).

Furthermore, from table A.19, we note that payoffs are on average increasing in IQ. This effect is significant and large: between 4 and 6 experimental units for the *PD*. The relevant comparison, since these are averages per period, is with the stage game payoffs in table A.1. These are gains per unit of time (rounds) and, on top of that, we control for experience by introducing session fixed effects in the *PD* regressions, so they can reasonably be considered independent of the faster decision time of subjects in the high-IQ groups. No other individual characteristic is systematically significant. Table A.19 also shows that for *PD* the cooperation rate increases between 30-35 percent depending on the specific model. Agreeableness is significant in some regressions in the *PD*, and, as we will explain later, the sign is the expected one. The coefficients of all other individual traits are not statistically significant, and this is also true for the *BoSC* (in table A.25).

E.2.2. *Analysis of the cooperative trends in the different groups.* As subjects play repeated games with different partners, their initial choices may change. We examine how the difference in cooperation and compromise rates between the two groups develop, taking as benchmark the first-round choice of a player, who, by definition, is facing a new partner, and, hence, cannot draw on a history of play. The estimated

[21]See Appendix D.6 where we explain the task and argue for it being an index of motivation.

[22] To increase the power of our estimation, in these regressions we include all data concerning the *PD*. Hence, we also use the low continuation probability treatment data, and the personality split treatments that will be illustrated below.

[23]An important difference between table A.21 and table A.25 is that in table A.25 we do not include session fixed effects. The reason is that, since we did not have a *BoSC* combined treatment, the sessions' dummies will explain an important portion of the variance otherwise explained by the coefficient of IQ; given this high level of collinearity between these coefficients the estimation would be unreliable. For the same reason we we did not estimate model A-1 for the *BoSC*.

odds ratios in column 2 and 3 of table A.21 (where we estimate some specification of model A-2) show that players in high-IQ groups are increasingly more likely to open with a cooperative choice (coefficient of the interaction *High-IQ*Period*) if compared with the benchmark represented by the combined sessions. This trend in the low-IQ session is smaller, although not significantly different from the trend in the combined sessions. The C-split treatment has a significant impact on the trend, as we will discuss below. Considering the trend of compromise outcomes *BoSC* in column 3 of table A.25 (where the benchmark is the low-IQ group), we cannot detect any difference in the trends of the 1st rounds outcomes between the high- and low-IQ groups. The reason could be that in the *BoSC* the difference between high- and low- IQ groups appears faster than in the *PD* because coordination is probably more difficult in the *BoSC* than in the *PD*; we discuss the difficulty of achieving coordination more extensively in section 5.2.

E.2.3. *Analysis of the conditional cooperation in the different groups.* In tables A.22 and A.23 we use variations of model A-2 in appendix E to analyze how subjects react to partners' choices.[24] In table A.22, we note that (as we saw in figures 6a and 6d), subjects' choice at round 2 of each supergame depends on the partners' choices at 1, and this response increases with subjects' IQ (see column 1 of table A.22). The response is also increasing with time (column 2). The interaction *IQ*Partner Choice[t-1]* seems significant in the first supergame as well (column 3). In table A.23 we obtain comparable results for the *BoSC*. The likelihood of a compromise outcome at round 2 is increasing in the compromise choice at round 1, and this positive reaction is increasing with the subjects' IQ (column 1) this attitude of reciprocation among the high-IQ groups is increasing with the periods (column 2). Finally the interaction *IQ*Partner Compromise[t-1]* seems significant from the 1st supergame as well (column 3).

E.3. **Errors Model in the 4 games.** In this section we specify in more detail the model of errors in choice. In the main text we defined what is the error in the 4 different games. We test the model, and estimate its parameters, in two different ways. Let

$$Pr(Ch = x|G, t) \equiv p(G, t) \tag{A-8}$$

[24]By introducing the individual fixed effect implied that we could not cluster the errors at the individuals' level. If we run a similar regression using individual random effect with errors clustered at the individual levels would not change qualitatively the results

and we consider testing two different formulations of the general form in equation (2), where $t = (1, IQ)$, IQ denoting the IQ score of the subject. Below, λ_G and λ are two vectors, each of dimension ≥ 2, each dimension corresponding to individual characteristics of the player (for example $\lambda = (\lambda^0, \lambda^{IQ})$). We test the more general form:

$$log\left(\frac{p(G,t)}{1-p(G,t)}\right) = \lambda_G \cdot t \tag{A-9}$$

versus the more restrictive form:

$$log\left(\frac{p(G,t)}{1-p(G,t)}\right) = (\lambda \cdot t)\Delta u_G \tag{A-10}$$

The model in equation (A-9) allows the dependence on the game to occur in a general way. The model in equation (A-10) instead requires the difference between the λ for two different games to be produced by the difference in the value of the action in the two games; for example, in the simple case in which we consider just IQ as individual characteristic, the null hypothesis for model A-10 is that, for any pair of games (G, G') in our set the λ_G in equation (A-9) satisfy:

$$\lambda^0_G = \lambda^0_{G'}, \lambda^{IQ}_G = \lambda^{IQ}_{G'}. \tag{A-11}$$

We also consider the finer hypothesis that the games are grouped in two subsets ($\{PD, BoSC\}$ and $\{SH, BoS\}$) such that model A-10 holds within the subset, but not across. The more restrictive model requires that the evaluation process is independent of the specific features of the games, and only depends on the game through the difference in payoffs; the more general model allows differences more general than that, for instance through specific features like the fact that the Δc^G and Δv^G , respectively representing the current and the continuation utility have opposite sign or not. We want to test whether data reject model A-9. We rewrite model A-9 as

$$\log\left(\frac{p(G,IQ)}{1-p(G,IQ)}\right) = \lambda^0_{PD}1_{PD} + \lambda^0_{SH}1_{SH} + \lambda^0_{BoS}1_{BoS} + \lambda^0_{BoS}1_{BoSC} \tag{A-12}$$
$$+\lambda^{IQ}_{PD}1_{PD} * IQ + \lambda^{IQ}_{SH}1_{SH} * IQ + \lambda^{IQ}_{BoSC}1_{BoSC} + \lambda^{IQ}_{BoSC}1_{BoSC}$$

or

$$= \lambda^0_{PD} + (\lambda^0_{SH} - \lambda^0_{PD})1_{SH} + (\lambda^0_{BoS} - \lambda^0_{PD})1_{BoS} + (\lambda^0_{BoSC} - \lambda^0_{PD})1_{BoSC}+$$

$$+\lambda_{PD}^{IQ}*IQ+(\lambda_{SH}^{IQ}-\lambda_{PD}^{IQ})1_{SH}*IQ+(\lambda_{BoS}^{IQ}-\lambda_{PD}^{IQ})1_{BoS}*IQ+(\lambda_{BoSC}^{IQ}-\lambda_{BoSC}^{IQ})1_{BoSC}*IQ$$

We estimate the above equation using a logit model and controlling for number of individual's variables and the random fixed effect. In table A.29 we present this estimation and test the following hypothesis

$$\begin{aligned} \lambda_{SH}^{0} &= \lambda_{PD}^{0} \\ \lambda_{BoS}^{0} &= \lambda_{PD}^{0} \\ \lambda_{BoSC}^{0} &= \lambda_{PD}^{0}; \end{aligned}$$

which are not verified whenever the coefficients of the dummies indicating the different games are significant. And

$$\begin{aligned} \lambda_{SH}^{IQ} &= \lambda_{PD}^{IQ} \\ \lambda_{BoS}^{IQ} &= \lambda_{PD}^{IQ} \\ \lambda_{BoSC}^{IQ} &= \lambda_{PD}^{IQ}; \end{aligned}$$

which are not verified whenever the coefficients of the interaction between dummy indicating the different games and the IQ are significant.

E.3.1. *Estimates of Errors Model.* We now present the test of hypothesis A-11 using the estimation presented in table A.29 of the model in E.3.

From this table we note that the dummies indicating the SH and BoS are negative and significant, so (recalling that PD is the baseline game in the regression of table A.29) the first group of hypothesis of the A-11 are not verified for some games: $\lambda_{PD}^{0} > \lambda_{SH}^{0}$ and $\lambda_{PD}^{0} > \lambda_{BoS}^{0}$ (this last at the 10% confidence level) . From the interaction of these dummy variables with the IQ, we can also argue that the second group of hypothesis of A-11 are not verified for some games: $\lambda_{PD}^{IQ} > \lambda_{SH}^{IQ}$ and $\lambda_{PD}^{IQ} > \lambda_{BoS}^{IQ}$ (this last at the 10% confidence level).

On the other hand, hypothesis A-11 cannot be rejected when one compare BoSC and PD. In fact the coefficient of the dummy BoSC is non significant (implying $\lambda_{PD}^{0} = \lambda_{BoSC}^{0}$) and the coefficient of the interaction IQ*BoSC is non significant either (implying $\lambda_{PD}^{IQ} = \lambda_{BoSC}^{IQ}$). One last important group of hypothesis to test is the difference between the two games without conflict, I.e. SH and BoS. We use the result of the regression presented in table A.29 to provide a test for $\lambda^0_{SH} = \lambda^0_{BoS}$ and $\lambda^{IQ}_{SH} = \lambda^{IQ}_{BoS}$. The first hypothesis is tested by comparing the coefficient of Stag-hunt dummy with the coefficient of Battle of Sexes dummy, using a linear test the hypothesis that the two are equal cannot be rejected with $p - value = 0.5613$. Similarly, testing second hypothesis by comparing the coefficient of IQ*SH and the coefficient of IQ*BoS, we find that the hypothesis that they are equal cannot be rejected with $p - value = 0.5613$.

Appendix F. Regression Analysis

Table A.19. **PD: Effects of IQ, Personality and other characteristics on cooperation rates and payoffs.** The regressions include the data from PD (high and low δ), IQ-split, C-split, A-split and combined treatments. The dependent variable is average cooperation and average payoff across all interactions. OLS estimator; IQ, personality traits and risk aversion are normalized between 0 and 1 (see appendix E.1.1 for details). Standard errors in brackets; * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

	Cooperate		Payoff	
	All Periods	All Periods	All Periods	All Periods
	b/se	b/se	b/se	b/se
IQ	0.3112***	0.3645***	4.4152***	5.7455***
	(0.0721)	(0.1026)	(0.9244)	(1.4109)
Conscientiousness	–0.0628	0.1250	–0.4816	1.3922
	(0.0687)	(0.1186)	(0.8809)	(1.6307)
Agreeableness	0.1001	0.2211**	1.5990*	2.1377
	(0.0677)	(0.0990)	(0.8679)	(1.3620)
Openness	–0.0357	–0.0106	–0.3939	–0.7716
	(0.0676)	(0.0978)	(0.8666)	(1.3446)
Extraversion	–0.1149*	–0.0072	–1.1337	–0.7697
	(0.0645)	(0.1016)	(0.8264)	(1.3972)
Neuroticism	0.0799	0.1167	1.2741	2.0863
	(0.0660)	(0.1017)	(0.8457)	(1.3984)
Risk Aversion	–0.0439	–0.0478	0.3649	0.9585
	(0.0665)	(0.0939)	(0.8521)	(1.2917)
Female	–0.0640***	–0.0172	–0.6483**	–0.0349
	(0.0246)	(0.0374)	(0.3149)	(0.5150)
Age	–0.0014	0.0016	0.0200	0.0113
	(0.0031)	(0.0056)	(0.0403)	(0.0766)
Decoding task		0.0029		0.0022
		(0.0040)		(0.0543)
Session Fixed-Effects	Yes	Yes	Yes	Yes
Culture Fixed-Effects	Yes	Yes	Yes	Yes
r2	0.424	0.365	0.708	0.593
N	526	232	526	232

TABLE A.20. **PD: Effects of IQ, personality, other characteristics on period 1 cooperation choice and payoffs.** The regressions include the data from PD (high and low δ), IQ-split, C-split, A-split and combined treatments. Column 1: the dependent variable is the individual cooperative decision in period 1; logit estimator, with **coefficients expressed in odds ratios**. Column 2: the dependent variable is average individual payoff per period; OLS estimator. IQ, personality traits and risk aversion are normalised between 0 and 1 (see section E.1.1 of the appendix for more details). **p-values in brackets**. * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

	Cooperate (Logit) 1st Period b/p	Payoff (OLS) 1st Period b/p
IQ	2.6357	0.0183
	(0.1646)	(0.4161)
Conscientiousness	1.4551	0.0157
	(0.5684)	(0.3754)
Agreeableness	4.5194**	0.1107
	(0.0207)	(0.6337)
Openness	0.5708	44.5652
	(0.3881)	(0.4103)
Extraversion	1.6450	0.3409
	(0.4246)	(0.8066)
Neuroticism	2.8667*	4.1512
	(0.0983)	(0.7517)
Risk Aversion	0.9219	10.1637
	(0.8982)	(0.6090)
Female	0.6831	0.6010
	(0.1103)	(0.7612)
Age	1.0279	1.1504
	(0.3659)	(0.5134)
Session Fixed-Effects	Yes	Yes
Culture Fixed-Effects	Yes	Yes
r2		0.060
N	526	526

TABLE A.21. **PD with high continuation probability: Effects of IQ, personality, other characteristics and groups on the evolution of cooperative choice and payoffs.** The regressions include the data from PD (high δ), IQ-split, C-split, A-split and combined treatments. The dependent variable is the cooperative choice in the first rounds of all repeated games; logit with individual random effect estimator. IQ, personality traits and risk aversion are normalised between 0 and 1 (see appendix E.1.3 for details). **Coefficients are expressed in odds ratios $p - values$ in brackets**; Standard Errors are clustered at the individual levels; * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$.

	Cooperate 1st rounds b/p	Cooperate 1st rounds b/p	Cooperate 1st rounds b/p
High IQ Session*Period		1.02951***	1.01751*
		(0.0008)	(0.0738)
Low IQ Session*Period		0.98357*	0.99538
		(0.0553)	(0.6012)
High C Session*Period		1.00276	1.00300
		(0.5565)	(0.5292)
Low C Session*Period		1.01882***	1.01593***
		(0.0004)	(0.0035)
High A Session*Period		1.00452	
		(0.2078)	
Low A Session*Period		0.99628	
		(0.2917)	
IQ	13.57686***	28.09900***	14.20014***
	(0.0009)	(0.0001)	(0.0008)
Openness	0.68672	0.63939	0.67614
	(0.5915)	(0.5596)	(0.5835)
Conscientiousness	1.33558	1.27681	1.34176
	(0.7097)	(0.7661)	(0.7092)
Extraversion	0.31157	0.31037	0.31484
	(0.1336)	(0.1706)	(0.1435)
Agreeableness	1.23897	1.93424	1.21873
	(0.7872)	(0.4423)	(0.8062)
Neuroticism	1.90373	3.42418	2.04609
	(0.4330)	(0.1664)	(0.3896)
Risk Aversion	0.99956	1.16051	1.02977
	(0.9995)	(0.8584)	(0.9697)
Female	0.43168***	0.39212***	0.41819***
	(0.0049)	(0.0038)	(0.0041)
Age	0.98554	0.99502	0.98628
	(0.6528)	(0.8888)	(0.6735)
Period	1.00571***	1.00780***	1.00504***
	(0.0004)	(0.0005)	(0.0035)
Average Supergame Length	1.82908***	1.15511**	1.72034***
	(0.0000)	(0.0304)	(0.0000)
Av. times Partner Chose C until t-1	120.28797***		97.77058***
	(0.0000)		(0.0000)
Session Fixed-Effects	Yes	Yes	Yes
Culture Fixed-Effects	Yes	Yes	Yes
N	17972	18418	17972

TABLE A.22. **PD with high probability of continuation: Effects of IQ, personality, other characteristics and groups on conditional cooperation.** The regressions include the data from PD (high δ), IQ-split, C-split, A-split and combined treatments. Columns 1 and 2: the dependent variable is the cooperative choice in the second rounds of all repeated games; logit with individual fixed effect estimator. Columns 3: the dependent variable is the cooperative choice in the second periods; logit estimator. IQ, personality traits and risk aversion are normalised between 0 and 1 (see section E.1.3 of the appendix for more details). **Coefficients are expressed in odds ratios** $p - values$ **in brackets**; * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

