2nd Dutch-Chinese Workshop on Game Theory and Applications

August 26-30, 2013

University of Twente, Enschede, The Netherlands

Hosted by Chair Discrete Mathematics and Mathematical Programming

Organizers
Theo Driessen (University of Twente, Enschede)
Marjo Mulder (University of Twente, Enschede)
Georg Still (University of Twente, Enschede)
Marc Uetz (University of Twente, Enschede)
Genjiu Xu (Northwestern Polytechnical University, Xi'an)

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Preface

On the occasion of the PhD defenses of three of our Chinese PhD students in 2013 (Yuan Feng, Xian Qiu, Dongshuang Hou), we had the idea to organize all three PhD defenses on one single day. By generous support in particular by the Dutch research foundation NWO and the National Natural Science Foundation of China NSFC, we were able to embrace the three PhD defenses by a Dutch-Chinese Workshop on Game Theory and Applications, with speakers from both China and Europe. This is the second workshop of its kind, after its first edition that was hosted by the Northwestern Polytechnical University in Xi'an, China, in August 2010. The program is the result of our efforts to put together an attractive list of speakers that documents a vital research landscape in the Netherlands, China, and across borders. It also continues the long tradition of cooperation between the chair Discrete Mathematics and Mathematical programming and different research institutes in China: Since Xueliang Li finished his PhD under the supervision of Cees Hoede in 1991, no less than 16 Chinese students have completed their PhDs in our group.

We particularly thank all members of the three PhD committees and all speakers for the willingness and effort spent.

Georg, Marc, Theo & Walter

Program

MONDAY, AUGUST 26 (Drienerburght)

from 18.00 Welcome reception at the bar of Hotel Drienerburght (Campushotel)

TUESDAY, AUGUST 27 (Drienerburght)

09:00 - 09:30 Welcome & Coffee

09:30 - 10:00 Hans Peters (Maastricht University)
Mutual control structures

10:00 - 10:30 Qiang Zhang, (Beijing Institute of Technology)
A new solution of core for interval-valued cooperative game

10:30 - 11:00 Coffee Break

11:00 - 11:30 Weibin Han (Radboud University, Nijmegen)
Weighted stable set: a new approach of extending stable set and generalized stable set

11:30 - 12:00 Reinoud Joosten (University of Twente)
Attractive evolutionary equilibria

12:00 - 14:00 Lunch at Drienerburght

14:00 - 14:30 Wei Fei (Fuzhou University)
A bilinear programming method of bi-matrix games with intuitionistic fuzzy set payoffs

14:30 - 15:00 Deng-Feng Li (Fuzhou University)
A parametric nonlinear programming method of matrix games with payoffs of intuitionistic fuzzy numbers

15:00 - 15:30 Jinhui Pang (Beijing Institute of Technology)
Integral representations of the cooperative game with fuzzy coalitions

15:30 - 16:30 Coffee Break

16:30 - 17:00 Pu-yan Nie (Jinan University)
A dynamic study on ecological disaster, government regulation and renewable resource

17:00 - 17:30 Genjiu Xu (Northwestern Polytechnical University, Xi'an)
The implement of cost allocation Problems by bankruptcy approach

17.30 - 18:00 Gerard v.d. Laan (VU University, Amsterdam)
Associated consistency characterization of two linear values for TU games by matrix approach

from 18:30 Dinner at the cantine of the Waaier building (bring your badge!)

WEDNESDAY, AUGUST 28 (Waaier)

11:00 (Light) Lunch at the Drienerburght

The three PhD defenses will take place at the **Waaier** Building, Room 4

12.30-14:30	Yuan Feng	*Extension of the Shapley value and their characterizations*
	Promotor:	Marc Uetz
	Co-promotors:	Theo Driessen and Georg Still
	Committee:	Ulrich Faigle (Cologne), Reinoud Joosten (Twente), Walter Kern (Twente), Anton Stoorvogel (Twente), Hao Sun (Xi'an), Genjiu Xu (Xi'an)
14.30-16:30	Xian Qiu	*Fractional programming in cooperative games*
	Promotor:	Marc Uetz
	Co-promotor:	Walter Kern
	Committee:	Ulrich Faigle (Cologne), Johann Hurink (Twente), Nelly Litvak (Twente), Bodo Manthey (Twente), Frits Spieksma (Leuven)
16.30-18:30	Dongshuang Hou	*Models, theory and applications in cooperative game theory*
	Promotor:	Marc Uetz
	Co-promotor:	Theo Driessen
	Committee:	Hajo Broersma (Twente), Erwin Hans (Twente), Hans Peters (Maastricht), Hao Sun (Xi'an), Genjiu Xu (Xi'an)

19.15 Banquet at restaurant *Chinatuin* (Hengelo), Oldenzaalsestraat 547, 7558 PW Hengelo — **Note**: A bus will leave from Hotel Drienerburght to Chinatuin at 19.00 and back to Dienerburght at 23.00.

