International Workshop

"Strategic Interactions, Information Transmission and Externalities in Networks"

May 24-25, 2016

Centre d'Economie de la Sorbonne, 106-112 Boulevard de l'Hôpital, 75647 Paris

Metro: line 5 (Campo Formio), line 6 (Place d'Italie)

INVITED SPEAKERS:

Sylvain Béal (*Université de Franche-Comté*)

Yann Bramoullé (*Aix-Marseille University*)

Christophe Bravard (*Université Grenoble 2*)

René van den Brink (*Free University Amsterdam*)

Nicolas Carayol (*Université de Bordeaux*)

Sidartha Gordon (*Université Paris-Dauphine*)

Sanjeev Goyal (*University of Cambridge*)

Jeanne Hagenbach (*Ecole Polytechnique*)

Ana Mauleon (*Université Saint-Louis – Bruxelles & CORE - UCL*)

Noemi Navarro (*Université de Bordeaux*)

Eduardo Perez-Richet (*Ecole Polytechnique*)

Simon Schopohl (*Université Paris 1 Panthéon-Sorbonne & Bielefeld University*)

Emily Tanimura (*Université Paris 1 Panthéon-Sorbonne*)

Alex Teytelboym (*University of Oxford*)

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Participation: Registration for participation is compulsory. If you would like to participate in the workshop, please contact agnieszka.rusinowska@univ-paris1.fr by ***May 8, 2016.***

PROGRAM (PRELIMINARY, UPDATED: 28/03/2016)

TUESDAY, May 24

10:00 – 10:30	*Welcome Coffee*
10:30 – 11:15	Sanjeev Goyal , *"War or peace? A dynamic model of conflict"*
	(joint work with Marcin Dziubinski and David Minarsch)
11:15 – 12:00	Eduardo Perez-Richet, *"Altruism in networks*"
	(joint work with Renaud Bourlès and Yann Bramoullé)
12:00 – 13:30	*Lunch (for registered participants)*
13:30 – 14:15	Noemi Navarro, *"The strategic formation of interbank networks"*
	(joint work with Fabio Castiglionesi)
14:15 – 15:00	Sidartha Gordon, "*Waiting for my neighbors*"
	(joint work with Emeric Henry and Pauli Murto)
15:00 – 15:20	*Coffee Break*
15:20 – 16:05	Alex Teytelboym, *"A simple model of cascades in networks"*
	(joint work with Yongwhan Lim and Asuman Ozdaglar)
16:05 – 16:50	Christophe Bravard, "*Network formation when players seek confirmation of information*"
	(joint work with Pascal Billand, Jurjen Kamphorst and Sudipta Sarangi)
16:50 – 17:00	*Short (Coffee) Break*
17:00 – 17:45	Emily Tanimura, *"Competition for the access to and use of information in networks"*
	(joint work with Philipp Moehlmeier and Agnieszka Rusinowska)
19:30 –	*Dinner (On invitation)*

WEDNESDAY, May 25

9:15 – 10:00	Yann Bramoullé, TBA
10:00 – 10:45	Nicolas Carayol, *"How do inventors networks affect regional inventive performance? "*
	(joint work with Pascale Roux et Laurent Bergé)

10:45 – 11:05	*Coffee Break*
11:05 – 11:50	René van den Brink, "*Power measures and solutions for games under precedence constraints*"
	(joint work with Encarna Algaba and Chris Dietz)
11:50 – 12:35	Sylvain Béal, "*Sequential equal surplus division rule*"
	(joint work with Amandine Ghintran, Eric Rémila and Philippe Solal)
12:35 – 14:00	*Lunch*
14:00 – 14:45	Ana Mauleon, *"Constitutions and social networks"*
	(joint work with Nils Röhl et Vincent Vannetelbosch)
14:45 – 15:30	Jeanne Hagenbach, *"Communication with evidence in the lab"*
	(joint work with Eduardo Perez-Richet)
15:30 – 15:50	*Coffee Break*
15:50 – 16:35	Simon Schopohl, *"Communication games with optional verification"*

ABSTRACTS

Sylvain Béal, "*Sequential equal surplus division rule*"

(joint with Amandine Ghintran, Eric Rémila & Philippe Solal)

(Béal et al., 2015, Theory & Decision) introduce a new allocation rule, called the sequential equal surplus division for rooted forest TU-games and provide two axiomatic characterizations for this allocation rule. In this article, we provide a strategic implementation of the sequential equal surplus division rule . Precisely, we design a non-cooperative mechanism of which the unique subgame perfect equilibrium payoffs correspond to the sequential equal surplus division outcome of a superadditive rooted tree TU-game. This mechanism borrowed from the bidding mechanism designed by Pérez-Castrillo and Wettstein (2001, J. Econ. Theory), but takes into account the direction of the edges connecting any two players in the rooted tree, which reflects some dominance relation between them. Our proofs rely on interesting properties that we provide for a general class of bidding mechanisms.