	Cooperate 2nd Rounds b/p	Cooperate 2nd Rounds b/p	Cooperate 2nd Period b/p
Partn. Ch.[$t-1$]	3.26738***	1.89584	0.49548
	(0.0042)	(0.1912)	(0.4543)
IQ*Partn. Ch.[$t-1$]	71.08330***	21.68136***	4.19146*
	(0.0000)	(0.0000)	(0.0622)
IQ*Period*Partn. Ch.[$t-1$]		1.01770***	
		(0.0000)	
Consc.*Partn. Ch.[$t-1$]	1.79506	1.50672	0.33455
	(0.1546)	(0.4239)	(0.1947)
Consc*Period*Partn. Ch.[$t-1$]		1.00061	
		(0.8947)	
Period*Partn. Ch.[$t-1$]		1.00794**	
		(0.0333)	
Agre.*Partn. Ch.[$t-1$]	0.90808	1.87127	3.16397
	(0.8056)	(0.1962)	(0.1430)
Agre.*Period*Partn. Ch.[$t-1$]		0.98957**	
		(0.0168)	
Low δ*Partn. Ch.[$t-1$]	0.34067***	0.35701***	1.62789
	(0.0000)	(0.0000)	(0.2910)
Female*Partn. Ch.[$t-1$]	0.63154***	0.62917***	1.60615*
	(0.0012)	(0.0012)	(0.0967)
Risk.Aversion*Partn. Ch.[$t-1$]	2.03041*	1.73107	3.13800
	(0.0733)	(0.1668)	(0.2112)
Av. Supergame Length	1.77557***	1.45633***	
	(0.0000)	(0.0000)	
Av. times Partner Chose C until t-2	21.40094***	10.87719***	
	(0.0000)	(0.0000)	
N	14689	14689	364

Table A.23. **BoSC: Effects of IQ, other characteristics on conditional compromise.** Columns 1 to 3: the dependent variable is the compromise outcome in the second rounds of all repeated games; logit with individual fixed effect estimator. Columns 4: the dependent variable is the compromise outcome in the second periods; logit estimator. IQ, personality traits and risk aversion are normalised between 0 and 1 (see section E.1.3 of the appendix for more details). **Coefficients are expressed in odds ratios** $p-values$ **in brackets**; * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

	Compromise 2nd Rounds b/p	Compromise 2nd Rounds b/p	Compromise 2nd Period b/p
Partn. Comp.[$t-1$]	2.10111	4.37119*	0.26309
	(0.2332)	(0.0531)	(0.5454)
IQ*Partn. Comp.[$t-1$]	8.17164***	1.46266	41.94662*
	(0.0012)	(0.6682)	(0.0872)
IQ*Period*Partn. Comp.[$t-1$]		1.02467**	
		(0.0102)	
Period*Partn. Comp.[$t-1$]		0.98982	
		(0.1309)	
Female*Partn. Comp. [$t-1$]	0.77877	0.76988	0.59889
	(0.3245)	(0.3045)	(0.4510)
Risk Aversion*Partn. Compromise [$t-1$]	2.21400	2.14574	0.93824
	(0.2692)	(0.2901)	(0.9685)
Av. Supergame Length	1.32038***	1.27756***	
	(0.0009)	(0.0039)	
Type 2	0.95064	0.95660	0.77458
	(0.6240)	(0.6695)	(0.6457)
Av. times Partner Chose B until t-2	0.85884	1.16682	
	(0.7468)	(0.7413)	
N	2501	2501	68

TABLE A.24. **BoS: Effects of IQ and other characteristics and groups on the alternating coordination.** The dependent variable is the choice of W in the second rounds of all repeated games. IQ, personality traits and risk aversion are normalised between 0 and 1 (see section E.1.3 of the appendix for more details). Logit with individual fixed effect estimator. **Coefficients are expressed in odds ratios** $p - values$ **in brackets**; * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

	Worst action 2nd Rounds b/p
Partn. Worst $[t-1]$	0.63885
	(0.3361)
IQ*Partn. Worst $[t-1]$	5.65342***
	(0.0017)
Female*Partn. Worst $[t-1]$	0.22158***
	(0.0000)
Risk Aversion*Partn. Worst $[t-1]$	7.81514***
	(0.0017)
Av. Supergame Length	0.95799
	(0.5981)
Type 2	0.94833
	(0.6218)
Av. Partner best choice until t-2	1.42639
	(0.5092)
N	1804

TABLE A.25. **BoSC: Effects of IQ, other characteristics and groups.** The dependent variable are: in columns 1,2,3, the outcome; in column 4, the individual choice B. logit with individual random effect estimator. IQ, personality traits and risk aversion are normalised between 0 and 1 (see section E.1.3 of the appendix for more details). **Coefficients are expressed in odds ratios** $p-values$ **in brackets**; Standard Errors are clustered at the individual levels; * $p-value<0.1$, ** $p-value<0.05$, *** $p-value<0.01$; * $p-value<0.1$, ** $p-value<0.05$, *** $p-value<0.01$

	Compromise 1st rounds b/p	(B,W) or (W,B) 1st rounds b/p	Compromise 1st rounds b/p	W Choice 1st rounds b/p
High IQ Session*Period			0.99854	
			(0.6253)	
IQ	4.22177**	0.42719**	5.16673**	11.14957**
	(0.0179)	(0.0210)	(0.0216)	(0.0213)
Openness	0.47605	1.03112	0.47751	0.27863
	(0.1788)	(0.9249)	(0.1839)	(0.1678)
Conscientiousness	1.33522	0.92082	1.28568	3.76417
	(0.5754)	(0.7609)	(0.6332)	(0.1552)
Extraversion	0.96491	1.00296	0.97557	1.01696
	(0.9519)	(0.9928)	(0.9666)	(0.9868)
Agreeableness	0.68124	1.16129	0.68816	0.51817
	(0.4543)	(0.5938)	(0.4656)	(0.4668)
Neuroticism	0.36328*	1.71410*	0.37779*	0.56289
	(0.0877)	(0.0725)	(0.0995)	(0.6164)
Risk Aversion	0.68919	1.61586*	0.71730	1.06632
	(0.5131)	(0.0858)	(0.5490)	(0.9545)
Female	1.14063	0.89469	1.13704	1.03774
	(0.6104)	(0.4093)	(0.6172)	(0.9350)
Age	0.88888**	1.07570***	0.89022**	0.89202
	(0.0118)	(0.0008)	(0.0127)	(0.2163)
Type 2	0.95044	1.00967	0.95043	0.96659
	(0.5726)	(0.9058)	(0.5732)	(0.7692)
Period	1.00332**	1.00109	1.00423*	1.00536*
	(0.0338)	(0.3755)	(0.0522)	(0.0538)
# Subjects	1.10918	0.95170	1.11077	1.17084
	(0.3624)	(0.3924)	(0.3542)	(0.4335)
Average Supergame Length	1.01353	1.07981	1.01011	1.06284
	(0.8535)	(0.1732)	(0.8906)	(0.6138)
Av. times Partner Chose B until t-1	0.34350**	2.71365***	0.33773**	0.11187***
	(0.0205)	(0.0035)	(0.0185)	(0.0018)
Culture Fixed-Effects	Yes	Yes	Yes	Yes
N	3398	3398	3398	3398

TABLE A.26. **SH: Effects of IQ, Personality, other characteristics on stag choices and payoffs.** In columns 1 and 2, the dependent variable is average stag choice in all periods; in column 3, the dependent variable is average payoff per interaction. OLS estimator; IQ, personality traits and risk aversion are normalised between 0 and 1. Standard errors in brackets; * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

	Stag Choice All b/se	Stag Choice All b/se	Payoff All b/se
IQ	–0.0030	–0.0049	–1.1041
	(0.0620)	(0.0717)	(2.1645)
Conscientiousness		0.1370	3.6528
		(0.0834)	(2.5169)
Agreeableness		0.1472*	3.2153
		(0.0809)	(2.4423)
Openness		–0.1272*	–3.5369
		(0.0719)	(2.1688)
Extraversion		0.0285	1.8740
		(0.0692)	(2.0865)
Neuroticism		0.1570**	4.0834*
		(0.0687)	(2.0735)
Risk Aversion		0.0241	2.4633
		(0.0807)	(2.4349)
Female		–0.0006	0.0380
		(0.0279)	(0.8406)
Age		0.0043	0.0974
		(0.0028)	(0.0849)
# Subjects	–0.0008	–0.0024	–0.1576
	(0.0052)	(0.0056)	(0.1689)
Av. Round in Supergame	–0.0172	–0.0069	–0.2664
	(0.0150)	(0.0162)	(0.4883)
Minnesota	0.0401	0.1005**	2.7324**
	(0.0249)	(0.0432)	(1.3038)
Culture Fixed-Effect	No	Yes	Yes
r2	0.037	0.204	0.222
N	102	101	101

TABLE A.27. **SH: Effects of IQ, Personality, other characteristics on stag choices in period 1** The dependent variable is average stag choice in period 1. Logit estimator; IQ, personality traits and risk aversion are normalised between 0 and 1. **Coefficients are expressed in odd ratios** $p-values$ **in brackets**; * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

	Stag Choice All b/p	Stag Choice All b/p
sh_choice		
IQ	1.4055	2.5534
	(0.8313)	(0.6276)
Conscientiousness		0.1565
		(0.4471)
Agreeableness		10.5027
		(0.3303)
Openness		0.1037
		(0.3512)
Extraversion		0.8326
		(0.9343)
Neuroticism		0.2508
		(0.4937)
Risk Aversion		141.9244*
		(0.0903)
Female		1.1133
		(0.8986)
Age		1.3761
		(0.2742)
# Subjects	1.0348	1.1039
	(0.8204)	(0.5644)
Minnesota	2.4472	4.4470
	(0.2153)	(0.3371)
Culture Fixed-Effect	No	Yes
r2		
N	102	88

TABLE A.28. **BoS: Effects of IQ, Personality, other characteristics on coordination outcomes and payoffs.** In columns 1 and 2, the dependent variable is coordination rate in both (B,W) and (W,B) outcomes in all periods; in column 3, the dependent variable is alternating coordination rates between t and t-1; in column 4 it is repeated coordination rates between t and t-1; in column 5 it is average payoff per interaction. OLS estimator; IQ, personality traits and risk aversion are normalized between 0 and 1 (see section E.1.1 of the appendix for more details). Standard errors in brackets; * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

	(B,W) or (W,B)	(B,W) or (W,B)	Alt. (B,W) (W,B)	Rep. (B,W) or (W,B)	Payoff
	All	All	All	All	All
	b/se	b/se	b/se	b/se	b/se
IQ	0.0648	0.0291	0.5035***	–0.4628***	1.0482
	(0.0452)	(0.0536)	(0.1116)	(0.0952)	(2.1053)
Conscientiousness		–0.0416	–0.0797	0.0489	–0.2363
		(0.0577)	(0.1202)	(0.1025)	(2.2673)
Agreeableness		0.0594	–0.0289	0.1065	1.9245
		(0.0556)	(0.1157)	(0.0987)	(2.1830)
Openness		0.0499	0.1467	–0.1233	–1.7124
		(0.0488)	(0.1015)	(0.0866)	(1.9146)
Extraversion		–0.0217	–0.0612	0.1057	–0.3624
		(0.0474)	(0.0986)	(0.0841)	(1.8603)
Neuroticism		0.0226	–0.1113	0.1529*	–0.8747
		(0.0473)	(0.0985)	(0.0840)	(1.8587)
Risk Aversion		–0.0189	0.2248*	–0.2338**	1.2747
		(0.0550)	(0.1146)	(0.0977)	(2.1617)
Female		–0.0081	–0.0732*	0.0428	0.2179
		(0.0196)	(0.0408)	(0.0348)	(0.7698)
Age		–0.0026	0.0033	–0.0067*	–0.0988
		(0.0019)	(0.0040)	(0.0034)	(0.0759)
# Subjects	0.0108***	0.0112**	0.0367***	–0.0223***	0.5045***
	(0.0039)	(0.0043)	(0.0090)	(0.0076)	(0.1691)
Av. Round in Supergame	0.0414**	0.0475**	0.1204***	–0.0505	2.0627***
	(0.0179)	(0.0198)	(0.0412)	(0.0351)	(0.7765)
Minnesota	0.0792***	0.0866**	0.3088***	–0.1688***	4.2034***
	(0.0213)	(0.0345)	(0.0717)	(0.0612)	(1.3534)
Culture Fixed-Effect	No	Yes	Yes	Yes	Yes
r2	0.180	0.295	0.555	0.492	0.289
N	102	101	101	101	101

Table A.29. **PD, SH, BoS, BoSC: Differential Effects of IQ on the errors of strategy implementation.** The baseline is PD with high δ treatments. For the PD, the dependent variable (error) is set equal to 1 if subject chooses defect (D) after a round of mutual cooperation (C,C), and equal to 0 if the subject chooses cooperate (C) after a round of mutual cooperation (C,C). For the SH, the dependent variable (error) is set equal to 1 if subject chooses hare after a round of stag equilibrium, it is set equal to 0 if subject chooses stag after a round of a round of stag equilibrium. For the BoS, the dependent variable (error) is set equal to 1 if subject makes the same choice in t and t-1 after two round of alternation at t-1 and t-2, it is set equal to 0 if subject makes a different choice in t and t-1 after two round of alternation at t-1 and t-2. For the BoSC, dependent variable (error) is set equal to 1 if subject chooses best option (B) after a round of mutual compromise, it is set equal to 0 if subject chooses compromise after a round of mutual compromise. Data with different histories are ignored. Logit with individual random effect estimator. Coefficients displayed. IQ, personality traits and risk aversion are normalised between 0 and 1 ($Dropbox/Cooperation-Intelligence/experiment-Prisonerdilemma/do-files/all_datadline365$); Robust Standard Errors in brackets are clustered at the individual levels * $p-value<0.1$, ** $p-value<0.05$, *** $p-value<0.01$

	All Round Baseline b/se	All Rounds +Controls b/se	2nd Half Only Baseline b/se
strerr			
IQ	–7.05809***	–6.76028***	–6.91811***
	(1.5939)	(1.5700)	(1.6899)
IQ*SH	6.63137**	6.18125**	6.32412*
	(3.2435)	(3.1323)	(3.4083)
IQ*BoS	4.31150*	4.50597*	5.71213
	(2.5087)	(2.4535)	(4.0267)
IQ*BoSC	0.04206	0.57259	0.37890
	(2.2108)	(2.1723)	(2.5001)
Constant	–1.25218	–0.16009	–0.39924
	(1.8336)	(1.8264)	(2.1749)
Stag-Hunt	–6.72830***	–6.45934***	–6.71199***
	(2.0069)	(1.9309)	(2.1048)
Battle of Sexes	–2.89640*	–3.46683**	–5.02297*
	(1.6461)	(1.6189)	(2.6464)
B. of S. with Compr.	1.72394	1.12918	1.66518
	(1.4415)	(1.4135)	(1.6124)
Risk Aversion	–1.16675	–1.06860	–1.91355*
	(0.9169)	(0.8996)	(1.0525)
Age	0.01201	0.00740	0.01981
	(0.0405)	(0.0391)	(0.0539)
Female	0.01483	0.04271	–0.00637
	(0.3176)	(0.3100)	(0.3618)
Openness	0.80402	0.75265	0.87106
	(0.9022)	(0.8863)	(1.0577)
Conscientiousness	–0.70492	–0.65741	–0.76966
	(0.7976)	(0.7776)	(0.8770)
Extraversion	0.58250	0.59468	0.74054
	(0.8425)	(0.8188)	(1.0027)
Agreeableness	–0.09161	–0.14452	–0.56706
	(0.8342)	(0.8215)	(0.9652)
Neuroticism	–0.64787	–0.59905	–1.19027
	(0.8789)	(0.8595)	(1.0744)
# Supergame		0.02667	
		(0.0257)	
Round		–0.01163	
		(0.0171)	
Average Supergame Length		–0.06785	
		(0.0844)	
Profits until t-1		–0.00041**	
		(0.0002)	
lnsig2u			
Constant	1.98818***	1.87985***	2.08342***
	(0.1354)	(0.1408)	(0.1508)
Culture Fixed-Effects	Yes	Yes	Yes
N	29142	29142	13444

TABLE A.30. **Principal Factors from the Conscientiousness questions and facets** The factor analysis has been performed on all 24 questions related to the different facets of the trait Conscientiousness, in the IPIP questionnaire. The numbers represent the coefficients for each survey item. The (-) after the name of the facet indicates reverse scoring.

