






## Kempton Autumn Talks 2020


Virtual lecture series on Game Theory




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Date	Time CET	Lecturer	University	Photo	Title	Abstract
Nov 04, 2020	1.45 pm	Prof. Dr. Tamás Solymosi	Corvinus University Budapest, Hungary		"On the Shapley value of liability games"	In a liability problem, the asset value of an insolvent firm must be distributed among the creditors and the firm itself, when the firm has some freedom in negotiating with the creditors. We model the negotiations using cooperative game theory and analyze the Shapley value to resolve such liability problems. We establish three main monotonicity properties of the Shapley value. First, creditors can only benefit from the increase in their claims or of the asset value. Second, the firm can only benefit from the increase of a claim but can end up with more or with less if the asset value increases, depending on the configuration of small and large liabilities. Third, creditors with larger claims benefit more from the increase of the asset value. Even though liability games are constant-sum games and - as we show - the Shapley value can be calculated directly from a liability problem, we prove that calculating the Shapley payoff to the firm is NP-hard.
Nov 05, 2020	5.30 pm	Prof. Dr. Péter Vékás	Corvinus University Budapest, Hungary		"Causes of the shadow economy in transition economies"	Due to its hidden nature, measuring the shadow economy is a challenging task. Concealing incomes leads to negative externalities: market distortions and loss of tax revenues cause immense damage all over the world. The expression 'transition economies' refers to the former Eastern bloc of European countries, which are in a peculiar situation: transformation from planned economies to market economies only happened a few decades ago, thus the corporate sector and the institutional background do not have such deep traditions as in the former West. We use panel data of several macro-indicators. Our dependent variable is the portion of the shadow economy relative to the GDP, for which we use estimates of the International Monetary Fund (IMF), and we incorporate region-specific effects by interactions. We apply static and dynamic panel linear regressions to reveal how variables such as socio-economic development, institutional background, income inequalities and tax rates impact the size of the shadow economy in the world in general and transition economies in particular.
Nov 06, 2020	1.45 pm	Prof. Dr. Michel Grabisch	Sorbonne University Paris, France		"A survey on opinion dynamics"	With the development of network theory, there is a huge literature on how opinion in a society of agents is evolving, due to interactions between agents. While sociologists have initiated many fundamental models, other disciplines have significantly contributed to the field: economists have incorporated strategic considerations, physicists have considered agents as particles and created sociophysics, computer scientists treated agents as automata, and control theorists have considered the dynamics of opinion as a particular input/output system. This short survey focuses on nonstrategic models, considering either that opinion is a binary (yes/no), or is continuous. Starting from classical models (essentially the threshold model for binary opinion, and the DeGroot model for continuous opinion), it shows the main variants of them, putting emphasis on two aspects which are of recent interest: anti-conformity behavior, and time-varying models.

