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BEHAVIORAL DETERMINANTS OF PLAY IN A STAG-HUNT COORDINATION GAME – A PILOT STUDY

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Summary

The aim of this pilot study is to investigate relationships between various risk-attitude measures and players' behavior in the first-round of a repeated stag hunt game. This research report presents preliminary findings that the first-round behavior cannot be explained by any of the commonly used risk-elicitation instruments and describes relationships between those instruments.

Keywords: experimental economics, coordination games, judgment and decision making

Introduction

In the last 20 years, we have seen a rise in game theory research focused on economic networks. These research developments have improved our understanding of the influence of structural factors on players' behavior. Fewer advances have been made in terms of our comprehension of behavioral determinants of play in these environments. Therefore, my goal is to shed some light on the influence of behavioral factors – risk- and trust-attitudes specifically – on subjects' performance in the first round of a network coordination game. The findings reported in this research report are very preliminary and are a part of larger effort focused on

[1] Acknowledgments: I would like to thank Professors Erin Krupka (University of Michigan, School of Information) and Stephen Leider (University of Michigan, Ross School of Business) for giving me an opportunity to extend their experiment on social information and equilibrium selection in networks to conduct this study. I would also like to Professors Jeff MacKie Mason (University of Michigan, School of Information) and Tracy Xiao Liu (Tsinghua University, Department of Economics) for their valuable feedback.

unraveling the role of behavior factors in explaining player's behavior in repeated coordination games.

1. Literature review

1.1. Coordination networks

Most research theoretical and empirical on economic networks falls into three main categories: buyer-seller networks[2][3], network formation[4][5][6] and cooperation and coordination networks[7]. The problem I study belongs to that last group, so I will review a few concepts specific to research in coordination networks.

One of the fundamental constructs in economic coordination games is that of a neighborhood[8][9][10]. Let's consider a finite population of I players ($I \geq 2$) with the i-th player playing against a subset of other players. I will refer to this subset of n_i other players as player's neighbors ($1 \leq n_i \leq I$-1). For each player in I, the neighborhood N_i includes all i-th player's neighbors and the size of N_i is n_i. I declare N_i to be closed, if all N_i players in the neighborhood also are each other's neighbors. Otherwise, I refer to such a neighborhood as open (Figure 1).

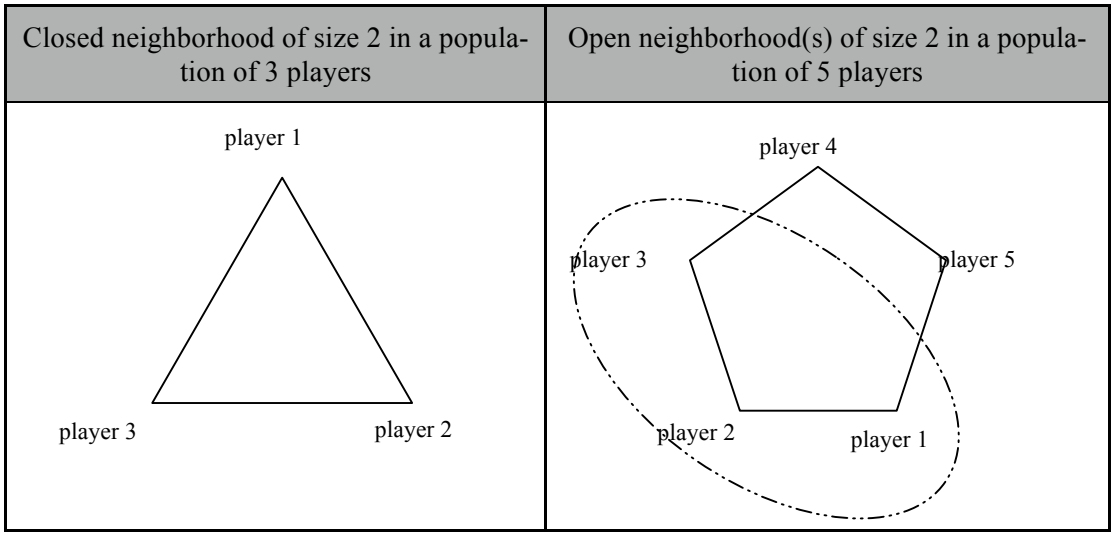

Figure 1. Open and closed neighborhood

A coordination game played by at least two neighbors is said to have Pareto-ranked equilibria, if its outcomes can be ordered from the most risky but payoff-efficient to the least risky but payoff-inefficient. The "stag-hunt" game (hereafter "SHG") is one useful example.

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[2] Kranton, R. E., & Minehart, D. F. (2001). *A theory of buyer-seller networks*. American economic review, 485–508

[3] Murphy, J. J., Dinar, A., Howitt, R. E., Rassenti, S. J., & Smith, V. L. (2000). *The Design of"Smart"Water Market Institutions Using Laboratory Experiments*. Environmental and Resource Economics, 17(4), 375–394.

[4] Myerson, R. B. (1977). *Graphs and cooperation in games*. Mathematics of Operations Research, 225–229

[5] Jackson, M. O. (2008). *Social and Economic Networks*. Princeton University Press.

[6] Bala, V., & Goyal, S. (2000). *A noncooperative model of network formation*. Econometrica, 68(5), 1181–1229.

[7] Kosfeld, M. (2004). *Economic networks in the laboratory: A survey.* Review of Network Economics, 3(1), 2.

[8] Ellison, G. (1993). *Learning, Local Interaction, and Coordination*. Econometrica, 61(5), 1047-1071.

[9] Morris, S. (2000). *Contagion*. The Review of Economic Studies, 67(1), 57.

[10] Berninghaus, S. K., Ehrhart, K.-M., & Keser, C. (2002a*). Conventions and Local Interaction Structures: Experimental Evidence*. Games and Economic Behavior, 39(2), 177-205. doi:10.1006/game.2001.0897

In the SHG, two hunters can decide to hunt separately and catch one hare each, or to hunt together and capture two stags[11]. Neither of them can catch a stag hunting alone and by trying to do so, the hunter would end up with nothing. Since both hunters value earning a stag more than a hare, they clearly find the coordinated outcome preferable. However, this game does not have such a trivial solution because hunters make their decisions simultaneously and independently of each other. Because they can only guess what the other hunter will decide to do, they are conflicted between a) choosing to hunt for stag and risking that the other hunter selects catching a hare which would leave the stag-hunter with nothing, or b) choosing to catch the less-preferable hare for sure.

The SHG contains, therefore, two Pareto-ranked equilibria. The first one (stag:stag) is characterized as payoff-efficient, payoff-dominant, or Pareto-efficient because it guarantees both players the highest earnings but involves higher risk. We refer to the second equilibrium (hare:hare) as risk-dominant or Pareto-inefficient because it offers a smaller, but certain, reward.

1.2. Behavioral determinants

In spite of - or perhaps as a result of - Harsanyi & Selten's acknowledgment that their "theory is fully dependent on the assumption of endogenous expectations"[12] very few studies investigate the role of behavioral factors. Devetag & Ortmann[13] pointed out that "even elementary behavioral determinants such as the effects of risk attitudes have hardly been studied (…) although their potential impact has been indirectly acknowledged by some researchers analyzing stag-hunt games (…)". To better understand this barely researched area, let's first review how economists and psychologists study such behavioral determinants. While scholars in these groups aim to understand human behavior, their approaches differ dramatically[14].

When studying decisions-making, many economists are interested in producing highly-generalizable theories. To that end, their experiments are designed to abstract elements critical to the decision-making process from situation-specificity. Blais & Weber[15] point out that many economists reduce risk-aversion, defined as an attitude against uncertainty associated with the outcome of a decision[16] to a simple label describing the curvature of the utility function[17]. Modern psychologists, on the other hand, emphasize the role of context and situation-specific factors. For example, Roberts[18] defines personality traits, such as risk-aversion, as "relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways under certain circumstances". Thus, psychologists interested in risk-aversion would strive to represent context that is relevant to the actual decision-scenario in their experimental designs.

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[11] Rousseau, J.-J. (1985). *A Discourse on Inequality*. Penguin Classics.

