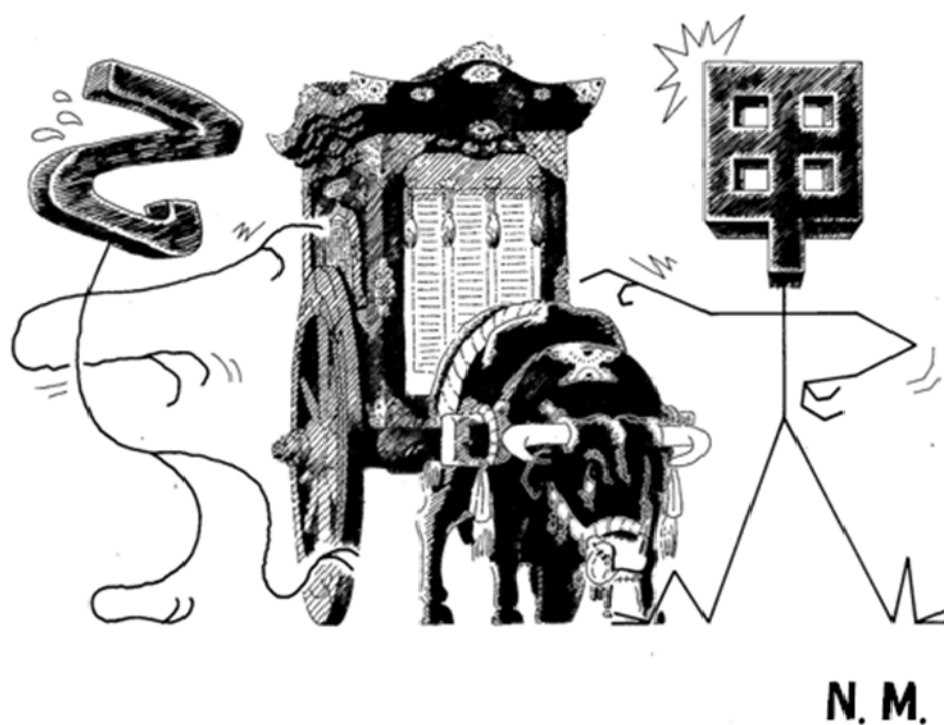


# Abstracts of Papers

## Logic, Game Theory, and Social Choice 6

University Hall  
University of Tsukuba  
Tsukuba, Ibaraki 305-8573, Japan  
August 26 – 29, 2009



A quarrel over an inheritance needs a brave heart and rational thinking.  
One is brave enough and the other is rational enough to continue the quarrel forever.

August 26 (Wednesday), 2009

**Session 1Ma: Unawareness in games and belief revision**

1: J. C. Quiggin, University of Queensland, Economics, johnquiggin1<at>mac.com (with J. Kline and S. Grant): A Matter of Interpretation: Bargaining over Ambiguous Contracts

**Abstract:** We present a formal treatment of contracting in the face of ambiguity. The central idea is that boundedly rational individuals will not always interpret the same situation in the same way. More specifically, even with well defined contracts, the precise actions to be taken by each party to the contract might be disputable. Taking this potential for dispute into account, we analyze the effects of ambiguity on contracting. We find that risk averse agents will engage in ambiguous contracts for risk sharing reasons. In addition to the risk sharing motivations for contracting in the presence of ambiguity, we find that agents may contract in order to reduce the downside effects of non-cooperative opportunism arising from ambiguity.

2. T.-W. Hu, Northwestern University, MEDS, tuh129<at>psu.edu: Expected Utility Theory from the Frequentist Perspective

**Abstract:** We present an axiomatization of expected utility from the frequentist perspective. It starts with a preference relation on the set of infinite sequences with limit relative frequencies. We consider three axioms parallel to the ones for the vN-M expected utility theory. Limit relative frequencies correspond to probability values in lotteries in the vN-M theory. This correspondence is used to show that each of our axioms is equivalent to the corresponding vN-M axiom in the sense that the former is an exact translation of the latter. As a result, a representation theorem is established: The preference relation is represented by an average of utilities with weights given by the relative frequencies.

3. M. A. Ballester, Universitat Autònoma, Economics, miguelangel.ballester<at>uab.es (with J. Apesteguia): Choice by Sequential Procedures

**Abstract:** In the model of choice by sequential procedures, the successive application of criteria gradually reduces the set of alternatives to a unique element, which is the one actually chosen. We offer a simple property, Independence of One Irrelevant Alternative, and show it is equivalent to choice by sequential procedures. Our property is instrumental for the understanding of choice by sequential procedures, and provides a novel tool with which to study how other behavioral concepts relate to it. We show that the notions of rationalizability by game trees, agenda rationalizability, and choice functions exhibiting a status-quo bias are special cases of choice by sequential procedures.

**Session 1Mb: Interactions among monkeys, humans and programs.**

1. N. Fujii, Riken BSI, na<at>brain.riken.jp: Development of social rule: How do social rules emerge in monkeys?

**Abstract:** Adaptive social behavior is unique brain functions observed in many species. It is commonly agreed that society rules our behaviors. For revealing a mechanism of the social brain function, conventional approach, which tries to control all of environmental parameters by isolating subject from reality, is not appropriate because adaptive social behavior can be observed only in reality. To reveal the social brain function, we developed Multi-dimensional Recording (MDR) system. MDR was designed to record simultaneously any biological and environmental information as much as possible. By using MDR, we recorded neuronal activity from prefrontal cortex (PFC) and parietal cortex from two monkeys simultaneously while they were socially interacting each other in a task. Monkeys performed simple food grab task. We analyzed neural activity to see how it was modulated by social context manipulated by the task. PFC neurons switched activity level by either up or down state that could reflect their internal social behavioral state. On the other hand, parietal cortex showed responses to motion of self and other, which were modulated by relative spatial positions and social hierarchy, suggesting that it might be useful information for social decision-making. It is obvious that these two areas are not the only brain regions that contribute social brain function so that we should record from entire neural network and analyze to understand how brain is managing adaptive social behavior.

2: H. Iizuka, Bio-informatic Engineering, University of Osaka, iizuka<at>ist.osaka-u.ac.jp (with H. Ando and T. Maeda): Synthesis and Collapse of Turn-taking Rules on Behaviour-based Turing Test

**Abstract:** To establish a harmonic interaction between a human and a computer, we reconsider human interactions that establish communication. Verbal communication has been enormously investigated as the symbolic operations however there are less studies that focus on how the rules emerged and how the rules relate to the communication because the rules in our verbal communication have been already well-established. On the other hand, psychological experiments such as double TV-monitor experiments [Trevarthen 1985] and perceptual crossing [Auvray et al. 2006] show the central role of dynamic mutuality and contingency for communication even in social embodied interactions. Therefore, in order to investigate communication, we use the simple and embodied low-level environment where inputs and outputs of people are restricted and we investigate how the rules emerge and how it contributes to the communication. In the experiments, a behaviour-based Turing Test is a task for subjects. It means that the communication is not an explicit goal for the subjects but implicitly required. As a result, it is shown that the emergence of turn-taking behavior plays an important role to pass our behavior-based Turing Test. We also show the rule is rather dynamic than static. The results will be discussed with communication.

3: T. Ikegami, General Systems Studies, University of Tokyo, ikeg<at>sacral.c.u-tokyo.ac.jp:

Learning and Uncertainty in Coupled Dynamical Recognizers

**Abstract:** We propose a new way of studying social dilemmas and the epistemic structures of agents. Here we study the iterated prisoner's dilemma game played by cognitive players, where each player optimizes his or her own future actions by making an internal model of the opponent's behavior. A simple recurrent neural net is used to make these internal models. In the present study, we pay

particular attention to uncertainty in optimization processes. The internal model of each player's behavior is constructed from a finite history, and various possible models can be generated from each history. That is, many internal models are equally accurate in mimicking the opponent's behavior. If the optimized future action varies depending on which of the models is chosen, we construct branches in the world line to represent several possible future worlds. Depending on the game situation (e.g. the payoff structures, the length of past sequences to be considered, the uncertainty level in choosing models, etc.), the structures of the branching of world lines (i.e., of possible worlds) will vary. Using the idea, we propose a new analysis of the testing of the explorative behavior of cognitive robots.

### **Session 1Mc: Voting and Experiment**

1: M. Munie, Stanford University, Computer Science, munie<at>stanford.edu (with P. Tang, Y. Shoham): A Framework for the Quantitative Evaluation of Voting Rules

**Abstract:** In order to characterize the set of desirable social choice functions, researchers have proposed axioms that all social choice functions should satisfy. However, it has been shown that achieving these axioms is impossible. Instead of viewing this impossibility result as a limitation, it can be viewed as an opportunity. In this paper, we develop a means of comparing various social choice functions with regard to a desired axiom by quantifying how often the axiom is violated. To this end, we offer a new framework for measuring the quality of social choice functions that builds from and provides a unifying framework for previous research. This framework takes the form of what we call a “violation graph.” Graph properties have natural interpretations as metrics for comparing social choice functions. Using the violation graph we present new metrics, such as the minimal domain restriction, for assessing social choice functions and provide exact and probabilistic results for voting rules including plurality, Borda, and Copeland. Motivated by the empirical results, we also prove asymptotic results for scoring voting rules. First, these results suggest that voting rules based on pairwise comparison (ex: Copeland) are better than scoring rules (ex: Borda count). Second, these results also suggest that although we can never fulfill our desired set of axioms, the frequency of violation is so small that with even a modest number of voters we can expect to never violate our axioms.

2: A. Slinko, University of Auckland, Mathematics, a.slinko<at>auckland.ac.nz (with E. Elkind, P. Faliszewski): On Distance Rationalizability of Some Voting Rules

**Abstract:** The concept of distance rationalizability has several applications within social choice. In the context of voting, it allows one to define (“rationalize”) voting rules via a consensus class (roughly, a set of elections in which it is obvious who should win) and a distance function: namely, a candidate is said to be an election winner if it is ranked first in one of the nearest (with respect to the given distance) consensus elections. It is known that many classic voting rules can be represented in this manner. In this paper, we provide new results on distance rationalizability of several well-known

voting rules such as all scoring rules, Approval, Young's rule and Maximin. We also show that a previously published proof of distance rationalizability of Young's rule is incorrect: the consensus notion and the distance function used in that proof give rise to a voting rule that is similar to—but distinct from—the Young's rule. Finally, we demonstrate that some voting rules cannot be rationalized via certain notions of consensus. To the best of our knowledge, these are the first non-distance-rationalizability results for voting rules.

