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Kick-Off Workshop

Ambiguity in Dynamic Environments

March 25-27, 2019

Bielefeld, Center for Interdisciplinary Research

Organized by:

Frank Riedel

Center for Mathematical Economics

Bielefeld University

E-Mail: frank.riedel@uni-bielefeld.de

Program

Monday, March 25

10:00 - 11:00	- Arrival & Coffee Break -
11:00 - 13:00	**Review of the Proposal**
13:00 - 15:00	- Lunch at Bar Celona -
15:00 - 16:30	**Presentation of the Research Groups**
16:30 - 17:00	- Coffee Break -
from 17:00	**Projects within our Proposal**

Tuesday, March 26

09:00 - 09:30	**Herman Demeze-Jouatsa**, *Folk theorem in repeated games with ambiguous actions*
09:30 - 10:00	**Kazuya Hyogo**, *Information Acquisition with Subjective Waiting Costs*
10:00 - 10:30	- Coffee Break -
10:30 - 11:00	**Philippe Colo**, *What's the Science? Communication under Model Uncertainty*
11:00 - 11:30	**Sofiia Mun**, *Risk and Ambiguity Preferences: Attitudes of the Self and Beliefs About Others*
11:30 - 12:00	**Marieke Pahlke**, *Dynamic Consistency in Incomplete Information Games with Multiple Priors*
12:00 - 14:00	- Lunch at Bar Celona -
14:00 - 16:00	**Project Work in Subgroups**
16:00 - 16:30	- Coffee Break -
from 16:30	**Presentation of Results**
from 19:00	- Dinner at Brauhaus Albrecht -

Wednesday, March 27

10:00 - 10:30	- Coffee Break -
10:30 - 12:30	**Workshop and Project Planning**
from 13:00	- Lunch at Bernstein & Departure -

Abstracts

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1. **Herman Demeze-Jouatsa**

Title: Folk theorem in repeated games with ambiguous actions

Abstract: This paper presents a model of finitely repeated games that allows to explain the emergence of cooperation without departing from the assumptions on the monitoring technology (see Abreu et al. (1990), Aumann et al. (1995)), the information structure (see Kreps et al. (1982) and Kreps and Wilson (1982)), or the rationality of players (see Neyman (1985), Aumann and Sorin (1989)). In each round of a finite repetition of a finite stage-game, in addition to the classic pure and mixed actions, players can employ objectively ambiguous actions by using imprecise probabilistic devices such as Ellsberg urns to conceal their intentions. We use an example to illustrate the idea that adding an infinitesimal level of ambiguity to the game can be enough to approximate collusive payoffs via subgame perfect equilibrium strategies of the finitely repeated game. Our main theorem states that if each player has many continuation equilibrium payoffs in ambiguous actions, any feasible payoff vector of the original stage-game that dominates the mixed maxmin payoff vector is (ex-ante and ex-post) approachable by means of subgame perfect equilibrium strategies of the finitely repeated game with discounting. Our condition is also necessary.

2. **Kazuya Hyogo**

Title: Information Acquisition with Subjective Waiting Costs

Abstract: Information acquisition is an important aspect of decision making. Acquiring information is costly, as in the literature of rational inattention, but the cost of information acquisition is not typically observable and hence it is not obvious how it can be measured. Using preference over menus, de Oliveira, Denti, Mihm, and Ozbek (2017) provide an axiomatic foundation for the additive costs model of information acquisition. On the other hand, if obtaining signals from experiments is time-consuming, such as in the case of a long-run investment decision, costs may be measured as a discount factor or waiting time for acquiring information. We provide an axiomatic foundation for such an alternative model and identify unique discounting costs. To prove the main theorem, we borrow techniques from the literature of choice under ambiguity. Our representation has a parallel relationship with the confidence representation of Chateauneuf and Faro (2009). We first show, as an intermediate lemma, that our axioms ensure a counterpart of the uncertain averse representation of Cerreia-Vioglio, Maccheroni, Marinacci, and Montrucchio (2011) and then specialize it into the confidence-class representation.

3. **Philippe Colo**

Title: What's the Science? Communication under Model Uncertainty

Abstract: This paper studies the discredit of scientific knowledge into fake news. Scientific knowledge is seen as a collection of models, which are simplified representations of reality. An informed sender is assumed to have a more educated perception of models' likelihood, but cannot prove one to be true. A receiver is in a situation of model-uncertainty and has ambiguity sensitive preferences. Communication is a cheap-talk game over models. The receiver's knowledge is built on the sender's advice and is thus vulnerable to strategic misalignment. I show that when ambiguity aversion grows, it is much harder for the sender to be credible. Yet, under the assumption that the receiver is a maxmin expected utility maximiser, I show that all equilibria of this game can be ranked by informativeness and that the sender is better off playing the most informative one. In other words, information transmission is harder to achieve, but incentives for information withholding disappear. These results shed new light on the role of ambiguity aversion in the foundation of expert-based knowledge.

4. **Sofiia Mun**

Title: Risk and Ambiguity Preferences: Attitudes of the Self and Beliefs About Others (with Emmanuel Kemmel)

Abstract: This research program builds on the experimental pilot study that provides a systematic parameter-free assessment of risk and ambiguity attitudes across three types of event likelihoods in the gain and in the loss domains. The advantage of this study is that the full pattern of risk and ambiguity attitudes is elicited in a unified experimental design in a within-subject fashion. The elicitation method is efficient and uses only certainty equivalents and matching probabilities. The results reveal the fourfold pattern of risk attitudes consistent with Prospect Theory, and the fourfold pattern of ambiguity attitudes. The comparison shows that the majority of participants simultaneously exhibits the same type of attitude towards risk and ambiguity in certain circumstances of events. The findings on the correlation between risk and ambiguity attitudes across considered events are not consistent, as positive and significant correlation is found only for the very unlikely winning events. The presented evidence on the non-existence of universal ambiguity aversion and on the corresponding pattern of risk and ambiguity attitudes suggests an interesting avenue for future work. As an extension, firstly, we propose to conduct the extended parametric replication of the pilot study with a larger sample and a wider range of stakes in order to test the results for their significance and robustness, as well as to test the descriptive validity of ambiguity models, such as the Smooth Ambiguity Model and Prospect Theory. The parametric analysis would also allow us to test for the comprehensive correlation between risk

and ambiguity attitudes. Secondly, we pertain our findings to the situations of strategic uncertainty where efficient decision-making can benefit from correct predictions of others' uncertainty preferences. In order to strategically determine their moves, players need to have accurate beliefs about how their opponents react to uncertainty. Therefore, we propose a new experiment that attempts to experimentally investigate the beliefs that people hold about uncertainty preferences of others, and their ambiguity attitudes towards these preferences. Furthermore, our experimental design allows to test for the existence of correlation between people's beliefs about others and their own risk and ambiguity preferences, as relevant literature suggests that a self-similarity bias may play a role.

5. **Marieke Pahlke**

Title: Dynamic Consistency in Incomplete Information Games with Multiple Priors

Abstract: This paper explores multi-stage incomplete information games with common ambiguous information about state or types and ambiguity averse players. We characterize a belief formation process that allows players to take their knowledge about the structure of the game into account. This process leads to subjective rectangular ex-ante belief sets for all players. We show that under these belief sets players behave dynamically consistent. Therefore, using our belief formation process, we can generalize the concept of Sequential Equilibria to multi-stage ambiguous incomplete information games and show existence. Furthermore, we show that ambiguity can introduce Sequential Equilibria, that do not exist without ambiguity.