THURSDAY, AUGUST 29 (Drienerburght)

09:00 - 09:30 Hao Sun (Northwestern Polytechnical University, Xi'an)
Some Type of Solutions for TU-Games with Optimal Decision Theory

09:30 - 10:00 Peter Sudhölter (University of Southern Denmark, COHERE)
Axiomatizations of symmetrically weighted solutions

10:00 - 10:30 Frank Thuijsman (Maastricht University)
Network Characteristics and Efficient Coordination

10:30 - 11:00 Coffee Break

11:00 - 11:30 Ping Zhu (Jiangnan University, Wuxi)
Social Network Analysis Based on Network Motifs
11:30 - 12:00 Ulrich Faigle (University of Cologne)
A Quantum Model for Activity Systems

12:00 - 14:00 Lunch at Drienerburght

14:00 - 14:30 Jasper de Jong (University of Twente)
The (Sequential) Price of Anarchy for Throughput Scheduling
14.30 - 15:00 Baomin Dong (Henan University, Zhengzhou)
Resale Bargaining, Upfront Payments and the Countervailing Power Hypothesis
15:00 - 15:30 Anna Khmelnitskaya (St. Petersburg State University, Russia)
Solution concepts for TU games with directed cooperation structures

15:30 - 16:30 Coffee Break

16:30 - 17:00 Tadeusz Radzik (Wroclaw University of Technology, Poland)
Is the solidarity value close to the equal split value ?
17:00 - 17:30 Genjiu Xu (Northwestern Polytechnical University, Xi'an)
Time-consistency of interval Shapley value in dynamic games

from 18:00 Dinner at the cantine of the Waaier building (bring your badge!)

FRIDAY, AUGUST 30 (Social Event – trip to Giethoorn by bus)

09.30 Trip starts by bus at Hotel Drienerburght
18.00 Back at Drienerburght
19.00 Conference dinner at the Faculty Club (University of Twente)

Practical Issues

- The workshop location (Tuesday & Thursday) is room D in the basement of the Hotel Drienerburght. The PhD defenses on Wednesday will take place in the Waaier building, room 4.
- Lunches will be served in the Drienerburght.
- For dinners at the Waaier building, you may compose your meal on your own, the cantine is self service. Please bring you badge, as this will allow the cashiers to bill your dinner on the workshop account (w/o badge you will have to pay yourself).
- For a map of the campus, see the last page.

List of Abstracts

Hans Peters (Maastricht University)
Tuesday, 09:30-10:00

Mutual control structures

For a player set $N = \{1, \ldots, n\}$, a mutual control structure is a map $C : 2^N \to 2^N$ which is monotonic, i.e., $S \subseteq T \Rightarrow C(S) \subseteq C(T)$ for all $S, T \in 2^N$, and satisfies $C(\emptyset) = \emptyset$. If $T = C(S)$, then this is interpreted as every player in T being controlled by the coalition S. An important inspiration for the concept of a mutual control structure derives from situations in which firms and investors own shares of each other. An important question in such situations is how the implicit power structure looks like. If firm 1 owns shares of firm 2 and firm 2 owns shares of firm 3, then indirectly firm 1 may have power over firm 3, and so on. An invariant mutual control structure C is one satisfying the following condition: for all $S, T, R \in 2^N$, if $T \subseteq C(S)$ and $R \subseteq C(S \cup T)$, then $R \subseteq C(S)$. Thus, an invariant mutual control structure also incorporates the indirect control relations. We show that any mutual control structure can be made invariant, indeed, by incorporating indirect control relations in a specific way. Alternatively, a mutual control structure can be represented as an n-tuple of simple games, expressing the control relations, and then we show that we reach the same result, namely an invariant mutual control structure, by performing specific substitutions in the simple games. The second part of the paper is concerned with establishing a power index for mutual control structures. We propose a specific index, and present an axiomatic characterization of this index. In particular, the index reflects the indirect control relations between the players.

(The presentation is based on joint work in progress with Dominik Karos, University of Saarbruecken, Germany)

Qiang Zhang (Beijing Institute of Technology, China)
Tuesday, 10:00-10:30

A new solution of core for interval-valued cooperative game

In this paper, we give a further discussion on the core solution for cooperative games with fuzzy payoffs. Some notions and results from classical games are extended to fuzzy cooperative games. Using an example, we point out that the theorem about the nonempty of I-core proposed in 2008 was not sufficient. Furthermore, the equivalence relation between balanced game and nonempty core, which plays an important role in classic games, doesn't exist in interval-valued cooperative games. After all, the nonempty of I-core is proved under the convex situation. It perfects the theory of fuzzy core for interval-valued cooperative game.