3: M. Nunez, Ecole Polytechnique, matias.nunez<at>polytechiq.edu: Approval Voting on Large Poisson Games

**Abstract:** Approval Voting is analyzed in a context of large elections with strategic voters, the Myerson's Large Poisson Games. Three examples show that this voting rule does not always correctly aggregate preferences. The first one shows that a candidate preferred by more than half of the voters need not be the Winner of the election under Approval voting. In the second one, we show that it can be the case that the Condorcet Winner is not the Winner of the election in any of the equilibria of the Large Poisson game under Approval Voting. Finally, in the third example, the Condorcet Winner gets no vote and sincere behavior is not a best response for strategic voters with such a voting rule.

**Invited Session: Peter Gärdenfors**, Lund University, Sweden, Peter.Gardenfors <at> lucs.lu.se: The Role of Intersubjectivity in Animal and Human Cooperation

**Abstract:** I argue that analyses of various kinds of cooperation will benefit from an account of the cognitive and communicative functions required for the cooperation. In particular, I focus on the role of intersubjectivity (theory of mind), which has not been sufficiently considered in game theory. Intersubjectivity will here be divided into representing the emotions, desires, attention, intentions, and beliefs of others. I then analyze some kinds of cooperation—reciprocal altruism, indirect reciprocity, cooperation on future goals, and conventions—with respect to their cognitive and communicative prerequisites. It is argued that uniquely human forms of cooperation depend on advanced forms of intersubjectivity.

**Keywords:** convention, cooperation, future goals, indirect altruism, intersubjectivity, prospective cognition, reciprocal altruism, symbolic language

**Tutorial 1: Jeffrey J. Kline**, Bond University, Australia, jekline<at>bond.edu.au: Inductive Game Theory #1: Application with Role Switching

**Abstract:** Inductive game theory has been developed by Kaneko-Matsui (1999) and Kaneko-Kline (2008) to describe the origin and emergence of each person's understanding of his social situation. It treats experience as the basic source for a person's understanding. As a theory, it has the potential to describe:

1. the behavior and learning of the players, including what they learn and retain as memories;

2. how they use their memories to inductively derive their views of a social situation;
3. how each player might use his view to adjust his future behavior.

In the first tutorial, I will introduce the theory using an application of role switching by players serving as an experiential source for both his understanding of the situation and his understanding of others. I will discuss how the experiential learning of the game through repeated play and role switching affects the behavior of the players. In particular, I will talk about a solution concept called *i.c. equilibrium*, which predicts cooperative behavior by players when role-switching occurs regularly. However, if the players don't switch roles enough or each ignores the other player's understanding, then the solution concept predicts non-cooperative Nash equilibrium behavior.

In the second tutorial, I will address more foundational questions and discuss new structures and new concepts required for inductive game theory.

## Session 1Aa: Rational and Social Choice

1: W. Bossert, University of Montreal, Economics, walter.bossert<at>videotron.ca (with Kotaro Suzumura): Decisive Coalitions and Coherence properties

**Abstract:** In a seminal contribution, Hansson demonstrated that the family of decisive coalitions associated with an Arrovian social welfare function forms an ultrafilter. If the population under consideration is infinite, his result implies the existence of non-dictatorial social welfare functions. Furthermore, Hansson established that if transitivity is weakened to quasi-transitivity, the set of decisive coalitions is a filter. In this paper, we examine the structure of decisive coalitions and analogous concepts without assuming completeness of social relations and with alternative coherence properties. In addition to transitivity and quasi-transitivity, we consider acyclicity and Suzumura consistency. We first show that, in the absence of completeness, transitivity and quasi-transitivity are indistinguishable in terms of the decisive coalition structures they generate: in each case, the set of decisive coalitions is a filter. Furthermore, we show that acyclicity and Suzumura consistency are equivalent in the Arrovian setting where unlimited domain, weak Pareto and independence of irrelevant alternatives are imposed. We identify the corresponding (quasi-)decisiveness properties and establish that they are identical for the two coherence properties. Finally, we strengthen the independence condition to neutrality and establish a simplified decisiveness structure appropriate for that setting.

2: M. Fleurbaey, University Paris Descartes, Economics, marc.fleurbaey<at>parisdescartes.fr (with Koichi Tadenuma): Universal Social Orderings

**Abstract:** We propose the concept of a universal social ordering, defined on the set of pairs of an allocation and a preference profile of any finite population. It is meant to unify evaluations and comparisons of social states with populations of possibly different sizes with various characteristics. The universal social ordering not only evaluates policy options for a given population but also compares social welfare across populations, as in international or intertemporal comparisons of living standards. It also makes it possible

to evaluate policy options which affect the size of the population or the preferences of its members. We study how to extend the theory of social choice in order to select such orderings on a rigorous axiomatic basis. Key ingredients in this analysis are attitudes with respect to population size and the bases of interpersonal comparisons.

3: N. Houy, Ecole Polytechnique, Economics, [nhouy@free.fr](mailto:nhouy@free.fr): Choice Rationality with Progressive Knowledge

**Abstract:** We weaken the implicit assumption of rational choice theory that imposes that preferences do not depend on the choice set. We concentrate on the cases where the preferences change monotonically when the choice set expands. Then, we show the relation between choice set dependent choices and revealed preferences by introducing an axiom of Progressive Knowledge Strong Axiom of Revealed Preferences. Then, we study the link between choices derived from monotonous set-dependent preferences and sequential rationalizability. This link is quite natural since choices derived from monotonous set-dependent preferences are characterized by a strong axiom of revealed preferences whereas sequentially rationalizable choice functions (introduced in "Sequentially rationalizable choice", American Economic Review, 97(5): 1824-1839.) are characterized by a weak axiom of revealed preferences.

4: K. Tadenuma, Hitotsubashi University, Economics, [koichi.t@econ.hit-u.ac.jp](mailto:koichi.t@econ.hit-u.ac.jp) (with Nicolas Houy): Axiomatizations of Compositions of two Choice Criteria

**Abstract:** We investigate natural and reasonable ways to make choices with multiple criteria. Given two choice functions, each of which represents a choice criterion, we study how to compose the two choice functions. We define reasonable or desirable properties that composed choice functions should satisfy. Then we characterize three types of composed choice functions by some lists of properties. Key ingredients are properties of choice in "simple" situations and properties of (bounded) rationality.

### Session 1Ab: Group Decisions

1: W. Trockel, Bielefeld University, Mathematical Economics, [wtrockel@wiwi.uni-bielefeld.de](mailto:wtrockel@wiwi.uni-bielefeld.de): On Maskin Monotonicity of Solution based Social Choice Rules.

**Abstract:** Howard (1992) argues that the Nash bargaining solution is not Nash implementable, as it does not satisfy Maskin monotonicity. His arguments can be extended to other bargaining solutions as well. However, by defining a social choice correspondence that is based on the solution rather than on its realizations, one can overcome this shortcoming. We even show that such correspondences satisfy a stronger version of monotonicity that is even sufficient for Nash implementability.

2: P. L. Mura, Leipzig Graduate School of Management, [plamura@hhl.de](mailto:plamura@hhl.de) (with E. Demidova): Group Bargaining with Incomplete Information

**Abstract:** In many real-life bargaining situations, in business life as well as in the political arena, the negotiating parties are typically not individual agents but rather groups of possibly heterogeneous individuals. In such situations, an agreement must reflect consensus not only between groups but also among members of the same group. We focus on the simplest of such scenarios, and extend Rubinstein's (1985) bilateral bargaining model with incomplete information to the case in which one of the negotiating parties is a couple. We investigate how the choice of negotiation format (specifically, open- vs. closed-door negotiations) affects the individual welfare of the participants, as well as the overall efficiency of the bargaining process

3: K. Indo, Kanto Gakuen University, Business Administration, kind<at>kanto-gakuen.ac.jp:

Modeling Cognitive Processes of a Decision Maker by PROLOG

**Abstract:** In this paper, a new direction of modeling for deterministic and non-probabilistic decision making, which describes explicitly a decision maker's internal dynamical cognitive processes, is proposed. Dynamic environment is modeled as a state space and acts are defined as transition functions over it. The mental activity of a decision maker is modeled as a set of possible acts as transition functions, hierarchical rules of utility, information processing, and beliefs on acts and their uncertain evaluations respectively. Two contingency state spaces, objective states (i.e., the environment) and subjective states (i.e., the perceived relevant fact), are connected by one-to-many mappings. It is shown experimentally that under a sort of pricing mechanism for memory management, a decision maker can inductively learn a covariant knowledge for transition rules and adopting behavior by using PROLOG.

4: D. Zhang, University of Western Sydney, Computing and Mathematics, d.zhang<at>uws.edu.au:

Logical Axiomatization of Ordinal Bargaining.

**Abstract:** This paper presents an axiomatic characterization for ordinal bargaining solution based on a logical model of bargaining. We represent bargainers' demands in propositional logic and preferences in total order. Based on the protocol of minimal simultaneous concession, we propose an ordinal solution to n-person bargaining problems. We prove that the solution can be uniquely characterized by four plausible axioms: Individual Rationality, Consistency, Collective Rationality, and Contraction with Minimal-Simultaneous-Concessions.

## **Session 1Ac: Political Economy and Social Evolution**

1: Y. Asako, University of Wisconsin-Madison, Economics, achako\_y\_2004<at>yahoo.co.jp: Partially Binding Platforms and the Advantages of Being an Extreme Candidate

**Abstract:** This paper develops a model in which platforms are partially binding: a candidate who implements a policy different from his platform must pay a cost of betrayal that increases with the size of the discrepancy. I also suppose that voters are uncertain about candidate preferences for policies. If voters believe that a candidate is likely to be extreme, there exists a semi-separating

equilibrium: an extreme candidate mimics a moderate candidate with some probability, and with the remaining probability, he announces a platform that is more moderate than a moderate candidate's platform. Although an extreme candidate will implement a more extreme policy than a moderate candidate in equilibrium, partial pooling ensures that voters prefer an extreme candidate who does not pretend to be moderate over an uncertain candidate announcing a moderate candidate's platform. As a result, an extreme candidate may have a higher probability of winning than a moderate one.