Factor explaining cooperation	Variable	Questions	Facets	Factor2	Factor3	Factor4
0.16936	r30r	Jump into things without thinking	CAUTIOUSNESS (-)	-0.09827	-0.31706	0.06403
0.11172	r60r	Make rash decisions	CAUTIOUSNESS (-)	-0.12437	-0.20113	-0.03344
0.10417	r95	Know how to get things done	SELF-EFFICACY (+)	0.07478	0.07065	-0.09043
0.10015	r115r	Have difficulty starting tasks	SELF-DISCIPLINE (-)	0.00406	0.06284	-0.1526
0.09789	r120r	Act without thinking	CAUTIOUSNESS (-)	-0.07915	-0.16409	0.06176
0.09332	r90r	Rush into things	CAUTIOUSNESS (-)	-0.12886	-0.17079	0.07351
0.0929	r20	Work hard	ACHIEVEMENT-STRIVING (+)	0.12668	0.01694	-0.11319
0.08838	r55	Carry out my plans	SELF-DISCIPLINE (+)	0.14733	0.06219	-0.00873
0.08474	r70r	Leave a mess in my room	ORDERLINESS (-)	-0.18113	0.25731	0.05986
0.07732	r50	Do more than what's expected of me	ACHIEVEMENT-STRIVING (+)	0.08397	0.07651	-0.10318
0.07667	r65	Handle tasks smoothly	SELF-EFFICACY	0.08759	0.04807	0.02386
0.07027	r40r	Often forget to put things back in their proper place	ORDERLINESS	-0.20061	0.22215	0.08396
0.06834	r80r	Do just enough work to get by	ACHIEVEMENT-STRIVING	0.0022	0.02772	-0.19374
0.06518	r25	Am always prepared	SELF-DISCIPLINE	0.00164	0.02987	-0.11166
0.06321	r5	Break my promises	DUTIFULNESS	0.13357	0.06436	-0.05748
0.057	r105r	Break my promises	DUTIFULNESS	0.10305	0.02848	0.24978
0.05611	r85r	Complete tasks successfully	SELF-EFFICACY	-0.00676	0.00904	-0.02999
0.05423	r35	Excel in what I do	SELF-EFFICACY	0.08825	0.01806	-0.0927
0.05423	r110r	Put little time and effort into my work	ACHIEVEMENT-STRIVING	0.02617	0.01698	-0.09782
0.0539	r100r	Have difficulty starting tasks	SELF-DISCIPLINE	-0.15508	0.16244	0.17962
0.04996	r15	Keep my promises	DUTIFULNESS	0.22442	0.02705	0.39991
0.04371	r45	Tell the truth	DUTIFULNESS	0.07279	-0.00321	0.18759
0.02807	r75r	Break rules	DUTIFULNESS	-0.02934	-0.11463	0.04997
0.02477	r10	Like to tidy up	ORDERLINESS	-0.08737	0.20324	0.0206

Table A.31. **PD with high probability of continuation: effect of A-split and C-split treatments.** The regressions include the data from PD C-split, A-split and combined treatments. The dependent variable are average cooperation and average payoff per interaction. The averages are calculated over the same number of supergames played by every individual, so that the longer sessions are truncated. OLS estimator. Standard errors in brackets; * $p-value<0.1$, ** $p-value<0.05$, *** $p-value<0.01$

	A-Split + Combined			C-Split + Combined		
	Cooperate	Payoff	Payoff	Cooperate	Payoff	Payoff
	b/se	b/se	b/se	b/se	b/se	b/se
Agreeableness			–2.0957			
			(1.7882)			
Conscientiousness						0.5007
						(1.9359)
High A Session	–0.0131	–0.4143	–0.2751			
	(0.0454)	(0.7117)	(0.7210)			
Low A Session	–0.0518	–1.4962*	–1.7938**			
	(0.0493)	(0.7740)	(0.8139)			
High C Session				–0.0367	–1.1757	–1.2560
				(0.0457)	(0.7421)	(0.8059)
Low C Session				0.1572***	3.9954***	4.0363***
				(0.0459)	(0.7458)	(0.7639)
# Subjects	0.0022	0.0966	0.1102	–0.0149*	–0.3146**	–0.3132**
	(0.0083)	(0.1302)	(0.1306)	(0.0082)	(0.1332)	(0.1335)
Av. Rounds Supergames	0.0378	0.9303**	0.9157**	0.0084	0.0057	–0.0005
	(0.0243)	(0.3817)	(0.3815)	(0.0336)	(0.5464)	(0.5481)
r2	0.025	0.068	0.073	0.093	0.195	0.196
N	224	224	224	232	232	232

Appendix G. Analysis of Response Time

In this section we complete the analysis of the response time developed in the main text.

As we mentioned in the main text, a trait (in addition to intelligence) that might be affect response time length is Conscientiousness. There is some evidence (discussed for instance in Powers and Kaufman (2004)) that subjects with high score in Conscientiousness are very careful in test taking, which would suggest the natural hypothesis that response time increases with the Conscientiousness score. The evidence, however, is weak, and another direction of the effect is possible: once the optimal rules are set, and the socially acceptable behavior is considered to have been agreed upon, then subjects with higher level of Conscientiousness may be more resolute in implementing the rules, rather than idling in the execution. Our data show that the resolute implementation dominates: the response time is shorter for the subjects in high-C groups (figure A.1). So, being careful in the decision-making process means here being resolute and deliberate, rather than thoughtful more than necessary.

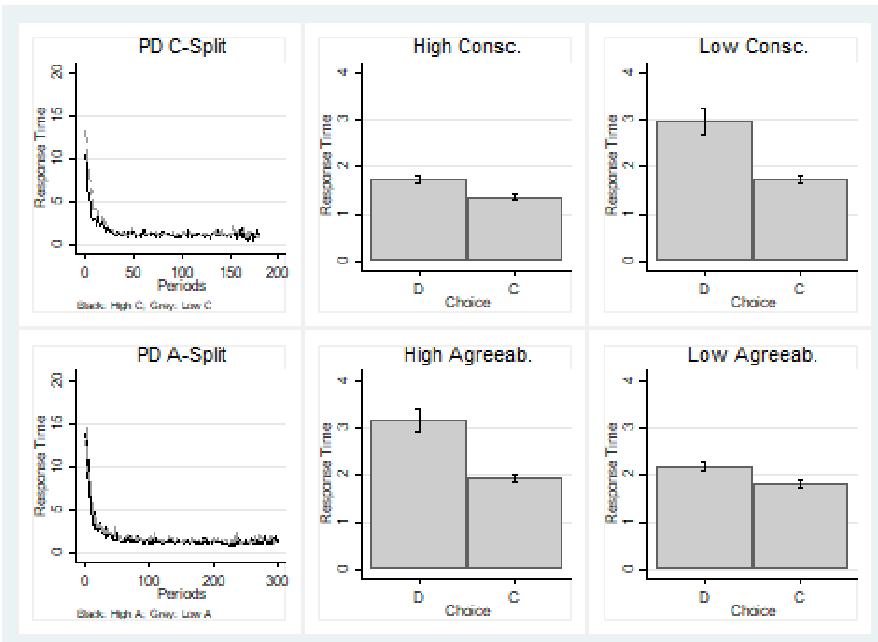
Table A.32. **PD: Effects of IQ, Choices, Personality, other characteristics and treatments on response time.** The regressions include the data from PD (high and low δ), IQ-split, C-split, A-split and combined treatments The dependent variable is the response time per individual in every period. GLS random-effects model estimator; IQ, personality traits and risk aversion are normalized between 0 and 1. Standard errors clustered at the individual levels in brackets; * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

	Response time All Periods b/se	Response time All Periods b/se	Response time All Periods b/se
IQ	–0.9990*	–0.3717	–0.6634
	(0.5317)	(0.5231)	(0.5307)
Cooperate	–0.1552**	0.4609**	0.3727*
	(0.0669)	(0.2089)	(0.2024)
IQ*Cooperate		–1.0942***	–0.8462**
		(0.3379)	(0.3488)
Partn. Cooperate [$t-1$]			–0.1014
			(0.0723)
Openness	0.3395	0.3129	0.3113
	(0.3197)	(0.3221)	(0.3342)
Conscientiousness	0.0154	0.0091	0.0400
	(0.3941)	(0.3949)	(0.3962)
Extraversion	–0.0770	–0.0710	–0.0951
	(0.3415)	(0.3445)	(0.3707)
Agreeableness	0.2223	0.2406	0.3470
	(0.3244)	(0.3258)	(0.3523)
Neuroticism	–0.4963	–0.4919	–0.5154
	(0.4271)	(0.4287)	(0.4401)
Risk Aversion	–0.1308	–0.0993	–0.0676
	(0.2994)	(0.3011)	(0.3151)
Female	0.1781	0.1794	0.1728
	(0.1678)	(0.1680)	(0.1746)
Age	0.1115	0.1128	0.1077
	(0.0769)	(0.0765)	(0.0738)
Round	–0.0122***	–0.0121***	–0.0119***
	(0.0007)	(0.0007)	(0.0007)
Low δ	–0.9883***	–0.9526**	–0.3387
	(0.3793)	(0.3844)	(0.3850)
Average Supergame Length	–0.4935***	–0.4926***	–0.2640***
	(0.0546)	(0.0545)	(0.0517)
Sess. Fixed-Effect	Yes	Yes	Yes
Culture Fixed-Effect	Yes	Yes	Yes
N	86086	86086	61892

TABLE A.33. **BoSC: Effects of IQ, Choices, Personality, other characteristics and treatments on response time.** The dependent variable is the response time per individual in every period. GLS random-effects model estimator; IQ, personality traits and risk aversion are normalised between 0 and 1. Standard errors in brackets; * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

	Response time All Periods b/se	Response time If Compromise at t-1 b/se
IQ	–1.1164*	2.0587
	(0.6219)	(2.6980)
W Choice		1.0153
		(1.6640)
Compromise	–0.2964**	
	(0.1244)	
IQ*W Choice		–3.1432
		(2.8586)
Openness	0.0655	0.4398
	(0.5741)	(0.5362)
Conscientiousness	0.4754	0.4339
	(0.7590)	(0.6409)
Extraversion	1.5836***	1.1928**
	(0.6107)	(0.5518)
Agreeableness	0.4457	–0.2850
	(0.5732)	(0.5635)
Neuroticism	0.0833	–0.6886
	(0.6188)	(0.5646)
Type 2	5.1375***	3.6984***
	(0.2476)	(0.2047)
Risk Aversion	–0.7914	–1.3077
	(0.9201)	(1.1516)
Female	0.6062**	0.3315
	(0.2742)	(0.2477)
Age	0.0501	0.0739
	(0.0415)	(0.0453)
Round	–0.0321***	–0.0224***
	(0.0024)	(0.0026)
Average Supergame Length	–0.7945***	–0.4577***
	(0.0884)	(0.0932)
Culture Fixed-Effect	Yes	Yes
r2		
N	14028	4998

Figure A.1. **PD: Response Time in the different treatments by Personality groups and choice** C denotes the Cooperation choice, D Defection. The grey line represents all low C and low A sessions in top and bottom correspondingly, the black line represents the high C and high A sessions in top and bottom correspondingly. The bands represent 95% confidence intervals.



Appendix H. Summary Statistics

Table A.34. Raven Scores by Sessions in IQ-split with High Delta Treatment

Variable	Mean	Std. Dev.	Min.	Max.	N
High IQ - Session 1	20.429	1.505	18	23	14
Low IQ - Session 2	14.063	3.395	6	18	16
High IQ - Session 3	19	2	16	23	18
Low IQ - Session 4	13.188	1.94	10	16	16
High IQ - Session 5	20.444	1.79	18	24	18
Low IQ - Session 6	14.167	3.538	7	18	12
High IQ - Session 7	20.688	2.243	18	25	16
Low IQ - Session 8	15.75	1.372	13	18	20

Table A.35. Raven Scores by Sessions in IQ-split with Low Delta Treatment

Variable	Mean	Std. Dev.	Min.	Max.	N
High IQ - Session 1	19.375	1.544	17	22	16
Low IQ - Session 2	14.286	2.199	10	17	14
High IQ - Session 3	20.571	1.342	18	23	14
Low IQ - Session 4	15.071	2.2	10	18	14
High IQ - Session 5	20	1.754	17	23	14
Low IQ - Session 6	13.143	3.009	7	17	14
High IQ - Session 7	19.6	2.633	16	23	10
Low IQ - Session 8	12.571	2.174	9	16	14

Table A.36. Raven Scores by Sessions in Combined Treatment

Variable	Mean	Std. Dev.	Min.	Max.	N
Session 1	17	3.651	9	23	10
Session 2	17	2.523	13	22	12
Session 3	14.917	3.942	7	21	12

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... table A.36 continued

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Session 4	15	4.134	5	20	12
Session 5	14.375	4.161	6	20	16
Session 6	16.188	5.456	5	27	16
Session 7	17.5	4	9	23	16
Session 8	16.813	5.833	4	25	16

Table A.37. Agreeableness Scores by Sessions in A-split Treatment

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
High A - Session 1	4.051	0.231	3.75	4.583	14
Low A - Session 2	3.273	0.355	2.542	3.708	18
High A - Session 3	4.056	0.191	3.833	4.375	12
Low A - Session 4	2.925	0.324	2.375	3.292	10
High A - Session 5	4.008	0.28	3.667	4.583	16
Low A - Session 6	3.372	0.253	2.708	3.667	16
Low A - Session 7	3.33	0.375	2.75	3.833	14
High A - Session 8	4.11	0.249	3.875	4.833	14

Table A.38. Conscientiousness Scores by Sessions in C-split Treatment

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
High C - Session 1	4.131	0.25	3.792	4.667	14
Low C - Session 2	3.299	0.313	2.667	3.792	18
High C - Session 3	4.095	0.294	3.833	4.708	14
Low C - Session 4	3.438	0.281	2.958	3.792	12
High C - Session 5	4.151	0.282	3.667	4.542	16
Low C - Session 6	3.245	0.319	2.542	3.667	16
High C - Session 7	3.882	0.416	3.208	4.708	18
Low C - Session 8	3.033	0.159	2.625	3.208	14

Table A.39. Raven Scores by Sessions in IQ-split BoSC

Variable	Mean	Std. Dev.	Min.	Max.	N
High IQ - Session 1	20	2.184	17	24	14
Low IQ - Session 2	14.571	1.828	10	17	14
High IQ - Session 3	20.083	2.021	18	24	12
Low IQ - Session 4	13.214	3.867	2	17	14
High IQ - Session 5	19.857	1.512	18	23	14
Low IQ - Session 6	13.5	3.503	6	18	12
High IQ - Session 7	20.25	1.603	18	24	12
Low IQ - Session 8	14.417	3.288	9	18	12

Table A.40. Raven Scores by Session in IQ-split BoS & and SH Sessions

Variable	Mean	Std. Dev.	Min.	Max.	N
High IQ - Session 1	18.75	1.832	16	21	8
Low IQ - Session 2	13.6	1.713	10	16	10
High IQ - Session 3	18	1.673	16	21	16
Low IQ - Session 4	13.563	2.308	8	16	16
High IQ - Session 5	21	2.309	17	24	10
Low IQ - Session 6	12.214	3.556	5	17	14
High IQ - Session 7	19.714	1.978	17	23	14
Low IQ - Session 8	13.786	3.017	8	17	14

Table A.41. IQ-split: High Delta - Low IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.429	0.495	0	1	5124
Partner Choice	0.432	0.495	0	1	5124
Age	22.354	4.736	18	51	5124
Female	0.629	0.483	0	1	5124
Period	40.976	23.841	1	91	5124
Openness	3.638	0.531	2.5	5	5124

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... table A.41 continued

Variable	Mean	Std. Dev.	Min.	Max.	N
Conscientiousness	3.409	0.648	2	5	5124
Extraversion	3.349	0.728	1	4.75	5124
Agreableness	3.846	0.583	2	4.778	5124
Neuroticism	2.893	0.804	1	5	5124
Raven	14.379	2.683	6	18	5124
Economist	0.052	0.223	0	1	5124
Risk Aversion	5.559	1.149	3	8	4052
Final Profit	2674.047	508.872	1420	3628	64
Profit x Period	33.232	4.244	21.194	45.075	64
Total Periods	80.063	8.504	67	91	64

Table A.42. IQ-split: High Delta - High IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.694	0.461	0	1	7688
Partner Choice	0.694	0.461	0	1	7688
Age	20.865	2.746	18	36	7688
Female	0.461	0.499	0	1	7688
Period	65.538	42.27	1	163	7688
Openness	3.612	0.59	1.9	4.9	7688
Conscientiousness	3.361	0.739	1.444	4.889	7688
Extraversion	3.228	0.738	1.875	4.5	7688
Agreableness	3.768	0.621	2.333	5	7688
Neuroticism	2.799	0.72	1.25	4.5	7688
Raven	20.331	1.947	16	25	7688
Risk Aversion	5.541	1.721	2	9	6064
Final Profit	4675.303	2034.416	1447	7752	66
Profit x Period	38.547	5.834	25.386	47.558	66
Total Periods	116.485	40.093	57	163	66