(Joint work with Xuan Zhao)

Weibin Han (Radboud University Nijmegen)
Tuesday, 11.00-11.30

Weighted stable set: a new approach of extending stable set and generalized stable set

A weighted binary relation is introduced in order to deal with the solution of an abstract decision problem, and then weighted stable solution is defined based on the binary relation. Some properties concerning this concept are offered and relationships between this concept and the concepts of stable set (Von Neumann-Morgenstern) and generalized stable set (Van Deemen) are discussed. Finally, one application of this solution in the collective decision-making of social network is offered.

(Joint work with Adrian Van Deemen)

Reinoud Joosten (University of Twente)
Tuesday, 11.30-12.00

Attractive evolutionary equilibria

We present attractiveness, a refinement criterion for evolutionary equilibria. Attractive equilibria turn out to be structurally stable, i.e., preserve defining properties nearby for small perturbations of the underlying payoffs or dynamics. They are also conceptually stable, i.e., equivalent to other attractive evolutionary equilibria for certain classes of evolutionary dynamics. For instance, each attractive evolutionarily stable strategy is an attractive evolutionarily stable equilibrium for two families of evolutionary dynamics, and vice versa.

(Joint work with Berend Roorda)

Wei Fei (Fuzhou University, Fuzhou)
Tuesday, 14:00-14:30

A bilinear programming method of bi-matrix games with intuitionistic fuzzy set payoffs

The aim of this paper is to develop a bilinear programming method for solving bi-matrix games in which the payoffs are expressed with intuitionistic fuzzy (IF) sets (IFSs), which are called IF bi-matrix games for short. In this method, using the equivalent relation between IFSs and interval-valued fuzzy sets (IVFSs) and the operations of IVFSs, we propose a new order relation of IFSs through introducing a ranking function, which is proven to be a total order relation. Hereby we introduce the concepts of solutions of IF bi-matrix games and parametric bi-matrix games. It is proven that any IF bi-matrix game has at least one satisfying Nash equilibrium solution, which is equivalent to the Nash equilibrium solution of corresponding parametric bi-matrix game. The latter can be obtained through solving the auxiliary parametric bilinear programming model. The method proposed in this paper is demonstrated with a real example of the e-commerce retailers strategy choice problem.

Deng-Feng Li (School of Management, Fuzhou University, China)
Tuesday, 14:30-15:00

A parametric nonlinear programming method of matrix games with payoffs of intuitionistic fuzzy numbers

The purpose of this paper is to develop an effective and efficient methodology for solving matrix games with payoffs of intuitionistic fuzzy numbers, which are special types of Atanassov's intuitionistic fuzzy sets defined on the set of real numbers. Firstly, we define the concepts of intuitionistic fuzzy numbers and the value-index and ambiguity-index. Secondly, we develop a difference-index based ranking method of intuitionistic fuzzy numbers, which is a total order and has some useful properties. Then, we construct a pair of auxiliary intuitionistic fuzzy mathematical programming models, which are transformed into the parametric nonlinear programming models through using the proposed ranking method. The solutions of matrix games with payoffs of intuitionistic fuzzy numbers are easily obtained through solving the parametric nonlinear programming models. Validity and applicability of the proposed models and method in this paper are illustrated with a practical example.

Jinhui Pang (Beijing Institute of Technology, China)
Tuesday, 15:00-15:30

Integral representations of the cooperative game with fuzzy coalitions

In this paper, the cooperative games with fuzzy coalitions were discussed. Several integral representations which described the fuzzy character function of the cooperative game were given, and the important solution — the Shapley function was also investigated. For the cooperative game where the rate of participation of every player in a coalition is allowed to range within interval [0,1], the multi-linear extension form and the Choquet integral representation were proposed. The Choquet integral representation can be regarded as a general form of cooperative game with fuzzy coalitions. The explicit formulas and some properties of fuzzy characteristic function which was determined by coalition structure were discussed in detail.

(Joint work with Ping Zhu, Department of Science Jiangnan University, China)

Pu-yan Nie (Institute of Industrial Economics, Jinan University, China)
Tuesday, 16:30-17:00

A Dynamic Study on Ecological Disaster, Government Regulation and Renewable Resource

This paper develops a dynamic oligopolistic model to investigate equilibrium outcomes for renewable resource markets under different property rights regimes. With different underlying assumptions from those in previous works, we find that different property rights regimes in renewable-resource markets yield very different equilibria. Under the private

property rights, the valve point increases with the natural growth rate, productivity, number of the firms, and marginal costs. Under the common property rights, "the tragedy of the commons" inescapably occurs with endogenous pricing in a multiple-firm framework. It suggests how to avoid ecological disaster by implementing public policies such as clarifying property rights, altering the number of manufacturers, and introducing certain subsidies or taxes.