2: Y. Funaki, Waseda University, Economics, funaki<at>waseda.jp (with J. Vyrasterkova, Daan van Soest): Coalition Formation in a Common Pool Resource Game: an Experiment

**Abstract:** We present experimental data on the impact of coalition formation in a common pool resource game. Subjects play the underlying game while having the possibility to form coalitions and commit themselves to an action profile in the coalition they form. The coalition formation process follows rules adapted from the continuous time game formulated by Perry and Reny (1994). The game is designed to implement the core of a cooperative TU game. We observe that subjects prevalently form grand coalitions and agree on efficient and egalitarian payoffs. When the option to form coalitions is removed, the incentives to free-ride are triggered again. The group welfare then drops significantly, as is known from experiments imposing individual decision-making.

3: W. Leininger, University of Dortmund, Economics, wolfgang.leininger<at>udo.ed Evolutionarily Stable Preferences in Contests

**Abstract:** We define an indirect evolutionary approach formally and apply it to (Tul-lock) contests. While it is known that the direct evolutionary approach in the form of finite population ESS yields more aggressive behavior than in Nash equilibrium, it is now shown that the indirect evolutionary approach yields the same more aggressive behavior, too. This holds for any population size  $N$ , if the evolution of preferences is determined by behavior in two-player contests. The evolutionarily stable preferences (ESP) of the indirect approach turn out to be negatively interdependent, thereby "rationalizing" the more aggressive behavior.

4: B. Dong, University of International Business and Economics, Economics, baomindong<at>uibe.edu.cn (with T. Zhou): A Moral Hazard Model of Pair Bonding and Conflict of Parental Care in Monogamy

**Abstract:** Pair bonding and parental care are essential elements of monogamy (monogyny). In particular, pair formation with male involvement of parental care provision is common. One perplexing observation is that although males and females have different comparative advantages, cooperation is only seen during breeding period. One interpretation is that the juvenile offspring serve as an indivisible public goods to facilitate cooperation between opposite sexes of adults. This paper then provides an alternative justification of the evolutionary advantage of male parental care in monogamy, i.e., through optimal labour division within the pair, offspring's survivorship is maximized at a lower care cost. However moral hazard arises when one specialized labour input is not observable, causing equilibrium care levels at second best. This may explain the occurrence of group breeding

by herding when food search is highly uncertain

## August 27 (Thursday), 2009

### Session 2Ma: Cooperative Games

1: Y. Chun, Seoul National University, Economics, ychun<at>snu.ac.kr (with J. Lee): Sequential Contributions Rules for Minimum Cost Spanning Tree Problems

**Abstract:** We introduce a family of sequential contributions rules for minimum cost spanning tree problems. Each member of the family assigns an agent some part of his immediate connection cost and all of his followers are equally responsible for the remaining part. We characterize the family by imposing the axioms of efficiency, non-negativity, independence of following costs, group independence, and weak first-link consistency. The Bird and the sequential equal contributions rules are two distinguished members of the sequential contributions rules. The Bird rule is obtained by requiring an agent to pay the whole part of the immediate connection cost, and the sequential equal contributions rule is obtained by requiring an agent and each of his followers to be equally responsible for the immediate connection cost. We show that how these two rules can be single out from the family by imposing additional axioms.

2: T. Driessen, University of Twente, Applied Mathematics, t.s.h.driessen<at>ewi.utwente.nl (with T. Radzik): Socially Acceptable Values for Cooperative TU-Games

**Abstract:** In the framework of the solution theory for cooperative transferable utility games, a value is called socially acceptable if, for every unanimity game, the payoff to any productive player covers the payoff to any non-productive player. Firstly, it is shown that two properties called desirability and monotonicity are sufficient to guarantee social acceptability. Secondly, the main goal is to investigate and characterize the class of efficient, symmetric, and linear values that are socially acceptable. Thirdly, a second type of social acceptability is added and similar results are shown.

3: A. Khmelnitskaya, Russian Academy of Sciences, SPb Inst. Economics- Mathematics, a.khmelnitskaya<at>math.utwente.nl: On 1-convexity and Nucleolus of Co-insurance Games

**Abstract:** We consider the situation in which a risk is evaluated too much heavy for a single insurance company, but it can be insured by the finite set of companies that share the risk and the premium. Such an insurance situation is modeled through a cooperative TU game, the so-called co-insurance game, first introduced in Fragnelli and Marina (2004). We study the non-emptiness and the structure of the core and the nucleolus of the co-insurance game subject to the premium value. If the premium is large enough, the core is empty. If the premium meets a critical upper bound, the non-emptiness of the core, being in this case a single allocation composed of player's marginal contributions, turns out to be equivalent to the so-called 1-convexity property of the co-insurance game. Moreover, if non-emptiness applies, the co-insurance game inherits the 1-convexity property while lowering the premium till a critical lower bound

induced by the individual evaluations of the enormous risk. In addition, 1-convexity of the co-insurance game yields the linearity of the nucleolus which, in particular, appears to be a linear function of the variable premium. If 1-convexity condition does not apply, then for the premium below another critical number we present an algorithm for computing the nucleolus.

4: C. Chang, National Tsing Hua University, Mathematics, cchang<at> math.nthu.edu. tw (with Y.-Y. Yang): On the Linearity Regions of the Nucleolus

**Abstract:** It is of both mathematical interest and computing reason to characterize the linearity region which is a subset of TU games such that the nucleolus is linear on it. The main purpose of the paper is to introduce the balanced topology which is a generalization of the concept – topology, and to characterize the linearity regions in terms of it. Although there are many different balanced topologies to generate many different linearity regions, we will propose a linearity region which cannot be generated by any balanced topology.

### Session 2Mb: Behavioral Economics

1: H. Sosnowska, Warsaw School of Economics, honorata<at>sggw.waw.pl: Formal and Intuitive Rules of Ordinal Risk in Case of Positive and Negative Events

**Abstract:** The aim of this paper is to establish whether the rules of probability calculus are fulfilled in the intuitive evaluation of ordinal risk. The rules of probability calculus are based on the rules of propositional calculus, so we also study whether these rules are satisfied in intuitive reasoning. Two experiments were conducted. They are compared to explain the degree of conformity of mathematical rules of probability calculus with the intuitive, subjective probability in case of ordinal risk. In ordinal risk the values of risk are not known. Every person knows only an order of probability of events. We study ordinal risk for negative and positive events. Results of both experiments are similar. There is no conformity of mathematical rules of probability calculus with the intuitive rules of ordinal risk, especially in a case of rule of probability of a sum of events. It is important that respondents distinguish the sum and intersection of events in the case of negative events but a lot of them do not do it in case of positive events.

2: A. Takeuchi, Waseda University, Economics, ai-tak<at>moegi.waseda.jp (with Y. Funaki, M. Kaneko, and J. J. Kline): Experimental Study of the Prisoner's Dilemma with Role-Switching from the Perspective of Inductive Game Theory

**Abstract:** We conduct an experimental study of behavior in some asymmetric prisoner's dilemma (PD) games; the PD games have the same structures of dominant actions as the standard symmetric PD. This experimental study has two salient features: Learning of payoffs from experiences; and emergence of cooperation. The first is the primary objective of inductive game theory, discussed in Kaneko-Kline (2008, 2009), and the second is specifically discussed in Kaneko-Kline (2009). Subjects have no knowledge about the payoffs of the game, and learn them through playing a PD-game

repeatedly. In one of the treatments, called *reciprocal*, the subjects switch the positions of “players”; whereas in the other treatment, called *non-reciprocal*, each is fixed to play one position. In this paper, we compare and analyze the results of the reciprocal and non-reciprocal treatments for the PD games. In the non-reciprocal treatment, we have, consistently, the convergence result to NE. On the other hand, in the reciprocal treatment, we observe some convergence to the cooperative result predicted by Kaneko-Kline (2009). Also, we look at these results from the cognitive point of view.

3: N. Berg, University of Texas-Dallas, Economics, nberg<at>utdallas.edu: Behavioral Economics: Neoclassical Economics in Disguise?

**Abstract:** Behavioral and neoclassical both rely on a single normative model based on internal logical consistency. Internal logical consistency—rather than context-specific metrics of performance—underlies normative axioms such as transitivity, time consistency, Bayesian belief structures, and the Savage axioms needed to guarantee that expected utility representations of risk preferences exist. Internal consistency imposes constraints on pairs of decisions, while any single decision considered in isolation can be rationalized. Normative concepts based on internal consistency are both too weak, allowing manifestly mal-adaptive behavior, and too strong, ruling out well-performing heuristics that are nevertheless internally inconsistent. This paper presents evidence of negative correlation between three normative measures based on internal consistency and context-specific performance metrics, implying that logical consistency predicts inferior performance in some real-world decision domains. An alternative normative framework is ecological rationality, which concerns the extent to which decision heuristics are well-matched to the domains in which they are used. Context-specific measures of the level of performance rather than norms requiring internal consistency suggest a promising normative framework in which veridical descriptions of the decision processes that people and firms actually use, and the contexts in which they are used, are primary objects of scientific inquiry.

4: E. Molis, CORE, University of Louvain, molis<at>fusl.ac.be (with R. Veszteg): How (rationally) Agents behave when They look for a Partner: Experimental Results.

**Abstract:** In this work, we use the experimental method to study agents decentralized decision-making in roommate markets in order to form a finite sequence of (myopic) blocking pairs to a stable matching. By using the approach by Haruvy and Unver (2007), we describe the problem as a repeated roommate market and analyze the convergence outcomes of this process under different information scenarios.