Nov 11, 2020	1.45 pm	Dr. Martón Benedek	Corvinus University Budapest, Hungary		"Computing the nucleolus of cooperative games: lexicographical optimisation with LPs"	After introducing the basic notions of cooperative games (with transferable utilities) the talk focuses on the computation of one of the most widely spread solution concepts, the nucleolus. The solution has attractive properties, as it exists under very mild assumptions, it is unique, and in many aspects it offers the most stable outcome of the game. However, computationally it comes with many challenges, as it involves lexicographically minimising a vector of exponential size in the number of players. Among the various formulations, we are focusing on solving the lexicographical optimisation problem with a sequence of linear programs (LPs): both from a primal and from a dual perspective, focusing on the major tasks along the way, offering possible solutions for them, and highlighting the possible computational trade-offs that one could encounter.
Nov 13, 2020	1.45 pm	Prof. Dr. Hannu Nurmi	University Turku, Finland		"An introduction to the theory of single-winner elections"	Various organizations (states, municipalities, private companies, university faculties, etc.) resort to a wide variety of voting rules to achieve a seemingly same outcome, viz. electing a candidate (or, as the case may be, a policy alternative) that best reflects the will of the voters. We show by way of a few examples that the voting rule can be an equally important determinant of the outcome as the opinions of the voters. We then introduce some properties of voting rules that are generally deemed desirable. Thereafter we discuss some well-known results in social choice theory demonstrating the incompatibility of some of these desiderata. Our specific focus is on monotonicity-related properties which basically state that adding the electoral support, ceteris paribus, should do no harm for the candidate or policy alternative. Finally we touch upon a relatively recent electoral reform proposal inspired by social choice considerations.
Nov 13, 2020	3.45 pm	Christopher Stapleton	Simiosys Real World Laboratories, Orlando, Florida, US		"All the World is a Game, Applying Immersive Entertainment to Real World Challenges" (Separate ZOOM link)	We are hardwired for games, a tradition that has evolved over time by engaging with real world challenges. The advancements in real-time, simulation technologies with multi-player immersion has applied the latest Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) technology to create an all new phenomenon called Social-XR (eXtended Reality). As an award-winning Entertainment Designer and Producer, Christopher Stapleton, will provide unique perspectives and heuristics of how how Social-XR and the InterPlay of story, play and games can help provide transformative experiences in education, health and enterprise. Mr. Stapleton travels the world to collaborate with creative teams mixing realities to develop experiences ranging from theme parks, museums, training and therapy scenarios. Trained at the New York University Tisch School of the Arts, he has advanced experiential learning theories to incorporate imagination, creativity, and emotions with the use of gameplay. His clients include Universal Studios, Disney Imagineering, Nickelodeon Studios, and Sanrio. His research on enhancing human experience has been sponsored by Canon Inc., US National Science Foundation (NSF), Department of Education and NASA. <b>Please note that Mr. Stapleton uses a different link for his lecture: <a href="https://us02web.zoom.us/j/83142068826">https://us02web.zoom.us/j/83142068826</a> , Meeting ID: 831 4206 8826, Passcode: 006634</b>

Nov 16, 2020	1.45 pm	Dr. Marcin Malawski	Leon Kozminski University, Warsaw, Poland		"Values of cooperative games: marginalism, egalitarianism and implementation"	The central problem in the theory of cooperative games is how to divide among players the gain resulting from the cooperation of all of them. "Values" are allocation rules designed to solve the problem and specifying, for each game, one well-defined division. The first and foremost of them, the Shapley value, relies on "marginalism": the share of each player is determined solely by his contributions to all coalitions. Many attempts to reconcile this approach with the egalitarian one have led to numerous classes of values with various appealing properties. An important problem is that of "implementation" of such values, i.e. constructing mechanisms under which the division prescribed by the value under consideration will result. Two approaches to this problem co-exist in the literature: a "procedural" one starting from the classical probabilistic interpretation of the Shapley value and adapting it to other values, and a dynamic one aimed at obtaining the relevant values as subgame-perfect Nash equilibria of appropriate non-cooperative games. This talk will focus on how some of the above classes of values can be implemented along these lines.
Nov 19, 2020	5.30 pm	Dr. Fatma Aslan	Budapest University of Technology and Economics, Hungary		"Core Stability of Shapley Scarf Markets with Couples: When Distance Matters"	We consider housing markets where individuals live in couples and where the set of goods is endowed with a geographical structure. This structure aims at capturing the fact that couples prefer living together. Our primary purpose is to investigate the existence of core allocations. Moreover, we are interested in checking whether core stable allocations can be obtained as outcomes of a relevant adaptation of the Top-Trading-Cycles algorithm.
Nov 20, 2020	11.45 am	Prof. Dr. Balázs Sziklai	Corvinus University Budapest, Hungary		"Expert selection in networks"	The Top Candidate algorithm was developed to identify experts on recommendation networks. It relies on a simple observation: experts are much more effective in identifying other experts. In this talk we show two applications of this method. We rank academic institutions by their performance in a scientific discipline. We compile a citation network from game theoretic literature published between 2008-2017. The Top Candidate algorithm not only shows the current position of an institution but also reveals how difficult it is to improve it. In our second case study we look at innovation spreading in social networks. Early adopters play an important role in the innovation diffusion process. We show that the Top Candidate method identifies innovators and early adopters much more efficiently than other centrality measures.
Nov 20, 2020	1.45 pm	Prof. Dr. Javier Fernández	Universidad Pública de Navarra, Pamplona, Spain		"New information fusion techniques and applications on image processing, classification and the computational brain"	In this talk we are going to focus on the problem of information fusion. More specifically, we are going to discuss some recent techniques which are based on the notion of aggregation function. We are going to relax the conditions required of these functions, specially those related to monotonicity, so we will introduce the class of pre-aggregation functions. We will show how we can use these new functions in several different problems, including edge detection or classification, for instance. In particular, we will apply them to a specific instance of neurocomputing: how to identify, from the electrical signals of the neural activity and in real time, whether a given subject is thinking of moving the left hand or the right hand. Considering this setting as binary classification problem, we will see that a specific class of pre-aggregation functions, built in terms of the so-called Sugeno integral, opens a very promising way to be explored in this problem.