(Joint work with Peng Sun and Bill Z.Yang (Department of Finance and Economics, Georgia Southern University)

Genjiu Xu (Northwestern Polytechnical University, Xi'an, China)
Tuesday, 17:00-17:30

The implement of Cost allocation Problems by Bankruptcy Approach

Cost allocation problems arise in many real life situations, where individuals decide to work together in order to save costs. In these situations the problem arises how to divide among the participants the joint costs which result from the cooperation. The Tennessee Valley Authority (TVA) studied how to allocate the costs of multipurpose water projects in the 1930's. The methods proposed by the TVA are all based on separable cost. We aim to study the implement of cost allocation problems by Bankruptcy approach. We convert the cost allocation problem to the induced bankruptcy version through a reasonable restricted condition to separable cost. Then the relationships between bankruptcy rules and cost allocation methods based on separable cost are revealed. These give new interpretation of separable cost allocation method.

(Joint work with Cuiying Zhu and Hao Sun)

Gerard van der Laan (VU University, Amsterdam)
Tuesday, 17.30-18.00

Associated consistency characterization of two linear values for TU games by matrix approach

Hamiache (2001) assigns to every TU game a so-called associated game and then shows that the Shapley value is characterized as the unique solution for TU games satisfying the inessential game property, continuity and associated consistency. The latter notion means that for every game the Shapley value of the associated game is equal to the Shapley value of the game itself. In this paper we show that also the EANS value as well as the CIS value are characterized by these three properties for appropriately modified notions of the associated game. This shows that these three values only differ with respect to the associated game. The characterization is obtained by applying a matrix approach as the pivotal technique for characterizing linear values of TU games in terms of associated consistency.

(Joint work with Genjiu Xu, Rene van den Brink and Hao Sun)

PhD Thesis Yuan Feng
Defense Wednesday, 12:30-14:30

Extension of the Shapley value and their characterizations

In this thesis we consider cooperative games with transferable utilities, which is also called the TU game. A TU game consists of a finite set of players, and a characteristic function from the set of all possible coalitions to a set of payments. The characteristic function describes how much a set of players can gain by forming a coalition. The main assumption in cooperative game theory is that the grand coalition, i.e., the set containing all involved players, will form. Thus the challenge is how to allocate the payoff of the grand coalition to all players in a fair way. Different definitions of fairness may result in different allocation rules. We aim to characterize some well known allocation rules (solutions) and their generalizations in different game models.

On the classical game space, a group of solutions satisfying efficiency, linearity and symmetry (ELS value) is discussed. A modified potential representation is derived for the ELS value, based on the potential approach for the Shapley value introduced by Hart and Mas-Colell. It is proved that the ELS value can be axiomatized by λ-standardness on two-person games and the Sobolev consistency with respect to a reduced game, which is derived by the previously derived modified potential representation. Based on Young's characterization for the Shapley value, we give another axiomatization to the ELS value by using efficiency, symmetry, and a modified strong monotonicity.

If the worth of a coalition depends not only on its members (as in the classical game), but also on the order of players entering into the game, then a generalized game is formed. Different permutations of a set with fixed players may have different payoffs, so the new characteristic function is from the set of all possible ordered coalitions to a set of payments. The generalized ELS value, Core, Weber Set and especially the Shapley value are discussed in this generalized game model. It is proved that the generalized Shapley value introduced by Sanchez and Bergantinos, equals the expectation with respect to a special chosen procedure, when all the choosing processes are under uniform distribution and the standard solution on two-person games is used. Another characterization to the generalized Shapley value is given in terms of associated consistency, continuity and inessential player property in the generalized game space. Throughout the axiomatization, a matrix approach is used to simplify the proof. Moreover, a so-called position-weighted value is defined and discussed in the generalized game model. Unlike the generalized Shapley value, this new value does not satisfy the generalized symmetry, but a stronger version of generalized symmetry. One candidate of this value is derived by Evans' consistency (with respect to a different procedure compared with the one used for the generalized Shapley value) and two-person standard solution.

To model some real problems, for example the motor insurance problem, a multiplicative game model is considered. The payoffs to players are treated in a multiplicative way instead of the usual additive way. In this new setting we only focus on strictly positive games, in which every coalition have strictly positive payoff, and specifically the payoff of the empty

set is 1. The Shapley value, ELS value and Least Square value in the classical game space and their properties are generalized accordingly to the multiplicative game model.

PhD Thesis Xian Qiu
Defense Wednesday, 14:30-16:30

Fractional programming in cooperative games

We study the approximate core allocation (multiplicative) ϵ-core for cooperative games, where ϵ indicates the deviation from the actual core. It turns out that finding the minimal ϵ such that the ϵ-core is always nonempty is equivalent to finding a lower bound for the integrality gap that underlies the value function of the game (in terms of the maximization problem). Chapters 1 and 2 are introductory chapters. In Chapter 3, we consider the uniform bin packing game, where the player set N consists of k bins of capacity 1 each and n items of size $a_1, ..., a_n$. The value function $v(S)$ of S containing bins and items is the total size of items of S that can be packed to the bins of S. In Chapter 4, we consider the non-uniform bin packing game, where bins are allowed to have distinct capacities. In both chapters, we improve previous results on the minimal epsilon core. Additionally, we also investigate approximation algorithms for the metric facility location problems in Chapter 6 and obtain an improved analysis to the famous JMS algorithm.