[12] Harsanyi, J. C., & Selten, R. (1988). *A general theory of equilibrium selection in games*. MIT Press Books, 1, pp.342-343

[13] Devetag, G., & Ortmann, A. (2007). W*hen and why? A critical survey on coordination failure in the laboratory*. Experimental Economics, 10(3), 331-344. doi:10.1007/s10683-007-9178-9

[14] Ariely, D., & Norton, M. I. (2007). *Psychology and experimental economics: A gap in abstraction*. Current Directions in Psychological Science, 16(6), 336–339.

[15] Blais, A. R., & Weber, E. (2006). *A Domain-Specific Risk-Taking (DOSPERT) scale for adult populations.* Judgment and Decision Making, Vol. 1, No. 1, 2006.

[16] Rohrmann, B. (1998). *The risk notion - epistemological and empirical considerations*; in: Stewart, M.G., & Melchers, R.E. (Eds.): Integrative risk assessment; Rotterdam: Balkema.

[17] Borghans, L., Duckworth, A. L., Heckman, J. J., & Ter Weel, B. (2008*). The economics and psychology of personality traits.* National Bureau of Economic Research Cambridge, Mass., USA.

[18] Roberts, B. W. (2009). *Back to the future: Personality and assessment and personality development.* Journal of research in personality, 43(2), 137–145.

This fundamental difference between economists and psychologists also manifests itself in two distinct approaches to eliciting risk-attitudes: behavioral and psychometrical[19].

Instruments developed in the first spirit often require subjects to select from a set of real or hypothetical gambles[2021]. Among many risk-attitude elicitation instruments used by experimental economists, a method developed by Holt & Laury[22] (henceforth HL) is quite common and influential. HL presented subjects with ten pairs of lotteries and asked them select one from each pair. In the first pair, the first lottery had a higher expected value and its payoff was much less variable than of the second one. In the next pairs these relationships incrementally changed; in the 10th pair the second lottery offered, with absolute certainty, a higher payoff than the first one. By looking at which lottery pair subjects switched from the first to the second lottery, Holt and Laurie were able to estimate subjects' von Neumann – Morgenstern risk-aversion. In recent papers, we see scholars developing a family of elicitation mechanisms based on HL's original idea[23,24,25].

In this study I rely on the Dohmen and Falk[26] variation of HL lottery task because it requires less cognitive effort from tested subjects than the original instrument (see Dave, Eckel, Johnson, & Rojas[27]), for a discussion on cognitive difficulties associated with HL[28]). In this lottery task, players are presented with 15 pairs of lotteries and, similarly to HL, asked to select one from each pair. The first lottery is the same in each pair; it is a 50-50 gamble between a payoff of $4.00 and a payoff of $0.00. The second option in each pair is a degenerate lottery with a fixed payoff of a specific amount, which increases by 25 cents from $0.25 in the 1st pair to $3.75 in the 15th pair. After the decisions are made, a random lottery pair is selected and corresponding payoffs paid out to participants. This procedure ensures that the instrument is incentives compatible.

Returning to psychometric research methods, researchers coming this tradition tend to measure risk-attitudes by asking subjects to self-report their likelihood of engagement in a series of briefly described scenarios (for example, Costa & McCrae[29]; Morey,[30]). Weber, Blais, & Betz[31] adopted this approach and developed a questionnaire (called a DOSPERT scale) measuring risk attitude across six domains: investing, gambling, ethical, health / safety, recreational and social. The DOSPERT scale, while still quite new, has already been validated

[19] Pennings, J. M. E., & Smidts, A. (2000). *Assessing the Construct Validity of Risk Attitude.* Management Science, 46(10), 1337-1348.

[20] Eckel, C. C., & Grossman, P. J. (2008). *Men, women and risk aversion: Experimental evidence*. Handbook of experimental economics results, 1, 1061–1073.

[21] Berg, J. E., Rietz, T. A., & Dickhaut, J. W. (2008). *On the Performance of the Lottery Procedure for Controlling Risk Preferences*. Handbook of Experimental Economics Results, 1, 1087–1097.

[22] Holt, C. A., & Laury, S. K. (2002*). Risk aversion and incentive effects*. American Economic Review, 92(5), 1644–1655.

[23] Eckel, C. C., & Grossman, P. J. (2002*). Sex differences and statistical stereotyping in attitudes toward financial risk*. Evolution and Human Behavior, 23(4), 281–295.

[24] Eckel, C. C., & Grossman, P. J. (2008*).* Op. cit.

[25] Dohmen, T., & Falk, A. (2011). *Performance Pay and Multidimensional Sorting: Productivity, Preferences, and Gender.* American Economic Review, 101(2), 556-590. doi:10.1257/aer.101.2.556

[26] Dohmen, T., & Falk, A. (2011). Op. cit.

[27] Dave, C., Eckel, C. C., Johnson, C. A., & Rojas, C. (2010). Eliciting risk preferences: When is simple better? Journal of Risk and Uncertainty, 1–25.

[28] Dave, C., Eckel, C. C., Johnson, C. A., & Rojas, C. Op.cit.

[29] Such items may measure risk-attitudes directly (e.g., engagement in unprotected sex) or via personality traits and emotional reactions associated with risk-aversion (e.g., tensing up when informed of a change of plans)

[30] Morey, L.C. (2007). *The Personality Assessment Inventory professional manual.* Lutz, FL: Psychological Assessment Resources.

[31] Weber, E. U., Blais, A.-R., & Betz, N. E. (2002). *A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors*. Journal of Behavioral Decision Making, 15(4), 263-290. doi:10.1002/bdm.414

by a few studies[32] [33]. Because there has been very little research on the role of behavioral factors in the SHGs, we do not know whether it is one general underlying risk-related trait which these games model, or whether is it, for example, only financial- or investment-specific risk propensity which comes into play. For this reason, I think that the DOSPERT scale is an appropriate instrument to use; since it measures risk-attitudes in multiple domains, I expect that, at least, one of its subscales (e.g., investment) to be a good predictor of players' actions.

Another instrument developed in the psychological tradition, but sometimes also used by economists and sociologists, is the "general risk question". This item simply asks respondents to rate on a 0 to 10 point scale, how willing they are to take risks in general. Perhaps due to its simplicity and reliability (e.g., Dohmen et al.[34]), it is included in many social surveys, like the German (SOEP) and the US (GSS) ones. I use it in this study for the same reasons. In addition to risk-elicitation instruments, I also measure players' trust-attitudes. As evidenced by Schechter[35], omitting these measurements may drastically bias the results.

Referenced earlier Devetag & Ortmann[36] cited Heinemann, Nagel & Ockenfels[37] as the only study focusing on behavioral aspects of the SHG. In Heinemann's study, the number of Pareto-efficient actions in the SHG was positively correlated with risk-lovingness measured by a lottery choice task. Conversely, in a more recent experiment, Neumann & Vogt[38] did not find evidence for risk-attitudes predicting action selection in their coordination game (not a SHG). Whether these contradictory results were a consequence of different payoff matrices or risk-elicitation instruments used is not clear.

Following the results of the first, more relevant, study and Huyck et al.'s[39] observation that Pareto-efficient actions appear to subjects as "too risky", I hypothesize that more risk-loving players are more likely than the more risk-averse ones to select the Pareto-efficient action as indicated by:

- the DOSPERT scale
- the lottery choice task
- the general risk question

I will test those hypotheses in an experiment described in the next section.

2. Experimental Design

I will start this section with a description of treatments used in the experiment. Later, I will move to discussing the game played and finish with a detailed account of how the experiment

[32] Zuniga, A., & Bouzas, A. (2005). *Actitud hacia el riesgo y consume de alcohol de los adolescented.* Working paper. Retrieved by Blais & Weber 2006 on July 17, 2006, from https://decisionsciences.columbia.edu/dospert/index.htm

[33] Hanoch, Y., Johnson, J. G., & Wilke, A. (2006*). Domain specificity in experimental measures and participant recruitment.* Psychological Science, 17(4), 300

[34] Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2009*). Individual risk attitudes: Measurement, determinants, and behavioral consequences.* Journal of the European Economic Association.

