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Working Paper

Emotion vs. cognition - Experimental evidence on cooperation from the 2014 Soccer World Cup

Passauer Diskussionspapiere - Volkswirtschaftliche Reihe, No. V-72-16

Provided in Cooperation with:
University of Passau, Faculty of Business and Economics

Suggested Citation: Graf Lambsdorff, Johann; Giamattei, Marcus; Werner, Katharina; Schubert, Manuel (2016) : Emotion vs. cognition - Experimental evidence on cooperation from the 2014 Soccer World Cup, Passauer Diskussionspapiere - Volkswirtschaftliche Reihe, No. V-72-16, Universität Passau, Wirtschaftswissenschaftliche Fakultät, Passau

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Diskussionsbeitrag Nr. V-72-16

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PASSAUER DISKUSSIONSPAPIERE

Herausgeber:
Die Gruppe der volkswirtschaftlichen Professoren
der Wirtschaftswissenschaftlichen Fakultät
der Universität Passau
94030 Passau

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Für den Inhalt der Passauer Diskussionspapiere ist der jeweilige Autor verantwortlich.
Es wird gebeten, sich mit Anregungen und Kritik direkt an den Autor zu wenden.

Emotion vs. Cognition

- Experimental Evidence on Cooperation from the 2014 Soccer World Cup

Johann Graf Lambsdorff, Marcus Giamattei, Manuel Schubert, Katharina Werner✉

Abstract

We investigate methods for stimulating cooperation by help of a controlled lab-in-the-field experiment. This allows us to compare group-related emotional and cognitive stimuli. The experiment was carried out in a sober classroom and in an emotionally loaded environment, a Bavarian beer garden during a public viewing event with a large screen displaying the soccer game. Contrary to widespread belief, we do not find shared and contagious emotions at the public viewing event to advance cooperation. Variations of the game reveal that only cognitive factors, namely the joint attention to a common goal, substantially increase cooperation.

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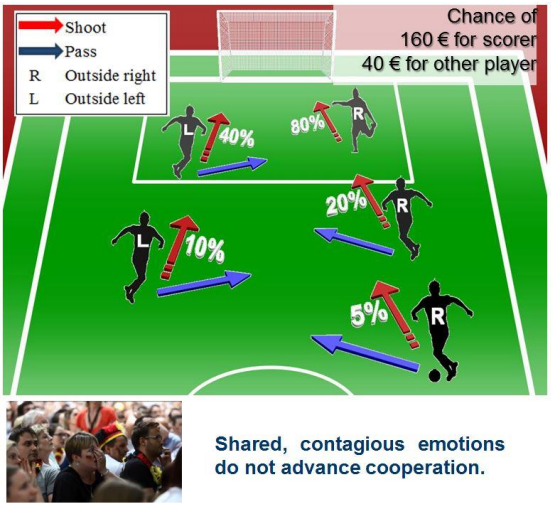
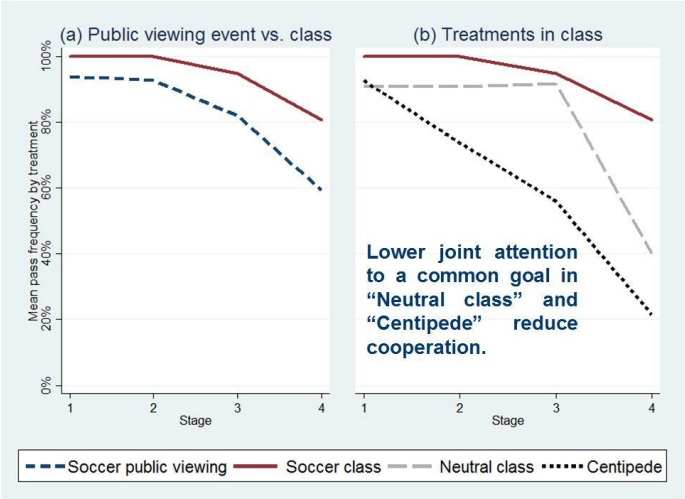
Highlights

- We investigate methods for stimulating cooperation, comparing group-related emotional and cognitive stimuli.
- We frame a centipede game as a game of soccer and run a lab-in-the-field experiment in a sober classroom and in an emotionally loaded environment, a Bavarian beer garden.
- We do not find shared and contagious emotions to advance cooperation.
- Cognitive factors, in particular the joint attention to a common goal, substantially increase cooperation.
- We interpret our findings by help of a theory of team reasoning.

Graphical Abstract





1 Introduction

Groups can widely differ in the extent to which their individual members engage in cooperative behavior. And those who achieve high levels of cooperation are often more successful. For example, after Germany won the 2014 FIFA world cup, the German coach Joachim Löw stated (September 2, 2014 in a German newspaper Focus.de; own translation): "Our great strength is that all players committed themselves to the team. There was not a single minute in which I had the feeling that somebody would not give everything for the benefit of the team". Similarly, Alchian and Demsetz (1972: 790) argue: "If one could enhance a common interest in non-shirking in the guise of team loyalty or team spirit the team would be more efficient." Stimulating cooperation has also recently become a focus of development policies. As the World Development Report 2015 argues, "fostering collective action is not purely a matter of incentivizing self-interested individuals. People can be intrinsically motivated to cooperate" (World Bank 2015: 61). But should groups cultivate sympathy towards others and control the empathetic and emotional environment? Or should they instead appeal to their individual understanding of collective gains and expect that individual sober thinking will do the job?

The willingness to cooperate has often been related to the institutional environment, in particular the extent to which information on past behavior is available and may allow individuals to establish a favorable reputation and motivate strategic reciprocity (Nowak and Sigmund 2005; Ostrom 2000; Camerer and Weigelt 1988). But levels of cooperation are high even when people will never meet again, gains from reputation are absent and contributing runs counter to short-term opportunistic gains (Fehr and Gächter 2000; Charness and Rabin 2002). These high levels of cooperation in one-shot interaction have been studied widely in the laboratory (Fehr and Fischbacher 2004; Fehr and Falk 2002). They have been related to individual characteristics, in particular to other-regarding preferences such as altruism, fairness and reciprocity (Fehr and Schmidt 1999; Rabin 1993; Sobel 2005; Dufwenberg and Kirchsteiger 2004). They have been linked to the conditional cooperation of others (Fischbacher, Gächter and Fehr 2001). Neuroeconomists have explored in how far this can be related to emotional compared to cognitive brain processes (Sanfey et al. 2003; Camerer, Loewenstein and Prelec 2005; Fehr and Camerer 2007).

Little focus has been placed on how to stimulate cooperation. Are there methods for leaders and groups to promote cooperation? Research has focused on culture (Henrich et al. 2001), institutions such as group size (Nosenzo, Quercia and Sefton 2015) and sanctioning mechanisms (Fehr and Gächter 2000; Masclet et al. 2003) or framing effects (Andreoni 1995; Liberman, Samuels and Ross 2004) that foster cooperation, but less on stimuli that groups may employ for

advancing cooperation. We investigate in particular whether cooperation advances when mutual positive emotions are cultivated and when these become contagious in the heat of the moment. Can groups arouse emotions and thereby induce individuals to cooperate? Or is cooperation rather advanced by cognitive processes that direct attention to a common goal?