PhD Thesis Dongshuang Hou
Defense Wednesday, 16:30-18:30

Models, Theory and Applications in Cooperative Game Theory

The research that forms the basis of this thesis addresses the following general topics in cooperative game theory: Why should the players cooperate in cooperative game? Once the coalitions are formed, how to distribute the total value fair and reasonable among all the players? Also, we study the approaches to determine the distribution solution, such as, Shapley value, Nucleolus, Core, Pre-kernel. By solving these problems, we will study the properties of the game model and the value of game.

Chapter 1 contains a short general introduction to the topics of the thesis and gives an overview of the main results, together with some motivation and connections to and relationships with older results.

In Chapter 2, we study the so-called information market game involving n identical firms acquiring a new technology owned by an innovator. For this specific cooperative game, the nucleolus is determined through a characterization of the symmetrical part of the core. The non-emptiness of the (symmetrical) core is shown to be equivalent to one of each, super-additivity, zero-monotonicity, or monotonicity.

In Chapter 3, The Bertrand Oligopoly situation with Shubik's demand functions is modeled as a cooperative TU game. For that purpose two optimization programs are solved to

arrive at the description of the worth of any coalition in the so-called Bertrand Oligopoly game. When the demand's intercept is small, this Bertrand Oligopoly game is shown to be a type of cost saving games. Under the complementary circumstances, the Bertrand Oligopoly game is shown to be convex and in addition, its Shapley value is fully determined on the basis of linearity applied to a appealing decomposition of the Bertrand Oligopoly game into the difference between two convex games, besides one non-essential game.

In Chapter 4, we model the interaction between soccer teams and their potential fans as a cooperative cost game based on the annual voluntary sponsorships of fans in order to validate their fan registration in a central database, inspired by the first lustrum of the Club Positioning Matrix (CPM) for professional Dutch soccer teams. The game theoretic approach aims to show that the so-called nucleolus of the suitably chosen fan data cost game agrees with the deviations of b_i, $i \in N$, from their average, where b_i represents the total budget of sponsorships of fans whose unique favourite soccer team is i.

In Chapter 5, we consider 2-convex n-person cooperative TU games. The nucleolus is determined as some type of constrained equal award rule. Its proof is based on Maschler, Peleg, and Shapley's geometrical characterization for the intersection of the prekernel with the core. Pairwise bargaining ranges within the core are required to be in equilibrium. This system of non-linear equations is solved and its unique solution agrees with the nucleolus.

In Chapter 6, we illustrate that the so-called indirect function of a cooperative game in characteristic function form is applicable to determine the nucleolus for a subclass of coalitional games called compromise stable TU games. In accordance with the Fenchel-Moreau theory on conjugate functions, the indirect function is known as the dual representation of the characteristic function of the coalitional game. The key feature of compromise stable TU games is the coincidence of its core with a box prescribed by certain upper and lower core bounds. For the purpose of the determination of the nucleolus, we benefit from the interrelationship between the indirect function and the prekernel of coalitional TU games. The class of compromise stable TU games contains the subclasses of clan games, big boss games, 1- and 2-convex n-person TU games. As an adjunct, this paper reports the indirect function of clan games for the purpose to determine its nucleolus.

In Chapter 7, the main goal is twofold. Thanks to the so-called indirect function known as the dual representation of the characteristic function of a coalitional TU game, we derive a new characterization of the pre-kernel of the coalitional game using the evaluation of its indirect function on the tails of pairwise bargaining ranges arising from a given payoff vector. Secondly, we study three subclasses of coalitional games of which its indirect function has an explicit formula and show the applicability of the determination of the pre-kernel (nucleolus) for such types of games using the indirect function. Three such subclasses of games concern the 1-convex and 2-convex n person games and clan games. A clan game with the clan to be s singleton is known as a big boss game.

In Chapter 8, The main goal is to reveal the 1-concavity property for a subclass of cost games called Data Cost Games. Two significantly different proofs are treated. The motivation for the study of the 1-concavity property are the appealing theoretical results for both the core and the nucleolus, in particular their geometrical characterization as well as

their additivity property. The characteristic cost function of the original Data Cost Game assigns to every coalition the additive cost of reproducing the data the coalition does not own. The underlying data and cost sharing situation is composed of three components, namely the player set, the collection of data sets for individuals, and the additive cost function on the whole data set. The first proof of 1-concavity is direct, but robust to a suitable generalization of the characteristic cost function. The second proof of 1-concavity is based on a suitably chosen decomposition of the data cost game which invites to a close comparison between the nucleolus and the Shapley cost allocations. As an adjunct, the 1-concavity property is shown for the subclass of so-called "bicycle cost games", inclusive of the data cost games in which the individual data sets are nested in a decreasing order.