## **Session 2Mc: Industrial Organization and Other Economic Problems**

1: S. Fabrizi, Massey University, Economics, s.fabrizi<at>massey.ac.nz (with S. Lippert): On Moral Hazard and Joint R&D

**Abstract:** This paper analyzes how the determinants of two entrepreneurs’ choice whether to conduct

product innovation R&D projects alone, or in a cross license agreement, or in a research joint venture depend on the intrinsic nature of the R&D projects. Results show that in fundamental research – which is considered to be affected by moral hazard behavior of the researchers – there is a systematic bias toward conducting R&D projects alone and against making use of synergies in an RJV. Furthermore, from a social standpoint, in nonfundamental research – which is considered not to be affected by moral hazard behavior of the researchers – too few RJsVs and too few cross license agreements are chosen; whereas in fundamental research too few RJsVs, and too many cross license agreements are chosen.

2: Y. Xing, Peking University, CCER, xingyq<at>gmail.com (with J. Y. Lin, H.-M. Wu): Excess Capacity in an Industry with Uncertain Number of Firms

**Abstract:** In industries where capacities are required to be established before production, excess capacity may happen and leads to a series of important consequences. This paper focuses on the uncertainty of the number of players (firms), showing that such uncertainty can lead to an unintentional and “rational” result of excess capacity. The equilibrium of such a game with uncertain number of players is defined and provided. Several in equilibrium properties are discussed—a lower prediction (prior distribution) of number of firms, a lower cost of capacity establishment cost or a better market demand all contributes to raise the equilibrium capacity establishment.

3: S.-F. Ueng, National Chung-Cheng University, Economics, ecdfsufu<at>ccu.edu.twe: On the Enterprise of Self-establishment

**Abstract:** The evolutionary interests of father and son are eternally intertwined. Their trust in and concern for each other is natural. However, fathers across cultures complain that their sons do not listen to them, while their sons lament their lack of understanding. This paper illustrates a rational mechanism that results in this contradiction. It studies the interactive dynamics of a pair of an ordinary father and son. The son aspires to achievements and expects the father's good judgement; the father enjoys the son's success and suffers with his failure. It is shown that these ordinary properties suffice to generate a steady-state where the son, on average, consults outsiders more often. Interest bond gives no advantage to parental guidance over outsiders' endorsement in influencing the son's decisions. To enhance the father-and-son partnership, a father may transmit suggestions via trustworthy outsiders so that his useful advice can go around the son's disappointment with him and get a proper listening.

4: E. Dziwok, University of Economics, Applied Mathematics, ewa.dziwok<at> ae.katowice.pl: Interest Rate as a Source of Market Expectations-Implications for Monetary Policy in Poland

**Abstract:** A process of term structure modeling - based on a functional relationship between discount, spot and forward rates - has started to play an important role in monetary policy. Generally it utilizes two types of models (parametric and B-splines) and various sources of data. The first aim of

the article is to compare different segments of Polish rate market to find the best source of data for Polish monetary policy. The second purpose is to extract market expectation of future monetary policy with the parametric model to show how they influence on monetary policy based on the Inflation Targeting strategy.

### **Invited Session**

**Jean-François Laslier**, Ecole Polytechnique, France, jean-francois.laslier <at>polytechnique.edu:  
Voting and Experiments

**Abstract:** We report on laboratory experiments on voting. In a setting where subjects have single-peaked preferences, we find that one-round voting and two-round voting generate significant path-dependent effects, whereas approval voting elects the Condorcet winner and Single Transferable vote (Hare system) does not. From the analysis of individual data, we conclude that voters behave strategically as far as strategic computations are not too involved, in which case they rely on simple heuristics.

### **Tutorial 2**

**Jeffrey J. Kline**, Bond University, Australia, jekline<at>bond.edu.au: Inductive Game Theory #2:  
New Concepts and Treatments of the Theory

**Abstract:** In this tutorial, I focus on the new concepts and treatments required for the development of inductive game theory. As mentioned in the first tutorial, inductive game theory has the potential to describe various aspects of behavior, learning, memory, induction, and revision. We introduce and describe the additional structures, to those used in standard extensive games. We will see why the present formulation of an extensive game is insufficient to describe a view of a player and the actual game being played.

The new structures introduced will include a *memory function* and an *information protocol*. I will use these structures to emphasize the importance of our treatment of experiences and memory and how it differs from standard treatments in the extant game theory. I will also use them to make clear distinctions between: *information transmission* and *beliefs/knowledge*, and *objective* versus *subjective* viewpoints and characteristics.

### **Session 2Aa: Social Inequality, Norm, and Justice: Sociological Perspective**

1: H. Hamada, Graduate School of Arts and Letters, Tohoku University,  
hamada<at>sal.tohoku.ac.jp: A Model of Educational Attainment: Effect of Social Origin

**Abstract:** This study attempts to explain why class barrier for educational attainment still remains in spite of educational expansion and why class origin effect on educational attainment declines across transition by making a simple model. Basic assumptions are the following. First, all players in a model are divided into high, middle and low class origin. Second, every player has binary choice: the one is to stay in education with a cost and the other is to leave education. Third, they maximize

their expected utility and choose to stay in education if their expected utility is greater than that of the case they do not. Fourth, they experience high school transition first and university transition second. Only players who succeed at first transition can go to the next stage. By this model we show that Maximally Maintained Inequality hypothesis which is proposed by Raftery and Hout (1993) holds at first and second transition. We proved that the total advancement rate is Nash equilibrium and the order of saturation of advancement rate corresponds to the degree of advantage of class origin. The condition that the effect of social origin on educational transition declines is specified by analyzing odds ratios at first and second transition.

2: H. Takikawa, The Graduate University for Advanced Studies (Sokendai),

takikawa\_hiroki<at>soken.ac.jp : On Game Theoretical Analysis of Norms and Justice

**Abstract:** In this presentation I will examine possible contributions of game theory to the normative theory of justice. In particular, I will show that game theory provides analytical tools to make clear the logical construction of "sociological normative theory" what I call. "Sociological normative theory" have three characteristics: It is empirically based, and assume the Durkheimian postulate-"society as sui generis", and the theory implements inter-personal comparison of good, which is inhibited by modern theories of liberalism. I think game theory is very useful to understand some of the most important problems of sociological normative theory such as follows: How should we compare the various conceptions of good which are informational basis of justice? What kind of rationality should we attribute to the agents when we try to construct a theory of justice? Is it reasonable to assume some kind of social entity such as ideal observer? And finally how can we derive the normative content from the analysis of the empirical social realities? I will examine the various normative theories of justice by philosophers, economists, and sociologists in terms of above questions and suggest the new direction for the dialogue between game theory and a normative theory of justice.

3: M. Muto, Shibaura Institute of Technology, muto<at>sic.shibaura-it.ac.jp: Pareto Inefficiency

from Inequality in Liberal Society: A Game Theoretic Analysis of Redistribution Principle

**Abstract:** The purpose of this paper is to clarify proper weight of welfare redistribution, for example that is tax rate, in liberal society where individuals rationally choose actions maximizing their own payoffs. As a research method we use game theory. As a result of the analysis, we find out that the proper tax rate is 100% so that everyone gains the same payoff regardless of his/her own payoff in the original game. In fact the only perfectly equalizing society can always realize Pareto efficiency. In other words any society permitting inequality of outcomes have possibility of resulting in Pareto inefficiency.

4: K. Seiyama, University of Tokyo, Sociology, seiyama<at>l.u-tokyo.ac.jp: Toward a Theory of Fair Distribution

**Abstract:** This presentation inquires the question: what kind of egalitarian norm is fair and efficient

when individuals act rationally? In other words, what kind of distribution rule is socially desirable? Since Rawls' *A Theory of Justice*, contemporary liberalism has endeavored to specify the desirable equality and explored the theoretical reasons for egalitarianism. But most of those theories have a serious defect: the neglect of consequences and production. Given an egalitarian norm or distribution rule established, there is still a possibility that rational individuals might act in a way detrimental not only to that norm but also to the goodness of people. So, this presentation, constructing mathematical models of production and distribution, explored the conditions for the "fair" distribution, where a rule is "fair" if it provides the most efficient production at the equilibrium under rationality assumption. Then, several theorems are derived. One important result is that, when the production is disjoint among individuals, the rule prohibiting any redistribution will be fair: a result especially consonant to libertarianism. But of course this is not the case when the production is joint as in the most empirical worlds, where the simple equal distribution is not fair either.

### Session 2Ab: Epistemic Logic

1: Y. Maruyama, Kyoto University, Humanistic Informatics, maruyama<at>i.h.kyoto-u.ac.jp: The Logic of Graded Belief and Common Belief: With Emphasis on Incomparable Beliefs.

**Abstract:** This paper aims to formalize reasoning about graded belief and common belief, especially incomparable beliefs, by using a logical system based on a Fitting-style many-valued modal logic, where incomparable beliefs are defined as beliefs whose degrees are not totally ordered. Kripke semantics for common belief operator is naturally extended to the many-valued case and thus graded common belief can be represented in the extended semantics. A Hilbert-style deductive system is then developed and shown to be sound and complete with respect to the extended semantics. Finite model property and decidability are also shown. It is a novel feature of the present work that the notion of incomparable beliefs can be formalized in the developed system, whereas they cannot be formalized in some previously proposed systems for graded belief.

2: N.-Y. Suzuki, Shizuoko University, Mathematics, smnsuzu<at>ipc.shizuoka.ac.jp: Semantics for Intuitionistic Epistemic Logics of Shallow Depths for Game Theory

**Abstract:** Epistemic logics of shallow depths are discussed in various papers by Kaneko-Suzuki, where by "shallow depths" we mean players' bounded interpersonal inferences for decision making of games. In their approach, classical logic is adopted as the base logic. That is, the players' logical abilities are also the same as classical logic. Classical logic has some non-constructive feature. However, decision making requires constructive reasoning. To capture the constructive nature, we adopt intuitionistic logic as the base logic, instead of classical logic. This logical system is denoted by  $IGEF$ . In this talk, we introduce epistemic possible world semantics for  $IGEF$ . We show the soundness and completeness of  $IGEF$  with respect to this semantics. We also show some applications to some game-theoretical problems.