In the rather artificial environment of a laboratory where subjects sit alone in front of computers, the experimenter can hardly induce high levels of emotional contagion (Levitt and List 2007). Due to this, the external validity of laboratory experiments has been criticized (Gneezy and List 2006). We thus run a lab-in-the-field experiment in an environment where emotional contagion is high by nature. We designed a software that allows us to maintain experimental control. At the same time, this software permits replication of the experiment in an environment with negligible levels of emotional contagion. In the sober environment of a classroom, we vary the salience of a common goal, this way testing separately for cognitive processes.

We find that shared and contagious emotions at the public viewing event do not advance cooperation. We thus do not find support for the idea that groups can stimulate cooperation via emotions. We find a major impact on cooperation by cognitive processes, in particular a salient common goal. One candidate for explaining our findings is a theory of team reasoning. By directing attention to common goals, people can be induced to ask "what should we do?" rather than "what should I do?".

2 Emotion, Cognition and Cooperation

The willingness to cooperate has fascinated scientists across many disciplines. One line of thought, which can be traced to David Hume and Adam Smith, focuses on emotions as a precondition for cooperation. The narrow set of self-serving interests is amended by emotions towards others. Individuals resist opportunistic and selfish temptation. They are guided by negative emotions towards non-cooperators and empathy and sympathy with all others. As argued by Bowles and Gintis (2003: 433) with regard to the cooperation often needed in society: "Without prosocial emotions, we would all be sociopaths, and human society would not exist." Frank (1988) assigns a central role to emotions for the enhancement of cooperation. He argues that natural selection favored emotions which served as a device for committing to cooperation. Anthropologists have argued that these prosocial emotions can be intensified by emotional contagion. An emotion conveyed by one individual, a happy cheering or facial expression showing excitement will become contagious to others. It will be consciously or unconsciously mimicked by another person in whose mind the associated emotion is reflected. Emotions and behavior are synchronized (Hatfield, Cacioppo and Rapson 1993; de Waal 2009). Emotional contagion will thus increase group cohesion and group appraisal. This induces individuals to care for group interests rather than only for self-serving interests (Barsade 2002; Barsade and Gibson

1998). Kosfeld et al. (2005) show that intranasal administration of oxytocin[1] increased trust among humans and thereby allowed for increased gains from cooperation. This is seen to be supportive of empathy as a basis for cooperation. For others, in particular in social psychology, the sharing of emotions and the joint experience of arousal provide a sense of social connectedness that serves as glue for forming groups (Zimbardo 1969; Diener 1980; Postmes and Spears 1998; Swann et al. 2012; Cwir et al. 2011). One of the first contributions goes back to Le Bon (1896: 57-58), who writes: "The entire audience experiences at the same time the same emotions (…) the sentiments suggested by the images are so strong that they tend, like habitual suggestions, to transform themselves into acts." Acting within a group in a state of emotional contagion would not be explained by cognitive processes. In Le Bon's perspective, groups extinguish rational capacities and take control of individual emotions.

Rather than through emotions, cooperation may also be advanced by cognitive factors. This line of thought can be traced to rational philosophers such as Plato and Immanuel Kant. Scientists from economics (Bacharach, Gold and Sugden 2006; Sugden 2003; Bardsley et al. 2009; Tan and Zizzo 2008), philosophy (Tuomela 2000; Hakli, Miller and Tuomela 2010; Hindriks 2012), evolutionary anthropology (Tomasello 2014), and behavioral sciences (Misyak and Chater 2014; Misyak et al. 2014) have recently contributed to this viewpoint. The major line of thought is that individual behavior is broadly guided by self-serving interests and in many circumstances this assumption suffices for predicting behavior. But once a group can benefit from cooperation and group interests become salient, people engage in a different mode of reasoning. Rather than asking "what should I do?" they pose the question "what should we do?". People then identify the group's best outcome and infer the cooperative actions that all members should take. If an ex-ante bargain were possible, they could assure each other of their commitment to cooperate. But even without such an explicit bargain, they identify the outcome of a virtual bargaining with an associated obligation to remain committed to cooperation. In the absence of such bargaining, for example, individuals should be tempted to engage in bilking, failing to pay the bill after having consumed a restaurant meal. But often they will not even take this action into consideration. They recognize that their commitment to pay is a necessary condition for getting the meal in the first place. Sticking to this commitment is not motivated by emotions towards the waiter, but is in line with joint interests (Sugden 2011). This mode of thinking has been labeled team reasoning. The idea that cooperation requires this type of reasoning has recently been supported by Tomasello (2014) who provides experimental evidence on primates and young children. He states that humans are cognitively capable of team-reasoning, which he labels we-

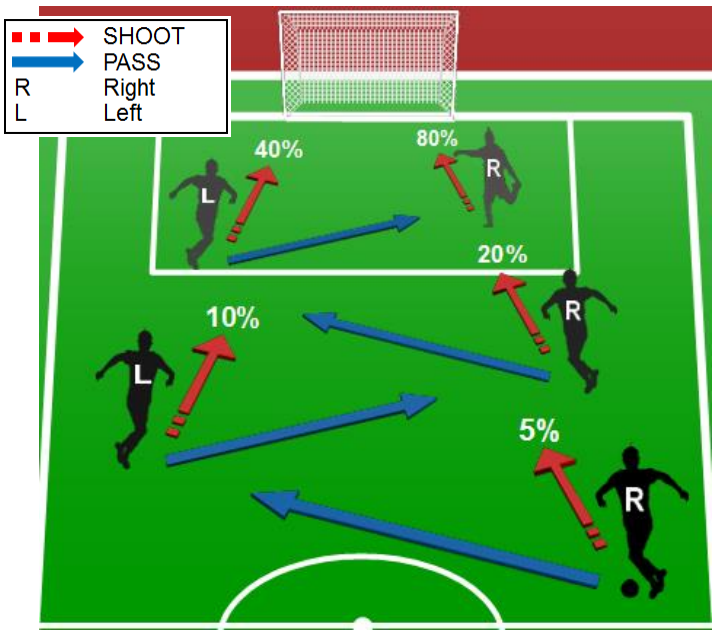
[1] Oxytocin is a neuropeptide that plays an important role for pair-bonding, maternal care and empathy towards closely related others.

thinking, while primates are not. Humans can engage in more complex forms of cooperation where it is imperative to understand what is in the minds of others. Only humans conceptualize the common goal, are jointly attentive to it, interact intentionally to achieve it, recognize the different roles and perspectives, and commit to carrying out the necessary steps in the process.

3 Experimental Design

We built our experiment on what is known in the literature as a centipede game (Rosenthal 1981; Nagel and Tang 1998; McKelvey and Palfrey 1992) and framed it as a situation in a soccer game. Players were randomly matched into groups of two and assigned the roles of left wing (L) and right wing (R). Both players were informed that R has the ball in the beginning. R was asked to decide whether to take a shot at the goal or to pass the ball to L. In case of shooting, R would score a goal with a 5% probability and the game would end. In case of passing, L would have to choose between passing the ball back or shooting and scoring with a 10% probability, and so on. As can be seen in figure 1, the probability of scoring a goal doubled with every pass, up to 80% where R would shoot for sure and the game would end. The successful scorer would earn 160 € while the other player would receive only 40 €. Hence, there was a trade-off between passing in order to increase the team's probability of scoring a goal, and shooting to gain the advantage of winning 160€.