[35] Schechter, L. (2007). *Traditional trust measurement and the risk confound: An experiment in rural Paraguay*. Journal of Economic Behavior & Organization, 62(2), 272-292. doi:10.1016/j.jebo.2005.03.006

[36] Devetag, G., & Ortmann, A. (2007). *When and why? A critical survey on coordination failure in the laboratory*. Experimental Economics, 10(3), 331-344. doi:10.1007/s10683-007-9178-9

[37] Heinmann, F., Nagel, R., & Ockenfels, P. (2009). *Measuring Strategic Uncertainty in Coordination Games.* Review of Economic Studies, 76(1), 181-221. doi:10.1111/j.1467-937X.2008.00512.x

[38] Neumann, & Vogt. (2009*). Do Players' Beliefs or Risk Attitudes Determine The Equilibrium Selections in 2x2 Coordination Games?* Otto-von-Guericke University Magdeburg, Faculty of Economics and Management. Retrieved from http://ideas.repec.org/p/mag/wpaper/09024.html

[39] Huyck, J. B. V., Battalio, R. C., & Beil, R. O. (1990*). Tacit Coordination Games, Strategic Uncertainty, and Coordination Failure.* The American Economic Review, 80(1), 234-248.

was conducted. It is important to note that, for completeness, the below section describes a multi-period, networked game theory experiment but the data analyzed in this paper was obtained only from the first period of the experiment, risk- and trust- elicitation instruments and a post-experimental survey.

2.1. Economic Environments

The game.—Each subject played 2 repeated SGHs; one with her left neighbor, and one with her right neighbor. As a part of the game, participants selected an action "X" or "Y". In my setup, playing "X" is a Pareto-efficient strategy, and playing "Y" is a risk-dominant strategy. By comparing strategies selected by subjects with their risk-attitudes, I will be able to evaluate how much measurements obtained using these instruments correlate with players' behavior. The game's payoff structure, for a single period, is shown in following two tables (Tables 1 and 2).

Table 1. Payoff table for 2 Players

		Player 2	
		X	Y
Player 1	X	\$4, \$4	\$1, \$3
	Y	\$3, \$1	\$3, \$3

As shown in Table 2, each player's total payoff is simply a sum of her payoffs from playing with each of her neighbors.

Table 2. Payoffs of player i playing against both of her neighbors

		BOTH NEIGHBORS PLAY X	BOTH NEIGHBORS PLAY Y	ONE NEIGHBOR PLAYS X AND THE OTHER PLAYS Y
Player $_i$	PLAYS TWO XS	\$8	\$2	\$5
	PLAYS TWO YS	\$6	\$6	\$6
	PLAYS AN X AND A Y*	\$7	\$4	\$7** or \$4***

Notes:

** please note that the third row is only possible in the unconstrained treatment*

*** when player $_i$ plays X to the neighbor who plays X, and Y to the neighbor who plays Y*

**** when player $_i$ plays X to the neighbor who plays Y, and Y to the neighbor who plays X*

Treatments.— A 2x2x2 factorial design was used and the following three dimensions were varied: neighborhood structure, restriction on subjects' actions, and information available to them (Figure 2).

Neighborhood **structure:** To study subjects' behavior in open and closed neighborhoods, each player was assigned to a network having only one type of such neighborhood structures and asked them to play the SHG with their two most immediate neighbors in the network: one to the left and one to the right. Figure 2 depicts two networks with different neighborhood

structures used in the experiment. Circular, six-node networks were used to test participants' behavior in the open neighborhood case. In turn, in the closed neighborhood treatment, a triangular network was employed.

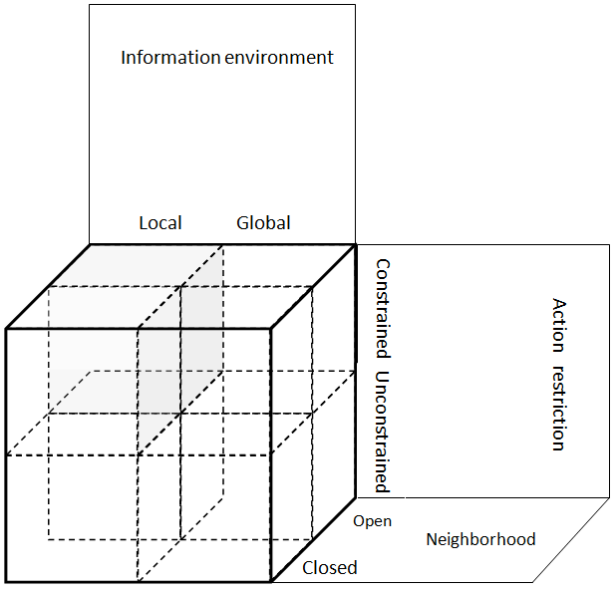

Figure 2. Treatment Matrix

Action restrictions: To explore the impact of letting subjects select different actions (with respect to each of their neighbors) on equilibrium selection, two action restriction treatments were created. Subjects were either constrained to making the same choice with both of their neighbors or unconstrained in their choices. For example, in the constrained case, subject 2 (in Figure 3) had to choose between playing either "X" or "Y" and this choice was played out with both subjects 1 and 3. However, in the unconstrained case, subject 2 could choose whether to play "X" only with subject 1, only with subject 3, could choose to play "X" with both or with neither of them.

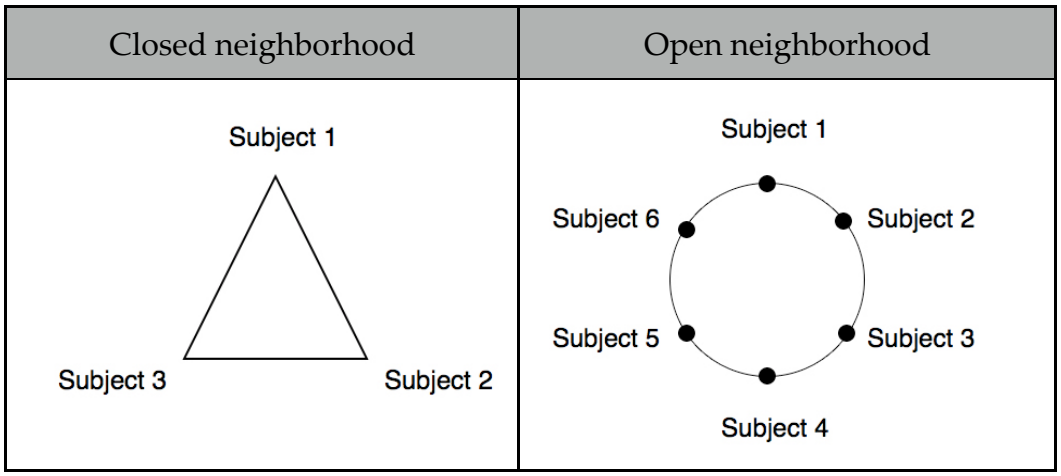

Figure 3. Neighborhood Structures

Information environments: To understand the effect of information availability on equilibrium selection, the information that was presented to subjects after each round was varied. In a local information treatment, they were informed about specific choices made by their immediate neighbors. In contrast, in a global information treatment, players were informed about the distribution of choices made by all players in their network but they lacked specific knowledge of the choices their immediate neighbors made[40]. Differences between these two treatments are summarized in Table 3. In the global information condition, subject 2 was informed what percentage of choices selected by all subjects in her entire network were "X" and what percentage were "Y". She was not, however, informed about the specific decisions of her neighbors or the actions of any other subjects.