Table A.43. IQ-split: Low Delta - Low IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.284	0.451	0	1	5600
Partner Choice	0.284	0.451	0	1	5600
Age	21.25	2.433	18	28	5600
Female	0.64	0.48	0	1	5600
Period	65.618	45.232	1	174	5600
Openness	3.642	0.588	2.3	4.9	5600
Conscientiousness	3.372	0.502	2.222	4.556	5600
Extraversion	3.372	0.724	1.625	4.625	5600
Agreableness	3.706	0.576	2.556	4.889	5600
Neuroticism	2.996	0.738	1.25	4.375	5600
Raven	13.383	2.562	7	18	5600
Risk Aversion	5.543	1.698	2	9	5306
Final Profit	2989.179	1844.582	480	6233	56
Profit x Period	28.94	3.245	22.831	35.822	56
Total Periods	100	55.484	21	174	56

Table A.44. IQ-split: Low Delta - High IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.392	0.488	0	1	8392
Partner Choice	0.392	0.488	0	1	8392
Age	20.639	2.182	18	28	8392
Female	0.59	0.492	0	1	8392
Period	87.114	59.394	1	250	8392
Openness	3.657	0.598	2	4.8	8392
Conscientiousness	3.523	0.565	2.222	4.667	8392
Extraversion	3.245	0.758	1.875	4.875	8392
Agreableness	3.774	0.525	2.222	4.667	8392
Neuroticism	2.867	0.715	1.5	4.5	8392
Raven	19.9	1.913	16	23	8392
Risk Aversion	5.652	1.319	3	9	6840

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... table A.44 continued

Variable	Mean	Std. Dev.	Min.	Max.	N
Final Profit	5035.963	2304.574	2380	9729	54
Profit x Period	31.297	3.957	24.536	38.916	54
Total Periods	155.407	53.120	97	250	54

Table A.45. Combined Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.652	0.476	0	1	24444
Partner Choice	0.652	0.476	0	1	24444
Age	20.937	2.964	18	36	24444
Female	0.722	0.448	0	1	24444
Period	116.384	70.277	1	255	24444
Openness	3.549	0.577	2	4.8	24444
Conscientiousness	3.448	0.618	1.889	4.889	24444
Extraversion	3.337	0.664	1.625	4.875	24444
Agreableness	3.702	0.6	2.111	4.889	24444
Neuroticism	3.002	0.687	1.125	4.875	24444
Raven	16.143	4.316	4	27	24444
Risk Aversion	5.731	1.449	3	9	24444
Final Profit	8669.727	2285.635	3674	11839	110
Profit x Period	38.639	4.402	29.706	46.427	110
Total Periods	222.218	46.277	120	255	110

Table A.46. A-split Treatment: Low A Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.551	0.497	0	1	11458
Partner Choice	0.551	0.497	0	1	11458
Age	20.725	2.233	18	29	11458
Female	0.468	0.499	0	1	11458
Period	113.493	76.521	1	300	11458

Continued on next page...

... table A.46 continued

Variable	Mean	Std. Dev.	Min.	Max.	N
Openness	3.541	0.584	1.7	4.8	11458
Conscientiousness	3.418	0.612	2	4.667	11458
Extraversion	3.265	0.699	1.5	4.75	11458
Agreableness	3.293	0.570	1.667	4.778	11458
Neuroticism	3.108	0.692	1.5	4.5	11458
Raven	16.711	4.442	5	24	11458
Risk Aversion	5.755	1.755	3	10	11458
Final Profit	7111.552	2439.993	3333	10537	58
Profit x Period	36.712	3.99	29.151	44.775	58
Total Periods	197.552	75.603	102	300	58

Table A.47. A-split Treatment: High A Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.667	0.471	0	1	9948
Partner Choice	0.667	0.471	0	1	9948
Age	20.799	4.739	18	60	9948
Female	0.690	0.462	0	1	9948
Period	96.678	62.007	1	227	9948
Openness	3.698	0.566	2.5	4.9	9948
Conscientiousness	3.382	0.615	1.778	5	9948
Extraversion	3.165	0.615	1.625	4.375	9948
Agreableness	3.936	0.376	3.111	4.778	9948
Neuroticism	3.1	0.8	1.625	4.625	9948
Raven	16.954	4.089	7	23	9948
Risk Aversion	5.167	1.431	2	8	9948
Final Profit	6974.071	2636.617	3500	10177	56
Profit x Period	38.225	4.659	29.661	45.637	56
Total Periods	177.643	51.588	118	227	56

Table A.48. C-split Treatment: Low C Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.753	0.431	0	1	8270
Partner Choice	0.753	0.431	0	1	8270
Age	20.355	2.112	18	31	8270
Female	0.661	0.473	0	1	8270
Period	70.329	41.396	1	164	8270
Openness	3.283	0.674	2	4.9	8270
Conscientiousness	3.164	0.391	2.222	4	8270
Extraversion	3.165	0.635	1.875	4.5	8270
Agreableness	3.525	0.55	2.444	4.667	8270
Neuroticism	3.291	0.690	1.625	4.875	8270
Raven	18.499	2.778	11	25	8270
Risk Aversion	5.654	2.172	0	9	8270
Final Profit	5722.533	761.16	3965	7254	60
Profit x Period	41.582	3.562	30.736	47.702	60
Total Periods	137.833	15.992	121	164	60

Table A.49. C-split Treatment: High C Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.591	0.492	0	1	9816
Partner Choice	0.591	0.492	0	1	9816
Age	21.962	4.88	18	45	9816
Female	0.538	0.499	0	1	9816
Period	81.035	47.954	1	182	9816
Openness	3.717	0.63	1.5	4.7	9816
Conscientiousness	3.983	0.433	3	4.778	9816
Extraversion	3.249	0.828	1.125	4.75	9816
Agreableness	3.8	0.592	2.222	4.889	9816
Neuroticism	2.816	0.844	1.125	4.875	9816
Raven	17.459	4.267	7	24	9816
Risk Aversion	5.343	1.957	0	9	9816

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... table A.49 continued

Variable	Mean	Std. Dev.	Min.	Max.	N
Final Profit	5917.871	1366.716	4161	8413	62
Profit x Period	37.078	4.879	28.487	46.225	62
Total Periods	158.323	21.024	130	182	62

TABLE A.50. IQ-split: BoSC - Low IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.503	0.5	0	1	6360
Partner Choice	0.503	0.5	0	1	6360
Age	20.734	3.34	18	38	6360
Female	0.658	0.474	0	1	6360
Period	63.334	37.908	1	142	6360
Openness	3.509	0.671	1.7	4.4	6360
Conscientiousness	3.618	0.743	2.222	5	6360
Extraversion	3.202	0.704	1.25	4.25	6360
Agreableness	3.681	0.525	2.556	5	6360
Neuroticism	3.111	0.662	1.375	4.25	6360
Raven	13.983	3.044	2	18	6360
Risk Aversion	5.268	1.847	0	10	6360
Final Profit	4069.308	990.257	2220	5820	52
Profit x Period	32.921	4.013	24.13	40.986	52
Total Periods	122.308	20.472	92	142	52

TABLE A.51. IQ-split: BoSC - High IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice	0.502	0.5	0	1	7668
Partner Choice	0.502	0.5	0	1	7668
Age	20.408	2.262	18	32	7668
Female	0.635	0.481	0	1	7668
Period	74.724	43.393	1	159	7668

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... table A.51 continued

Variable	Mean	Std. Dev.	Min.	Max.	N
Openness	3.612	0.507	2.3	4.600	7668
Conscientiousness	3.239	0.631	1.667	4.556	7668
Extraversion	3.142	0.753	1.625	4.875	7668
Agreableness	3.637	0.671	2.111	5	7668
Neuroticism	3.145	0.839	1.5	5	7668
Raven	20.04	1.765	17	24	7668
Risk Aversion	5.823	1.667	3	10	7668
Final Profit	5513.308	582.054	4082	6932	52
Profit x Period	37.54	4.137	25.673	45.492	52
Total Periods	147.462	12.179	130	159	52

Table A.52. IQ-split: BoS & SH - Low-IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice SH	0.076	0.265	0	1	5644
Partner Choice SH	0.076	0.265	0	1	5644
Choice BoS	0.449	0.497	0	1	5750
Partner Choice BoS	0.449	0.497	0	1	5750
Age	21.312	6.315	18	52	5974
Female	0.467	0.499	0	1	5974
Periods	54.031	32.254	1	125	5644
Periods	54.311	31.661	1	118	5750
Openness	3.462	0.574	2.1	4.5	5974
Conscientiousness	3.487	0.582	2.111	4.667	5974
Extraversion	3.279	0.773	1.75	4.625	5974
Agreableness	3.83	0.624	1.889	5	5974
Neuroticism	2.665	0.674	1.125	4	5974
Raven	13.354	2.709	5	17	5974
Risk Aversion	4.636	1.55	0	8	5974
Final Profit SH	4667.944	916.658	2680	6000	54
Profit x Period SH	44.507	3.811	32.289	48	54
Total Periods SH	104.519	16.459	83	125	54

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... table A.52 continued

Variable	Mean	Std. Dev.	Min.	Max.	N
Final Profit BoS	2465.778	559.977	1251	3577	54
Profit x Period BoS	23.055	4.122	14.056	31.674	54
Total Periods BoS	106.481	11.12	89	118	54

Table A.53. IQ-split: BoS & SH - High-IQ Sessions, Main Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Choice SH	0.057	0.232	0	1	4984
Partner Choice SH	0.057	0.232	0	1	4984
Choice BoS	0.501	0.5	0	1	5656
Partner Choice BoS	0.501	0.5	0	1	5656
Age	19.684	2.859	16	36	5656
Female	0.562	0.496	0	1	5656
Periods	52.771	30.606	1	118	4984
Periods	59.456	34.086	1	122	5656
Openness	3.61	0.632	2	5	5656
Conscientiousness	3.458	0.659	1.556	4.444	5656
Extraversion	3.295	0.906	1.375	4.875	5656
Agreableness	3.806	0.526	2.778	5	5656
Neuroticism	2.949	0.824	1.25	4.625	5656
Raven	19.275	2.171	16	24	5656
Risk Aversion	5.331	1.637	2	10	5656
Final Profit SH	4703.917	589.165	2587	5616	48
Profit x Period SH	45.249	3.716	26.398	48	48
Total Periods SH	103.833	8.672	97	118	48
Final Profit BoS	2812.021	327.559	2012	3498	48
Profit x Period BoS	23.867	2.724	17.051	29.15	48
Total Periods BoS	117.833	3.083	114	122	48

TABLE A.54. IQ-split: High Continuation Probability - Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreableness	Neuroticism
Raven	1.000							
Female	-0.160	1.000						
	(0.068)							
Risk Aversion	0.030	-0.039	1.000					
	(0.764)	(0.699)						
Openness	-0.152	-0.017	-0.086	1.000				
	(0.084)	(0.844)	(0.396)					
Conscientiousness	0.085	0.004	0.073	0.157	1.000			
	(0.337)	(0.965)	(0.470)	(0.075)				
Extraversion	-0.076	-0.086	0.004	0.319	0.054	1.000		
	(0.391)	(0.330)	(0.970)	(0.000)	(0.539)			
Agreableness	-0.020	-0.052	-0.106	0.183	0.269	0.183	1.000	
	(0.823)	(0.554)	(0.296)	(0.038)	(0.002)	(0.037)		
Neuroticism	-0.036	0.424	0.072	-0.130	-0.305	-0.315	-0.351	1.000
	(0.684)	(0.000)	(0.478)	(0.141)	(0.000)	(0.000)	(0.000)	

TABLE A.55. IQ-split: Low Continuation Probability - Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreableness	Neuroticism
Raven	1.000							
Female	-0.133	1.000						
	(0.166)							
Risk Aversion	-0.052	-0.010	1.000					
	(0.645)	(0.931)						
Openness	-0.016	0.127	-0.055	1.000				
	(0.871)	(0.186)	(0.628)					
Conscientiousness	0.102	0.143	0.053	0.097	1.000			
	(0.288)	(0.137)	(0.643)	(0.315)				
Extraversion	-0.154	-0.037	-0.053	0.251	0.270	1.000		
	(0.108)	(0.704)	(0.641)	(0.008)	(0.004)			
Agreableness	-0.012	0.176	0.061	0.075	0.247	-0.045	1.000	
	(0.905)	(0.066)	(0.589)	(0.436)	(0.009)	(0.644)		
Neuroticism	-0.026	0.305	-0.132	0.064	-0.070	-0.279	-0.068	1.000
	(0.790)	(0.001)	(0.243)	(0.509)	(0.469)	(0.003)	(0.483)	

TABLE A.56. Combined Treatment: Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreableness	Neuroticism
Raven	1.000							
Female	-0.064	1.000						
	(0.509)							
Risk Aversion	0.272	-0.061	1.000					
	(0.004)	(0.525)						
Openness	-0.037	0.120	0.027	1.000				
	(0.699)	(0.211)	(0.779)					
Conscientiousness	-0.144	0.187	-0.123	-0.040	1.000			
	(0.133)	(0.051)	(0.200)	(0.678)				
Extraversion	-0.073	-0.017	-0.100	0.236	0.189	1.000		
	(0.448)	(0.859)	(0.299)	(0.013)	(0.048)			
Agreableness	0.001	0.016	-0.007	0.264	0.133	0.236	1.000	
	(0.994)	(0.865)	(0.944)	(0.005)	(0.167)	(0.013)		
Neuroticism	-0.016	0.100	0.099	0.050	-0.125	-0.270	-0.285	1.000
	(0.868)	(0.297)	(0.303)	(0.606)	(0.193)	(0.004)	(0.003)	

TABLE A.57. A-split: Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreableness	Neuroticism
Raven	1.000							
Female	-0.006	1.000						
	(0.952)							
Risk Aversion	0.028	-0.096	1.000					
	(0.770)	(0.309)						
Openness	-0.056	0.057	0.027	1.000				
	(0.556)	(0.547)	(0.779)					
Conscientiousness	0.134	-0.114	0.113	0.027	1.000			
	(0.156)	(0.228)	(0.231)	(0.775)				
Extraversion	-0.056	-0.002	-0.027	0.142	0.128	1.000		
	(0.557)	(0.981)	(0.775)	(0.131)	(0.175)			
Agreableness	-0.080	0.089	-0.112	-0.077	0.206	0.127	1.000	
	(0.395)	(0.347)	(0.234)	(0.418)	(0.028)	(0.177)		
Neuroticism	0.018	0.295	0.017	-0.044	-0.167	-0.270	-0.155	1.000
	(0.849)	(0.001)	(0.858)	(0.646)	(0.075)	(0.004)	(0.099)	

TABLE A.58. C-split: Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Raven	1.000							
Female	-0.222	1.000						
	(0.014)							
Risk Aversion	0.137	-0.106	1.000					
	(0.132)	(0.246)						
Openness	-0.113	0.021	0.022	1.000				
	(0.217)	(0.819)	(0.813)					
Conscientiousness	-0.128	-0.107	-0.053	0.259	1.000			
	(0.159)	(0.241)	(0.564)	(0.004)				
Extraversion	-0.176	-0.079	0.005	0.328	0.132	1.000		
	(0.053)	(0.388)	(0.958)	(0.000)	(0.148)			
Agreeableness	0.077	-0.135	0.002	0.040	0.344	0.301	1.000	
	(0.400)	(0.139)	(0.984)	(0.665)	(0.000)	(0.001)		
Neuroticism	0.012	0.436	0.029	-0.294	-0.306	-0.368	-0.354	1.000
	(0.892)	(0.000)	(0.748)	(0.001)	(0.001)	(0.000)	(0.000)	

TABLE A.59. IQ-split: BoSC - Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreableness	Neuroticism
Raven	1.000							
Female	-0.044	1.000						
	(0.659)							
Risk Aversion	0.056	-0.061	1.000					
	(0.575)	(0.539)						
Openness	0.094	-0.005	-0.082	1.000				
	(0.345)	(0.957)	(0.406)					
Conscientiousness	-0.173	-0.058	0.049	-0.001	1.000			
	(0.079)	(0.556)	(0.621)	(0.994)				
Extraversion	-0.064	-0.006	0.093	0.325	0.146	1.000		
	(0.521)	(0.949)	(0.345)	(0.001)	(0.140)			
Agreableness	-0.016	-0.073	0.068	-0.139	0.277	-0.050	1.000	
	(0.869)	(0.460)	(0.495)	(0.159)	(0.004)	(0.616)		
Neuroticism	-0.097	0.300	-0.082	0.037	-0.145	-0.201	-0.250	1.000
	(0.328)	(0.002)	(0.409)	(0.710)	(0.141)	(0.041)	(0.011)	

TABLE A.60. IQ-split: BoS & SH - Correlations Table (p−*values* in brackets)

Variables	Raven	Female	Risk Aversion	Openness	Conscientiousness	Extraversion	Agreableness	Neuroticism
Raven	1.000							
Female	0.138	1.000						
	(0.166)							
Risk Aversion	0.062	0.037	1.000					
	(0.539)	(0.712)						
Openness	0.002	0.004	-0.012	1.000				
	(0.986)	(0.970)	(0.904)					
Conscientiousness	-0.081	-0.006	0.081	0.089	1.000			
	(0.420)	(0.953)	(0.416)	(0.373)				
Extraversion	-0.059	0.071	-0.000	0.351	0.056	1.000		
	(0.555)	(0.481)	(0.999)	(0.000)	(0.574)			
Agreableness	-0.062	0.157	-0.052	0.202	0.256	0.362	1.000	
	(0.533)	(0.116)	(0.602)	(0.042)	(0.009)	(0.000)		
Neuroticism	0.188	0.164	0.112	-0.088	-0.246	-0.318	-0.293	1.000
	(0.059)	(0.099)	(0.261)	(0.380)	(0.013)	(0.001)	(0.003)	

FIGURE A.2. **Distribution of Raven Scores.** Top row shows raven distribution for all sessions of high continuation probability PD IQ-split in first column and second and third column separate across low and high IQ sessions. Second row presents the equivalent distributions for the low continuation probability PD IQ-split. Third row presents the distribution for the combined treatment in the first column and splits across odd and even sessions in the second and third columns respectively.