3. T. Agotnes, University of Bergen, Norway, Thomas.agotnes<at>infomedia.uib.no (with H. van Ditmarsch): What will they say – Public Announcement Games

**Abstract:** Dynamic epistemic logics describe the epistemic consequences of actions. Public announcement logic, in particular, describes the consequences of public announcements. As such, these logics are descriptive – they describe what agents can do. In this paper we discuss what rational agents will or should do. We consider situations where each agent has a goal, a typically epistemic formula he or she would like to become true, and where the available actions are public announcements. What will each agent announce, assuming common knowledge of the situation? The truth value of the goal formula typically depends on the announcements made by several agents, hence we have a game theoretic scenario. We discuss possible solutions of such public announcement games.

4: T. Masuzawa, Osaka University of Economics, Economics, masuzawa<at>Osaka-ue.ac.jp (with K. Hasebe): Iteration of Public Announcement and Stability of Agreements

**Abstract:** We discuss the epistemic conditions for all players to agree to a proposal. For that purpose, we consider the situation when every player iteratively decides whether or not to agree to some proposal only with the information about the other players' past decisions, and in this setting, the proposal is considered to be accepted if no player rejects it for any finite iteration of such decisions. In order to analyze the players' knowledge in this situation, we use the public announcement logic originally introduced by Plaza (1989). We first extend the Plaza's logic by, instead of the information-invariance axiom on all atomic formulas, introducing the *information-monotonic* axiom: an atomic formula remains true after any announcement of information. We show that the iteration has then the property that the order of iterated decisions does not matter. This result explains the order-independency of iterated determination of disadvantageous strategies, which is well known in existent game theory.

## Session 2Ac: New Concepts in Game Theory

1: A. Slinko M. Ryan, University of Auckland, Mathematics, slinko<at>math.auckland.ac.nz (W. Bossert, M. Ryan): Orders on Subsets Rationalised by Abstract Convex Geometries

**Abstract:** We find conditions on the order on subsets of a finite set which are necessary and sufficient for the relative ranking of any two subsets in this order to be determined by their extreme elements relative to an abstract convex geometry. It turns out that this question is closely related to the rationalisability of path independent choice functions by hyper-relations.

2: K. Nishihara, Fukuoka University, Economics, nishi<at>fukuoka-u.ac.jp: Stochastic Stability of a Cooperative Equilibrium in a Social Dilemma Game with Observable Defection.

**Abstract:** A social dilemma is a situation in which a collection of selfish behavior causes a serious

social problem. Such problems include environmental pollution, waste of energy and resources, and, in the case of public goods, the free-rider problem. Decision making in a social dilemma is formulated by a normal form game which is called a social dilemma game. (It is also called an  $n$ -person Prisoners' Dilemma) Nishihara (Economic Theory 1997) relaxed the simultaneous move assumption of the social dilemma game, and investigated it under the assumption that players have randomly ordered sequential moves and defection is observable but cooperation is not. This game represents the situation in which to defect is to impose negative externality on others, and to cooperate is not doing so. He showed that this game has a Nash equilibrium which supports cooperation, if the payoff functions satisfy a certain condition. But, it also has a Nash equilibrium which supports defection. For the equilibrium selection, in the present paper we apply the stochastic evolutionary game theory introduced by Kandori, Mailath and Rob (1993) to this game. We examine the stochastic stability of the Nash equilibrium which supports cooperation under the assumption of a common linear payoff function. As a main result, we show that if the incentive of defection is sufficiently small, then the Nash equilibrium supporting cooperation is a unique long-run equilibrium.

3: E. Winter, Hebrew University, Economics, mseyal<at>pluto.huji.ac.il (with I. Garcia-Jurado, J. M.-N. Luciano): Mental Equilibrium and Rational Emotion

**Abstract:** We introduce emotions into an equilibrium notion. In a mental equilibrium each player selects an emotional state which determines the player's preferences over the outcomes of the game. These preferences typically differ from the players' material preferences. The emotional states interact to play a Nash equilibrium and in addition each player's emotional state must be a best response (with respect to material preferences) to the emotional states of the others. We first discuss the concept behind the definition of mental equilibrium and show that this behavioral equilibrium notion organizes quite well the results of some of the most popular experiments in the literature of experimental economics. We expose some attractive properties of mental equilibria which are useful for deriving the set of mental equilibria for specific games.

4: S. Suzuki, Komazawa University, Arts and Sciences, bxs05253<at>nifty.com:

Measurement-Theoretic Foundation of Conditional Expected Utility Maximiser's Preference Logic

**Abstract:** Von Wright (1963) divided preferences into two categories: extrinsic and intrinsic preference. Most preference logics that have been proposed are intrinsic but little attention has been paid to extrinsic preference. Von Wright (1972) posed the following fundamental problem intrinsic preference logics were doomed to face: almost every principle which has been proposed as fundamental to one preference logic has been rejected by another one. Mullen (1979) analysed the cause of this problem. Different theories make different demands upon the fundamental properties of preference. He came to the conclusion that preference logic rested upon the mistaken belief that concept construction of preference could satisfactorily be carried out in isolation from theory construction. In this talk we propose a new version of complete and decidable extrinsic preference

logic (CEUMPL) based on conditional expected utility theory, which can avoid this problem. We provide CEUMPL with a Domotor-type (1978) semantics that is measurement-theoretic. We provide CEUMPL with a model by developing the idea of Naumov (2006) and provide CEUMPL with a proof system by developing that of Segerberg (1971). CEUMPL can treat preferences resulting from decision makings under certainty, risk, uncertainty and ignorance. CEUMPL has the merit of covering such a wide scope.

### Session 2Ea: Subjective Probability

1: N. Koida, Iwate Prefectural University, Policy Studies, nobuo<at>iwate-pu.ac.jp: Nest-Monotonic Two-stage Acts and Exponential Probability Capacities

**Abstract:** This paper examines conditions in the Choquet expected utility (CEU, Schmeidler (1989)) to satisfy both the reduction of two-stage acts and the recursion axioms, which are taken for granted in economics. Our main theorem shows that the axioms, one of which is restricted to *nest-monotonic acts*, and the consequentialism are satisfied if and only if the preference is an exponential CEU. This result indicates that within a specified range of decision problem, an exponential CEU is the only CEU that is indifferent to the timing of information resolution. Further, the connection between the first-stage and second-stage exponential CEUs is characterized both by the  $f^*$ -Bayesian updating rule (Gilboa and Schmeidler (1993)) and comonotonic dynamic consistency. Conditions to establish the law of iterated expectation in the CEU are also discussed.

2: Z. Hellman, Hebrew University of Jerusalem, Mathematics, zivyahel<at>gmail.com: Epistemic Subjective Probability

**Abstract:** An epistemic model for Savage's (1954) axiomatic derivation of subjective probability, within the standard framework of knowledge partitions, is constructed and shown to be capable of serving as a foundation for qualitative and quantitative subjective probability, attaining a goal Savage hinted at but gave up on for lack of a formal definition of knowledge. A crucial element of the epistemic model developed here is an analogue of the Sure-Thing Principle that is closer to Savage's intuitive intention than the corresponding axiom used by Savage himself. There are two possible intuitive interpretations of our model: one is that subjective probability is derivable from inter-temporal decision preference consistency requirements imposed on a decision-maker with respect to the set of all possible future histories of information that may be received, as represented by successive partition refinements over time. The other is that subjective probability is derivable from decision preference consistency between different agents, in which agents with less information align their preferences with those of 'wiser' agents who have more information.

### Session 2Eb: Judgment Aggregation

1: G. Pigozzi, University of Luxembourg, Computer Sciences, gabriella.pigozzi<at>uni.lu (with F.

Benamara, S. Kaci): Group Decision Procedures Reactive to Individual Opinions

**Abstract:** Judgment aggregation is a recent formal discipline that studies how to aggregate individual judgments on logically connected propositions to form collective decisions on the same propositions. Despite the apparent simplicity of the problem, the aggregation of individual judgments can result in an inconsistent outcome. This seriously troubles this research field. Expert panels, legal courts, boards, and councils are only some examples of group decision situations that confront themselves with such aggregation problems. So far, the existing framework and procedures considered in the literature are idealized. Our goal is to enrich standard judgment aggregation by allowing the individuals to agree or disagree on the decision rule. Moreover, the group members have the possibility to abstain or express neutral judgments. This provides a more realistic framework and, at the same time, consents the definition of an aggregation procedure that escapes the inconsistent group outcome.

2: M. Slavkovik, University of Luxembourg, Computer Science, marija.slavkovik<at>uni.lu (with D. Grossi , G. Pigozzi): White lies in Judgment Aggregation

**Abstract:** A judgment is a yes/no position on a proposition. Judgment aggregation investigates how individual judgments on logically connected propositions can be aggregated into a collective judgment on the same propositions. The problem is that seemingly reasonable aggregation procedures may force the group to hold an inconsistent judgment set. Even worse, it has been shown that there exists no aggregation function satisfying some desirable properties. Hence, the possibility that a group stall into an inconsistent decision seems unavoidable. What happens when the agents realize that the group outcome will be inconsistent? We claim that, in order to avoid an untenable collective outcome, individuals may prefer to submit a less preferred judgment set. Thus, the prospect of an individual trying to manipulate the social outcome by submitting an insincere judgment set is turned from being undesirable to a “virtuous” (or white) manipulation when it is a coordinated action of the whole group.

## Session 2Ec: Network

1: C. Kayi, Maastricht University, Economics, C.Kayi<at>algec.unimaas.nl (with R. Ilkilić): Allocation Rules on Networks

**Abstract:** Given geographical or infrastructure constraints, it is important to understand how scarce resources should be allocated. An example where such network constraints are critical is water resources. We depict the water distribution infrastructure as a network between sources and cities which are linked by rivers and pipelines. In a stylized model, we assume that sources are only connected to cities and cities are only connected to sources. We define the constrained proportional rule, the constrained equal awards and the constrained equal losses rules and give algorithms how to calculate these allocation rules. The objective is to identify allocation rules that are well-behaved from the normative viewpoint. In addition to efficiency, we look for distributional fairness. We give

axiomatic characterizations of the constrained proportional rule and the constrained equal awards rule.