Figure 1: Illustration of the game which resembles a centipede game framed as a game of soccer.

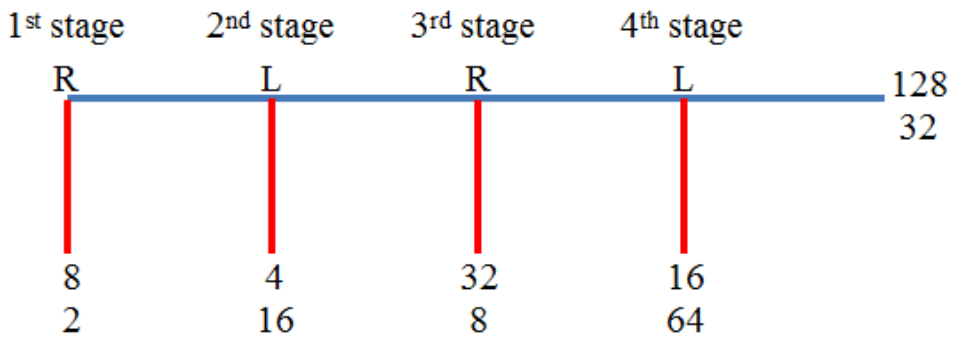


Notes: Passing increases the team's chance of scoring a goal while shooting secures an individual the possibility to receive the higher payoff, which is 160 € for the scorer compared to only 40 € for the other player.

Figure 2 illustrates the game by displaying expected payoffs. Passing at the 4th stage reduces L's expected payoff from 64 to 32. If L maximizes his own payoff, he prefers to shoot. Once anticipating this, shooting guarantees R the maximum payoff in the 3rd stage, because passing would reduce the payoff from 32 to 16. This type of backward induction can be pursued back to the 1st stage. An individually maximizing R, who expects L to be equally maximizing, is expected to shoot at the outset where he scores only with a 5% probability. This represents the subgame perfect Nash equilibrium. As the game is run only once, we can exclude a variety of factors that would otherwise increase the willingness to cooperate: Subjects cannot build up a favorable reputation for cooperation. They can neither identify deserving partners nor can they punish non-cooperating participants.

Nonetheless, passing is often observed even for one-shot centipede games. The literature provides different explanations for this fact. Some have advocated other-regarding preferences such as altruism and reciprocity (López-Pérez 2008; McKelvey and Palfrey 1992). As will be shown later, we hold expected payoffs constant across all our treatments, which implies that differences across treatments cannot be explained by standard theories related to other-regarding preferences. Other studies maintain the idea of interests being purely self-serving. They argue that a deviation from the Nash equilibrium occurs due to cognitive factors (Bornstein, Kugler and Ziegelmeyer 2004; McKelvey and Palfrey 1995; Palacios-Huerta and Volij 2009).[2]

Figure 2: Expected payoffs in the game



*Notes: Numbers denote the payoffs in € to players (160 or 40 €) multiplied with the probability of scoring a goal (5, 10, 20 or 40%). The game represents the so-called centipede game. The upper payoff denotes the payoff for player R, the lower payoff for player L. For example, R shooting with an 80% probability of scoring a goal implies an expected payoff of 0.8*160=128 for R and 0.8*40=32 for L.*

[2] The cognitive reasons for cooperation in the centipede game are commonly described by limited reasoning: Subjects fail to iteratively delete dominated strategies or expect others to do so. This induces them to overestimate the other

4 Treatments

We ran four different treatments. One treatment is labelled “Soccer public viewing”. It was run in July 2014 at public viewing events in two different Bavarian beer gardens during the quarterfinal (Germany vs. France) and the final (Germany vs. Argentina) of the Soccer World Cup. During this time, a World Cup fever had spread across Germany. Visitors arrived in groups of friends or with their families, dressed in national colors and brought along German flags. Such expressions of patriotism are uncommon for Germans at occasions other than national soccer events. In conversations, visitors repeatedly expressed their pride with regard to previous victories, joy about the spirit of the team, excitement with respect to the forthcoming game, and hope for another victory. These emotions became contagious. The few visitors without makeup in national colors were swiftly colored by their friends. The national anthem induced many to stand up and put their right hand over their heart, prompting others to follow this example. Fan chants that were started at one table spilled over to other tables as they were known to all. One person’s yelling and shouting led others to join in. Whenever “we” scored a goal, waves of excitement burst out, flooding the scene with people jumping, laughing, cheering and hugging their neighbors, regardless of whether they were friends or strangers. These self-intensifying emotions created a sense of social connectedness among the visitors. Empathy with those who behave similarly is likely to be higher and sympathy with those who share joint interests can be assumed to be more pronounced in such an emotionally contagious environment. This lets us expect high levels of cooperation in this treatment.

We replicated the experiment in the sober atmosphere of a lecture hall in December 2014, after the world-cup fever had disappeared. We label this treatment “Soccer class”. The experiment was run after a lecture that lasted for 45 minutes. Participants were given instructions identical to those in “Soccer public viewing”. Attendance at the lecture hall was voluntary. The hall is located centrally on the university campus, embedded in a learning environment. During both the lecture and the experiment, students remained largely silent and took notes, taking the lecture as an opportunity to prepare for the exam that is part of their curricular obligations. Given this sober environment, there were no shared emotions that could be identified and no emotional contagion took place in the classroom. Therefore, we expect less cooperation here.

player’s willingness to cooperate and thus to pass at early stages. The concept of team reasoning differs from this because it additionally motivates passing at the final stage.

Table 1: Four treatments vary the degree of emotional contagion and team reasoning

Treatment	Description	Emotional contagion	Team reasoning	Condition	Obser-vations
Soccer public viewing	Common goal to score a goal during public viewing event	High	High	Probabilistic	134
Soccer class	Common goal to score a goal	Low	High	Probabilistic	91
Neutral class	Abstract common goal without reference to soccer	Low	Medium	Probabilistic	121
Centipede	Centipede game in the Classroom	Low	Low	Non-probabilistic	111

In "Soccer class" (as well as in "Soccer public viewing"), the description as a game of soccer assigns joint attention to a common goal. All look at the same object (the goal), imagine an obstacle (the rival team), notice an instrument for scoring (the ball), recognize the environment (the soccer pitch) and observe a shared plan (passing the ball and running towards the goal). In the two other treatments run in the classroom, the salience of a common goal was gradually reduced. We do this in order to vary the level of team reasoning that participants employ. In the treatment "Neutral class", the game was explained without any reference to soccer. Respective terms were substituted by neutral ones while keeping probabilities and payoffs unchanged. The salience of a common goal is lower because attention is directed only towards the same object (a joint success, which is our neutral substitute for the scoring of a goal) and a shared plan (passing and increasing the probability), but without a ball or a soccer pitch. This may induce medium levels of team reasoning and, thus, cooperation.

In the final treatment "Centipede", participants obtained the payoffs as shown in figure 2, which are identical to the expected payoffs in the other treatments. For risk neutral players, this non-probabilistic variant of the game should make no difference.[3] What should make a difference is that "Centipede" does not direct attention towards a joint success. Participants face the task of inferring the common goal from the payoff structure. They are not automatically directed towards this goal and a related shared plan. This is likely to induce low levels of team reasoning. Table 1 summarizes the treatments. All instructions can be found in the online appendix.