In Chapter 9, the main goal is to introduce the so-called Service cost savings games involving n different customers requiring service provided by companies. For these special cooperative games, on one hand, we determine the Shapley value allocation for these service cost savings games through a decomposition method for games into one additive game and one Sharing car pooling cost game, exploiting the linearity of the Shapley value. On the other hand, we determine the nucleolus allocation as well, by exploiting fully the so-called 1-convexity property for these Service cost savings games.

In Chapter 10, the topic is two-fold. Firstly, we prove the convexity of Owen's Airport Profit Game (inclusive of revenues and costs). As an adjunct, we characterize the class of 1-convex Airport Profit Games by equivalent properties of the corresponding cost function. Secondly, we classify the class of 1-convex Bankruptcy Games by solving a minimization problem of its corresponding gap function.

Hao Sun (Northwestern Polytechnical University, Xi'an, China)
Thursday, 09:00-09:30

Some Type of Solutions for TU-Games with Optimal Decision Thoery

One solution for TU-games, named a type of distribution to all players involved in the cooperative games, may be consider one dicision for all players. Some Type of Solutions for TU-Games, which is optimal for certain loss functuon or risk function, is introduced. The uniqueness of this solutions are shown by some axiom characterizations.

Peter Sudhölter (University of Southern Denmark)
Thursday, 09:30-10:00

Axiomatizations of symmetrically weighted solutions

If the excesses of the coalitions in a transferable utility game are weighted, then we show that the arising weighted modifications of the (pre)nucleolus and (pre)kernel satisfy the equal treatment property if and only if the weight system is symmetric. We generalize Sobolev's axiomatization of the prenucleolus and its modification for the nucleolus as well as Peleg's axiomatization of the prekernel to the symmetrically weighted versions.

(Joint work with J. Kleppe and H. Reijnierse)

Frank Thuijsman (Maastricht University)
Thursday, 10:00-10:30

Network Characteristics and Efficient Coordination

In coordination games, with multiple pure strategy Nash equilibria, the primary question concerns the possibility of achieving efficient coordination. We address this question for a model in which individuals from a finite population are randomly matched to play the coordination game. While this interaction is global in the sense that the co-player can be drawn from the entire population, individuals observe only the strategies and payoffs of the immediate connections (or neighbors) in their (social) network. Each individual then imitates the most successful strategy used in the immediate neighborhood. This process continues until all individuals coordinate on the same action. We examine the influence of network characteristics on (1) achieving efficient coordination in the population, and (2) the time it takes to reach coordination. Our study is based on simulations using two types of networks: free scale networks and small world networks.

(Joint work with A. Khan, R. Peeters and P. Uyttendaele)

Ping Zhu (Jiangnan University, China)
Thursday, 11:00-11:30

Social Network Analysis Based on Network Motifs

In combination with the method of social network analysis, a set of network analysis methods is established based on the theory and methods of frequent subgraph mining, network motifs, at el, which is different from the traditional social network analysis. It can be used to analyze the properties of social network and judge the roles of the nodes effectively.

(Joint work with Yan Han-Bing and Tang Xu-Qing)

Ulrich Faigle (University of Cologne)
Thursday, 11:30-12:00

A Quantum Model for Activity Systems

A quantum theoretic model for activity systems with n agents is presented, which include classical cooperative games and their well-known generalizations to "multichoice games" and "fuzzy games" as very special cases. It is argued that also social and economic activity systems should (and can) be analyzed as physical systems.

The lecture does not assume the audience to have special training in quantum mechanics. Familiarity with complex numbers and linear algebra suffices.

(Joint work with Michel Grabisch)

Jasper de Jong (University of Twente)
Thursday, 14.00-14.30

The (Sequential) Price of Anarchy for Throughput Scheduling

Motivated by the organization of distributed service systems, we study models for throughput scheduling in a decentralized setting. In throughput scheduling, a set of jobs j with values w_j, processing times p_{ij} on machine i, release dates r_j and deadlines d_j, is to be processed non-preemptively on a set of unrelated machines. The goal is to maximize the total value of jobs scheduled within their time window $[r_j, d_j]$. While approximation algorithms with different performance guarantees exist for this and related models, we are interested in the situation where subsets of machines are governed by selfish players. We give a universal result that bounds the price of decentralization: Any local alpha-approximation algorithm, $\alpha \geq 1$, yields Nash equilibria that are at most a factor $\alpha + 1$ away from the global optimum, and this bound is tight. For identical machines, we improve this bound to approximately $\alpha + 1/2$, which is shown to be tight, too. The latter result is obtained by considering subgame perfect equilibria of a corresponding sequential game. We also address some variations of the problem.