Table 3. Information displayed for Player 2 after each period

Local information	**Global information**
Unconstrained	
Your Choice: _	
Your total payoff for this period:_	
Choice of player 1: _. Your payoff for the game with Player 1: _	Percentage of choices that were X:_
Choice of player 3: _. Your payoff for the game with Player 3: _	Percentage of choices that were Y:_
Constrained	
Your Choice: _	
Your total payoff for this period:_	
Choice of player 1: _. Your payoff for the game with Player 1: _	Percentage of Players who played X: _
Choice of player 3: _. Your payoff for the game with Player 3: _	Percentage of Players who played Y:_

2.2. Experimental procedure

Subjects were drawn from a pool of undergraduate and graduate students at the University of Michigan to participate in a computerized network experiment conducted at the experimental laboratory at the School of Information. Each experimental session was run by at least two members of a research group consisting of two assistant professors and three research assistants. All five experimenters were certified to conduct human-subjects experiments. The experimental procedure consisted of 4 steps:

1. Random assignment to groups and treatments: After showing up, subjects were assigned a random workstation in the lab and a treatment for the whole session was randomly selected. Participants then read instructions and were randomly assigned to anonymous groups of 3 or 6 people. These groups formed separate triangular or circular networks respectively and that assignment stayed fixed for the duration of the whole experiment. (To further ensure anonymity, at least two experimental sessions with networks of the same size were run in parallel.) Participants were informed about their network size, the topology to which they were assigned and the type of information that would be available to them after each round. z-

[40] Please note that local information is not a subset of global information – these are two separate, non-nested information conditions. For example, in the local information condition, subject 2 (in Figure 3) was only told what choices subjects 1 and 3 selected with respect to her, and her payoff with each of these subjects.

Tree software package[41] (Fischbacher, 2007) was used to implement the above assignments and the game play described below.

2. Repeated SHG: Participants played the SHG for 20 rounds with two neighbors closest to them in the network. Subjects were anonymous – they never knew the real identity of anybody in their networks. Additionally, each subject was assigned a letter (A-C or A-F). Participants used these letters as in-game pseudonyms.
3. Risk and trust elicitation: After the game, I asked subjects to complete Dohmen and Falk's[42] variation of Holt & Laury's[43] incented paired lottery choice task (Appendix A) and to fill out a non-incentivized domain-specific risk questionnaire[44]. I also asked them to report their willingness to take risks. To that end, I used a question (Appendix A, item 34) coming from the German Socio-Economic Panel (SOEP). To elicit participants' trust-attitudes, I used another three SOEP items (Appendix B, items 31-33), which resemble a few questions used in the General Social Survey[45][46].
4. Survey: As the last task, subjects filled out a brief demographics questionnaire (Appendix A, items 35-44).

In total, 58 experimental sessions were run and 240 subjects participated in the experiment with each one participating in a single session only. I present the number of sessions, subjects and groups per treatment in Tables 4 and 5.

Table 4. Number of sessions per treatment

	Neighborhood structure					
	Closed			Open		
	Action restriction			Action restriction		
Information environment	Constrained	Unconstrained	Total	Constrained	Unconstrained	Total
Global	6	9	15	8	4	12
Local	11	10	21	4	6	10
Total	17	19	36	12	10	22

[41] Fischbacher, U. (2007). *z-Tree: Zurich toolbox for ready-made economic experiments*. Experimental Economics, 10(2), 171-178. doi:10.1007/s10683-006-9159-4

[42] Dohmen, T., & Falk, A. (2011). *Performance Pay and Multidimensional Sorting: Productivity, Preferences, and Gender.* American Economic Review, 101(2), 556-590. doi:10.1257/aer.101.2.556

[43] Holt, C. A., & Laury, S. K. (2002). *Risk aversion and incentive effects*. American Economic Review, 92(5), 1644–1655.

[44] Weber, E. U., Blais, A.-R., & Betz, N. E. (2002). *A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors*. Journal of Behavioral Decision Making, 15(4), 263-290. doi:10.1002/bdm.414

[45] Please note that, after a few stylistic changes, I used their translation of the four SOEP items.

[46] For General Social Survey trust questions see: Glaeser, Laibson, Jose A. Scheinkman, & Soutter, 2000.

Table 5. Number of subjects and groups per treatment

Information environment		Neighborhood structure and Action restriction					
		Closed			Open		
		Constrained	Unconstrained	Totals	Constrained	Unconstrained	Totals
Global	Subjects	48	24	72	18	27	45
	Groups	8	4	12	6	9	15
Local	Subjects	24	36	60	33	30	63
	Groups	4	6	10	11	10	21
				13			10
Totals	Subjects	72	60	2	51	57	8
	Groups	12	10	22	17	19	36

After the experiment, one of each subject's lottery decisions and two periods[47] of the SHG were randomly selected.

Summarizing, after being randomly assigned to treatments and groups, subjects played the SHG for 20 rounds with two of their neighbors[48]. After the game, they performed an incented lottery choice task, filled out the DOSPERT scale questionnaire and answered four SOEP questions about their trust- and risk-attitudes.

3. Data construction and results

In this section, I will explain how risk- and trust-attitudes obtained during the experiment are expressed in my variables, and discuss correlations among them.

3.1. Data construction

Subjects' risk- and trust-attitudes were stored in nine variables (Table 6). The first five of them (*social, recreational, ethical, investment, gambling*) represent domain-specific risk-attitudes obtained using the DOSPERT scale[49]. I follow Bollen & Lennox[50] and Deck, Lee, Reyes, & Rosen[51] in using survey items in estimating subjects' unobserved risk-attitudes. That is, I treat every answer as a manifestation of a measured latent variable. However, instead of taking an arithmetic mean, I normalize my measurements in the following manner. Let MV_{ijkl} be a *k*-th manifest variable of a *j*-th risk-attitude of an *i*-th subject[52] and let *L* denote the number

[47] For a discussion on why two periods were selected please see: Krupka, E., & Leider, S. (2011). Transmitting social norms in networks. (Working Paper).

[48] Due to length considerations, the experimental instructions are available by request.

[49] I decided to omit DOSPERT health/safety subscale because I was concerned with the already high number of 44 items in the post-experimental survey. There are no reasons to expect that risk-attitudes in this domain would have any meaningful influence on players' decisions.

[50] Bollen, K., & Lennox, R. (1991). *Conventional wisdom on measurement: A structural equation perspective.* Psychological bulletin, 110(2), 305.

[51] Deck, C. A., Lee, J., Reyes, J. A., & Rosen, C. (2008). *Measuring Risk Attitudes Controlling for Personality Traits.*

[52] Please note that the number of questions – and hence, of manifest variables - differs across DOSPERT subscales, e.g., there five questions in the investment and eight in the social subscale.

of scale points used in given instrument (e.g., $L = 5$ for a 5-point Likert scale), then a latent variable LV_{ij} can be normalized as shown in Equation 1.

$$LV_{ij} = \frac{\sum_{k=1}^{K} MV_{ijk} - K}{K(L-1)} \qquad (1)$$

For comparability, I applied the same formulae to normalize all variables capturing subjects' risk- and trust-attitudes[53]. An aggregate measure of these five measurements is stored in *dospert*, which simply is a sum of the previous five variables. *Selfperception* stores subjects' self-reported willingness to take risks (SOEP's general risk question). *Risky bets* contains information about the number of risky gambles selected in the incented lottery choice task. Subjects' trust attributes obtained using three the SOEP trust questions (Appendix A, items 31-33) were combined into *trust index* because participants' answers to these questions were highly correlated with each other. Formula for obtaining the trust score is presented as Equation 2[54].

$$\text{trust index} = \text{trust question1} + (4 - \text{trust question2}) + (4 - \text{trust question3}) \qquad (2)$$

Higher values of all risk-related variables correspond to a higher propensity to take risks. Higher trust index score corresponds to being more trusting towards strangers (Table 7).

Table 6. Correlations between risk- and trust-measurements

	social	reational	ethical	investment	gambling	dospert	selfperception	safe bets	trust index
Mean	0.640	32	0.273	0.636**	0.186**	453*	0.572*	0.485	0.394
Std. deviation	0.141	21	0.190	0.188	0.230	114	0.194	0.148	0.193
Men									
Mean	0.632	59	0.279	0.685	0.247	480	0.611	0.499	0.412
Std. deviation	0.137	14	0.205	0.178	0.257	116	0.187	0.141	0.179
Women									
Mean	0.648	06	0.268	0.589	0.127	428	0.535	0.472	0.377
Std. deviation	0.145	25	0.175	0.187	0.183	107	0.193	0.153	0.206
social	1.000								
recreational	0.346*	00							
ethical	0.275*	73*	1.000						
investment	-0.024	76	0.010	1.000					
gambling	-0.139*	28*	0.201*	0.135*	1.000				
dospert	0.424*	25*	0.618*	0.432*	0.520*	000			
selfperception	0.267*	20*	0.184*	0.096	0.208*	400*	1.000		
risky bets	-0.043	072	-0.077	-0.029	0.046	.062	0.015	1.000	
trust index	-0.087	008	-0.009	-0.056	-0.163*	.109	0.005	0.150*	1.000

Observations = 216

Notes: Mann-Whitney two-sample statistic and Spearman's correlations: * p<0.05 ** p<0.01

[53] Normalization is appropriate because the number of questions, and consequently the range of each scale, differs across the remaining instruments too. By applying Equation 1 to the collected data, I force all of the measurements to be in the same range <0;1>.