[3] The difference between probabilistic and non-probabilistic payoffs may also raise concern, predominantly from psychology, whether participants can adequately translate probabilities into expected payoffs. We consider this concern to be minor due to two reasons. First, a similar distinction has been investigated by Bereby-Meyer and Roth (2006) in a repeated prisoner's dilemma without marked differences in the first round (only in subsequent rounds, which are not relevant to our experiment). Second, the probabilities in our experiment serve to simplify understanding rather than complicate the experiment. Doubling the group's chance to score a goal is intuitive and allows for quick comprehension of the experimental task.

5 Experimental Procedures

The experiment was programmed with classEx, a software that we designed for classroom and field experiments. It provides smartphone users with immediate access to the game without having to register. Smartphone coverage in Germany is currently close to 70%, suggesting that participation was possible for most. The software also allows for random and blind matching and assignment of roles in the experiment (Giamattei and Lambsdorff 2015). To ensure a maximum understanding of the instructions, subjects in all treatments had to answer comprehension questions correctly before being able to play. A publicly known number of pairs was randomly drawn to obtain the respective payoff. Their code numbers were publicly announced and they were able to collect their money immediately. The game lasted about 5 minutes. On average, 5 minutes were required additionally for reading the instructions.

Participants in "Soccer public viewing" covered all age groups and professions, but students and pupils were overrepresented relative to the German population average. Visitors at the beer garden were informed about the experiment at the entrance and received a flyer with detailed instructions. Several public announcements were made. The website was opened after the national anthems had been played, just before the kick-off, and subjects had the entire first half of the soccer game to start the experiment and make their decisions. Payoffs in the field were made publicly. Owing to the design of the game, observers in the field could neither infer choices nor roles from payoffs. For example, a payoff of 160 € could be obtained by R players who had received a pass at the 4th stage and then shot automatically after having been cooperative to the full extent. It could equally be achieved by a player who shot immediately. This preserves conditions of anonymity. Among the 134 participants in the field, 8 pairs were randomly chosen of which 3 scored a goal, such that 600 € were paid out.[4]

We used the strategy method combined with certain features of the game method: Subjects decided independently of the other player, as in a strategy method design, to keep data traffic minimal. At the same time, they were guided through the experiment step by step as if they were interacting with another player. In this sequential design, if they decided to shoot at a certain stage, they did not have to make any further decision, as if they were playing game method. After each decision, subjects were asked to state their beliefs whether the other player would shoot or

[4] Originally we collected 379 observations in the field. 245 participants were additionally provided with the information that they were playing for Germany or for the opponent team (France or Argentina). Here, we only process data from the group that was given no such information (91 observations from the quarterfinal and 43 from the final) in order to preserve comparability to the data from the classroom. Altogether 25 team were randomly chosen with 11 scoring a goal, such that 2200€ were paid out.

pass in the subsequent stage.[5] Matching of participants into pairs of players took place at the end of the experiment, prior to drawing the winning pairs. This design choice eliminates problems with participants dropping out during the course of the experiment.

Participants in the other treatments attended an introductory lecture in economics, embracing students from various disciplines such as cultural studies, political science and business administration. Subjects were informed at the beginning of the lecture that they had the possibility to participate in a classroom experiment. Different flyers for the individual treatments had been spread on the tables before the lecture. In the lecture hall, treatments were separated between seat blocks in order to avoid design contamination.[6] Subjects listened to a public announcement informing them about the procedures before the game was started. Payoffs were made privately outside the lecture hall by a third person who did not know the game, making sure that conditions of double-blindness were adhered to. In "Soccer class", 3 pairs were randomly chosen, all of which scored a goal (600 € paid out). In "Neutral class", out of 3 randomly chosen pairs only 1 achieved a success (200 € paid out). In "Centipede", 4 pairs were chosen to obtain a total income of 220 €.

6 Graphical Analysis

The data for "Soccer public viewing" is depicted in figure 3(a), revealing that across all stages pass frequencies are well above zero. Passing at the first three stages is indicative of cooperation and additionally embraces the hope that the other player may pass. Pass frequencies fall across stages, due to a decreasing chance of getting the ball back. The decision at the 4th stage strategically differs from those at earlier stages. There is no chance to obtain the ball again. Passing in this case runs counter to opportunistic maximization and reveals an intrinsic commitment to carry out the concluding cooperative step. Remarkably, around 60% of participants decided in favor of passing.

We conjectured that replication of the game in class would reduce pass frequencies, because emotional contagion is absent there. But, as can be observed from figure 3(a), "Soccer class" brings about even more frequent passing across all stages. This suggests that emotional contagion does not explain the high pass frequencies that we observed in "Soccer public viewing".

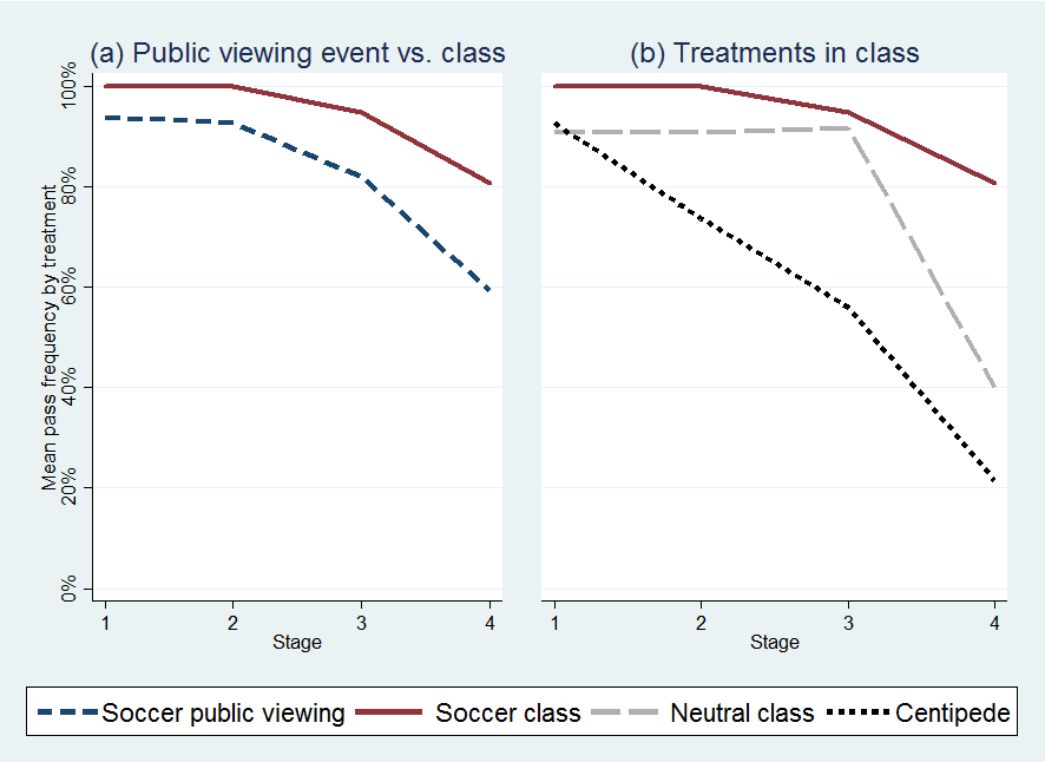
We test the impact of team reasoning by comparing "Soccer class" to the other two classroom treatments in which we gradually reduce the salience of a common goal. Figure 3(b)

[5] This was asked as a hypothetical question in case a player shot. Additionally, left wing players were asked whether they believed right wing had passed or shot at the first stage, before making their first decision. We opted in favor a non-incentivized elicitation of beliefs, owing to the necessity to keep instructions as simple as possible.

