MINT SEMINAR

"Models of Influence and Network Theory"

Centre d'Economie de la Sorbonne, Paris, May 19, 2011

We would like to invite you to participate in the MINT Seminar "Models of Influence and Network Theory" which will take place at CES in Paris in May 19th, 2011. The seminar is sponsored by the ANR (National Agency for Research – *Agence Nationale de la Recherche*) and is a scientific meeting of the project MINT – *Models of Influence and Network Theory* (Programme Blanc, ANR-09-BLAN-0321-01). This project is a collaboration between researchers of two CNRS laboratories:

- CES (Centre d'Economie de la Sorbonne, Université Paris 1 Panthéon - Sorbonne)
- GATE Lyon Saint-Etienne (Groupe d'Analyse et de Théorie Economique, Université Lyon 2, Université Lyon 1, Ecole Normale Supérieure LSH, Centre Léon Bérard, Université Jean Monnet Saint-Etienne), and
- The Cooperation Institute on Social Choice Theory (SKT – Sociale Keuze Theorie) in the Netherlands.

Speakers of the seminar

Sylvain BEAL (*Université de Franche-Comté*)
Francis BLOCH (*Ecole Polytechnique*)
Jean-François CAULIER (*Centre d'Economie de la Sorbonne*)
Gabrielle DEMANGE (*Paris School of Economics*)
Mark JOHNSON (*Tulane University*)
Anne VAN DEN NOUWELAND (*University of Oregon*)

Address of the seminar

Centre d'Economie de la Sorbonne, **ROOM 115**
106-112 Bd de l'Hôpital, Paris Cedex 13
METRO: Place d'Italie (7 min. walk), Campo Formio (0 min. walk)

Organizers of the seminar

Agnieszka RUSINOWSKA & Michel GRABISCH

Participation

Registration for participation is free, but in order to facilitate the organization please register to the seminar by sending an e-mail to agnieszka.rusinowska@univ-paris1.fr by ***May 8, 2011***.

PROGRAM

9:30 – 10:20 Gabrielle Demange (*Paris School of Economics*)

"Collective Attention and Ranking Methods"

10:20 – 11:10 Anne van den Nouweland (*University of Oregon*)

"An Axiomatic Characterization of the Position Value for Value Functions on Networks"

(joint with Marco Slikker)

11:10 – 11:30 Coffee Break

11:30 – 12:20 Mark R. Johnson (*A. B. Freeman School of Business, Tulane University*)

"An Algebraic Perspective on Networks"

14:30 – 15:20 Francis Bloch (*Ecole Polytechnique*)

"Learning, Preemption and Cooperation in R & D Races"

(joint with Simona Fabrizi & Steffen Lippert)

15:20 – 16:10 Sylvain Béal (*CRESE, Université de Franche-Comté*)

"The Average Tree Solution for Multi-choice Forest Games"

(joint with Aymeric Lardon, Eric Rémila & Philippe Solal)

16:10 – 16:30 Coffee Break

16:30 – 17:20 Jean-François Caulier *(Centre d'Economie de la Sorbonne)*

"Allocation Rules for Dynamic Random Network Formation Processes"

(joint with Michel Grabisch & Agnieszka Rusinowska)

ABSTRACTS

Collective Attention and Ranking Methods

Gabrielle Demange

Ranking systems are becoming increasingly important in many areas, in the Web environment and academic life for instance. Presumably a ranking helps individuals to make decisions by providing them with relevant information. In a world with a tremendous amount of choices, a ranking plays also the crucial role of influencing the attention that is devoted to the various alternatives. In recurrent situations, attention will, in turn, alter the new statements on which subsequent rankings will be based. The paper proposes an analysis of this feedback by studying some reasonable dynamics that a ranking method may induce. The feedback is shown to depend strongly on the used ranking method. Two main families of methods are investigated, one based on the notion of 'handicaps', the other one on the notion of peers' rankings.