[54] While the first question asks respondents to rate (on a 1 to 4 point-scale) how much they agree that, in general, others can be trusted, the remaining two questions ask about not trusting them. For this reason, I had to re-sign answers to the last two questions and then rescale them to their original scales by adding 4.

Table 7. Codebook

variable	type	interpretation	additional information, example questions, etc.	normalized
triangle	dummy variable	= 1 for triangle treatment and 0 for circles	closed or open neighborhood treatment	-
constrained	dummy variable	= 1 for constrained treatment and 0 for unconstrained	constrained or unconstrained action treatment	-
localinfo	dummy variable	= 1 for local information treatment and 0 for global	local or global information treatment	-
risky bets	risk measure	higher values correspond to being more risk-loving	number of risky bets in the lottery choice task	yes
selfperception	risk measure	higher values correspond to being more risk-loving	How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?	yes
social	risk measure	higher values correspond to being more risk-loving	arguing with a friend about an issue on which he or she has a very different opinion	yes
recreational	risk measure	higher values correspond to being more risk-loving	chasing a tornado or hurricane by car to take dramatic photos	yes
gambling	risk measure	higher values correspond to being more risk-loving	Betting a day's income at a high stake per game.	yes
investment	risk measure	higher values correspond to being more risk-loving	Investing 10% of your annual income in a moderate growth mutual fund.	yes
ethical	risk measure	higher values correspond to being more risk-loving	Forging somebody's signature.	yes
dospert	risk measure	higher values correspond to being more risk-loving	sum of all five domain-specific risk-attitudes	yes
revealed attitude	risk measure		number of risky actions selected in the first period	yes
trust index	trust measure	higher values correspond to trusting strangers more	1. Generally speaking, most people can be trusted. 2. Nowadays, you can't be too careful in dealing with people. 3. If one is dealing with strangers, it is better to be careful before trusting them. trust index = trust_question1 + (4 − trust question2) + (4 − trust_question3)	yes
male	dummy variable	= 1 for males and 0 for females	subject's gender	-
parental education	other	higher values correspond to higher levels of education	he highest level of education completed by either of subjects' parents	no
education	other	higher values correspond to higher levels of education	the highest level of education completed	no
economics	dummy variable	= 1 for economics students and 0 otherwise	Is the subjects studying economics?	-

psychology	dummy variable	= 1 for psychology students and 0 otherwise	Is the subjects studying psychology?	-
income	other	higher values correspond to higher levels of income	average personal income per month	no
the Pareto-efficient action selection	dummy variable	= 1 if yes and 0 otherwise	Did the subjects select the Pareto-efficient action in this period?	-
total profit efficiency	other	higher values correspond to higher profits	Total profit efficiency in model 9. in table 3 treats total profits from games with each neighbor separately. In all of the other models, profits from both games are added together.	yes

3.2. Risk-aversion and distrust towards strangers across elicitation instruments

In my sample, there are significant gender differences in *investment, gambling, dospert* and *selfperception* measures with males always being more risk-loving than females (Table 8). This finding is consistent with previous research (cf. Eckel & Grossman,[55]). The lower part of the table shows that some measurements are correlated with each other. Worth noticing is a strong relationship between *selfperception* and *recreational* which suggests that these variables captured similar underlying traits. In turn, the number of risky bets in the lottery choice task and subjects' trust attitudes are only very weakly correlated with each other and other measurements.

*The lottery choice task***.**—The majority of subjects (91.5%) followed a "threshold strategy"[56], i.e., they switched from a gamble to a certainty equivalent no more than once. Seven of such subjects never switched; four always chose a gamble and three never selected one. Following previous research[57], I excluded subjects who switched more than once from my analysis[58].

I classified subjects as risk-averse, risk-neutral or risk-loving by looking at the number of risky gambles they selected. Since subjects switched no more than once, selecting less than 8 risky bets is equivalent to switching at a value lower than the gamble's EV ($2). Hence, subjects with less than 8 risky bets were classified as risk-averse. Similarly, subjects with over 8 risky bets were classified as risk-loving. I classified subjects with exactly 8 risky gambles as risk-neural. With almost 45% of participants, that last category contains the largest number of subjects (Table 10). No statistically significant gender differences were detected (p-value of the Mann-Whitney two-sample statistic = 0.3239).

[55] Eckel, C. C., & Grossman, P. J. (2002). *Sex differences and statistical stereotyping in attitudes toward financial risk.* Evolution and Human Behavior, 23(4), 281–295.

[56] Heinmann, F., Nagel, R., & Ockenfels, P. (2009). *Measuring Strategic Uncertainty in Coordination Games.* Review of Economic Studies, 76(1), 181-221. doi:10.1111/j.1467-937X.2008.00512.x

[57] Heinmann, F., Nagel, R., & Ockenfels, P. op. cit.

[58] Additionally, I excluded subjects who had not revealed their gender or education. In total 24 out of 240 subjects were removed from my dataset.

Table 8. Risk and trust-attitudes classification by instrument

		Female		Male		Total	
Instruments	Classification	N	%	N	%	N	%
Risky bets	Risk averse	40	36.36	39	36.79	44	36.57
	Risk neutral	44	40	53	50	98	44.91
	Risk loving	26	23.64	14	13.21	74	18.52
Social	Risk averse	16	14.55	16	15.09	32	14.81
	Risk neutral	8	7.27	7	6.6	15	6.94
	Risk loving	86	78.18	83	78.3	169	78.24
Recreational	Risk averse	53	48.18	37	34.91	90	41.67
	Risk neutral	8	7.27	7	6.6	15	6.94
	Risk loving	49	44.55	62	58.49	111	51.39
Ethical	Risk averse	96	87.27	90	84.91	186	86.11
	Risk neutral	4	3.64	1	0.94	5	2.31
	Risk loving	10	9.09	15	14.15	25	11.57
Investment	Risk averse	26	23.64	10	9.43	36	16.67
	Risk neutral	14	12.73	12	11.32	26	12.04
	Risk loving	70	63.64	84	79.25	154	71.3
Gambling	Risk averse	102	92.73	85	80.19	187	86.57
	Risk neutral	1	0.91	7	6.6	8	3.7
	Risk loving	7	6.36	14	13.21	21	9.72
DOSPERT	Risk averse	79	71.82	64	60.38	143	66.2
	Risk neutral	1	0.91	2	1.89	3	1.39
	Risk loving	30	27.27	40	37.74	70	32.41
Selfperception	Risk averse	52	47.27	35	33.02	87	40.28
	Risk neutral	22	20	18	16.98	40	18.52
	Risk loving	36	32.73	53	50	89	41.2
Trust	Distrustful	80	72.73	70	66.04	150	69.44
	Trustful	30	27.27	36	33.96	66	30.56

Notes: For each instrument, percentages add up to 100. In total, 110 females and 106 males participated in the experiment

*The DOSPERT scale***.**—To classify subjects as risk-averse, risk-neutral or risk-loving, I took an arithmetic mean of MV_{ijk}. Subjects with the sum of MV_{ijk} equal to the mean were classified as risk-neutral. Those participants with the sum smaller than the mean were labeled as risk-averse and subjects with the sum bigger than the mean as risk-loving. Worth noticing is a stark difference in the proportion of risk-neutral subjects between the lottery choice task and

DOSPERT scale measurements (Table 8). It would be reasonable to expect that at least in the investment and gambling domains, the proportions of subjects in different categories would resemble those in the lottery task. This is certainly not the case. Apart from the differences in the precision of scales used in these instruments, one possible cause of this result might be a discrepancy between subjects' self-image captured by the DOSPERT scale and subjects' real behavior measured by the incented lottery task. There are similar differences between the investment and gambling domains. These results will be echoed by later regression analysis.