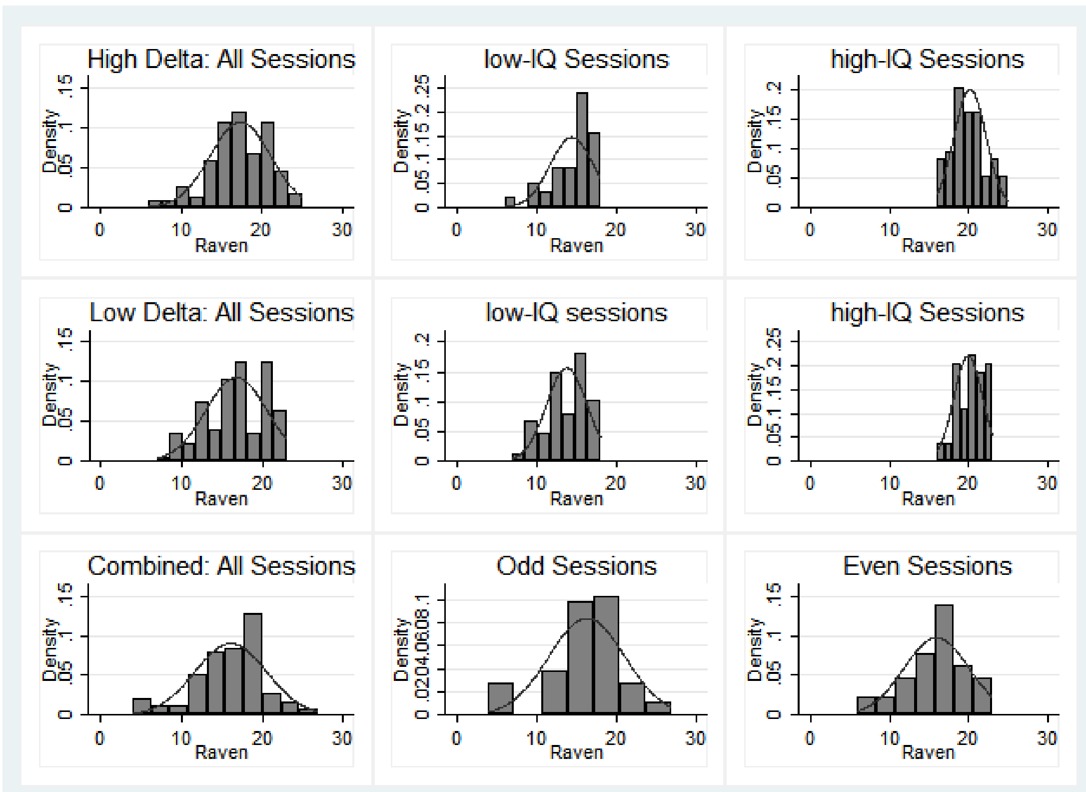


Figure A.3. **Distribution of Personality Scores.** Top row shows Agreeableness distribution for all sessions of PD A-split in first column and second and third column separate across low and high A sessions. Second row shows Conscientiousness distribution for all sessions of PD C-split in first column and second and third column separate across low and high C sessions.

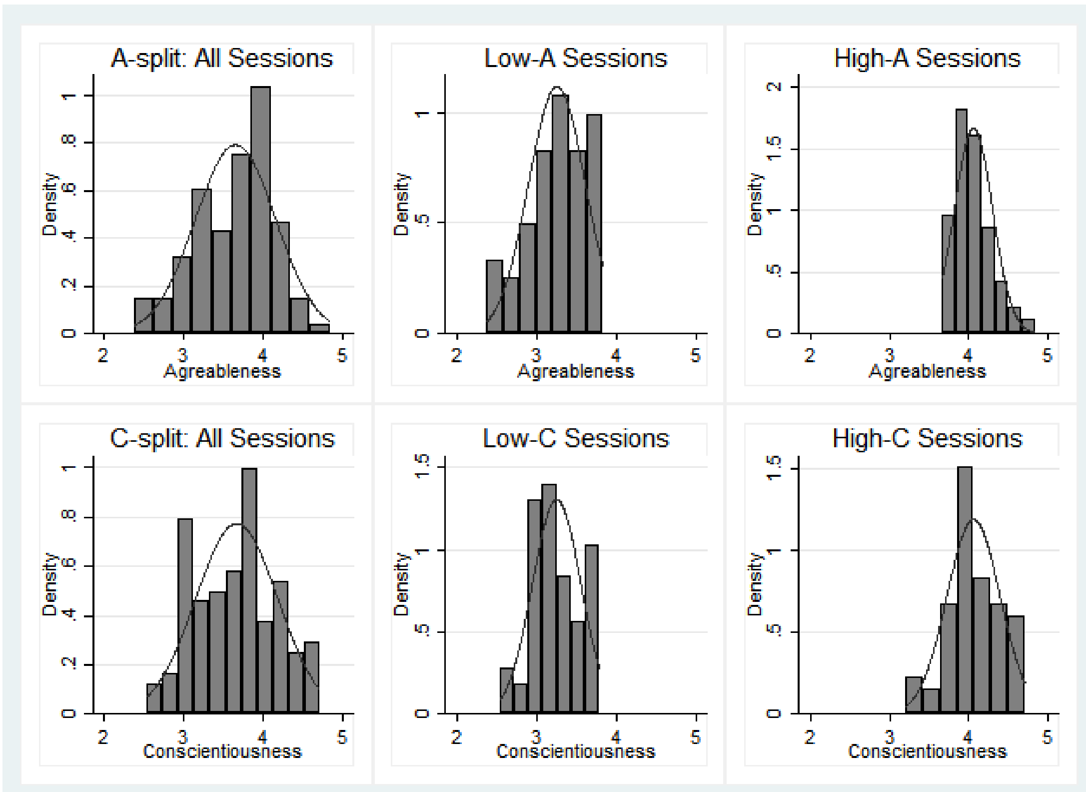


FIGURE A.4. **Distribution of the Raven Scores for the IQ-split BoSC treatment.** The top panel depicts the distribution of the entire sample. The bottom panel presents the distributions in the separate IQ sessions.

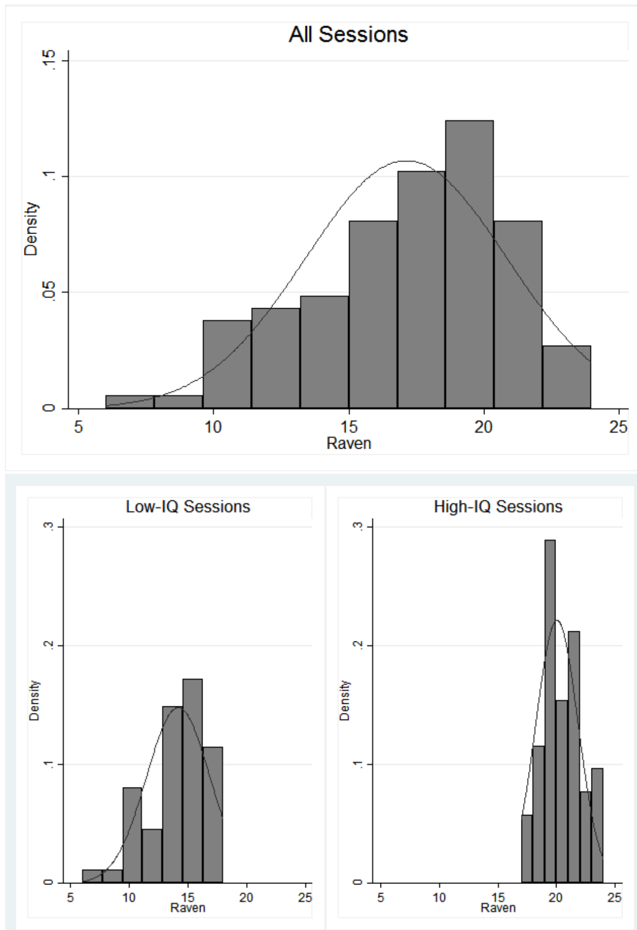
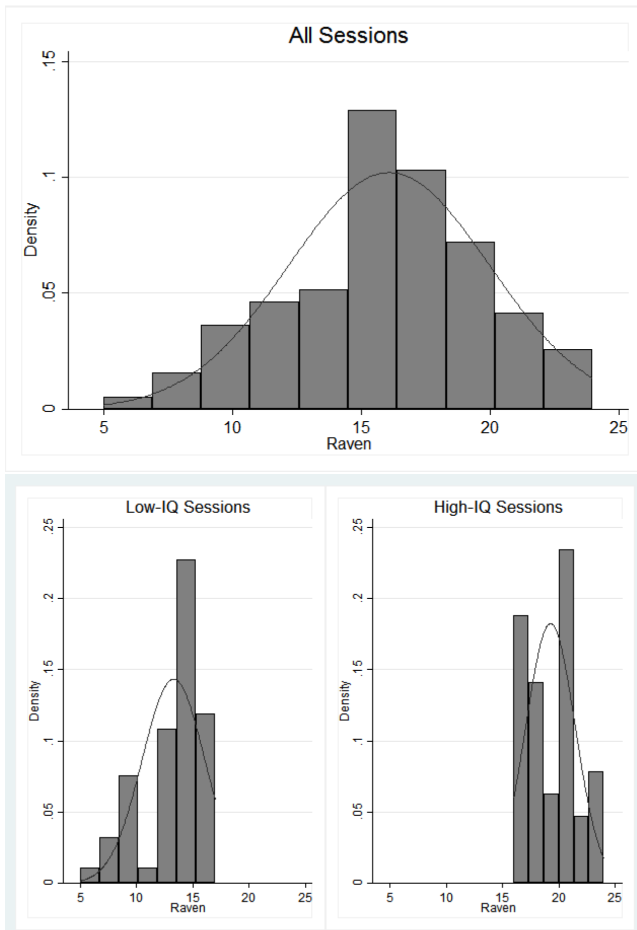


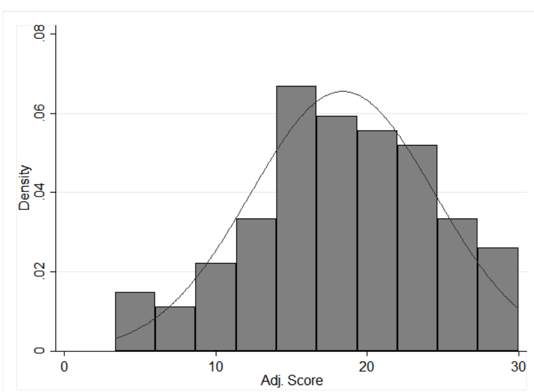
FIGURE A.5. **Distribution of the Raven Scores for the IQ-split BoS & SH treatment.** The top panel depicts the distribution of the entire sample. The bottom panel presents the distributions in the separate IQ sessions.



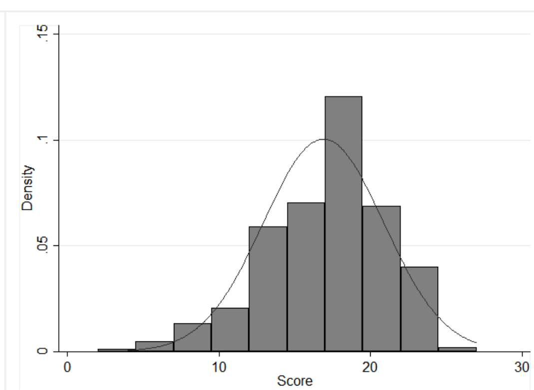
Appendix I. Comparison of IQ Scores with Representative UK Population

We can compare the distribution of Raven scores of the subjects in our sample with the standardization sample of the Advanced Progressive Matrices. To do this, we have to make two adjustments: first because our subjects had fewer questions (30 instead of 36), and second because they had a time constraint of 30 seconds per test. This is a strict constraint, allowing 15 minutes in total; for example even the timed tests available in the APM manual the time limit is 30 minutes. The first can be achieved with a simple rescaling (ignoring the possible difference in difficulty among the tests). The second is harder, and we will need to just keep it in mind when we compare the samples. The adjusted score of the standardization sample has a mean of 18.37, standard deviation 6.088. Our subjects, perform at least as well, and perhaps better, considering the tight time constraint. This is to be expected, since the sample is selected among college students. The raven mean score across all treatments is 16.89 with a standard deviation of 3.974.

Figure A.6. **Comparison of Sample Raven Scores.** The two figures below compare the distribution of raven scores in the standardization UK sample of the APM and our sample raven scores across all treatments.