2: S. Lippert, Massey University, Economics, s.lippert<at>massey.ac.nz, (with G. Spagnolo):

Networks of Relations and Word-of-Mouth Communication

**Abstract:** We study networks of relations - groups of agents linked by several interdependent cooperative relationships (e.g. relational contracts) - and explore how equilibrium conditions change under different network configurations and information structures. In our model relations are the links, and the value of a network lies in its ability to induce word-of-mouth communication and enforce cooperative agreements that could not be sustained if agents had no access to the information and sanctioning power of other network members. We identify conditions for network stability and in-network information transmission as well as conditions under which stable subnetworks inhibit more valuable larger networks. The model explains, why network "closure" is important and why information flows and action choices cannot be analyzed independently. It also provides a rigorous basis for the often used but seldom defined concept of "social capital" in the spirit of Coleman and Putnam.

## August 29 (Saturday), 2009

### Session 4Ma: Simulation and fMRI Studies on Human Cognition and Social Phenomena

1: K. Izumi, National Institute of Advanced Ind. Sci.-Tech., kiyoshi<at>ni.mints.ne.jp: New Efficient Market Hypothesis: Analysis of Financial Markets' Complexity by Artificial Market Simulation

**Abstract:** In this study we rethought efficient market hypothesis from a viewpoint of complexity of market participants' prediction methods and market price's dynamics, and examined the hypothesis using simulation results of our artificial market model. As a result, we found the two differences from the hypothesis. (a) Complexity of markets was not fixed, but changed with complexity of agents. (b) When agents increased the complexity of their prediction methods, structure of dynamic patterns of market price did not disappear, but it cannot be described by equation of any dimensions.

2: E. Akiyama, University of Tsukuba, Social Systems and Management, eizo<at>sk.tsukuba.ac.jp : Evolution of Finite Automata in the Game of Leader: Simulation Approach

**Abstract:** We present an evolutionary model of a population where individuals play the repeated "Game of Leader (Rapoport 1967)" Each individual has a finite memory strategy (Moore machine) to decide her action and those who perform well get more offspring in the next generation. The system can explore the strategy space by "point mutation" that slightly modifies a strategy or by "duplication/split mutation" that changes memory capacity of strategies. The simulation results of this model show that the evolutionary process brings about stable leader-follower relationship in the

population when individuals sometimes make mistakes in the repeated game. The strategies that survived in all simulation runs of this model are found to share several policies that can explain two different theories on Leadership in psychology, trait theory and behavioral theory, from the viewpoint of evolution of strategies.

3. M. Yasugi, Kyoto Sangyo University, yasugi<at>cc.kyoto-su.ac.jp: Computation in the Limit - Its Image and Philosophy Behind –

**Abstract:** The background of the present theme is “computable analysis”. As the basis of computability in analysis, we assume the theory of recursive functions, but we need “limiting recursive functions” in order to evaluate the value of a discontinuous function. Since limiting recursion involves taking the “limit” of a recursive function, we need some epistemic virtue in order to recognize the “computability” of a limiting recursive function. We propose to take the “boundedness property” of a monotone non-increasing sequence of sets as the epistemic basis for the computability of limiting recursion. Namely, such a sequence of sets is said to be bounded if its intersection can be presented as an intersection of a finite initial segment of the sequence. This replaces an infinite notion by a “finitary” one, so that it “fits” the human brain better.

4: J. Okuda, Kyoto Sangyo University, Computer Sci. & Eng. Jokuda<at>cc.kyoto-su.ac.jp: Memory and Prospection of the Brain: Implications for Decision-making

**Abstract:** How do you plan a menu of today’s dinner? You may remember that of the last night. How do you find a way to use a novel tool? Perhaps you try to apply knowledge about ordinary tools. How do you behave when a snake suddenly appears in front of your eyes? Your reaction should be based on conditioned reflexes acquired through past experiences. As is illustrated in these instances, our cognition and behaviour towards the future are closely linked to episodic, semantic, and procedural memories of our past. Very recent theories of prospective abilities in humans and animals have started to propose the functional link between various forms of our memory and prospection. At the same time, processes supporting the prospective abilities inside our brain have been gradually elucidated, motivated by long long histories of neuroanatomical research of memory. In this paper, I will introduce the common bases that underlie processes for memory and prospection in the brain, and argue how these neuro-cognitive architectures support our decision-making, based on our recent experiments using functional neuroimaging.

## Session 4Mb: Cooperative Games 2

1: J. Arin, Basque Country University, Economics, franciscojavier<at>bs.ehu.es: Monotonic Core Solutions: Beyond Young’s Theorem

**Abstract:** We introduce two new monotonicity properties for core concepts: single-valued solution concepts that always select a core allocation whenever the game is balanced. We present one result of impossibility for one of the properties and we pose several open questions for the second property.

2: C.-R. Hsiao, Soochow University, Mathematics Hsiao<at>mail.scu.edu.tw (with W.-L. Chiou): A Characterization of the Multi-Choice Shapley Value

**Abstract:** Reducing both the number of players and the number of choices, we define a new reduced game for a multi-choice cooperative game with respect to a solution of the game and an action vector. Then, we characterize the multi-choice Shapley value by applying a partially consistent property of the multi-choice Shapley value.

2: M. Grabishch, University Paris I, CES, Michel.grabishch<at>univ-paris1.fr (with Lijue Xie): The Core of Games on  $k$ -Regular Set Systems

**Abstract:** Cooperative games with feasible and unfeasible coalitions appear in many applications. Many authors have proposed various structures for feasible coalitions (lattices, convex geometries, etc.). We propose the concept of  $k$ -regular set system, where all maximal chains have the same length  $k$ . Practically, it corresponds to the situation where the set of orders in which players may enter the game is limited, and several players can enter together. One of the main problem with such games is to study the properties of the core, which may be unbounded and have no vertices. We give general results concerning these issues, as well as the relation with marginal vectors and the Weber set.

4: T. Gvozdeva, University of Auckland, Mathematics, t.gvozdeva<at> math.auckland.ac.nz (with A. Slinko): Roughly Weighted Simple Games

**Abstract:** This paper contributes to the program of numerical characterization and classification of simple games outlined in the classical monograph of von Neumann and Morgenstern (1944). One of the most fundamental questions of this program is what makes a simple game a weighted majority game. The necessary and sufficient conditions that guarantee weightedness are known: Taylor and Zwicker (1992) showed that a simple game is weighted majority game if no sequence of winning coalitions (up to a certain length) can be converted into a sequence of losing coalitions by exchanging players. If a simple game does not have weights, then rough weights may serve as a reasonable substitute (see Taylor and Zwicker (1999)). A simple game is roughly weighted if there exists a system of weights and a threshold such that all coalitions whose combined weight is above the threshold are winning and all coalitions whose combined weight is below the threshold are losing and a tie-breaking is needed to classify the coalitions whose combined weight is exactly the threshold. Not all simple games are roughly weighted, the class of projective games is a prime example. In this paper we give necessary and sufficient conditions for a simple game to have rough weights. We define two functions  $f(n)$  and  $g(n)$  that measure the deviation of a simple game from a weighted majority game and roughly weighted majority game, respectively. We also investigate rough weightedness of simple games with a small number of players.

## Session 4Mc: Social Thoughts

Chair: Maurice Salles

1: K. Suga, Waseda University, Economics, ksuga<at>waseda.jp: Publicness and the Market

**Abstract:** The purpose of this paper is to consider relations between publicness and the market. The former is one of the most basic concepts of social values and the latter the most basic structure of economy to offer a material base to us. The market is a place where people establish new relations with others and deepen them through everyday transactions. In this sense the market is a place which realizes publicness of the development of human relations. But it has a more fundamental meaning as well. The market plays an important role of actualizing publicness by offering material conditions to prescribe our survival itself. This function is achieved in cooperation with a lot of public goods surrounding the market. And it also promotes many other aspects of publicness such as diversity, transparency, autonomy, stability and so forth. I clarify and examine these aspects of publicness which the market realizes in relation to a multi-layered structure of various public goods.

2: M. Salles, University of Caen, CREM, maurice.salles<at>unicaen.fr, (with F. Zhang): Rights Revisited, and Limited

**Abstract:** One of the most justly famous result of social choice theory is Sen's Theorem on the impossibility of a Paretian liberal. In two recent papers, Salles introduced the notion of limited rights both in an aggregation function framework and in a social choice function framework. He then proved Sen-type impossibility theorems. In the aggregation function framework an individual has a "right" if whenever she prefers an option (social state), say  $a$ , to another social state, say  $b$ , the social preference ranks  $a$  before  $b$ . Salles proposed to consider the following weakening. Rather than  $a$  being socially ranked before  $b$ , he suggests that  $b$  should not be ranked before  $a$ . In the social choice framework, a framework which was introduced later on and was thought to be more or less equivalent to the aggregation function framework, if the individual prefers  $a$  to  $b$ ,  $b$  must not be chosen from any set to which  $a$  belongs. Salles's weakening amounts to say that if it happens that  $b$  be chosen, then  $a$  must be chosen too. In the present paper, we will describe from an intuitive point of view the technical results obtained by Salles in the light of the distinction between possibility and obligation, and we will present a research program based on the use of tools borrowed from modal logic.

3: M. Lombardi, University of Surrey, economics, m.lombardi<at>warwick.ac.uk: Liberal Egalitarianism and the Harm Principle. A New Axiomatic Approach to Rawls's Difference Principle and its Refinement

**Abstract:** This paper analyses Rawls's celebrated difference principle, and a set of refinements of it, in societies with a finite and an infinite number of agents. A unified framework of analysis is set up, which allows one to characterize a family of egalitarian principles by means of a new axiom - the Harm Principle - recently proposed by [13]. This is quite surprising, because the Harm principle is

meant to capture a liberal requirement of noninterference and it incorporates no obvious egalitarian content. A set of new characterizations of the maximin and of its lexicographic refinement are derived, including in the intergenerational context with an infinite number of agents. Finally, a complete axiomatic characterization of a new refinement of the difference principle, recently proposed in the literature on intergenerational justice and environmental issues ([17], [20]) - the recursive maximin - is provided.