*The general risk questions and trust index***.**—When rating their own willingness to taking risk, most subjects described themselves as risk-loving (scores higher than 6 on a 0-10 point scale) with males rating themselves significantly higher than females (Table 8). In turn, none of the subjects was classified as "trust-neutral", i.e., with a trust score $\epsilon(7;8)$ on a 3-12 point scale. Almost 70% of subjects were classified as distrustful towards strangers.

Please find statistics regarding answers given to each individual questionnaire question in Attachment B.

3.3. Relationships between risk- and trust elicitation instruments

To explore relationships between risk- and trust-elicitation methods, I conducted a regression analysis (Table 9). Since my dependent variables take over 7 distinct values, I had considered using linear regression as it is commonly practiced, for example, in psychology. Eventually, however, I decided that an order probit model would be more appropriate due to my variables not being truly continuous. Upon comparison with OLS results, my estimates are only slightly more conservative. To ameliorate the problem of having a relatively high number of independent variables in my models for the size of my dataset, I used bootstrapping. I calculated the number of replications (1096) by following Andrews & Buchinsky's[59] three-step method. While bootstrapping reduced some of the standard errors, it was, unfortunately, impossible to fit any models with gender and risks-measurements interacted.

In addition to risk- and trust-attitudes measurements, I included controls for subjects' parental education (higher values indicate parents who are more educated) and for studying economics or psychology.

Lastly, I introduced an additional instrument called *revealed attitude* as a dependent variable. I was interested in relationships between this and other instruments to understand what influences subjects initial behavior. This variable is equal to the number of Pareto-efficient actions selected by a given subject in the first period. So early in the experiment, subjects do not know anything about their neighbors and are mostly unaffected by treatment conditions. Therefore, this measure might be a representation of some underlying personality traits and/or of a SHG-relevant cognitive, problem-solving strategy. One weakness of this instrument is that action restriction might have influenced how many Pareto-efficient action subjects selected. To control for this effect, I included a dummy called *constrained*, which equals one for subjects in the constrained condition. As we will see, this variable is not statistically significant.

Since each subject played 2 games per period (one with each of her two neighbors), the number of risky actions per period equals 0, 1 or 2. Therefore, each subject was assigned a vector with two binary coordinates indicating the selection of a risky action with respect to the left (the first coordinate) and to the right neighbor (the second coordinate). In regression, relationships between covariates and each of the coordinates were estimated separately as if there were twice as many subjects, which doubled the reported number of observations.

Regression results (Table 9) suggest a complex system of correlations between obtained measurements. To aid in interpretation, I visualize the results as a directed graph (Figure 4).

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[59] Andrews, D. W., & Buchinsky, M. (2000). *A Three-step Method for Choosing the Number of Bootstrap Repetitions.* Econometrica, 68(1), 23–51.

Table 9. Trust- and risk-attitudes across elicitation methods

	1	2	3	4	5	6	7	8	9
	social	recreational	gambling	investment	ethical	trust index	selfperception	risky bets	revealed attitude
social		1.845** [0.610]	-2.132** [0.761]	-0.00647 [0.600]	1.614** [0.622]	-0.903 [0.565]	1.418* [0.615]	0.101 [0.672]	0.638 [0.537]
recreational	1.195** [0.412]		0.822 [0.545]	0.0425 [0.490]	1.634*** [0.486]	0.142 [0.398]	1.809*** [0.428]	-0.393 [0.394]	0.2 [0.391]
gambling	-0.882 [0.517]	0.564 [0.480]		0.0283 [0.403]	1.234* [0.489]	-1.333*** [0.352]	1.067** [0.379]	0.52 [0.459]	-0.497 [0.377]
investment	-0.0545 [0.391]	0.0447 [0.437]	0.151 [0.441]		0.0844 [0.406]	-0.661 [0.394]	0.152 [0.428]	-0.282 [0.452]	-0.215 [0.397]
ethical	1.300* [0.543]	1.619*** [0.466]	1.413** [0.543]	0.153 [0.542]		0.464 [0.433]	-0.288 [0.504]	-0.335 [0.509]	0.397 [0.462]
trust index	-0.642 [0.398]	0.0513 [0.452]	-1.351** [0.521]	-0.605 [0.394]	0.652 [0.435]		0.508 [0.408]	1.000* [0.424]	0.381 [0.435]
selfperception	1.007* [0.431]	2.025*** [0.444]	1.214* [0.522]	0.219 [0.426]	-0.182 [0.412]	0.571 [0.426]		0.00599 [0.458]	0.101 [0.441]
risky bets	0.114 [0.625]	-0.0935 [0.496]	0.993* [0.467]	-0.325 [0.563]	-0.483 [0.530]	1.288** [0.497]	-0.374 [0.492]		-0.846 [0.456]
parental education	0.0462 [0.0641]	0.0386 [0.0680]	-0.0655 [0.0713]	0.124 [0.0660]	-0.00396 [0.0656]	0.0361 [0.0679]	0.0242 [0.0721]	0.226** [0.0754]	0.123 [0.0735]
income	0.041 [0.0371]	0.0467 [0.0386]	0.0513 [0.0347]	0.0276 [0.0325]	-0.0228 [0.0301]	-0.000285 [0.0323]	-0.0788* [0.0389]	-0.0537 [0.0342]	-0.0608 [0.0321]
economics	-0.421* [0.194]	-0.519 [0.278]	0.24 [0.263]	0.432 [0.247]	0.576* [0.232]	0.256 [0.236]	0.175 [0.299]	0.0126 [0.226]	-0.145 [0.234]
psychology	0.0885 [0.177]	-0.102 [0.198]	0.0508 [0.215]	0.313 [0.221]	-0.231 [0.201]	0.323 [0.192]	-0.0804 [0.215]	-0.305 [0.188]	0.398 [0.215]
male	-0.0939 [0.170]	0.11 [0.162]	0.477** [0.178]	0.511** [0.156]	-0.216 [0.171]	0.303* [0.154]	0.268 [0.174]	0.104 [0.174]	0.318* [0.159]
age	-0.0012 [0.0297]	-0.0459 [0.0243]	0.00522 [0.0399]	0.025 [0.0280]	-0.00955 [0.0273]	0.0403 [0.0277]	-0.0074 [0.0322]	0.0093 [0.0290]	0.0764* [0.0301]
constrained									0.209 [0.151]
N	213	213	213	213	213	213	213	213	426
pseudo R-sq	0.045	0.078	0.073	0.025	0.051	0.036	0.083	0.034	0.057
Prob > chi2	0.000	0.000	0.000	0.002	0.000	0.005	0.000	0.002	0.017

Notes: 1) Standardized beta coefficients of ordered probit regressions; 2) Bootstrapped standard errors in brackets; 3) * p<0.05 **p<0.01 ***p<0.001