Nov 20, 2020	3.45 pm	Dr. Stefano Moretti	Dauphine University Paris, France		"Ordinal measures of influence in social structures"	In the literature of cooperative games, the notion of "power index" has been widely used to evaluate the "influence" of individual players (e.g., voters, political parties, nations, stockholders, etc.) involved in a collective decision process, i.e. their ability to force a decision in situations like an electoral system, parliament, governing council, management board, etc. In practical situations, however, the information concerning the strength of coalitions and their effective possibilities of cooperation is not easily accessible due to heterogeneous and hardly quantifiable factors about the performance of groups, their bargaining abilities, or other "psychological" attributes (e.g., the power obtained by threatening not to cooperate with other players). So, any attempt to numerically represent the influence of groups and individuals conflicts with the complex and multi-attribute qualitative nature of the problem. For these reasons, we introduced new solutions to provide a more flexible theory of cooperative interaction situations and power indices based on the evidence that the nature of available information about the interaction of individuals and groups is mostly ordinal.
Nov 23, 2020	1.45 pm	Prof. Dr. Arend Hintze	Dalarna University, Dalarna, Sweden		"How to make androids dream of electric sheep?"	A puzzling question, but one to take seriously if we ever want to build machines that think like you and me. The field of artificial intelligence experiences a lot of attention, mostly due to advances in computational infrastructure, finally allowing us to train deep neural networks effectively. But these machines are mostly stateless classifiers, trained beforehand, and lack the ability to learn over their lifetime. What I am looking for instead are machines that first observe the world, then create proper internal models, and finally use their experiences to improve their future decision making. Neuroevolution is a method that allows us to optimise complex computational substrates (Markov Brains) to perform in various test environments - simply because evolution is the only known method that ever produced the intelligence we want to mimic in a machine. Instead of reverse-engineering the brain, I reverse engineer the process that made them. I present a sample of my work dealing with our initial question, how to make machines that have memory and rich internal representations.
Nov 25, 2020	1.45 pm	Prof. Dr. Joaquin Sánchez-Soriano	Universidad Miguel Hernández de Elche, Spain		"Attribution problems and their applications. A game theoretical approach"	An attribution problem consists of determining what is the relevance of a series of factors for a particular result to be produced. This type of problem has special relevance in many fields such as marketing, health, management, computing, performance evaluation, assessment... In this talk we will review some of the most relevant applications of these problems. In particular, we will focus on those approaches based on game theory.
Nov 30, 2020	11.45 am	Prof. Dr. Josep Freixas	Universitat Politècnica de Catalunya, Barcelona, Spain		"The Shapley and Banzhaf values in voting and cooperative contexts: a hindsight and some extensions"	The talk aims to review the seminal articles that gave rise to these values for cooperative games and these power indices for simple games. The main arguments that support them are the axiomatic characterizations and the respective probabilistic approaches. On this basis, arguments and difficulties will be presented for their appropriate extension to multichoice cooperative games and voting games with several levels of approval.