4: K. Kamaga, Waseda University, Economics, k-kmg<at>ruri.waseda.jp (with Y. Kamijo and T. Shinotsuka): Intergenerational equity and consensus among generations

**Abstract:** This paper studies complete evaluation relations for infinite utility streams. We formalize some versions of an axiom of coalitional veto of future generations and examine permissible coalitional veto for existing evaluation relations and also for the new relations we present in this paper. We characterize the future domination extension, which is originally proposed in Sakai [2009], by using the axiom which asserts that any infinite coalition of future generations has a veto. Our new evaluation relations alleviate weakness of selectivity of existing relations due to Fleurbaey and Michel [2003] and Sakai [op. cit.], in return for weakened coalitional veto of future generations. Axiomatic characterizations of these new evaluation relations are also established.

#### **Session 4Md: Evolution and Experiments**

1: J. Kim, Seoul University, Economics, jbdavid<at>snu.ac.kr (with Y. Chun, T. Saijo): The Spite Dilemma Experiment in Korea

**Abstract:** We investigate choice behavior in the provision of public goods via voluntary contribution mechanism in Korea. The laboratory experiment employs the same design which is used in Saijo and Nakamura (1995) and subjects are undergraduate students in Seoul National University (SNU). In experiment design, either cooperating (full contribution) or free riding (no contribution) is predicted as the unique Nash equilibrium with a high or low marginal return of contribution. There are deviations from theoretical predictions in both cases of contribution, i.e. lower than full contribution in high marginal return case and more than zero contribution in low marginal return case. Also, we perform cross-country analysis of results in Korea with prior experiments conducted in Japan and China. Although the results in Korea and China show very similar behavior in both cases of contribution, there is a significant difference in results between Japan and other two countries. Whereas Korean and Chinese subjects are more likely to act cooperatively, Japanese subjects are more likely behave spitefully.

2: T. Kongo, Waseda University, Economics, kongo<at>toki.waseda.jp (with Y. Kamijo):

Axiomatizations of the Values of TU Games Using the Balanced Cycle Contributions Property

**Abstract:** This paper presents axiomatizations of the Shapley and egalitarian values. The balanced cycle contributions property is the key axiom in this paper. It requires that, for any order of all the

players, the sum of the claims from each player against his predecessor is balanced with the sum of the claims from each player against his successor. This property is satisfied not only by the Shapley value but also by some other values for TU games. Hence, it is a less restrictive requirement than the balanced contributions property introduced by Myerson (1980).

3: Z. Yang, Yokohama National University, Business Administration, yang<at>ynu.ac.jp (with G. van der Laan): An Ascending Multi-Item Auction with Financially Constrained Bidders

**Abstract:** A number of heterogeneous items are to be sold to a group of potential bidders. Every bidder knows his own values over the items and his own budget privately. Due to budget constraint, bidders may not be able to pay up to their values. In such a market, a Walrasian equilibrium typically fails to exist and also the existing auctions usually do not work properly anymore. To deal with such markets, we introduce a new equilibrium solution, called a rationed equilibrium. We also propose an ascending auction mechanism that always yields a rationed equilibrium allocation and a corresponding price system. By starting with the reservation price of each item, the auctioneer announces the current prices of the items in each step and the bidders respond with their demand at these prices. As long as there is overdemand, the auctioneer adjusts prices upwards for a set of overdemanded items until a price system is reached at which either there is an underdemanded set of items, or there is neither overdemand nor underdemand anymore. In the latter case the auction stops. In the former case, precisely one item will be sold, the bidder buying the item leaves the auction and the auction continues with the remaining items and the remaining bidders. We prove that the auction always yields a rationed equilibrium, and also examine its properties in detail.

4: S. Kishimoto, Tokyo Institute of Technology, Mathematical and Computing Sciences, kishimoto.s.aa<at>m.titech.ac.jp (with N. Watanabe, S. Muto): Bargaining Outcomes in Patent Licensing: Asymptotic Results in a General Cournot Market

**Abstract:** We study asymptotic bargaining outcomes in licensing a patented technology of an external patent holder to firms in a Cournot market. Our results are as follows: Under each permissible coalition structure including the grand coalition, the patent holder can extract the entire profits of all licensees in the bargaining set for a coalition structure when the number of firms is large, so the optimal number of licensees is completely determined. Moreover, the bargaining outcome, where the patent holder can gain the maximum profit by licensing to  $K$  firms, exactly coincides with the non-cooperative outcome, and cannot be improved upon by any objecting coalitions even if coalition formation for objections entails almost zero cost. Thus, it is strongly stable.

**11:30-12:25: Panel Discussion: Moderator: Mamoru Kaneko, Panelers: Jean-François Laslier, and Kazuo Seiyama**

Basic understanding:

(1): The earth is getting smaller and narrower as the total population is getting larger.

- (2): Progress in information and transportation technology is rapid.
- (3): Nevertheless, people will change slowly, and diversity of cultures will remain.
- (4): Thus, the earth will have more and severe conflicts and contradictory features.

What should and can we, social scientists, think for the earth of the year 2100?

13:50-16:05: Sessions of Contributed Papers

#### **Session 4Aa: Inductive Game Theory and Related Topics.**

1: R. Ishikawa, University of Tsukuba, Social System and Management, (with E. Akiyama, M. Kaneko, J. J. Kline), [ishikawa@sk.tsukuba.ac.jp](mailto:ishikawa@sk.tsukuba.ac.jp) : A Simulation Study of Learning a Structure: Mike's Bike Commuting,

**Abstract:** This paper undertakes a simulation study of a player's learning about the structure of a game situation. In a simple 1-person example called Mike's Bike Commuting, we simulate the process by which Mike experiences and accumulates memories about the game structure. It is the basic requirement that to keep an experience as a long-term memory, Mike needs enough repetitions of that experience. By the choice of our simple and casual example, we can discuss relevant time spans for learning. In particular, we argue that the limit case of Mike's learning as time tends to infinity is of little relevance to the problem of learning. We also find that the concept of "marking" introduced by Kaneko-Kline is important for obtaining sufficient structural knowledge in a reasonable time span. The simulation study shows that Mike's learning can change drastically with the concept. We also consider Mike learning his preferences from his experiences, where we will meet various new conceptual problems.

2: A. Mitra, Middlebury College, Economics, (with M. Kaneko) [amitra@middlebury.edu](mailto:amitra@middlebury.edu): An Analysis of Discrimination in Festival Games with Limited Access,

**Abstract:** This paper provides an analysis of discrimination and prejudices from the perspective of inductive game theory, originally proposed by Kaneko and Matsui (1999) and developed further in Kaneko and Kline (2008). We model ethnic interaction as the festival game (Kaneko and Matsui). We extend the festival game to include additional constraints on the observability of ethnic identities and on the accessibility of alternative locations for players. We provide a complete characterization of the Nash equilibrium set under these additional constraints. With this characterization, we see a variety of segregation patterns and discriminatory behaviors. We then characterize the Nash equilibrium set relative to a given structure of segregation and introduce a measure of discrimination. The measure is used to analyze patterns of discriminatory behavior observed in society. Finally, we discuss our results by comparing them with some sociological and social psychological studies.

3: S. Luckraz, Bond University, Economics, (with J. J. Kline) [sluckraz@bond.edu.au](mailto:sluckraz@bond.edu.au): Local Graph Theoretic Representation of an Information Protocol

**Abstract:** Kaneko-Kline (2008) developed information protocols to describe players who learn the social situation by their experiences which is a part of inductive game theory. The theory of information protocols looks similar to graph theory. Nevertheless, the former is based on global concepts (paths and histories) while the latter is based on local concepts (vertices and edges). One question is whether graph theory can capture the theory of information protocols. We show that while graph theory can capture only some part of the theory of information protocols, the theory of information protocols is still needed because the remaining part covers some important situations.

4. Y. Zeng, CCER, Peking University, CCER, zengyao<at>pku.edu.cn: Active Learning, Strategic Externality and Information Transparency

**Abstract:** In the economy, every expectation, mean, variance, covariance, and every moment of every random variable is conditional on some specific information set. Typically, we think of that information set as being all the past realizations of the variable. But, how can we assume that agents in the economy are aware of all the past realization of all possible economic variables? Actually, the information really captured by agents does not affect what the future realizations of the random variable will be; however, it changes what they know about those realizations, hence further shape the actions and choices of agents in their decision makings. Since means, variances and covariances appear all over economics and finance, how agents in our models evaluate these moments affects how they behave in any environment where a random savings problem, of money supply shocks in a price-setting problem, or changes in the state in a coordination game, all depend on what information people know. As a matter of result, researches in the course of learning towards information of agents in general economy is appealing. This piece of research survey will focus on a certain kind of active learning process of agents, as well as pay most attention to the role of active learning in economies with strategic externality and its welfare consequence. Finally, a research proposal is proposed to be combined the discussed issues and try to raise some possible approach in the further work in this field.

### **Session 4Ab: Roles, Power and Inequality**

1: A. Miroiu, SNSPA Bucharest, admiroiu<at>snsipa.ro: Playing Roles

**Abstract:** The purpose of this paper is to give, within the frame of social choice, a formal treatment of the roles the individuals play. A role (like being the mayor, or being a teacher) is defined as a function which attaches to each admissible profile a set of individuals. The intuitive idea is that those individuals play the role at that profile. A large variety of examples of roles are introduced. It is showed that by appealing to roles we can obtain all the results proved within the frame of the standard one, which studies aggregation functions defined on the collection of preference profiles. The significance of results like Arrow's theorem is discussed.

2: A. Rusinowska, Universite Lumiere, GATE, rusinowska<at>gate.cnrs.fr, (with R. van den Brink, F.

Steffen): Measuring Power and Satisfaction in Society with Opinion Leaders: Dictator and New Opinion Leader Properties

**Abstract:** A well known and established model in communication policy in sociology and marketing is that of opinion leadership. It is based on the idea of a two-step flow of communication. Opinion leaders are actors in a society who are able to affect the behavior of other members of the society called followers. Hence, opinion leaders might have a considerable impact on the behavior of markets and other social agglomerations being made up of individual actors choosing among a number of alternatives. For marketing purposes it appears to be interesting to investigate the effect of different opinion leader-follower structures in markets or any other collective decision-making situations in a society. We study a two-action model in which the members of a society are to choose one action, for instance, to buy or not to buy a certain joint product, or to vote yes or no on a specific proposal. Each of the actors has an inclination to choose one of the actions. By definition opinion leaders have some power over other actors, their followers, and they exercise this power by influencing the behavior of their followers, i.e. their choice of action. After all actors have chosen their actions, a decision-making mechanism determines the collective choice resulting out of the individual choices. The structure of the relations between the actors can be represented by a bipartite digraph. We analyze such digraphs investigating satisfaction and power distributions within societies with and without the opinion leaders. Moreover, we study common dictator and new opinion leader properties of the satisfaction and power measures and illustrate our findings and some marketing implications for a society with five members.