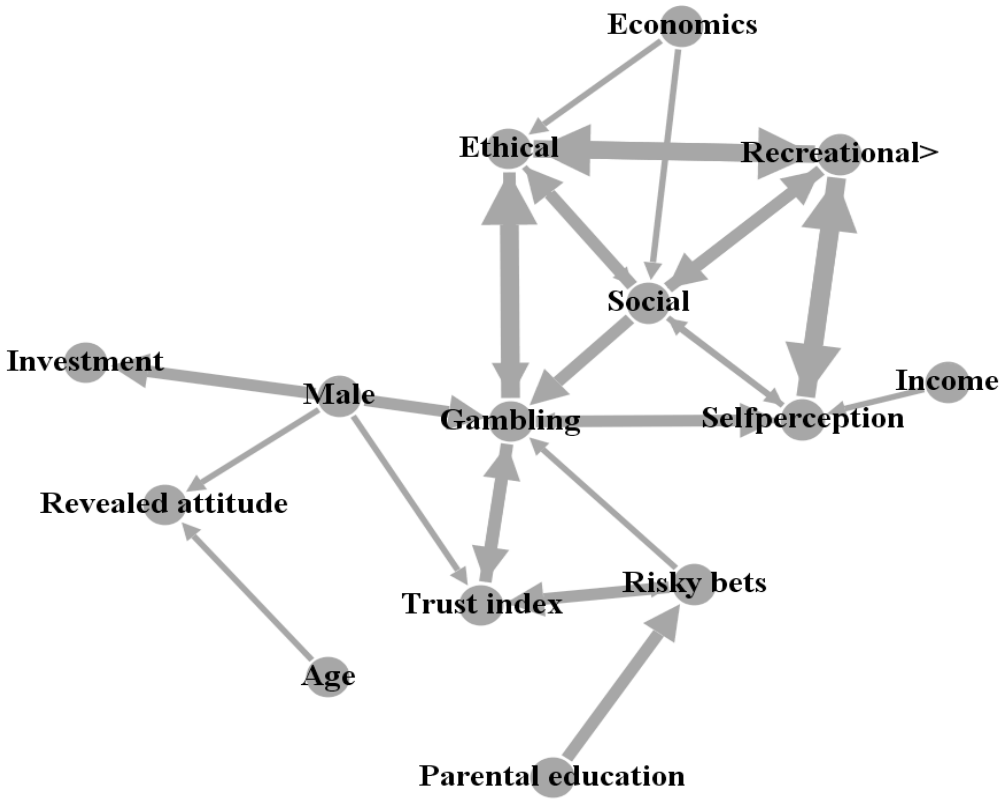

Figure 4. Relationships between risk- and trust-measures

Notes: 1) Arrows between nodes symbolize correlations between measurements. For example, an arrow coming from *parental education* and pointed at *risky bets* indicates that *parental education* is a significant regressor in a model with *risky bets* as a dependent variable. 2) Arrows on the graph have three different sizes with bigger arrows corresponding to more significant coefficients. 3) Please note that my goal is only to uncover correlations among the measurements; I am not implying existence of any casual model.

Result 1 (More risk-loving players are more likely than the more risk-averse ones to select the Pareto-efficient action): I find no support for this hypothesis; the measured risk-attitudes have no effect on what action was selected in the first period of the SHG.

Support: None of the relevant coefficients is statistically significant (Table 11, column 9). P-values of *social, recreational, gambling, investment, ethical, lottery* and *selfperception* are equal to 0.235, 0.608, 0.173, 0.583, 0.365, 0.053, 0.815, respectively.

As a robustness check, I conducted the same analysis controlling for all experimental treatments; the results were very similar to those presented in this paper.

Characterization 1: *Revealed attitude* can be predicted by sex and age (Table 9, column 9). P-values of *male* and *age* are equal to 0.045 and 0.016, respectively.

Characterization 2: G*ambling, ethical, recreational, social* and *selfperception* (the only non-DOSPERT scale measure) create a group of measurements very strongly related to each other. Except for *gambling* and *social,* the remaining coefficients have the same sign (Table 9, column 3), suggests a presence of a common underlying trait. Among the above measurements, *social* has the highest number of significant relationships, *recreational* has the most relationships with other DOSPERT subscales and *gambling* is the only risk measure correlated with *trust index*. Curiously, studying economics is significant correlated with the willingess to engage in ethically-risky behaviors.

Characterization 3: *Gambling*, *investment* and *revealed attitude* are not directly related to each other. It is quite surprising because intuitively, at least the first three variables, ought to be capturing related traits. Intriguingly, gender is a significant predictor of *gambling*, *investment* and *revealed attitude* and *trust index*. *Gambling* and *risky bets*, in turn, both have bidirectional relationships with *trust index*.

Characterization 4: Unlike Dohmen et al.[60], I do not find any significant relationships between the general risk question and gender, age or parental education. I also cannot confirm previous findings about the lottery choice task and DOSPERT scale measurements; while the coefficients for *ethical, investment* and *male* (Table 9, column 7) have the same sign as reported by Deck et al.[61], none of them is significant. These discrepancies might perhaps be due to vastly different subject pools and different controls included in the models.

4. Summary and directions for future work

Understanding of behavioral determinants plays a crucial role in our efforts to explain players' performance. This very preliminary study attempted to explain players' behavior in the first period of a repeated networked SHG and to provide some insight into relationships between various trust- and risk-elicitation mechanisms. First, my findings showed that very early in the experiment subjects' behavior cannot be predicted using any of the most commonly used instruments. Assuming players' decisions are not random, my findings call for further work in this area. Second, my exploratory data analysis provided some insight into relationships between traits measured using the DOSPERT subscales, Holt & Laury's incented lottery choice task, self-reported willingness to take risks and trust-attitudes. I found evidence that some, but not all, of the DOSPERT subscales capture similar underlying traits and, in general, they are not correlated with Holt & Laury's incented lottery choice task.

As the work reported in this research report is at a very early stage, many aspects of players' behavior in the experiment remain unaddressed. In the future, I plan to investigate the relationships between trust- and risk-measures and players' convergence to the Pareto-efficient or the risk-dominant equilibrium over the course of the whole experiment (20 periods). In addition to analyzing the role of behavioral determinants measured on an individual level, I intend to focus on

[60] Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2009). *Individual risk attitudes: Measurement, determinants, and behavioral consequences*. Journal of the European Economic Association.

[61] Deck, C. A., Lee, J., Reyes, J. A., & Rosen, C. (2008). *Measuring Risk Attitudes Controlling for Personality Traits*. SSRN eLibrary.

neighborhood level measures and their relationships with structural determinants such as neighborhood structure and information environment. This analysis, however, will require a much richer dataset than the one currently available.

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BEHAWIORALNE DETERMINANTY ZACHOWAŃ UCZESTNIKÓW GRY KOORDYNACYJNEJ – BADANIE PILOTAŻOWE

Streszczenie

Celem tego pilotażowego badania było zbadanie zależności między szeregiem miar preferencji względem podejmowania ryzyka oraz zachowaniem w pierszej rundzie tzw. stag-hunt game. Niniejszy raport prezentuje bardzo wczesne wyniki badań, które sugerują, że zachowanie w pierwszej rundzie gry nie może być wyjaśnione przy pomocy miar często stosowanych przez innych badaczy. Ponadto, autor opisuje relacje między miarami użytymi w eksperymencie.

Słowa kluczowe: ekonomia eksperymentalna, gry koordynacyjne, teoria podejmowania decyzji

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APPENDIX A

Each Lottery Decision will present you with the choice between a Fixed Payoff of a specific amount, or a 50-50 Lottery between a payoff of $4.00 or a payoff of $0.00. When you have made all of your choices, the computer will randomly select one Lottery Decision, and the payoff from whichever option you selected.

For each Lottery Decision, please select either the Fixed Payoff, or the Lottery.

Lottery Decision	Lottery	Fixed Payoff	I choose
1	50% Chance $4.00 and 50% Chance $0.00	$0.25	Lottery ○ ○ Fixed Payoff
2	50% Chance $4.00 and 50% Chance $0.00	$0.50	Lottery ○ ○ Fixed Payoff
3	50% Chance $4.00 and 50% Chance $0.00	$0.75	Lottery ○ ○ Fixed Payoff
4	50% Chance $4.00 and 50% Chance $0.00	$1.00	Lottery ○ ○ Fixed Payoff
5	50% Chance $4.00 and 50% Chance $0.00	$1.25	Lottery ○ ○ Fixed Payoff
6	50% Chance $4.00 and 50% Chance $0.00	$1.50	Lottery ○ ○ Fixed Payoff
7	50% Chance $4.00 and 50% Chance $0.00	$1.75	Lottery ○ ○ Fixed Payoff
8	50% Chance $4.00 and 50% Chance $0.00	$2.00	Lottery ○ ○ Fixed Payoff
9	50% Chance $4.00 and 50% Chance $0.00	$2.25	Lottery ○ ○ Fixed Payoff
10	50% Chance $4.00 and 50% Chance $0.00	$2.50	Lottery ○ ○ Fixed Payoff
11	50% Chance $4.00 and 50% Chance $0.00	$2.75	Lottery ○ ○ Fixed Payoff
12	50% Chance $4.00 and 50% Chance $0.00	$3.00	Lottery ○ ○ Fixed Payoff
13	50% Chance $4.00 and 50% Chance $0.00	$3.25	Lottery ○ ○ Fixed Payoff
14	50% Chance $4.00 and 50% Chance $0.00	$3.50	Lottery ○ ○ Fixed Payoff
15	50% Chance $4.00 and 50% Chance $0.00	$3.75	Lottery ○ ○ Fixed Payoff

You must make a choice for each Lottery Decision before clicking OK.