Christophe Bravard, "*Network formation when players seek confirmation of information*"

(joint with Pascal Billand, Jurjen Kamphorst & Sudipta Sarangi)

We study network formation in a situation where the network allows players to obtain information (signals) about other players. This information is important for making a payoff relevant decision. However, not all information is reliable and so players may have an incentive to check it. By obtaining multiple messages about the same player through the network, a player learns whether his

information is reliable. We study the existence and architecture of strict Nash networks. We find that there exist key players: players that are involved in at least three links and sponsor all links they are involved in. These players are similar to the central players in center sponsored stars. Efficient networks are also analyzed and compared to strict Nash networks. We show that Nash networks can be over-connected as well as under-connected as compared to efficient networks. Finally, we extend the basic model to study heterogeneous populations. In the first scenario, we allow for the co-existence of players who only value checked information and players who also value information with unknown reliability. In the second scenario, players who do not care about checking their information co-exist with players who do. Our results are robust with respect to both types of heterogeneity, with one exception: the presence of a single player who cares only about checked information is enough to ensure that center sponsored stars are no longer stable.

Sidartha Gordon, "*Waiting for my neighbors*" (joint with Emeric Henry & Pauli Murto)

We study a waiting game on a network where the payoff of taking an action increases each time a neighbor takes the action. We show that the dynamic evolution of the network starkly depends on initial parameters and can take the form of either a shrinking network, where players at the edges take the action first or a fragmenting network where over time the network splits up in smaller ones. We find that, in addition to the coordination inefficiency standard in waiting games, the network structure gives rise to a spatial inefficiency. The model applies in particular to the adoption of new technologies by firms organized in a network and in this context we study the welfare impact of different subsidy programs aimed at encouraging adoption and show how their benefits depend on the network characteristics.

Jeanne Hagenbach, *"Communication with evidence in the lab"* (joint with Eduardo Perez)

We study communication with evidence in a collection of sender-receiver games in the lab. We find important differences between games with cyclic and acyclic masquerade relations. Overall, receivers take evidence into account and perform better in acyclic games, and with more precise messages. In acyclic games, they tend to be skeptical about vague messages, and more so over time. Sender types whose interests are aligned with those of the receiver fully disclose in all games, and sender types whose interests are not aligned with those of the receiver tend to use vague messages. When partially disclosing, senders tend to use weakly dominated strategies.

Ana Mauleon, *"Constitutions and social networks"* (joint with Nils Röhl & Vincent Vannetelbosch)

The objective of the paper is to analyze the formation of social networks where individuals are allowed to engage in several groups at the same time. These group structures are interpreted here as social networks. Each group is supposed to have specific rules or constitutions governing which members may join or leave it. Given these constitutions, we consider a social network to be stable if no group is modified any more. We provide requirements on constitutions and players' preferences under which stable social networks are induced for sure. Furthermore, by embedding many-to-many matchings into our setting, we apply our model to job markets with labor unions. We find a variation of Roth's "polarization of interests" (cf. Roth, 1984) between employers and employees.

Noemi Navarro, *"The strategic formation of interbank networks"* (joint with Fabio Castiglionesi)

We study the endogenous formation of an interbank network. Banks benefit from the connections in the network since they can coinsure their uncertain liquidity needs. However, the same connections can be risky since banks have an incentive to gamble with depositors' money when not sufficiently capitalized. The bankruptcy of a bank can negatively affect the banks connected to it in the network (counterparty risk). We establish conditions under which banks endogenously form an interbank network with a core-periphery structure, meaning that a group of banks (the core) is internally densely connected, and the rest of banks (the periphery) connect to a few (possible only one) bank in the core. Our conditions allow us to note that the core banks with counterparties in the periphery (the bridges) assume less risk in terms of investment behavior than core banks with only counterparties in the core. Nevertheless, the counterparty risk suffered by the core banks at the bridges make them in all more fragile than the core banks which only have counterparties in the core. We also find that banks that are identical a priori can take completely different positions in the network, and opposite investment behavior.