3: A. M. Urrutia, University of the Basque Country, Applied Economics IV,  
anamarta.urrutia@ehu.es (with M. C. L. de la Vega): Unit-Consistency and Bipolarization of  
Income Distributions

**Abstract:** Many polarization measures proposed in the literature assume some invariance condition. Clearly, each invariance condition imposes a specific value judgement on polarization measurement. In inequality and poverty measurement, B. Zheng suggests rejecting these invariance conditions as axioms, and proposes replacing them with the unit-consistency axiom (Economica 2007, Economic Theory 2007 and Social Choice and Welfare 2007). This property demands that the inequality or poverty rankings, rather than their cardinal values, are not altered when income is measured in different monetary units. Following Zheng's proposal we explore the consequences of the unit-consistency axiom in the bipolarization field. We introduce a new family of Krtzschatype intermediate bipolarization indices, and also propose and characterize a class of ntermediate polarization orderings which are unit-consistent. Finally, a short empirical application using data from Spain is also provided to illustrate how the bipolarization orderings proposed may be used in practice.

4: C. L. de la Vega, University of the Basque Country, Applied Economics IV,

casilda<at>lassodelavega<at>ehu.es: Dominance Curves and Multidimensional Poverty Analysis with Ordinary and Cardinal Data

**Abstract:** Most of the data available to measure capabilities or dimensions of poverty are either ordinal or categorical. However, apart from the multidimensional head count ratio, all the indices introduced to assess poverty behave well only with cardinal variables. In a recent paper, Alkire and Foster (2008) propose a new methodology to measure multidimensional poverty based on a counting approach, and introduce what they call the *dimension adjusted headcount ratio*, which suits well with ordinal and categorical data, and overcome some difficulties that arise with the head count ratio. These indices are gauged after having identified the poor people in the society using a threshold of the number of dimensions in which a person should be deprived to be identified as multidimensional poor. In this paper, we explore a very simple and intuitive graphical device to represent these indices. The curves we propose are able to portray the multidimensional headcount ratio and the dimension adjusted headcount ratio. We also prove that they provide a tool of checking unanimous orderings in a wide set of multidimensional poverty indices that suit well with ordinal and categorical data.

### **Session: 4Ac: Cooperative Games 3**

1: H. Peters, Maastricht University, Economics, h.peters<at>maastrichtuniversity.nl (with J. Derks): The Undominated Set: a New Solution Concept for Games with Transferable Utility

**Abstract:** We introduce and study a new set-valued solution concept for games with transferable utility, called the “undominated set”. For balanced games the undominated set coincides with the core and for anti-balanced games with the anti-core. In this respect, it exhibits a coalitional fairness property: If one coalition gains, then all coalitions should gain (if possible); and if one coalition loses then all coalitions should lose (if possible). The undominated set is defined by considering the (ex ante) possibility of side payments between coalitions and the (ex post) possibility of side payments with respect to proposals (pre-imputations) that are on the bargaining table. Undominated allocations (proposals) are those allocations that are cannot be Pareto dominated for the coalitions by using such side payments, under the assumption of complete uncertainty whether or not agreement is going to be reached. We characterize the undominated set by balancedness conditions and study its properties.

2: P. Calleja, University of Barcelona, Economic Mathematics, calleja<at>ub.edu (with C. Rafels, S. Tijs): Aggregate Monotone Stable Solutions

**Abstract:** Core-selection and aggregate-monotonicity are compatible on the domain of TU games. The per-capita prenucleolus satisfy both properties. In the present work, we characterize all single-valued solutions satisfying both properties. It remains to study the compatibility of these two properties with other well-known properties as individual rationality and dummy player. In this sense the per-capita prenucleolus seems to be a candidate. However, as quoted in Young et al. (1982): "The per-capita prenucleolus (weak nucleolus in their terminology) may not be individually rational

when the core is empty. While individual rationality may simply be imposed as a constraint (as proposed in Grotte (1970, 1976)), another serious difficulty remains. The per-capita prenucleolus may imply payments to dummies ... (a fact first noted by Reinhard Selten)". We show that these four properties are compatible. Moreover, we characterize all single-valued solution satisfying core-selection, aggregate-monotonicity, imputation selection, dummy player and also the symmetry property.

3: I. Katsev, St. Petersburg Institute for Economics and Mathematics, katsev<at>yandex.ru (with R. van der Brink, G. van der Laan): An Algorithm for Computing the Nucleolus of Disjunctive Additive Games with an Acyclic permission Structure

**Abstract:** A situation in which a finite set of players can obtain certain payoffs by cooperation can be described by a cooperative game with transferable utility, or simply a TU-game. A (single-valued) solution for TU-games assigns a payoff distribution to every TU-game. A well-known solution is the nucleolus. A cooperative game with a permission structure describes a situation in which players in a cooperative TU-game are hierarchically ordered in the sense that there are players that need permission from other players before they are allowed to cooperate. The corresponding restricted game takes account of the limited cooperation possibilities by assigning to every coalition the worth of its largest feasible subset. In this paper we consider the class of non-negative additive games with an acyclic permission structure. This class generalizes the so-called peer group games being non-negative additive games on a permission tree. We provide a polynomial time algorithm for computing the nucleolus of every restricted game corresponding to some disjunctive non-negative additive game with an acyclic permission structure. We discuss an application to market situations where sellers can sell objects to buyers through a directed network of intermediaries.

4: V. Vasil'ev, Sobolev Institute of Mathematics, vasilev<at>math.nsc.ru (with G. van der Laan, R. van der Brink,): On Axiomatization of the Restricted Core for the Totally Positive Games with Ordered Players

**Abstract:** In several important allocation problems, including water distribution problems described by the well-known river games, the game under consideration is endowed by some natural hierarchical structure of the players. Moreover, this game is very often totally positive (i.e., all its Harsanyi dividends are nonnegative). In this paper, we introduce a new solution concept for such totally positive games with ordered players: the *Restricted Core*. This concept is based on the distribution of Harsanyi dividends taking into account the hierarchical ordering of the players: a higher ranked player gets more than a lower ranked one in the players hierarchy. It is worth to note that due to the convexity of totally positive games this solution is always contained in the classic Core, and contains the Shapley value (being the single-valued solution distributing the dividends equally among the players in the corresponding coalitions). We study the main properties of the concept under consideration, and provide some axiomatizations of the Restricted Core. The basic one

treats the Restricted Core as the maximal (with respect to set inclusion) solution that satisfies the classic efficiency, null player, additivity and nonnegativity properties, and a *structural monotonicity* property which reflects the hierarchical aspect of games with ordered players. By applying so-called *disjoint additivity* instead of standard additivity, and appending three more axioms, namely, nonemptiness, convexity and a *consistency* property, we obtain a full axiomatization of Restricted Core with eight logically independent axioms. To demonstrate that Restricted Core yields a reasonable set of payoff vectors, we pay strong attention to the applications of the results obtained to some allocation problems, including well-known sequencing games, auction games, airport games and queueing games. In conclusion we propose also rather detailed consideration of the above mentioned river game.

#### **Session 4Ad: Critical Examinations**

1: M. El-Hodiri, University of Kansas, Economics, mohamedelhodiri<at>gmail.com: Much ado about Nothing; Where Econometricians should go and What They should do once they get there

**Abstract:** The starting point is the assertion (reasonable and easily testable) is that the observed equilibria are bargaining solutions of games. If power index is uniform ( $1/n$  for each of  $n$  players) then bargaining equilibrium coincides with orthodox market equilibrium. But the probability of uniform index of power is zero. Thus econometrics which is the ado part of title is about something that occurs with probability zero. The next best of where they should go is they should estimate strategy sets of bargaining partners (see Edgeworth's "trading boards").

2: M. N. S. Bugarin, FUCAPE, Business School, mirtabugarin<at>gmail.com (with S. A. L. Alves): Understanding the Role of Consumer's Risk Aversion on Aggregate Price Rigidity as a Sub-Game Perfect Equilibrium Outcome

**Abstract:** This paper aims to contribute to the research agenda on the sources of price rigidity. Based on broadly accepted assumptions on the behavior of economic agents, we show that firms competition can lead to the adoption of sticky prices as a (sub-game perfect) equilibrium strategy to optimally deal with the risk aversion of consumers, even if firms have no adjustment costs. To this end, we build a model economy based on consumption centers with several complete markets and relax some traditional assumptions used in standard monetary policy models by assuming that households have imperfect information about the inefficient time-varying cost shocks faced by the producers. Furthermore, we assumed that the timing of events is such that, at every period, consumers have access to the actual prices prevailing in the market only after choosing a particular consumption center. Since such choices under uncertainty may decrease the expected utilities of risk adverse consumers, competitive firms adopt some degree of price stickiness in order to minimize the price uncertainty and "attract more customers".

3: M.S. Bugarin, Insper (Ibmec Sao Paulo), bugarin<at>isp.edu.br: Vote Splitting, Reelection and Electoral Control: Political Gridlocks, Ideology and the War on Terror

**Abstract:** This article presents a game-theoretic model of voting and political bargaining where voters have two instruments for controlling politicians: vote splitting and reelection. It shows that vote splitting may totally offset the traditional reelection control mechanism, which suggests an application to the American 2004 Presidential elections. When reelection is useful, voters tend to have more flexible reelection criteria when they believe the true state of the world is likely to be unfavorable. Furthermore, there will be government shutdown with positive probability. Political gridlocks constitute an information revelation mechanism that improves subsequent control. The model is robust to voters' ideological heterogeneity.



Stop fighting; otherwise, the cow cart would decay;  
I recommend the elder should take the cow, the younger the cart;  
and you pay the  $\frac{1}{3}$  of its monetary value to me.  
Then we are all equally happy.