An Axiomatic Characterization of the Position Value for Value Functions on Networks

Anne van den Nouweland (joint with *Marco Slikker*)

There are several player-based stability concepts for networks, several of them based on the Myerson value - an allocation rule based on the Shapley value of a game between the players that changes the worth of coalitions to take the network into account. To our knowledge, there are no solidly link-based stability concepts for networks. A prime candidate for such a concept is one based on the position value - a link-based counterpart of the Myerson value that focuses on the role of the links rather than the players. In the current paper, we pave the way for studying a stability concept based on the position value by providing an axiomatic characterization of the position value along the lines of Shapley's (1953) axiomatization of the Shapley value. The distinctive feature of our axiomatization is that it is valid on the set of *all* networks, rather than just the set of cycle-free networks to which earlier similar characterizations had to be limited. We show that the restriction to cycle-free graphs can be lifted when we consider general value functions for networks (popularized in Jackson and Wolinsky, 1996), in which players can obtain a potentially different worth if they are connected through a different system of links.

An Algebraic Perspective on Networks

Mark R. Johnson

Commonly, network theory treats relationships as undirected graphs. While this approach has led to many interesting results, it leaves substantial ambiguity about the nature of the relationship being addressed. Specifically, the relationships may be either symmetric or asymmetric. The undirected graph representation is most appropriate for those situations where the relationship at issue is symmetric. There are many examples of relationships that need not be symmetric. For these relationships, it may be more appropriate to use directed graphs or multigraphs. When this is appropriate, there are substantial advantages to be gained by analyzing these directed graphs algebraically. Even in the case where the relationships being analyzed are symmetric, there can be advantages from using algebraic techniques. The means for representing graphs as algebraic are presented and the direct implications derived. Some of the pitfalls are identified. The main result demonstrates that when algebraic tools are employed Chwe's "clique hierarchy" result is a corollary of a well-known algebraic theorem.

Learning, Preemption and Cooperation in R & D Races

Francis Bloch (joint with *Simona Fabrizi* & *Steffen Lippert*)

This paper analyzes a research race with learning. The research process is divided into an experimental phase, where the teams receive signals about the cost of the project, and a research phase where they draw the innovation after investment. We characterize the equilibrium of the investment timing game with private and common values, private and public signals. There are two sources of inefficiencies: duplication and excess momentum due to preemption. We analyze cooperation schemes and show that a large part of the surplus should accrue to the unsuccessful team. Cooperation allows to reach efficient outcomes in the common values case, but not necessarily in the private values case.

The Average Tree Solution for Multi-choice Forest Games

Sylvain Béal (joint with *Aymeric Lardon, Eric Rémila* & *Philippe Solal*)

In this article we study cooperative multi-choice games with limited cooperation possibilities, represented by an undirected forest on the player set. Players in the game can cooperate if they are connected in the forest. We introduce a new (single-valued) solution concept which is a generalization of the average tree solution defined and characterized by Herings et al. (2008) for TU-games played on a forest. Our solution is characterized by component efficiency, component fairness and independence on the greatest activity level. It belongs to the precore of a restricted multi-choice game whenever the underlying multi-choice game is superadditive and isotone. We also link our solution with the hierarchical outcomes (Demange, 2004) of some particular TU-games played on trees. Finally, we propose two possible economic applications of our average tree solution.

Allocation Rules for Dynamic Random Network Formation Processes

Jean-François Caulier (joint with *Michel Grabisch* & *Agnieszka Rusinowska*)

Most allocation rules for network games, such as the Myerson value, the position value and the component-wise egalitarian solution assume that the network structure is fixed. In Jackson (2005) a new class of allocation rules that takes into account the potential alternative constructions of network is introduced by assuming that the efficient network will eventually emerge. In our paper, we put explicit emphasis on the construction of networks and examine the dynamic formation of networks whose evolution across time periods is stochastic. Time-series of networks are studied that describe processes of network formation where several players or links may appear or disappear at any period. Moreover, convergence to one of the efficient networks is not necessarily prescribed. Transitions from one network to the next are random and yield a Markov chain. The main contribution of our paper is to propose an allocation rule that takes into consideration the marginal contributions of a player or a link to the network formation process relative to a given network game. We show that particular assumptions on the network game and specific processes permit to recover the player and linked-based Jackson's allocation rules for network games.