OK

APPENDIX B

#	Question	Risk domain			Percent of subjects		
			Extremely unlikely (=1)	Somewhat unlikely (=2)	Not sure (=3)	Somewhat likely (=4)	Extremely likely (=5)
1	Admitting that your tastes are different from those of your friends.	Social	0.83%	9.17%	8.33%	48.33%	33.33%
2	Going camping in the wilderness, beyond the civilization of a campground.	Recreational	11.25%	20.83%	11.67%	30.83%	25.42%
3	Betting a day's income at the horse races.	Gambling	58.33%	27.50%	5.00%	5.83%	3.33%
4	Cheating on an exam.	Ethical	45.42%	31.67%	11.25%	9.17%	2.50%
5	Chasing a tornado or hurricane by car to take dramatic photos.	Recreational	50.00%	17.92%	15.00%	14.17%	2.92%
6	Investing 10% of your annual income in a moderate growth mutual fund.	Investment	2.08%	5.42%	16.67%	45.00%	30.83%
7	Cheating by a significant amount on your income tax return.	Ethical	61.25%	24.17%	6.25%	6.25%	2.08%
8	Disagreeing with your father on a major issue.	Social	2.92%	13.33%	20.83%	38.75%	24.17%
9	Betting a day's income at a high stake per game.	Gambling	57.50%	22.92%	7.50%	9.58%	2.50%
10	Having an affair with a married man or woman.	Ethical	63.33%	15.42%	11.67%	7.08%	2.50%
11	Forging somebody's signature.	Ethical	33.33%	29.17%	12.50%	20.83%	4.17%
12	Passing off somebody else's work as your own.	Ethical	50.83%	32.92%	9.17%	6.25%	0.83%
13	Going on a vacation in a third-world country without prearranged travel and hotel accommodations.	Recreational	30.83%	19.58%	11.67%	27.50%	10.42%
14	Arguing with a friend about an issue on which he or she has a very different opinion.	Social	1.25%	9.17%	12.92%	46.25%	30.42%
15	Investing 5% of your annual income in a very speculative stock.	Investment	12.92%	25.83%	22.08%	27.08%	12.08%
16	Approaching your boss to ask for a raise.	Social	4.17%	27.08%	23.33%	40.42%	5.00%
17	Illegally copying a piece of software.	Ethical	12.92%	19.58%	14.58%	33.75%	19.17%
18	Going whitewater rafting during rapid water flows in the spring.	Recreational	15.00%	16.67%	15.83%	33.33%	19.17%
19	Betting a day's income on the outcome of a sporting event (e.g. baseball, soccer, or football).	Gambling	6.25%	7.92%	17.08%	44.58%	24.17%
20	Telling a friend if his or her significant other has made a pass at you.	Social	46.67%	29.17%	8.75%	10.83%	4.58%
21	Investing 5% of your annual income in a conservative stock.	Investment	7.08%	19.17%	33.33%	29.58%	10.83%
22	Shoplifting a small item (e.g. a lipstick or a pen).	Ethical	55.00%	22.08%	8.33%	10.83%	3.75%
23	Wearing provocative or unconventional clothes on occasion.	Social	17.08%	19.17%	14.17%	37.92%	11.67%
24	Stealing an additional TV cable connection off the one you pay for.	Ethical	33.33%	27.08%	12.08%	20.00%	7.50%
25	Investing 10% of your annual income in government bonds (treasury bills).	Investment	7.92%	14.17%	28.33%	35.00%	14.58%
26	Gambling a week's income at a casino.	Gambling	74.17%	12.50%	4.58%	6.25%	2.50%
27	Taking a job that you enjoy over one that is prestigious but less enjoyable.	Social	2.92%	11.67%	18.33%	41.25%	25.83%
28	Defending an unpopular issue that you believe in at a social occasion.	Social	3.75%	10.83%	21.25%	40.42%	23.75%
29	Trying out bungee jumping at least once.	Recreational	13.33%	12.08%	8.75%	27.08%	38.75%

#	Question	Disagree totally	Somewhat disagree	Somewhat agree	Totally agree
31	Generally speaking, most people can be trusted.	5.83%	35.83%	49.17%	9.17%
32	Nowadays, you can't be too careful in dealing with people.	5.42%	29.17%	47.08%	18.33%
33	If one is dealing with strangers, it is better to be careful before trusting them.	0.83%	12.92%	40.83%	45.42%

#	Question		
34	How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means:"risk averse" and the value 10 means: "fully prepared to take risks".	0	0.42%
		1	1.67%
		2	3.33%
		3	11.67%
		4	6.67%
		5	15.83%
		6	17.50%
		7	24.17%
		8	15.42%
		9	2.50%
		10	0.83%

#	Question	Mean	Std. Dev.	Median	Min	Max
35	What is your age?	22	3.30	21	18	43

#	Question		
36	What is your gender?	Female	50.00%
		Male	48.75%
		Missing data	1.25%

37	What is your religious affiliation?	Catholic	15.00%
		Evangelical Protestant	2.92%
		Jewish	3.33%
		Mainline Protestant	4.58%
		Muslim	3.75%
		None	39.58%
		Other Christian	14.17%

		Other religion (Not Christian, Jewish or Muslim)	12.50%
		Prefer not to answer	3.33%
		Missing data	0.83%
38	What best describes your race or ethnicity?	Asian or Pacific Islander	42.92%
		Black / African American	7.08%
		Hispanic	3.33%
		Multiracial	2.92%
		White	40.00%
		Other	2.92%
		Missing data	0.83%
39	What is the highest level of education you have completed?	Some or no high school	0.42%
		High school degree or equivalent	10.42%
		Some college	50.42%
		Bachelor's degree or equivalent	26.25%
		Graduate degree or equivalent	11.67%
		Missing data	0.83%
40	If you are currently or have previously attended college, what is or was your major?	Arts and Humanities	7.50%
		Engineering	26.25%
		Natural Sciences (Bio., Physics, Math, Chem.)	23.75%
		Other	13.33%
		Social Sciences (Anthro., Pol. Science, History, Economics)	27.50%
		Prefer not to tell	1.67%
41	Are you an Economics major?	Yes	11.25%
		No	87.92%
		Prefer not to tell	0.83%
42	Are you an Psychology major?	Yes	16.67%

No	82.08%
Prefer not to tell	1.25%

43	What is the highest level of education completed by either of your parents?	Some or no high school	3.33%
		High school degree or equivalent	8.33%
		Some college	11.67%
		Bachelor's degree or equivalent	28.75%
		Graduate degree or equivalent	46.67%
		Missing data	1.25%

44	What is your average personal income per month? [Consider all forms of income, including salaries, tips, interest and dividend payment, scholarship support, student loans, parental support and others.]		Missing data	0.0125
		Less than	400	0.2625
		400.1 -	800	0.1625
		800.1 -	1200	0.2
		1200.1 -	1600	0.1375
		1600.1 -	2000	0.0792
		2000.1 -	2400	0.0458
		2400.1 -	2800	0.0208
		2800.1 -	3200	0.025
		3200.1 -	3600	0.0083
		More than	3600	0.0458

	Mean	Std. Dev.	Median	Min	Max
DOSPERT	84.96	13.73	84	53	133
Social	28.53	4.44	29	17	40
Recreational	18.60	5.36	19	7	29
Ethical	16.86	6.02	16	8	40
Investment	14.03	3.10	14	5	20
Gambling	6.93	3.61	6	4	20
Incented lottery choice task (number of safe bets)	7.66	2.20	8	0	15

Notes:

DOSPERT is a sum of items 1 - 30

Social is a sum of items: 1,8,14,16,20,23,27,28

Recreational is a sum of items: 2,5,13,18,29,30
Ethical is a sum of items: 4,7,10,11,12,17,22,24
Investment is a sum of items: 6,15,21,25
Gambling is a sum of items: 3,9,19,26