[6] We additionally controlled for treatment contamination by a post-experimental question asking if subjects had noticed any differences between their instructions and the ones of other players. Only 2 out of 323 subjects had noticed that others had different instructions, 16 had noticed that they had the same instructions and 305 had not taken any notice of the others' instructions.

shows that pass frequencies in "Neutral class", where team reasoning is only at a medium level, are substantially lower than those in "Soccer class". Passes are least frequent in "Centipede" where common goals are least salient and team reasoning is low. This provides supportive evidence for the idea that team reasoning advances cooperation.

Figure 3: Mean Pass Frequencies Across all Stages by Treatments



Notes: Pass frequencies denote the relative share of players who decide to pass among all those who have reached a given stage. As can be seen in panel (a), frequencies are high in "Soccer public viewing", but even higher in "Soccer class". This contradicts the idea that emotional contagion advances cooperation. Data from Soccer Class is displayed for comparison also in panel (b). Pass frequencies are moderate in "Neutral class" and lowest in "Centipede" where a common goal is least salient. This is in line with the idea of team reasoning increasing cooperation.

7 Regression Analysis

To confirm our graphical findings, we ran regressions with the total of our 457 participants. First, we will interpret the coefficients for the treatment variables in table 2. The treatment "Soccer class" serves as the baseline in R1-R3. The dummy variable for the treatment "Soccer public viewing" obtains a negative coefficient of -1.44 in regression R1 and -1.29 in regression R2, indicating that participants in "Soccer public viewing" pass less often than in "Soccer class".

We obtain related evidence when looking only at choices at the 4th stage. As can be observed from the coefficient of -1.11 in regression R3, passing at the 4th stage is also significantly lower in "Soccer public viewing" than in "Soccer class". The emotional contagion in the field thus runs counter to cooperation. The sober classroom environment is superior in motivating participants to pass. This finding can also be confirmed at the individual level. Players self-reported their level of arousal in "Soccer public viewing". We hypothesized that this arousal might increase emotional contagion and motivate participants to cooperate with others. But as can be observed from regression R4, arousal reduced passing at the 4th stage (coefficient -0.42). Altogether, we do not find support for the idea that emotional contagion advances cooperation.

Evidence on team reasoning can be obtained from the negative coefficients for "Neutral class" across all regressions in table 2, which indicate that subjects pass less often in this treatment. The coefficients are even lower for the treatment "Centipede". In R1, for example, the coefficient of -2.87 is significantly below the one for "Neutral class" (Wald Test, X^2=18.59 p=0.0000, two-tailed). The pure confrontation with expected payoffs without reference to a joint success significantly reduces passing.

Further data on game variables is included in table 2. We control for the position with the variable "Left player" in regressions R1 and R2. Coefficients of -1.47 and -1.44 indicate lower passing rates for L, presumably due to L's lower chances of getting the ball back. Additional self-reported data on subjects' individual characteristics was collected, regarding the student status and whether subjects are risk-seekers. Not all visitors in the field were students. By controlling, we make sure this difference does not affect our findings.[7] Risk-seeking might induce a difference between the probabilistic treatments and the non-probabilistic "Centipede". But we do not find support for such an impact and inclusion of this variable makes no difference to our findings. We also tested whether participants communicated with other smartphone users during the experiment and the self-assessed level of drunkenness in the field. Again, the variables were immaterial to our results. We also collected self-assessed data on whether they had participated in the experiment before, and further demographic data on gender, age group and field of study. We do not report details, owing to the fact that these variables were insignificant and did not affect our findings.

[7] We observed that of the 96 student participants in "Soccer field", 98% passed in the 1st stage, 94% in the 2nd stage, 85% in the 3rd stage and 57% in the 4th stage. They passed slightly more often than the 38 non-students in the 1st stage and less often at the 4th stage. Overall, this suggests that being a student had no noteworthy impact on behavior. Also the social distance among participants was not lower in the classroom. Participants in the classroom were first-year students of seven different majors and the subject's acquaintance with each other was limited. Participants were acquainted with a few among many unknown, just as at the public viewing events.

Table 2: Regressions on each subject's number of passes and the decision to pass at the 4th stage.

	R1	R2	R3	R4
Treatments	All		All	"Soccer public viewing"
Dependent variable	Number of passes		Pass at 4th stage (only L)	
Treatment variables				
Soccer public viewing	-1.44***	-1.29**	-1.11*	
	(0.37)	(0.39)	(0.47)	
Neutral class	-1.71***	-1.65***	-1.83***	
	(0.37)	(0.38)	(0.46)	
Centipede	-2.87***	-2.85***	-2.78***	
	(0.38)	(0.38)	(0.53)	
Game variables				
Left Player	-1.47***	-1.44***		
	(0.22)	(0.22)		
Individual characteristics				
Aroused				-0.42+
				(0.23)
Drunk				0.30
				(0.51)
Student		0.51	-0.26	-0.47
		(0.42)	(0.61)	(0.66)
Risk-seeker		0.02	0.01	0.22
		(0.10)	(0.14)	(0.26)
Communicated		0.17	-0.74	
		(0.43)	(0.77)	
Constant			2.40*	1.17
			(1.06)	(1.13)
Observations	457	448	202	60
(pseudo) R^2	0.146	0.147	0.141	0.054

R1 and R2 are ordered logit and R3 and R4 binary logit regressions. Number of passes range between 0 and 2 because each subject decides at 2 out of 4 stages. Emotional contagion does not support cooperation because the coefficients for "Soccer public viewing" are negative and thus passing is lower than in the baseline, which is "Soccer class". The negative coefficients for "Neutral class" and "Centipede" can be explained by the lower salience of a common goal.

*Standard errors in parentheses.+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001.*

Aroused: How are you feeling? At the moment I am… 1: relaxed / calm | 5: aroused / tense.

Drunk: How drunk are you? 1: sober | 5: completely drunk.

Student: Your status is… 0: Pupil | 1: Student | 0: Working | 0: Other.

Risk-seeker: In general, I tend to… 1: avoid risk | 5: take risks.

Communicated: Did you discuss your decision with other smartphone users (participants)? 0: No | 1: Yes.

We also elicited beliefs regarding the other player's decisions. Table 3 shows the regression results with the expected number of passes as the dependent variable in R1 and the actual number of passes in R2. Being a left player has a positive impact on the expected number of passes with a coefficient of 1.02 because respective beliefs refer to earlier stages in the game compared to those of right wing (and consequently to a higher probability of getting the ball back). As shown in R1, in "Soccer public viewing" players expected passing to be less frequent compared to the baseline, which is "Soccer class". With an insignificant coefficient of -0.17, we are not able to confirm that emotional contagion in the field increases expectations of cooperation.

The expected number of passes is lower in "Neutral class". It is lowest in our treatment "Centipede" where the coefficient -1.79 is significantly below zero. This shows that this treatment had an impact on expectations similar to that on actual behavior. A salient common goal increases expectations of cooperative behavior.