(Joint work with Marc Uetz)

Baomin Dong (Henan University, Zhengzhou, China)
Thursday, 14:30-15:00

Resale Bargaining, Upfront Payments and the Countervailing Power Hypothesis

We assess the competitive effect of upfront payments such as slotting allowances in a situation where a manufacturer faces a polarized retail sector which consists of a dominant retailer and a competitive fringe of retailers such as Chen (2003). We show that the vertically integrated profits can realize in equilibrium where upfront payments play a crucial commitment role in eliminating the vertical and horizontal externalities. Exclusion of fringe retailers may occur if slotting allowances are prohibited. But the gains are neither profits extracted from the manufacturer nor passed onto the consumers. The paper offers a theoretical basis for Stigler's criticism (Stigler, 1954) on the concept of "Countervailing Power" proposed by Galbraith (1952).

(Joint work with Yeran Dong, Capital University of Economics and Business, Beijing, China)

Anna Khmelnitskaya (St. Petersburg State University, Russia)
Thursday, 15.00-15.30

Solution concepts for TU games with directed cooperation structures

In classical cooperative game theory it is assumed that any coalition of players may form. However, in many practical situations the collection of feasible coalitions is restricted by some social, economical, hierarchical, communicational, or technical structure. The study of TU games with limited cooperation introduced by means of undirected communication graphs was initiated by Myerson (1977). In our study we consider directed graph games in which possible cooperation is prescribed by a directed graph (digraph). The approach to the solution for digraph games depends on the interpretation of a directed cooperation structure. If it is assumed that a digraph represents a flow situation when some links may merge while others split into several separate ones, we restrict our consideration to the class of cycle-free digraph games (without directed cycles, undirected cycles are not excluded). We introduce web-type values, in particular the tree value, for cycle-free digraph games axiomatically, each one with respect to a chosen coalition of players that is assumed to be an anti-chain in the digraph and is considered as a management team. We provide the explicit formula representation and simple recursive algorithms to calculate these values and we study their efficiency and stability. We also define the average web value as the average of the web values over all management teams in the digraph. In general these values are not component efficient.

As application we consider the water distribution problem of a river with multiple sources, a delta and possibly islands. Another possible interpretation of a directed cooperation structure is the assumption that a digraph represents the dominance structure or subordination of players such that after each player any of his subordinates may follow as long as this does not hurt the total subordination among the players prescribed by the

digraph. In this case we define a covering tree for a digraph as a tree that keeps the subordination of players prescribed by the digraph but in general is not a spanning tree. We introduce the average covering tree value as the average of the tree values over all covering trees in the digraph. The average covering tree value appears to be component efficient. Under the same assumption concerning the digraph we consider also another solution concept, the so-called Shapley value for digraph games, defined as the average of the marginal contribution vectors corresponding to those permutation of players that do not violate the dominance of players induced by the digraph.

(Joint work with Dolf Talman and Özer Selçuk)

Tadeusz Radzik
Thursday, 16:30-17:00

Is the solidarity value close to the equal split value?

In the paper we study the asymptotic behavior of the solidarity value and the equal split value in different classes of cooperative games. In particular, we discuss three natural definitions of asymptotic equivalence of values for TU -games and identify for each of them the classes of games for which the solidarity value and the equal split value are equivalent. Also, a computer illustration of the obtained results is given.

Genjiu Xu (Northwestern Polytechnical University, Xi'an, China)
Thursday, 17:00-17:30

Time-Consistency of Interval Shapley Value in Dynamic Games

Interval Shapley value (ISV) was initially considered for static one-shot games in [1, 2]. In [3, 4] it was shown that the Shapley value in dynamic games is time-inconsistent. To satisfy time-consistency condition for the Shapley value it is necessary to introduce a new control variable, so-called imputation distribution procedure (IDP). The case with interval Shapley value for dynamic games was not investigated in the game theory literature as well as time-consistency of ISV. It is proved that ISV is time-inconsistent, and the analogue of IDP for constructing time-consistent ISV is proposed.

(Joint work with Leon Petrosyan (Saint Petersburg State University, Russia), Artem Sedakov (Saint Petersburg State University, Russia) and Hao Sun)