(A) Standardization Sample



(B) Our Sample

Appendix J. Differences between Characteristic Groups

Table A.61. **Comparing Variables across IQ-split High Continuation Probability Sessions**

Differences between the means of the main variables

Variable	Low IQ	High IQ	Differences	Std. Dev.	N
Age	22.35938	21.24242	1.116951	.7251282	130
Female	.625	.5	.125	.0870282	130
Openness	3.642188	3.595455	.0467329	.1016391	130
Conscientiousness	3.399306	3.405724	-.0064184	.1198434	130
Extraversion	3.349609	3.244318	.1052912	.1308186	130
Agreeableness	3.840278	3.765993	.0742845	.1060675	130
Neuroticism	2.910156	2.835227	.074929	.1361939	130
Risk Aversion	5.5625	5.5	.0625	.2865234	100
Testing equal means for all above variables fails to reject null of equal means: $p - value = 0.2957$					
Raven	14.39063	20.10606	-5.715436***	.4170821	130
Economist†	.25	.5714286 .	-.3214286*	.1753537	30
Final Profit	2674.297	4675.303	-2001.256***	261.93	130
Periods	80.0625	116.4848	-36.42235***	5.120332	130
Profit per Period	33.23248	38.546693	-5.314214***	.8970977	130

† only sessions 1 and 2

Culture Representation across IQ Sessions

Culture Groupings	Proportion in Low IQ	Proportion in High IQ	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.375	.2878788	.0871212	.082843	43
Germanic Europe	.015625	.0454545	-.0298295	.0304175	4
Latin Europe	.03125	.0606061	-.0293561	.0370045	6
Confucian Asia	.203125	.1818182	.0213068	.0696529	25
Southern Asia	.296875	.3333333	-.0364583	.0820891	41
Arab Cultures	.015625	0	.015625	.0153846	1
Eastern Europe	.03125	.0757576	-.0445076	.0397113	7
Sub-Sahara Africa	.03125	.0151515	.0160985	.0265076	3
Others					none

Note: * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

Table A.62. **Comparing Variables across IQ-split with Low Continuation Probability Sessions**

Differences between the means of the main variables

Variable	Low IQ	High IQ	Differences	Std. Dev.	N
Age	21.19643	21.01852	.1779101	.4517162	110
Female	.5892857	.6111111	-.0218254	.0942731	110
Openness	3.653571	3.633333	.0202381	.1158957	110
Conscientiousness	3.414683	3.532922	-.1182393	.1055989	110
Extraversion	3.310268	3.289352	.020916	.1390815	110
Agreeableness	3.700397	3.751029	-.050632	.1064611	110
Neuroticism	2.950893	2.854167	.0967262	.1402351	110
Risk Aversion	5.547619	5.631579	-.0839599	.3578302	80
Testing equal means for all above variables fails to reject null of equal means: $p - value = 0.7653$					
Raven	13.76786	19.88889	-6.121032***	.4230287	110
Final Profit	2989.179	5035.963	-2046.784***	397.2878	110
Periods	100	155.4074	-55.40741***	10.36334	110
Profit per Period	28.94046	31.29716	-2.356697***	.6889489	110

Culture Representation across IQ Sessions

Culture Groupings	Proportion in Low IQ	Proportion in High IQ	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.3035714	.2777778	.0257937	.0873865	32
Germanic Europe	.0178571	.037037	-.0191799	.0312965	3
Latin Europe	.0535714	.037037	.0165344	.0400622	5
Confucian Asia	.1607143	.2037037	-.0429894	.0741239	20
Southern Asia	.3035714	.2777778	.0257937	.0873865	32
Arab Cultures	.0178571	0.0185185	-.0006614	.0257171	2
Eastern Europe	.0535714	.1481481	-.0945767	.0570229	11
Sub-Sahara Africa	.0714286	0	.0714286**	.0353697	4
Others	.0178571	0	.0178571	.0181878	1

Note: * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

Table A.63. **Comparing Variables across Combined Sessions**

Differences between the means of the main variables

Variable	Odd Sessions	Even Sessions	Differences	Std. Dev.	N
Age	20.98148	20.80357	.1779101	.5632195	110
Female	.7962963	.6428571	.1534392*	.0853268	110
Openness	3.590741	3.5	.0907407	.1122133	110
Conscientiousness	3.545268	3.331349	.2139183*	.1156676	110
Extraversion	3.425926	3.25	.1759259	.1287746	110
Agreeableness	3.759259	3.678571	.0806878	.1153316	110
Neuroticism	2.837963	3.078125	-.240162*	.1293729	110
Raven	15.90741	16.28571	-.3783069	.8485822	110
Risk Aversion	5.555556	5.839286	-.2837302	.271521	110
Testing equal means for all above variables fails to reject null of equal means: $p-value = 0.3251$					
Final Profit	9058.852	8294.5	764.3519.271*	431.7188	110
Periods	234.2963	210.5714	23.72487***	8.56799	110
Profit per Period	38.48076	38.79133	-.3105663	.8429733	110

Culture Representation across Combined Sessions

Culture Groupings	Proportion in Odd Sessions	Proportion in Even Sessions	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.4259259	.5	-.0740741	.0957211	51
Germanic Europe	.037037	.0178571	.0191799	.0312965	3
Latin Europe	.037037	.0714286	-.0343915	.0435854	6
Confucian Asia	.1296296	.0535714	.0760582	.0548485	10
Southern Asia	.3148148	.25	.0648148	.0863699	31
Arab Cultures					none
Eastern Europe	.0555556	.0535714	.0019841	.0437105	6
Sub-Sahara Africa	0	.0178571	-.0178571	.0181878	1
Others	0	.0357143	-.0357143	.0254866	2

Note: * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

Table A.64. **Comparing Variables across A-split Sessions**

Differences between the means of the main variables

Variable	Low A	High A	Differences	Std. Dev.	N
Age	20.65517	21.03571	-.3806519	.7922812	114
Female	.4827586	.7142857	-.23315271**	.0901115	114
Openness	3.558621	3.664286	-.105665	.1112717	114
Conscientiousness	3.444444	3.388889	.0555556	.1162997	114
Extraversion	3.293103	3.151786	.1413177	.1277033	114
Neuroticism	3.114224	3.158482	-.044258	.1401527	114
Raven	16.56897	16.85714	-.2881773	.7730721	114
Risk Aversion	5.62069	5.178571	.4421182	.294027	114
Testing equal means for all above variables fails to reject null of equal means: $p - value = 0.2001$					
Agreeableness	3.25431	4.054316	-.8000052***	.0571786	114
Final Profit	7111.552	6974.071	137.4803	475.5691	114
Periods	197.5517	177.6429	19.90887	12.16424	114
Profit per Period	36.71155	38.22486	-1.513313*	.8115282	114

Culture Representation across A Sessions

Culture Groupings	Proportion in Low A	Proportion in High A	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.3275862	.3035714	.0240148	.0878287	36
Germanic Europe	.0172414	.0178571	-.0006158	.0248145	2
Latin Europe	.1034483	.0357143	.067734	.0478554	8
Confucian Asia	.1724138	.1607143	.0116995	.0704317	19
Southern Asia	.2586207	.3392857	-.080665	.0861338	34
Arab Cultures	0	0.0357143	-.0357143	.024584	2
Eastern Europe	.0689655	.0714286	-.0024631	.048281	8
Sub-Sahara Africa	.0517241	0.0178571	.0350877	.0346308	4
Others	0	0.0178571	-.0178571	.0175438	1

Note: * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

Table A.65. **Comparing Variables across C-split Sessions**

Differences between the means of the main variables

Variable	Low C	High C	Differences	Std. Dev.	N
Age	20.36667	21.82258	-1.455914**	.6692754	122
Female	.65	.5322581	.1177419	.0891571	122
Openness	3.275	3.7	-.425***	.1171683	122
Extraversion	3.172917	3.247984	-.0750672	.1327237	122
Agreeableness	3.531481	3.806452	-.2749702***	.1048788	122
Neuroticism	3.28125	2.810484	.4707661***	.1416807	122
Raven	18.55	17.54839	1.001613	.6517364	122
Risk Aversion	5.683333	5.322581	.3607527	.372067	122
Testing equal means for all above variables rejects null of equal means: $p - value = 0.0002$					
Conscientiousness	3.25	4.05578	-.8057796***	.058155	122
Final Profit	5722.533	5917.871	-195.3376	201.202	122
Periods	137.8333	158.3226	-20.48925***	3.390004	122
Profit per Period	41.58246	37.07793	4.504527***	.7755027	122

Culture Representation across C Sessions

Culture Groupings	Proportion in Low C	Proportion in High C	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.1	.1612903	-.0612903	.0613839	16
Germanic Europe					none
Latin Europe	.0333333	.0322581	.0010753	.0325167	4
Confucian Asia	.1833333	.1612903	.022043	.0689006	21
Southern Asia	.55	.3709677	.1790323**	.0895124	56
Arab Cultures	0	0.016129	-.016129	.01633978	1
Eastern Europe	.1	.2096774	-.1096774*	.065401	19
Sub-Sahara Africa	.016667	0.016129	.0005376	.0231869	2
Others	.016667	0.0322581	-.0155914	.0282437	3

Note: * $p - value < 0.1$, ** $p - value < 0.05$, *** $p - value < 0.01$

TABLE A.66. **Comparing Variables across IQ-split BoSC Sessions**

Differences between the means of the main variables

Variable	Low IQ	High IQ	Differences	Std. Dev.	N
Age	20.76923	20.38462	.3846154	.5830494	104
Female	.6346154	.6346154	0	.0953587	104
Openness	3.521154	3.601923	-.0807692	.1179842	104
Conscientiousness	3.630342	3.235043	.3952991***	.1376939	104
Extraversion	3.201923	3.134615	.0673077	.1447452	104
Agreeableness	3.688034	3.638889	.0491453	.120359	104
Neuroticism	3.125	3.137019	-.0120192	.1511667	104
Risk Aversion	5.307692	5.826923	-.5192308	.349811	104
Testing equal means for all above variables fails to reject null of equal means: $p-value = 0.1727$					
Raven	13.92308	20.03846	-6.115385***	.5047345	104
Final Profit	4069.308	5513.308	-1444***	159.2891	104
Periods	122.3077	147.4615	-25.15385***	3.30341	104
Profit per Period	32.92109	37.53997	-4.618882***	.7993098	104

Culture Representation across IQ Sessions

Culture Groupings	Proportion in Low IQ	Proportion in High IQ	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.2692308	.3846154	-.1153846	.0921882	34
Germanic Europe	.019208	.0576923	-.0384615	.0378917	4
Latin Europe	.0384615	.0192308	.0192308	.0330902	3
Confucian Asia	.2307692	.0192308	.2115385***	.0620524	13
Southern Asia	.2884615	.4423077	-.15384622	.0941341	38
Arab Cultures	.0384615	0	.0384615	.0269285	2
Eastern Europe	.0769231	.0384615	.0384615	.0460154	6
Sub-Sahara Africa	.0192308	0	.0192308	.0192308	1
Others	.0192308	0.0384615	-.0192308	.0330902	3

Note: * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

TABLE A.67. **Comparing Variables across IQ-split BoS & SH Sessions**

Differences between the means of the main variables

Variable	Low IQ	High IQ	Differences	Std. Dev.	N
Age	21.40741	19.6667	1.740741*	1.035291	102
Female	.462963	.5625	-.099537	.0996584	102
Openness	3.462963	3.610417	-.1474537	.1202257	102
Conscientiousness	3.469136	3.456019	.0131173	.1240174	102
Extraversion	3.280093	3.296875	-.0167824	.1682359	102
Agreeableness	3.820988	3.80787	.0131173	.1160543	102
Neuroticism	2.662037	2.950521	-.2884838*	.1501934	102
Risk Aversion	4.592593	5.333333	-.7407407**	.3159701	102
Testing equal means for all above variables fails to reject null of equal means: $p-value = 0.0744$					
Raven	13.27778	19.25	-5.972222***	.5002121	102
SH - Final Profit	4667.944	4703.917	-35.97222	154.7415	102
SH - Periods	104.5185	103.8333	.6851852	2.653468	102
SH - Profit per Period	44.50749	45.2491	-.7416123	.7471558	102
BoS - Final Profit	2465.778	2812.021	-346.2431***	92.32837	102
BoS - Periods	106.4815	117.8333	-11.35185***	1.659725	102
BoS - Profit per Period	23.05537	23.867	-.8116353	.7011031	102

Culture Representation across IQ Sessions

Culture Groupings	Proportion in Low IQ	Proportion in High IQ	Difference	Std. Dev.	Total in Sample
Anglo Cultures	.4259259	.4166667	.0092593	.098929	43
Germanic Europe	.0185185	0	.0185185	.0198627	1
Latin Europe	.037037	0	.037037	.02782238	2
Confucian Asia	.0555556	.2708333	-.2152778***	.0696074	16
Southern Asia	.3148148	.1666667	.1481481*	.0848953	25
Arab Cultures	0	.0208333	-.0208333	.0196296	1
Eastern Europe	.0185185	.0833333	-.0648148	.0427684	5
Sub-Sahara Africa	.0740741	.0208333	.05322407	.0429278	5
Others	.0555556	0	.0555556*	.0333912	3

Note: * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

Appendix K. PD: results per sessions

K.1. **IQ-Split treatments.** The panel A of figure A.7 shows that the same pattern is replicated in each pair of contiguous sessions with high continuation probability. In sessions 3 and 4 (top right-hand panel) the divergence is less significant. This is due in part to the fact that in session 3 a particularly slow subject prevented the group from playing a sufficiently large number of repeated games. However, the dashed blue line in the figure, representing the trend estimate, shows that divergence was starting to take place in a way consistent with the other sessions.

The panel B of figure A.7 refer to the sessions with low continuation probability and shows that that cooperation always decline from about 50% in the low IQ sessions, but the high IQ sessions we have mixed results. In two sessions (sessions 3 and 7) cooperations seem to increase, and in one case (session 7) it reaches almost full cooperation. In the other 2 high IQ sessions (sessions 1 and 5) cooperation decline in a similar way than in the sessions with the low IQ subjects.

In figure A.8 we report the cooperation rates in two sessions where we informed the subjects their own Raven scores and the session average Raven score, also in this case the cooperation rates in the two groups follow a similar pattern. This data has not been included in the analysis in the main text.

K.2. **Combined treatments.** Figure A.9 shows that a similar pattern is replicated in almost all 8 sessions. We can observe an increasing trend in all but 1 session, and a trendline for the high IQ almost always above the one for the low IQ.

K.3. **C-Split treatments.** The panel A of Figure A.10 presents the cooperation rates by sessions in the low-C and high-C treatments. The low-C sessions feature a high level of cooperation, especially toward the end, where in 3 cases cooperation is almost 100% and only in one case (session 2) it is just below 80%. In the high-C sessions cooperation is generally lower and in session 5 it is very low, below 40% at the end. We found instructive to present the session aggregated by treatment as in figure A.11. Here we see that while the low-C sessions tend to have a similar behaviour starting around 50% cooperation rates and going up (top right panel), in the high-C sessions (top left panel) session 5 follows a different patten oscillating around 40% rates. Accordingly, in figure 10 we only aggregated more homogeneous the high-C sessions and presented session 5 on its own.

K.4. **A-Split treatments.** The panel B of Figure A.10 presents the cooperation rates by sessions in the low-A and high-A treatments. The high-A sessions feature a pattern of cooperation not very different from the low-A sessions. The only difference is represented by the session 7 (high-A session), where cooperation collapsed at the beginning and remained at a low level throughout the entire session.

As before, we found instructive to present the session aggregated by treatment as in figure A.11, from where we can notice that session 7 (the continuous blue line in the left bottom panel). Accordingly, in figure 11 we only aggregated more homogeneous the high-C sessions and presented session 7 on its own.

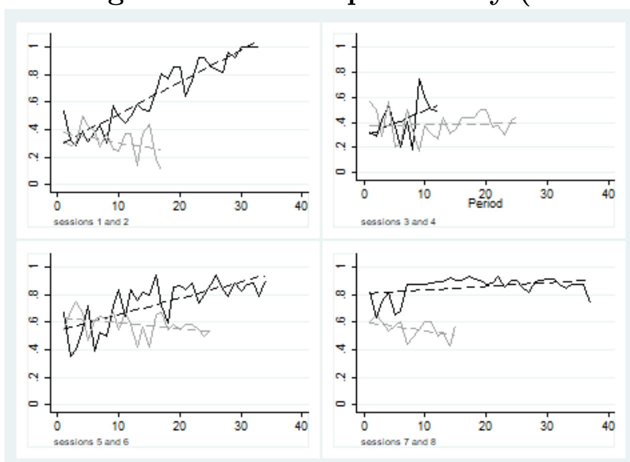
Appendix L. BoSC, BoS and SH: results per sessions

Figure A.14 shows that a similar pattern is replicated in each pair of contiguous sessions. We observe that the trend-line of the compromise outcome among the high IQ is almost always above the one in the low IQ with a non converging pattern, apart from session 7, where the low IQ seem to eventually achieve the same rates than the high IQ.

Finally in A.15 and A.16, we report the pattern of cooperation per sessions in the BOS IQ-Spilt and SH IQ-Split treatments. In both we can observe a similar behaviour across the different IQ groups.

Figure A.7. **PD in IQ-Split sessions: Average cooperation per supergame in all different sessions** The grey lines in each panel represent the average cooperation per period among all subjects of the corresponding low IQ session and the black lines represent the average (over pairs of subjects) cooperation per supergame among all subjects of the corresponding high IQ session. The straight dashed lines represent the linear trend.

Panel A: High continuation probability (Delta=0.75)



Panel B: Low continuation probability (Delta=0.50)

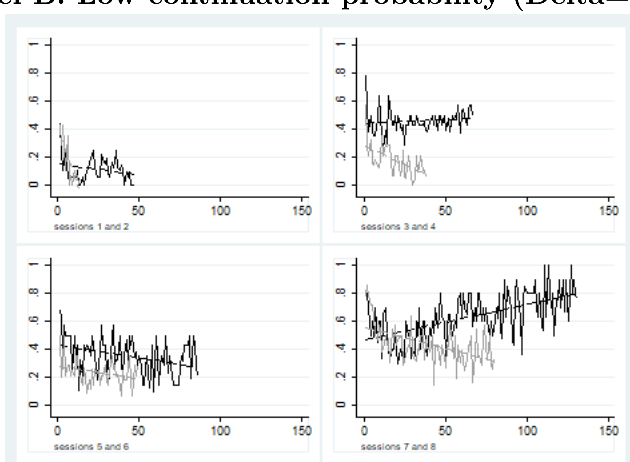


FIGURE A.8. **PD in IQ-Split sessions: Average cooperation per supergame in all different sessions.** This is data from additional sessions where information was provided on scores achieved in the Raven test as well as the group's average. The grey lines in represent the average cooperation per period among all subjects of the corresponding low IQ session and the black lines represent the average (over pairs of subjects) cooperation per supergame among all subjects of the corresponding high IQ session. The straight dashed lines represent the linear trend.