Table 3: Ordered Logit Regressions on Subject's Expected and Actual Number of Passes

	R1	R2
Dependent variable	Expected number of passes	Number of passes
Treatment variables		
Soccer public viewing	-0.17	-1.30**
	(0.37)	(0.41)
Neutral class	-1.03**	-1.38***
	(0.33)	(0.39)
Centipede	-1.79***	-2.35***
	(0.33)	(0.39)
Game variables		
Left player	1.02***	-2.14***
	(0.21)	(0.26)
Expected number of passes		1.75***
		(0.22)
Individual characteristics		
Student	1.21**	0.09
	(0.42)	(0.46)
Risk-seeker	0.14	-0.07
	(0.10)	(0.10)
Communicated	-0.14	0.11
	(0.43)	(0.46)
Observations	448	448
(pseudo) R^2	0.097	0.247

Expected number of passes range between 0 and 2 because each subject reports expectations at 2 out of 4 stages. Emotional contagion does not bring about higher expected passing because the coefficient for "Soccer public viewing" in R1 is negative and thus passing is lower than in the baseline, which is "Soccer class". Higher expected passes have a positive impact on the number of passes, which is in line with cooperation being conditional on expected behavior by the other player.

For information on individual characteristics consult notes in table 2.

*Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.*

This raises the question whether treatments impacted behavior largely via changing beliefs. The high cooperation in "Soccer class" may result because the joint attention increases expectations of cooperation. These expectations may then induce some participants to cooperate, in particular those who condition cooperation on the other player's cooperation. Indeed, as shown in R2, table 3, the expected number of passes obtains a positive coefficient of 1.75 and the (pseudo) R^2 of 0.247 reveals that the explanatory power of the regression increased substantially. This is evidence in favor of conditional cooperation. Controlling for this impact, we observe in R2 that coefficients on treatments are slightly lower compared to those in table 2. Yet, the coefficients for the treatments remain strong and highly significant. Hence, conditional cooperation has a

strong explanatory power, but explains only a small fraction of our treatment effects. The treatments have a direct impact on decisions to pass, not only an indirect impact via beliefs.

We finally check whether our data is comparable to related laboratory evidence. Comparing our findings from "Centipede" to those from other laboratory studies[8], we observe that results on passing are largely identical.

8 Discussion

Our sample of participants at a public viewing event shared emotions and was further aroused so that levels of social connectedness were high. They stood united to cheer for the same team. There was ample reason to expect a high level of cooperation. However, we observed cooperation to be lower compared to a sober classroom environment, implying that emotional contagion did not advance cooperation. Contrary to this, we find a solid impact of cognitive factors. We observed cooperation to increase when joint attention was directed towards a common goal and participants were induced to reason as a team.

Our findings suggest that the role of empathy and emotional contagion is sometimes not fully understood and might be more complex than often assumed. Batson and Moran (1999), for example, observe cooperation in a prisoner's dilemma to increase if it is framed as a game of social exchange rather than as a business transaction. They conclude that the framing as a social exchange induces empathy. This conclusion might be premature. Social exchange may rather trigger team reasoning and thus represent a cognitive manipulation. Also the role assigned to empathy by Kosfeld et al. (2005) may be critically reviewed. The authors showed that oxytocin, which promotes empathy towards closely related others, increases trust among experimental subjects. However, in their study it did not induce subjects to cooperate and return the trust invested in them. Subjects that were intranasally administered a placebo returned just as much. On the other hand, states of emotional arousal may reduce self-control, increase myopia or lead participants to be overconfident and bias the reported probabilities of scoring a goal upwards. This is likely to inhibit cooperation. There is evidence on such an impact at the individual level (Loewenstein 1996; Ariely and Loewenstein 2006). This would imply that emotional contagion and empathy has a rather unpredictable impact on cooperation.

While in our one-shot interaction cognitive factors stimulated cooperation and emotional factors failed, the question arises how this translates to repeated interaction. In reality, interaction is often not one-shot and the long-term individual success will depend on how subjects perform across repetitions. Cooperation will be successful in repeated interaction in case of positive

[8] McKelvey and Palfrey (1992) collect data from 39 pairs of subjects. 100% of the players passed in the 1st stage, 74% in the 2nd stage, 38% in the 3rd stage and 27% in the 4th stage. These data refer to the first round (where no learning effects can be observed) and are pooled across stake sizes. Clearly, their data are close to our treatment "Centipede".

assortment. Cooperators and non-cooperators may be segregated into different groups. Cooperation then brings about the long-term advantage of being matched more often with other co-operators. Assortment is commonly assumed for group-related emotions. The empathetic are allocated to one another and increase their mutual well-being (Bowles and Gintis 2011; Frank 2005). One repercussion from our findings is that this assortment need not be related to such emotions. Cooperation may also be sustainable if those who engage in team reasoning can signal their capacity to do so and have a high probability of encountering people with similar cognitive capabilities. The development of cooperation may thus be supported largely by cognitive factors and less by emotional ones.

There is recent interest in exploiting the capacity for cooperation as a method for improving policies. The World Development Report 2015 states: "Policies can tap people's social tendencies to associate and behave as members of groups to generate social change" (World Bank 2015: 42). This suggests, for example, that a selfish, non-cooperative equilibrium can be abandoned by changing beliefs: A temporary intervention might induce people to expect cooperation by others such that an equilibrium marked by conditional cooperation would be achievable. Our findings add to this approach by suggesting ways for stimulating cooperation. This stimulation is not necessarily achieved by arousing groups that share emotions. It may depend more on directing joint attention to clear and broadly shared interests. This may, for example, be advanced by avoiding ambiguity in the description of goals, preventing contradictions between conflicting goals, directing attention towards common objectives, accentuating shared plans, highlighting common instruments or raising awareness for mutual obstacles. Controlling the empathetic and emotional environment, to the contrary, may not be the way forward to fostering cooperation.

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Appendix

The two following photographs depict the public viewing event in a Bavarian beer garden with a large screen displaying the soccer game in the background (left image). The second photo (right image) shows the sober classroom atmosphere.

Methods employed in the field are explained in a movie, which provides an impression of the shared and contagious emotions: https://www.youtube.com/watch?v=C4ajsNmy9Fk .

Instructions

All instructions were in German. Below is the English translation. The German version can be obtained upon request from the authors. The instructions consist of public announcements, written instructions on flyers, which were distributed to participants, and instructions on the screen of the mobile device.

Public Announcements in the Field.

Hi everybody and welcome to the game „shoot or pass“. If you have questions concerning the game, you can approach our assistants in the yellow t-shirts at any time. In order to participate in the game, you should read the flyer carefully and open the website stated on the flyer. Everybody can participate and win 160€ as a goal scorer or 40€ as a team mate. Today a total amount of 3000€ may be paid out. The game will take approximately 5 minutes. Participation pays! As soon as the game starts, all of you will be randomly assigned to a group, consisting of you and another randomly chosen player here at the Public Viewing event in this beer garden. Your position will either be right wing or left wing. Several times, you will have to decide between “shoot” and “pass”. With “shoot”, you have the chance of winning the high bonus of 160€. With “pass”, your group’s chance of scoring a goal increases. The game will start shortly before the kick-off of the final Germany vs. Argentina. You have time until the 30th minute of the final until we stop the smartphone game.