Nov 30, 2020	1.45 pm	Prof. Dr. Vito Fragnelli	University of Eastern Piedmont, Alessandria, Italy	"Orders of Criticality in Graph Connection Games"	The order of criticality of a player in a simple game and two indices inspired by the reasoning a la Shapley and a la Banzhaf were introduced in two previous papers by Dall'Aglio, Fragnelli, Moretti in 2016 and 2019, respectively, mainly having in mind voting situations. Here, we devote our attention to graph connection games, and to the computation of the order of criticality of a player. The indices introduced in the second paper may be used as centrality measures of the edges in preserving the connection of a graph.
Dec 02, 2020	1.45 pm	Prof. Dr. Agnieszka Rusinowska	Sorbonne University Paris, France	 "Targeting in social networks"	The aim of this lecture is to discuss different approaches to targeting in social networks, in non-competitive as well as competitive environments, i.e., in the presence of social planner and competing persuaders. I will mainly focus on analytical models of targeting in economics, where targets are frequently characterized by new or existing centrality measures.
Dec 03, 2020	3.45 pm	Prof. Dr. Iwona Skalna	AGH Kraków, Poland	"Interval and affine computation"	Interval arithmetic (also known as interval mathematics, interval analysis, or interval computation) is a mathematical technique used to bound rounding errors and measurement errors in mathematical and numerical computation. Methods based on interval arithmetic can produce reliable results, i.e., results that are guaranteed to include the (unknown) exact result. Interval arithmetic has however a deficiency called the "dependency problem". This deficiency can be partially eliminated by using affine forms which preserve first order dependency between input variables. Thanks to the use of affine forms the results are still (assuming proper implementation) reliable whereas the results are usually much tighter than the results of the same computation with interval arithmetic. Interval and affine computation are used to solve practical problems in the field of structural mechanics, electrical engineering, physics, and in game theory.
Dec 04, 2020	11.45 am	Prof. Dr. Pierre Dehez	CORE - University of Louvain, Belgium	 "Sharing a collective probability of success"	How to allocate the probability of success resulting from the joint actions of a group of actors? To address this question, Hou et al. (Operations Research Letters 46, 457-461, 2018) propose to use the Shapley value of a transferable utility game, a "probability game", assuming probabilistic independence. The purpose of the present note is to analyze the properties of probability games and their duals and to study various solution concepts, in particular the core and the Shapley value. We investigate the axiomatic foundations of the Shapley value on the class of probability games and the link between the different solution concepts, including asymmetric values.

Dec 04, 2020

1.45 pm

Prof. Dr. David Ramsey

Wroclaw University,  
Poland



"Game Theoretical Models of  
Partnership Formation"

In the classical mate search problem, a female faces the following stopping problem. She observes a sequence of males, whose values as prospective partners are assumed to be independent realizations from a known distribution. On observing a male, a female must either accept him as a partner (and thus stop searching) or reject him (and thus continue observing the sequence). The goal of the female is to maximize her expected reward from search, which is assumed to be the value of the chosen male discounted according to the time spent searching.

Dec 04, 2020

3.45 pm

Prof. Dr. Encarnación  
Algaba

Universidad de Sevilla,  
Spain



"Power measures and  
cooperation on communication  
networks"

This talk focuses on network structures whose main feature is communication. The more general networks reflecting communication are defined by the following rule: if two sets of nodes are connected, the common nodes will act as intermediaries in order to establish a connection in the union of these sets, these networks are known in the literature as union stable systems. Particular cases are the well-known communication situations and the permission structures. The main purpose is to present some power measures, in this context, which generalize the degree measure for graphs. Later, we will present some values in these networks, and analyze some of their properties with the aim of distributing payoffs to players which take into account their power or influence in such networks.

Dec 07, 2020

11.45 am

Prof. Dr. László Á. Kóczy

Budapest University of  
Technology and  
Economics, Hungary

"Apportionment methods and  
practices"

In a representative democracy citizens exert their influence via elected representatives. Representation will be fair if the citizens have more or less the same (indirect) influence, that is, if each representative stands for the same number of citizens. Establishing electoral districts with equal numbers of voters becomes nontrivial, when they must fit into the existing administrative structure of a country. For instance the distribution of three seats between two equally populated regions will necessarily lead to inequalities. This example may seem artificial, but under more realistic circumstances with many regions and a high number of seats to be allocated the problem remains hard. The general problem of allocating seats between regions in a fair way is known as the apportionment problem. While virtually every Western-type democracy adopted the principle laid down in the US Constitution, their approaches differ on how they deal with the arising paradoxes and anomalies. The European Commission for Democracy through Law, better known as the Venice Commission published a comprehensive guidebook on good electoral laws in 2002. The Code of Good Practice in Electoral Matters contains original recommendations for a good practice of apportionment. In this presentation we survey the apportionment methods and the impact of the policy recommendation by the Venice Commission. First we explain the problem of apportionment and related issues in designing voting systems. Then we give an overview on the apportionment methods and discuss their properties. Then we illustrate the usage of the Leximin Method, motivated by the recommendations of the Venice Commission, compared to the solutions by the current legislations.