Eduardo Perez-Richet, *"Altruism in networks*" (joint with Renaud Bourlès & Yann Bramoullé)

We provide the first analysis of altruism in networks. Agents are connected through a fixed, weighted network and care about the well-being of their network neighbors. Given some initial distribution of incomes, agents may provide financial support to their poorer friends. We characterize the Nash equilibria of this transfer game for general networks and utility functions. We show that equilibria solve a well-behaved maximization program, related to classical problems of optimal transportation on networks. We build on this reformulation and establish existence, uniqueness in consumptions and generic uniqueness in transfers. We show that transfers are affected by the geometry of the altruistic network. They flow through shortest paths and chains of transfers emerge when the network is not transitive. We analyze the effects of changes in incomes and in the network. When an agent suffers a negative income shock, the equilibrium consumption of every agent decreases weakly. We characterize the impact of small redistributions and show that decreasing income inequality may increase consumption inequality. We also characterize the impact of a small increase in altruism. While altruistic networks reduce inequality, more altruism may lead to more inequality.

Simon Schopohl, *"Communication games with optional verification"*

We consider a Sender-Receiver Game in which the Sender can send either a costless cheap-talk message or a costly verifiable message. While the Sender has private information about the state of the world, the Receiver chooses an action, which yields to a specific utility for both players. Since the preferences about the actions may differ, depending on the state of the world, the Receiver may or may not trust the messages if they are not verified. In a discrete setting we show under which conditions full revelation is possible and also describe the players optimal behaviour if full revelation is impossible. We also state necessary and sufficient conditions for fully revealing equilibria in a continuous model. In both models we distinguish between equilibria where just one type of message is sent and where the Sender chooses the type of message depending on the state of the world. Furthermore we take common used properties, such as increasing differences and state which other conditions have to hold for the existence of fully or partial revealing equilibria.

Emily Tanimura, *"Competition for the access to and use of information in networks"*

(joint with Philipp Moehlmeier & Agnieszka Rusinowska)

In a network formation framework, where payoffs reflect an agent's ability to access information from direct and indirect contacts, we integrate negative externalities due to connectivity associated with two types of effects: competition for the access to information, and rivalrous use of information. We consider two separate models to capture the first and the second situations, respectively. In the first model we assume that information is a non-rivalrous good but that there is competition for the access to information, for example because an agent with many contacts must share his time between them and thus has fewer opportunities to pass on information to each particular contact. The main idea is that the probability that each neighbor receives the information decreases with the number of contacts the sender has. In the second model we assume that there is not competition for the access to information but that the use of information is rivalrous. Furthermore, it is assumed that people who receive the information before me have a more harmful effect on my utility than people who receive the information at the same time as me. Our results concern pairwise stability and efficiency in both models and allow us to compare and contrast the effects of two kinds of competition for information.

Alex Teytelboym, *"A simple model of cascades in networks"*

(joint with Yongwhan Lim & Asuman Ozdaglar)

We consider a linear threshold model of cascades in networks. An agent switches (e.g. adopts an innovation or spreads a rumor) if the proportion of his neighbors who have already switched exceeds his threshold. Agents' thresholds are drawn randomly at the start of the cascade process. We present a result for the expected number of switches in arbitrary finite networks with any initial seeds. We define a new measure of an agent's ability to influence a cascade in a given network, called cascade centrality, which is the expected size of the cascade when the agent is the only seed in the network. We then define complete cascade centrality, which is the probability that all agents switch when the node is a seed. For certain network topologies, we find analytic expressions for cascade centrality and complete cascade centrality and show that there may be tension between them. We then consider two economic applications. First, we look at how the network structure affects optimal prices when a profit-maximizing firm tries to spread an innovation. Optimal prices behavior can be fairly counterintuitive when firms price irreversible cascades. Second, we look at a setting in which two firms compete to spread rumors in a social network. Firms seed their rumors simultaneously and rumors propagate according to the linear threshold model. We provide a sharp characterization of networks that admit pure-strategy Nash equilibria (PSNE). We provide tight bounds for the efficiency of these equilibria and for the inequality in firms' equilibrium payoffs. We apply our results to competition over rumor spread in tree networks. In this case, a PSNE always exists and can be efficiently found. Our model can be extended in various ways.