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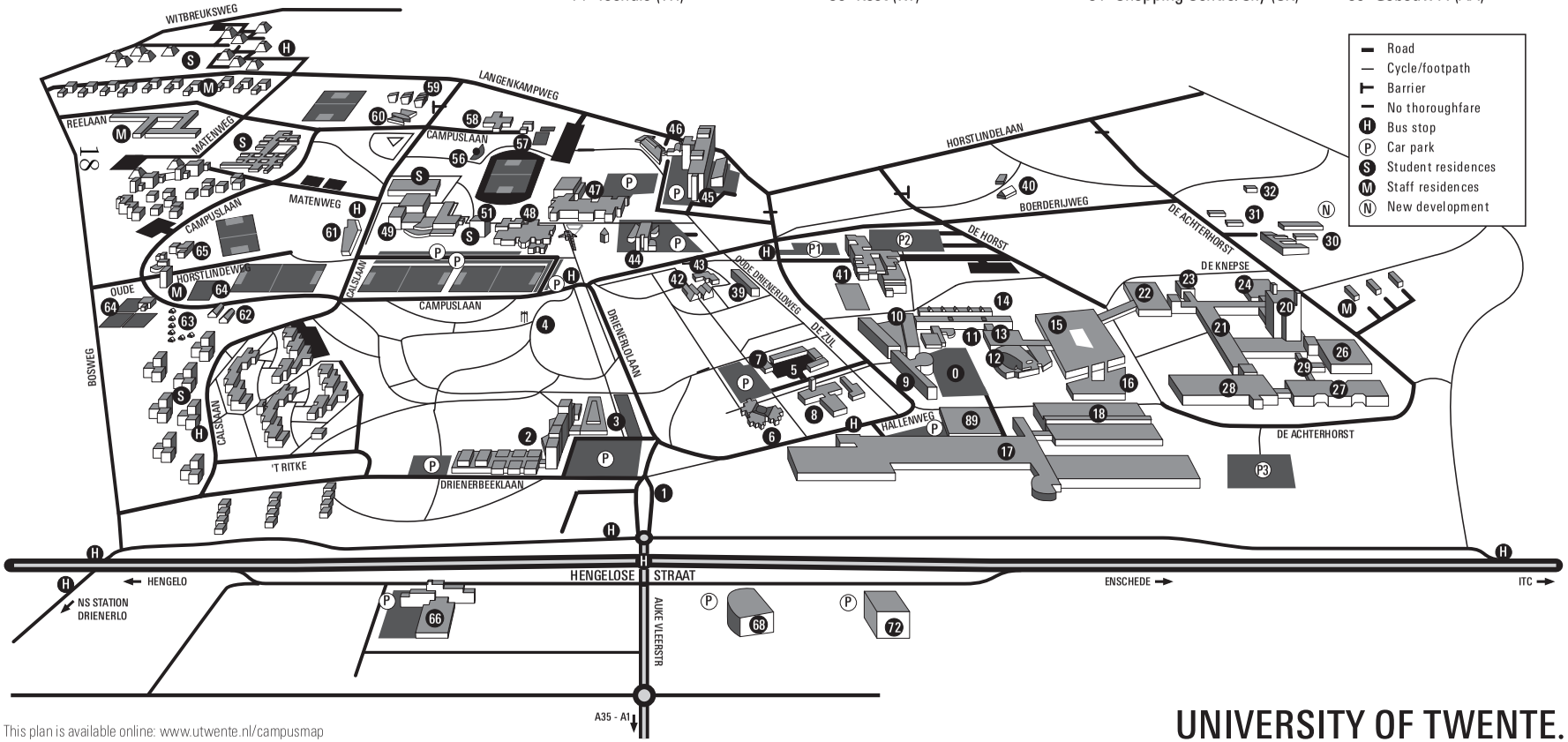
0 O&O plein (OO)
2 Spiegel (SP)
3 Vleugel (VL)
4 Carillon (CN)
5 Garage (GA)
6 Paviljoen (PA)
7 Seinhuis (SH)
8 High Pressure Laboratory (HD)
9 Citadel (CI)
10 Ravelijn (RA)
11 Zilverling (ZI)
12 Waaier (WA)
13 Hal B (HB)
14 Teehuis (TH)
15 Carré (CR)
16 Nanolab (NL)
17 Langezijds (LA)
18 ArtEZ (AR)
20 Horsttoren (HT)
21 Horstring (HR)
22 Westhorst (WH)
23 Kleinhorst (KH)
24 Noordhorst (NH)
26 Oosthorst (OH)
27 Meander (ME)
28 Zuidhorst (ZH)
29 Buitenhorst (BH)
30 Keet (KT)
31 Wind Park (WP)
32 Biomagnetic Centre (BI)
39 Chalet (CT)
40 Erve Holzik (ER)
41 Cubicus (CU)
42 Faculty Club (FC)
43 Schuur (SR)
44 Drienerburght (DR)
45 Hogekamp (HO)
46 High Tech Factory (HTF)
47 Vrijhof (VR)
48 Bastille (BA)
49 Sportcentrum (SC)
51 Shopping Centre/Sky (SK)
56 Openluchttheater (OUT)
57 Swimming Pool (ZW)
58 Sleutel (SL)
59 Mondriaan (MO)
60 Vlinder (VI)
61 Santar (SA)
62 Boerderij Bosch (BB)/Stal (ST)
63 Cabins (BL)
64 Tennis Park (TP)
65 Logica (LO)
66 BTC
68 KPMG Building (KP)
72 Corridor (CO)
89 Gebouw A (AA)



This plan is available online: www.utwente.nl/campusmap
For a 3d version see maps.utwente.nl

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