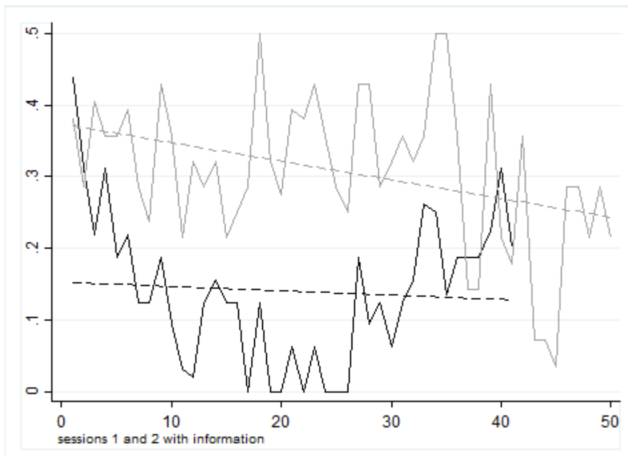


FIGURE A.9. **PD in Combined sessions: Average cooperation per supergame in all the different sessions** The dashed lines in each panel represent the average cooperation per period among all subjects of the corresponding session. The grey lines represent the trends among the low IQ subjects and the black lines represent the trends among the high IQ subjects.

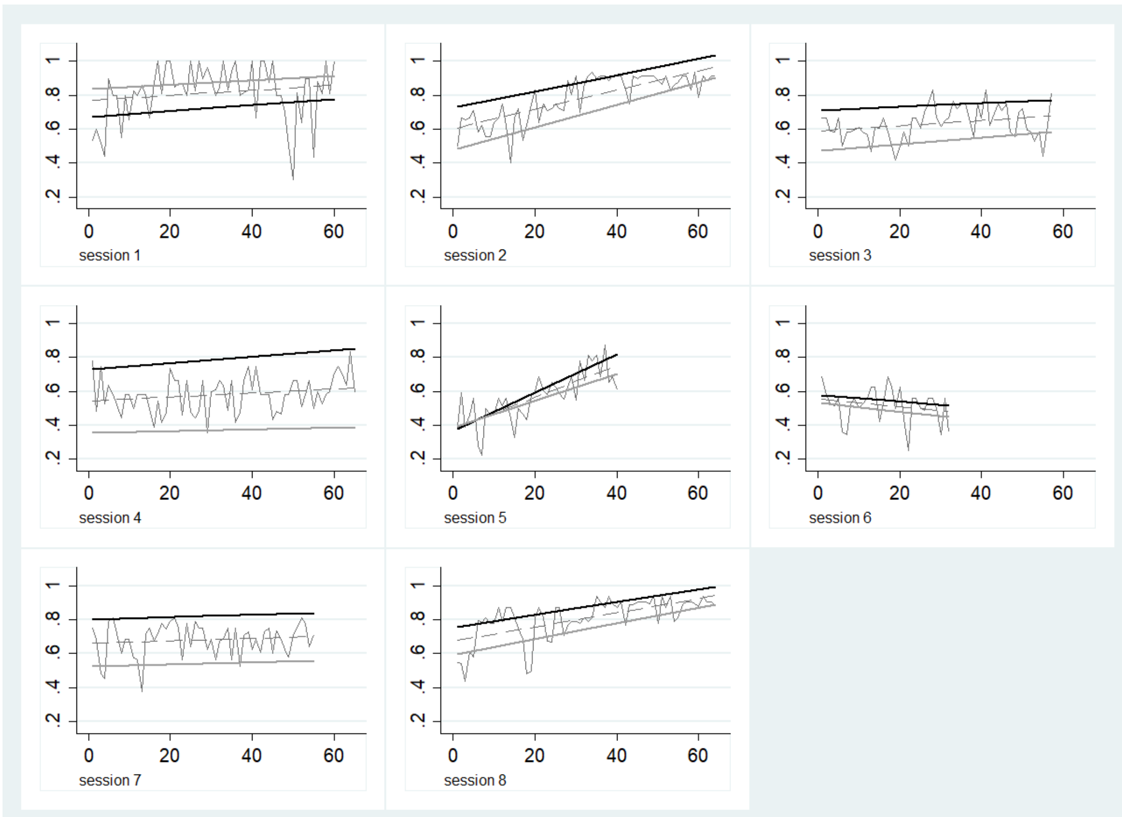
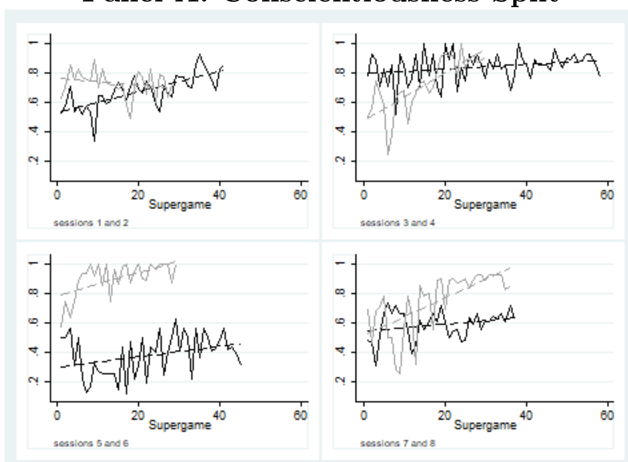


FIGURE A.10. **PD in personality split sessions: Average co-operation rates per supergame in all different sessions** The grey lines in each panel represent the average cooperation per period among all subjects of the corresponding low Conscientiousness and low Agreeableness sessions and the black lines represent the average cooperation per supergame among all subjects of the corresponding high Conscientiousness and high Agreeableness sessions. The straight dashed lines represent the linear trend.

Panel A: Conscientiousness-Split



Panel B: Agreeableness-Split

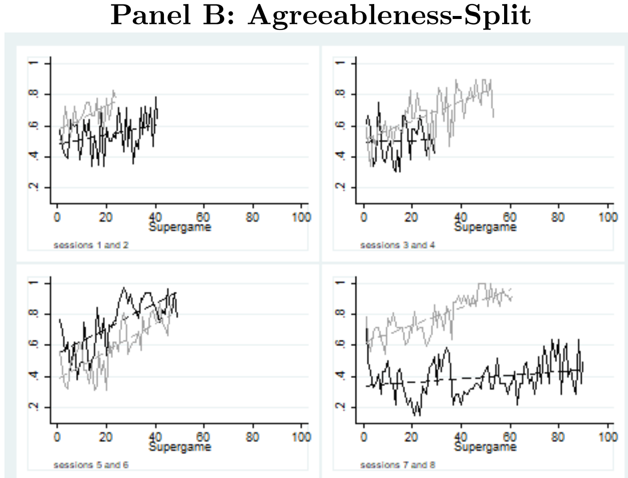


FIGURE A.11. **PD in personality split sessions: cooperation rates per supergame in all different sessions aggregated by treatments and groups** The grey lines in each panel represent the average cooperation per period among all subjects of the corresponding low Agreeableness and low Conscientiousness sessions. The black lines represent the average cooperation per period among all subjects of the corresponding high Agreeableness high Conscientiousness sessions. The straight dashed lines represent the linear trends

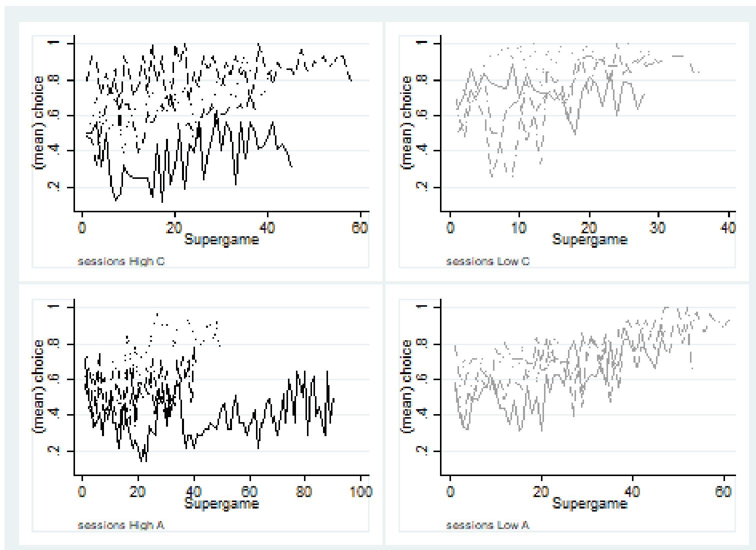


Figure A.12. **PD with High Continuation Probability and combined Sessions: Cooperation and payoffs per period in the low and high Conscientiousness partitions.** The top panels report the averages computed over observations in successive blocks of five supergames of all sessions, aggregated separately. The dashed lines represent the average cooperation in each block; the black and grey lines report the average cooperation for high and low C subjects in each block. The bottom panels reports the average of cooperation and payoffs in the first round (of a repeated game) among the two groups. Bands represent 95% confidence intervals.

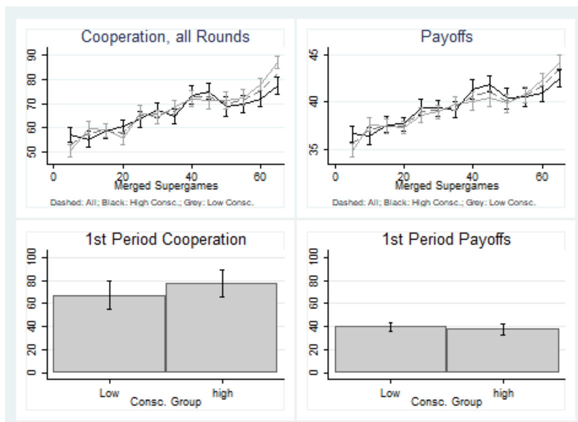


Figure A.13. **PD with High Continuation Probability and combined Sessions: Cooperation and payoffs per period in the low and high Agreeableness partitions** The top panels report the averages computed over observations in successive blocks of five supergames of all sessions, aggregated separately. The dashed lines represent the average cooperation in each block; the black and grey lines report the average cooperation for high and low A subjects in each block. The bottom panels reports the average of cooperation and payoffs in the first round (of a repeated game) among the two groups. Bands represent 95% confidence intervals.

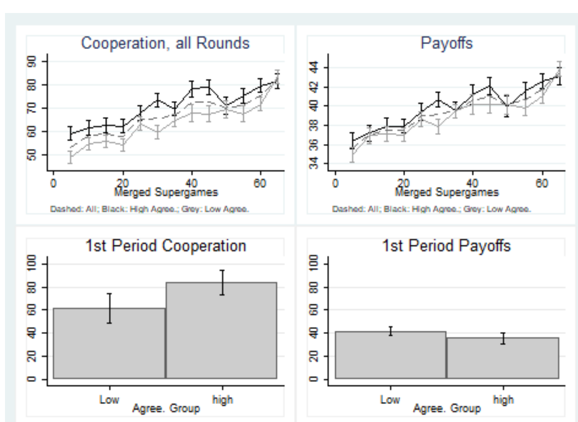


FIGURE A.14. **BoSC: Average compromise outcome per supergame in all the different sessions.** The grey lines in each panel represent the compromise outcome per period among all pairs of the corresponding low Raven session and the black lines represent the percentage of subjects achieving a compromise outcome per supergame among all subjects of the corresponding high Raven session. The straight dashed lines represent the linear trends

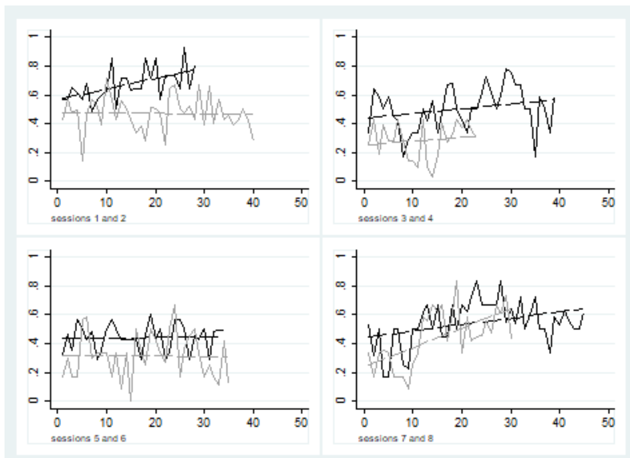
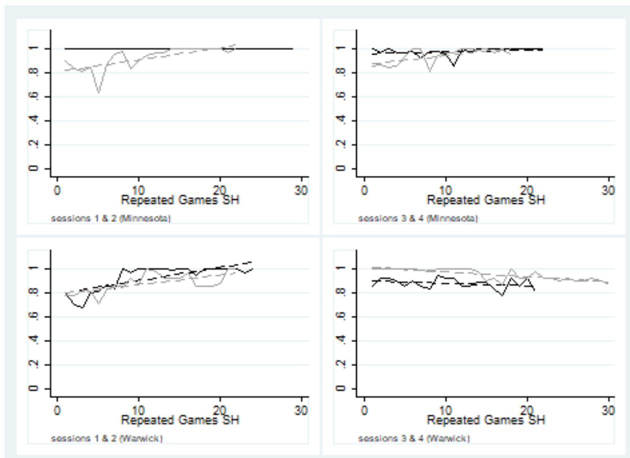


FIGURE A.15. **Average coordination per supergame in all the different sessions of the BoS.** The grey lines in each panel represent the average coordination outcome per period among all pairs of the corresponding low Raven session and the black lines represent the average cooperation per period among all subjects of the corresponding high Raven session.

Figure A.16. **Average coordination to stag-stag outcome per supergame in all the different sessions of the SH game.** The grey lines in each panel represent the average Stag-Stag outcome per period among all pairs of the corresponding low Raven session and the black lines represent the average cooperation per period among all subjects of the corresponding high Raven session.



Appendix M. Strategy Tables

TABLE A.68. **Individual strategies in the different IQ sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (PD with High Continuation Probability).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p-values < 0.1$, ** $p-values < 0.05$ **, $p-values < 0.01$ ***

IQ Session	High	Low	High	Low	High	Low
Repeated Games	Last 5	Last 5	First 5	First 5	Equiv. Experience	Equiv. Experience
Strategy						
Always Cooperate	0.0886	0.0267	0	0.0793	0.0441	0.0754
	(0.1059)	(0.0542)	(0.0187)	(0.0626)	(0.0670)	(0.0604)
Always Defect	0.0417	0.4434***	0.3880***	0.3651***	0.2121***	0.4270***
	(0.0353)	(0.1027)	(0.0909)	(0.0836)	(0.0814)	(0.0983)
Grim after 1 D	0.3704**	0.0807	0.3899***	0.2109**	0.2440	0.2091**
	(0.1458)	(0.0618)	(0.1120)	(0.1026)	(0.1686)	(0.0881)
Tit for Tat (C first)	0.2976**	0.4492***	0.2221**	0.3132***	0.4998***	0.2885***
	(0.1417)	(0.0807)	(0.1048)	(0.0964)	(0.1436)	(0.0963)
Win Stay Lose Shift	0.0701	0	0	0.0315	0	0
	(0.1295)	(0.0267)	(0.0372)	(0.0404)	(0.0043)	(0.0157)
Tit For Tat (after D C C)††	0.1315	0	0	0	0	0
Gamma	0.3249***	0.4154***	0.5402***	0.5813***	0.3137***	0.4204***
	(0.0764)	(0.0378)	(0.0487)	(0.0682)	(0.0360)	(0.0433)
beta	0.956	0.917	0.864	0.848	0.960	0.915
Average Rounds	4.83	5.13	2.28	3.60	3.44	5.29
N. Subjects	48	64	66	64	66	64
Observations	1,090	1,676	966	1,288	1,204	1,460

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.

†† Tit for Tat (after D C C) stands for the Tit for Tat strategy that punishes after 1 defection but only returns to cooperation after observing cooperation twice from the partner.