A player number will be displayed on your smartphone. In the half-time break, I will read out the winners' player numbers. The winners will receive their goal bonus immediately in cash at our information desk. Thank you!

Public Announcements in Class.

Welcome to the lecture in microeconomics. Today, I will leave the lecture earlier. After I have left, you can participate in a classroom game ran by my colleague Graf Lambsdorff. Participation is optional and is not related to the lecture. All smartphone users can participate and earn a total amount of more than 1500€. The game is used to collect data for research purposes. More detailed instructions on the game can be found on the flyer in front of you. The exact course of the game is explained on the flyer and illustrated in a graph. (This part of the announcement was made at 10:15 a.m. by Michael Grimm, professor in microeconomics, the following part of the announcement was made by Johann Graf Lambsdorff at 11 a.m.).

Welcome to today's classroom game. All smartphone users can participate and earn a total amount of more than 1500€. We are a team of the University of Passau and want to collect data for research purposes. More detailed instructions on the game can be found on the flyer in front of you. Before starting the game, I am now going to explain the game once more.

Once the game starts, you will be assigned to a group and a role. Your group consists of you and another player in the classroom who will be randomly selected by the computer. Instructions on your smartphone will guide you through the game step by step. Please always read the texts on your smartphone carefully before making a decision. You will have sufficient time to do so. The payoff you can receive depends on your own decisions and those of the other randomly selected player in the classroom. The exact course of the game is explained on the flyer and illustrated in a graph. In case you have not read the flyer yet, you will get some short time to do so in a moment. After the game, you will be asked to answer some questions for statistical purposes. The computer will then randomly select ten groups among all participants that will receive the payoffs according to the rules stated on the flyer. Each player receives a player number which will be displayed on the smartphone at the end of the game. Don't lose this player number. Right after the game, we will read out the player numbers that have won. If you have won you will receive the respective amount immediately and in cash upon presentation of your smartphone with the player number – depending on your role either upstairs in the hallway or down here behind the side exit. It is stated on the flyer where you will receive your payoff.

All of your decisions and data are anonymous. They can neither be observed by the other player or the players of other groups nor by us. The persons distributing the payoffs do not know the game and cannot infer your behavior from the amount you receive. Please respect other people's privacy and do not look at their smartphones. Please read the flyer carefully now because

you will have to answer comprehension questions at the beginning of the game and you will only be able to participate after answering them correctly. I will give you 4 more minutes now for reading. Then I will start the game (After 5 minutes the last part of the announcement was made).

When I start the game in a moment, you will have 5-10 minutes to complete the game. This is a long time and you can think about your decisions without any hurry. From my point of view, we can start now.

Written Instructions on Flyers.

The following instructions for treatments "Soccer public viewing" and "Soccer class" were printed and given to participants upfront. For the treatments "Neutral class" and "Centipede" the words and expression were substituted as shown in table A1. And instead of figure 1, in "Neutral Class", figure A1 was displayed and in "Centipede" figure A2 was displayed.

Table A1: Different wordings by treatment. For the treatments "Neutral class" and "Centipede" the words and expression in table 1 were substituted.

"Soccer class/field"	"Neutral class"	"Centipede"
Team	Group	
Position	Role	
Scorer	Player who takes	
Team mate	Other player	
Right wing	Player A	
Left wing	Player B	
Shoot	Take	
Ball	Decision	
Goal	Success	2€|4€|8€|16€|32€|64€|128€

We are a team of the University of Passau and want to collect data for research purposes. The classroom game will be played in the lecture in microeconomics and will take about 10 minutes. All smartphone users can participate and earn a total amount of more than 1500€. If you want to participate, please read the following instructions carefully.

Before the game – good preparation. When the game starts, open the webpage classEx.uni-passau.de/start. There you will be assigned to a team and a position. Your team consists of you and another randomly selected player. Your position is either right wing or left wing.

Start – The attack on the goal begins. Right wing (R) and left wing (L) are approaching the opponent's goal. The goal scorer receives 160€, the team mate 40€. [Figure 1 from the main text was shown; for treatments figure was adjusted, see figure A1 and figure A2]

- Right wing has the ball and can either SHOOT or PASS. If he SHOOTS he will score a goal with a probability of 5%. If he PASSES the ball goes to left wing.
- If left wing receives the ball he can also decide whether to SHOOT or PASS. With SHOOT he will score a goal with a probability of 10%. If he PASSES the ball goes back to right wing.

- If right wing gets the ball back he can again SHOOT or PASS. With SHOOT he will score a goal with a probability of 20%. If he PASSES the ball goes to left wing again.

- If left wing gets the ball again he can choose between SHOOT or PASS one last time. With SHOOT he will score a goal with a probability of 40%. If he PASSES the ball goes back to right wing who now is in an optimal position and will score a goal with a probability of 80%.

After the game, some questions for statistical purposes are to be answered.

Finish – Have you won? Randomly, 10 teams will be selected among all participants after the game has finished. These teams will receive the goal bonus if they have scored a goal. The goal scorer receives 160€, the team mate 40€. Each player receives a player number which will be displayed on the smartphone at the end of the game. Don't lose this player number. Right after the game, we will read out the player numbers that have won. If you have won, you will receive the respective amount immediately and in cash upon presentation of your smartphone with the player number. Rights wings will receive their payoff upstairs in the hallway, lefts wings will receive it down here, behind the side exit (In the field the instruction was changed to: If you have won you will receive the respective amount immediately and in cash upon presentation of your smartphone with the player number at our information desk). All of your decisions and information are anonymous. Your decisions can neither be observed by the players of other teams nor by us. Nor will you ever learn who your team mate is. Please respect other people's privacy and do not look at their smartphones.

On Screen Instructions.

The on screen instructions can be found in tables A2-A5. Each screen displayed only one question. Again terms were changed according to table A1 for the treatments "Neutral class" and "Centipede".

Figure A1: Graphical overview in treatment "Neutral class". The overview was part of the written instructions.

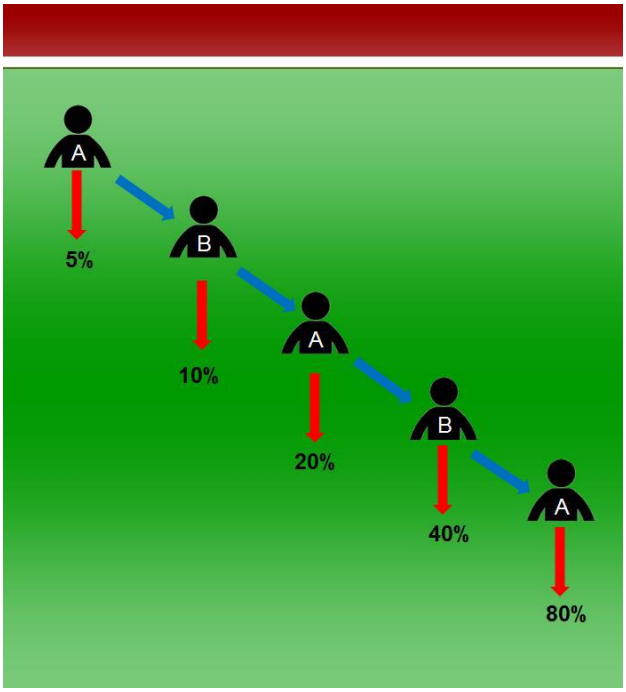

Figure A2: Graphical overview in treatment "Centipede". The overview was part of the written instructions.