TABLE A.69. **Individual strategies in the different IQ sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (PD with Low Continuation Probability).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p-values < 0.1$, ** $p-values < 0.05$ **, $p-values < 0.01$ ***

IQ Session	High	Low	High	Low	High	Low
Repeated Games	Last 5	Last 5	First 5	First 5	Equiv. Experience	Equiv. Experience
Strategy						
Always Cooperate	0	0	0.0598	0.1091	0.0817	0.0370
	(0.0530)	(0.0480)	(0.0735)	(0.1109)	(0.0607)	(0.0420)
Always Defect	0.6019***	0.7719***	0.4920***	0.5286***	0.6168***	0.7375***
	(0.1755)	(0.1118)	(0.1300)	(0.1668)	(0.0952)	(0.1365)
Grim after 1 D	0.2134	0.0077	0.2557	0	0.0164	0.2255*
	(0.2010)	(0.0739)	(0.1684)	(0.0748)	(0.1498)	(0.1364)
Tit for Tat (C first)	0	0.1437	0.0776	0.1207	0.2346*	0
	(0.1232)	(0.1202)	(0.1094)	(0.1167)	(0.1305)	(0.0009)
Win Stay Lose Shift	0	0	0	0.0560	0	0
	(0.0041)	(0.0053)	(0.0509)	(0.0975)	(0.0547)	(0.0255)
Tit For Tat (after D C C)††	0.1847	0.0767	0.1149	0.1856	0.0505	0
Gamma	0.4413***	0.4489***	0.6485***	0.6466***	0.4663***	0.3812***
	(0.0713)	(0.0564)	(0.0723)	(0.0778)	(0.0451)	(0.0408)
beta	0.906	0.903	0.824	0.824	0.895	0.932
Average Rounds	1.54	1.9	1.79	1.83	2.06	1.42
N. Subjects	54	42	54	56	54	42
Observations	424	420	454	560	594	336

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.
†† Tit for Tat (after D C C) stands for the Tit for Tat strategy that punishes after 1 defection but only returns to cooperation after observing cooperation twice from the partner.

TABLE A.70. **Individual strategies in the different IQ partitions in the last 5, first 5 and latest 5 SGs of equivalent experience (PD Combined).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p-values < 0.1$, ** $p-values < 0.05$ **, $p-values < 0.01$ ***

IQ Partition	High	Low	High	Low	High	Low
Repeated Games	Last 5	Last 5	First 5	First 5	Equiv. Experience	Equiv. Experience
Strategy						
Always Cooperate	0.0544	0.1026	0.0138	0.0502	0.0385	0
	(0.0465)	(0.0778)	(0.0512)	(0.0577)	(0.0806)	(0.0301)
Always Defect	0.0755	0.2353***	0.1896***	0.3337***	0.0942	0.2897***
	(0.0628)	(0.0782)	(0.0699)	(0.0685)	(0.0632)	(0.0826)
Grim after 1 D	0.3337	0.4015***	0.2145**	0.2412**	0.0957	0.3029**
	(0.2897)	(0.1301)	(0.0855)	(0.1025)	(0.1584)	(0.1274)
Tit for Tat (C first)	0.3115*	0.1859	0.5822***	0.2404**	0.5773**	0.3097**
	(0.1699)	(0.1495)	(0.0913)	(0.1077)	(0.2239)	(0.1473)
Win Stay Lose Shift	0	0	0	0	0	0
	(0.0000)	(0.0277)	(0.0020)	(0.0074)	(0.0017)	(0.0042)
Tit For Tat (after D C C)††	0.2249	0.0748	0	0.1345	0.1944	0.0977
Gamma	0.2713***	0.3719***	0.5059***	0.6397***	0.3007***	0.3978***
	(0.0350)	(0.0521)	(0.0478)	(0.0768)	(0.0510)	(0.0406)
beta	0.976	0.936	0.878	0.827	0.965	0.925
Average Rounds	6.21	6.25	4.14	4.16	4.74	4.84
N. Subjects	53	57	53	57	53	57
Observations	1,366	1,480	1,367	1,473	1,036	1,128

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.
†† Tit for Tat (after D C C) stands for the Tit for Tat strategy that punishes after 1 defection but only returns to cooperation after observing cooperation twice from the partner.

TABLE A.71. **Individual strategies in the different Agreeableness sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (PD with A-Split).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p-values < 0.1$, ** $p-values < 0.05$ **, $p-values < 0.01$ ***

Agreeableness Session Repeated Games	High Last 5	Low Last 5	High First 5	Low First 5	High Equiv. Experience	Low Equiv. Experience
Strategy						
Always Cooperate	0.1421	0.2469**	0.0846	0.1514***	0.0499	0.1446**
	(0.1147)	(0.1030)	(0.0606)	(0.0543)	(0.0591)	(0.0731)
Always Defect	0.1344	0.1210**	0.3303***	0.4135***	0.2119***	0.2951***
	(0.0897)	(0.0553)	(0.0821)	(0.0872)	(0.0731)	(0.1047)
Grim after 1 D	0.2629	0.1824	0.1478	0.1172*	0.2325*	0.2016*
	(0.1771)	(0.1276)	(0.1125)	(0.0678)	(0.1201)	(0.1057)
Tit for Tat (C first)	0.4606***	0.4497***	0.3063***	0.1814**	0.4910***	0.3587***
	(0.1538)	(0.1128)	(0.1087)	(0.0738)	(0.1239)	(0.1104)
Win Stay Lose Shift	0	0	0	0.0085	0	0
	(0.0234)	(0.000)	(0.0536)	(0.0331)	(0.0244)	(0.1104)
Tit For Tat (after D C C)††	0	0	0.1311	0.1279	0.0148	0
Gamma	0.4318***	0.3936***	0.6380***	0.6519***	0.3509***	0.4258***
	(0.0564)	(0.0581)	(0.0872)	(0.0810)	(0.0376)	(0.0462)
beta	0.910	0.927	0.827	0.823	0.945	0.913
Average Rounds	2.22	3.82	3.40	3.62	5.95	3.30
N. Subjects	56	58	56	58	56	58
Observations	682	1,082	778	866	1,668	1,064

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.

†† Tit for Tat (after D C C) stands for the Tit for Tat strategy that punishes after 1 defection but only returns to cooperation after observing cooperation twice from the partner.

TABLE A.72. **Individual strategies in the different Conscientiousness sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (PD with C-split).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p-values < 0.1$, ** $p-values < 0.05$ **, $p-values < 0.01$ ***

Conscientiousness Session	High	Low	High	Low	High	Low
Repeated Games	Last 5	Last 5	First 5	First 5	Equiv. Experience	Equiv. Experience
Strategy						
Always Cooperate	0.1726*	0.1572	0.0883	0.0236	0.0701	0.1184
	(0.1022)	(0.1263)	(0.0709)	(0.0697)	(0.0606)	(0.1018)
Always Defect	0.2048**	0.0500	0.3108***	0.1215*	0.2293***	0.0500
	(0.0808)	(0.0364)	(0.0990)	(0.0687)	(0.0787)	(0.0356)
Grim after 1 D	0.0960	0.3110	0.0886	0.3358**	0.1523*	0.4216*
	(0.0944)	(0.2350)	(0.0990)	(0.1401)	(0.0874)	(0.2197)
Tit for Tat (C first)	0.4138***	0.1241	0.3561***	0.4409***	0.5112***	0.2371
	(0.1270)	(0.1752)	(0.1206)	(0.1190)	(0.1174)	(0.2132)
Win Stay Lose Shift	0.0211	0.0146	0	0.0782	0	0.0246
	(0.0368)	(0.0530)	(0.0529)	(0.0843)	(0.0049)	(0.0687)
Tit For Tat (after D C C)††	0.0918	0.3430*	0.1562	0	0.0371	0.1482
Gamma	0.3872***	0.3060***	0.5574***	0.5298***	0.4210***	0.2817***
	(0.0400)	(0.0448)	(0.0539)	(0.1024)	(0.0396)	(0.0380)
beta	0.930	0.963	0.857	0.868	0.915	0.972
Average Rounds	4.78	5.90	5.14	4.93	3.96	4.88
N. Subjects	62	60	62	60	62	60
Observations	1,460	1,808	980	1,190	1,476	1,462

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.
†† Tit for Tat (after D C C) stands for the Tit for Tat strategy that punishes after 1 defection but only returns to cooperation after observing cooperation twice from the partner.

TABLE A.73. **Individual strategies in the different IQ sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (SH).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p - values < 0.1$, ** $p - values < 0.05$ **, $p - values < 0.01$ ***

IQ Session Repeated Games	High Last 5	Low Last 5	High First 5	Low First 5	High Equiv. Experience	Low Equiv. Experience
Strategy						
Always Stag	0.1749	0.3742*	0.5550***	0.3502***	0.4786*	0.5720***
	(0.2130)	(0.2232)	(0.1685)	(0.1295)	(0.2565)	(0.2012)
Grim after 1 Hare	0.4780	0.4868**	0.1537	0.2396*	0.2640	0.4010**
	(0.3064)	(0.2467)	(0.1503)	(0.1382)	(0.1998)	(0.1834)
Tit for Tat (Stag first)	0.3320	0.1239	0.2609*	0.3396**	0.2423	0
	(0.2604)	(0.1784)	(0.1486)	(0.1430)	(0.1723)	(0.1806)
Always Hare	0.0152	0.0152	0.0303	0.0706	0.0151	0.0270
Gamma	0.2401***	0.2492***	0.3231***	0.3385***	0.2558***	0.2526***
	(0.0640)	(0.0337)	(0.0389)	(0.0468)	(0.0576)	(0.0462)
beta	0.985	0.982	0.957	0.950	0.980	0.981
Average Rounds	3.72	3.53	3.53	6.14	4.24	4.24
N. Subjects	66	66	66	66	66	66
Observations	1,248	1,526	1,248	1,920	1,534	1,192

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.

TABLE A.74. **Individual strategies in the different IQ sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (BoS).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p - values < 0.1$, ** $p - values < 0.05$ **, $p - values < 0.01$ ***

IQ Session	High	Low	High	Low	High	Low
Repeated Games	Last 5	Last 5	First 5	First 5	Equiv. Experience	Equiv. Experience
Strategy						
Always Preferred	0.1378*	0.2473	0.2482***	0.3659***	0.2257**	0.2674**
	(0.0792)	(0.1565)	(0.0708)	(0.0719)	(0.1000)	(0.1176)
Alternating Grim after 1 deviation	0.0540	0.0692	0.0304	0.0433	0	0.1198
(starting with R,R)	(0.0996)	(0.0470)	(0.0488)	(0.0554)	(0.0853)	(0.0759)
Alternating Grim after 1 deviation	0.0622***	0.0529	0	0	0	0
(starting with Q,Q)	(0.0231)	(0.0544)	(0.0358)	(0.0440)	(0.0262)	(0.0143)
Alternating Tit for Tat ††	0.3469**	0.2711**	0.2482***	0.2927***	0.2115**	0.0712
(starting with R,R)	(0.1390)	(0.1303)	(0.0900)	(0.0730)	(0.0968)	(0.1585)
Alternating Tit for Tat ††	0.3401***	0.1817**	0.3402***	0.1291**	0.4377***	0.3049**
(starting with Q,Q)	(0.1033)	(0.0790)	(0.0988)	(0.0622)	(0.1405)	(0.1210)
Always Concede	0.0590	0.1779**	0.1331**	0.1691**	0.1250*	0.2367***
Gamma	0.5927***	0.6395***	1.1286***	1.0242***	0.6919***	0.7629***
	(0.0636)	(0.0836)	(0.1009)	(0.1215)	(0.0838)	(0.0735)
beta	0.844	0.827	0.708	0.726	0.809	0.788
Average Rounds	4.34	3.57	3.55	4.55	5.04	3.41
N. Subjects	66	66	66	66	66	66
Observations	1,342	1,472	1,204	1,336	1,436	1,122

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.

†† Tit for Tat in the sense that the strategy carries on alternating as long as the partner alternates. If not, then go for preferred till partner starts alternating again.

TABLE A.75. **Individual strategies in the different IQ sessions in the last 5, first 5 and latest 5 SGs of equivalent experience (BoSC).** The equivalent experience SGs were identified by finding the last 5 SGs that would include all sessions considered across the treatment thus ensuring similar experience in terms of game length. Each coefficient represents the probability estimated using ML of the corresponding strategy. Std error is reported in brackets. Gamma is the error coefficient that is estimated for the choice function used in the ML and beta is the probability estimated that the choice by a subject is equal to what the strategy prescribes.† Tests equality to 0 using the Waldtest: * $p-values<0.1$, ** $p-values<0.05$ **, $p-values<0.01$ ***

IQ Session Repeated Games	High Last 5	Low Last 5	High First 5	Low First 5	High Equiv. Experience	Low Equiv. Experience
Strategy						
Always Preferred	0.1162**	0.3267***	0.2853***	0.2673***	0.1282**	0.2732***
	(0.0499)	(0.0622)	(0.0685)	(0.0704)	(0.0622)	(0.0681)
Compromise Grim after 1 deviation	0.0976	0.0519**	0.1092*	0.0811	0.3191**	0.1570*
	(0.1512)	(0.0208)	(0.0602)	(0.0981)	(0.1235)	(0.0856)
Tit for Tat (Compromise first)	0.4702***	0.4850***	0.1643	0.2887***	0.2332**	0.3386***
	(0.1210)	(0.0644)	(0.1175)	(0.0767)	(0.1138)	(0.0911)
Alternating Grim after 1 deviation	0.0182	0	0	0	0	0.0191
(starting with R,R)	(0.0174)	(0.0427)	(0.0273)	(0.0682)	(0.0207)	(0.0396)
Alternating Grim after 1 deviation	0	0	0	0	0	0
(starting with Q,Q)	(0.0469)	(0.0357)	(0.0262)	(0.0332)	(0.0177)	(0.0145)
Alternating Tit for Tat ††	0	0	0.0948***	0	0	0
(starting with R,R)	(0)	(0.0414)	(0.0143)	(0.0268)	(0.0618)	(0.0318)
Alternating Tit for Tat ††	0	0.0063	0.0153	0	0.0356	0
(starting with Q,Q)	(0.0904)	(0.0213)	(0.0157)	(0.0287)	(0.0460)	(0.0232)
Always Concede	0.2977***	0.1301**	0.3311***	0.3630***	0.2838**	0.2121***
Gamma	0.5191***	0.6093***	0.7266***	0.9693***	0.5004***	0.5604***
	(0.0691)	(0.0590)	(0.0551)	(0.1434)	(0.0897)	(0.0635)
beta	0.873	0.838	0.798	0.737	0.881	0.856
Average Rounds	4.70	4.43	3.98	4.36	5.46	3.94
N. Subjects	52	52	52	52	52	52
Observations	1,294	1,214	1,068	1,106	1,026	1,156

† When beta is close to 1/2, choices are essentially random and when it is close to 1 then choices are almost perfectly predicted.
†† Tit for Tat in the sense that the strategy carries on alternating as long as the partner alternates. If not, then go for preferred till partner starts alternating again.

TABLE A.76. **Individual Declared Preferred Strategies** This table is based on the questions: *"If my opponent does not cooperate with me this many times, then I will not cooperate either: 1; 2; 3; 4; more (5)"* and *" If I stop cooperating, this is: For ever (=0); Until others start cooperating again (=1)"*

	$\delta = 0.75$			$\delta = 0.50$			$\delta = 0.75$		
IQ Group/Partition	High	Low	Diff.	High	Low	Diff.	Combined High	Combined Low	Diff.
Strategy									
Always Cooperate	.0909	.0781	.0128	.0741	.0428	.0313	.0566	.1403	-.0837
Grim after 1 D	.0303	.0312	-.0009	.0185	.0428	-.0243	.0566	.0175	.391
Tit for Tat	.1515	.0937	.0578	.2037	.1286	.0751	.2453	.1930	.0523
Grim weak	.0454	.0781	-.0327	.0741	.0571	.0170	.0943	.0526	.0417
Tit For Tat weak	.6515	.5937	.0578	.5556	.5	.0556	.8490	.8070	.0420
N. Subjects	66	64		54	56		53	57	

Legend

Always Cooperate =stop cooperating after more than 4 Defects;
Grim after 1 D = stop cooperating for after 1 Defect AND for ever;
Tit for Tat = stop cooperating for after 1 Defect AND cooperate again after Cooperation;
Grim weak= stop cooperating after 1,2,3 or 4 Defects AND for ever;
Tit for Tat weak = stop cooperating for after 1,2,3 or 4 Defects AND cooperate again after Cooperation
Note: * $p-value < 0.1$, ** $p-value < 0.05$, *** $p-value < 0.01$

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