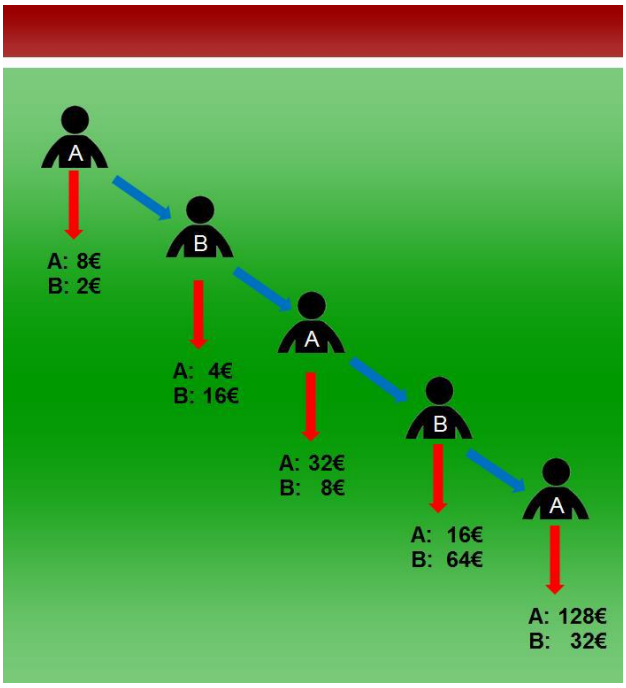

Table A2: On-Screen Instructions for both players (treatment "Soccer Class").

Number	Question Text	Type of Question	Options	Explanation
1	If you SHOOT, you have the chance to earn…	Single Choice	10€ (2)	Read the flyer carefully. If you want to start the game, please answer two comprehension questions on the game. Then you can start!
			40€ (2)	
			80€ (2)	
			160€ (3)	
2	If you SHOOT, you have the chance to earn…	Single Choice	10€ (2)	You provided the wrong answer. Please try again.
			40€ (2)	
			80€ (2)	
			160€ (3)	
3	If you PASS, …	Single Choice	the chance of scoring a goal decreases (4).	You answered the first question correctly. Please answer another question, then you can start.
			the chance of scoring a goal remains identical. (4).	
			the chance of scoring a goal increases (5).	
4	If you PASS, …	Single Choice	the chance of scoring a goal decreases (4).	You provided the wrong answer. Please try again.
			the chance of scoring a goal remains identical. (4).	
			the chance of scoring a goal increases (5).	
Continue with question 5 in table A3 for right wing and in table 4 for left wing.				

Notes: The numbers in brackets in column "Options" denote the following question number if the participant decided in favor of that option).

Table A3. On-Screen Instructions for right wing player (treatment "Soccer Class").

Num-ber	Question Text	Type of Question	Options	Explanation
5	You have the ball and you can SHOOT or PASS. If you SHOOT you score a goal with a probability of 5%. If you PASS the ball goes to left wing and he can decide. What do you do?	Single Choice	I SHOOT (6) I PASS (7)	You answered the questions correctly. The game will start now.
6	If you had passed, do you think left wing would have SHOT at his 10% chance for a goal or would he have PASSED back to you?	Single Choice	Left wing would have SHOT (11) Left wing would have PASSED (11)	You shot.
7	Do you think left wing will SHOOT at his 10% chance for a goal or will he PASS back to you?	Single Choice	Left wing will SHOOT (8) Left wing will PASS (8)	You passed.
8	Assume that left wing PASSED at his chance for a goal of 10%. You can now SHOOT or PASS the ball. If you SHOOT you score a goal with a probability of 20%. If you PASS the ball goes to left wing and he can decide. What do you do?	Single Choice	I SHOOT (9) I PASS (10)	Left wing is deciding whether to shoot or pass.
9	If you had passed, do you think, left wing would have SHOT at his 40% chance for a goal or would he have PASSED back to you?	Single Choice	Left wing would have SHOT (11) Left wing would have PASSED (11)	You shot.
10	Do you think left wing will SHOOT at his 40% chance for a goal or will he PASS back to you?	Single Choice	Left wing will SHOOT (11) Left wing will PASS (11)	You passed. Left wing is deciding whether to if he shoots or passes. If left wing passes, you shoot automatically.
Continue with question 11 in table A5.				

Notes: The numbers in brackets in column "Options" denote the following question number if the participant decided in favor of that option).

Table A4. On-Screen Instructions for left wing player (treatment "Soccer Class").

Num-ber	Question Text	Type of Question	Options	Explanation
5	Right wing has the ball and he can SHOOT or PASS. If he SHOOTS he scores a goal with a probability of 5%. If he PASSES the ball goes to you and you can decide. What do you think, right wing will do?	Single Choice	Right wing will SHOOT (6) Right wing will PASS (6)	You answered the questions correctly. The game will start now.
6	Assume that right wing PASSED at his chance for a goal of 5%. You can now SHOOT or PASS the ball. If you SHOOT you score a goal with a probability of 10%. If you PASS the ball goes to right wing and he can decide. What do you do?	Single Choice	I SHOOT (7) I PASS (8)	
7	If you had passed, do you think right wing would have SHOT at his 20% chance for a goal or would he have PASSED back to you?	Single Choice	Right wing would have SHOT (11) Right wing would have PASSED (11)	You shot.
8	Do you think, right wing will SHOOT at his 20% chance for a goal or will he PASS back to you?	Single Choice	Right wing will SHOOT (9) Right wing will PASS (9)	You passed.
9	Assume that right wing PASSED at his chance for a goal of 20%. You can now SHOOT or PASS the ball. If you SHOOT you score a goal with a probability of 40%. If you PASS the ball goes back to right wing and he SHOOTS automatically. Thereby he scores a goal with a probability of 80%. What do you do?	Single Choice	I SHOOT (11) I PASS (11)	Right wing is deciding whether to shoot or to pass.
Continue with question 11 in table A5.				

Notes: The numbers in brackets in column "Options" denote the following question number if the participant decided in favor of that option).

Table A5: Final questionnaire for both players (treatment "Soccer Class").

Num-ber	Question Text	Type of Question	Options
11		Single Choice	I am male.
			I am female
12	I study...	Single Choice	Business Administration / Economics
			Governance and Public Policy
			Teaching
			International Cultural and Business Studies
			Something else
13		Single Choice	I am less than 20 years old.
			I am between 20 and 24 years old.
			I am between 25 and 30 years old.
			I am more than 30 years old.
14		Single Choice	The people sitting next to me had the same instructions as me.
			The people sitting next to me partly had other instructions than me.
			I did not take notice of the instructions of the people sitting next to me.
15	Did you discuss your decision with other smartphones users (participants)?	Single Choice	Yes
			No
16	Did you participate at the game Shoot or Pass in the lecture hall or at the public viewing event during the soccer world cup in July 2014?	Single Choice	Yes
			No
17	In general, I tend to…	Likert Scale	1 = avoid risks
			5 = take risks.
18	"The individual should subordinate himself to the welfare of the community." With this statement…	Likert Scale	1 = I totally agree.
			5 = I totally disagree.
19	How are you feeling? At the moment I am…	Likert Scale	1 = relaxed / calm
			5= aroused / tense

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