Workshop on Logic & Games
Amsterdam, December 12, 2001

Program

10.00 – 10.45	Johan van Benthem: *Games over Time*
Coffee	
11.00 – 11.45	Marc Pauly: *In Praise of Ignorance and Individualism*
11.45 – 12.30	Rohit Parikh: *Levels of Knowledge in Distributed Computing*
Lunch[1]	
14.00 – 14.45	Joe Halpern: *A Computer Scientist Looks at Game Theory*
14.45 – 15.30	Alexandru Baltag: *Playing with Kripke Structures: Logics for Communication Games*
Tea	
15.45 – 16.30	Peter van Emde Boas: *Imperfect Information Games; Looking for the Right Model*
16.30 – 17.15	Valentin Goranko: *Completeness of Extended Coalition Logics*
"Borrel"	

Abstracts

Johan van Benthem: Games over Time

We propose a model for infinite extensive games in a branching temporal logic, assessing its merits for analyzing game-theoretic reasoning. The model also supports expectations and uncertainty.

Marc Pauly: In Praise of Ignorance and Individualism

Coalitional power in multistage processes is modeled using effectivity frames, which are general enough to capture what groups of agents can bring about in extensive games of perfect and almost perfect information. Coalition Logic is used to describe effectivity frames, and the question of generating a mechanism satisfying a given specification is formulated as a satisfiability problem in Coalition Logic. Using this logical reformulation, we show that the complexity of this implementation problem depends (a) on whether the mechanism to be generated allows for imperfect information, and (b) on whether we are interested in individual or group ability.

Rohit Parikh: Levels of Knowledge in Distributed Computing[2]

When a group of people know some proposition, it can be known at various levels. The highest level is when it is common knowledge. The lowest when it is true but known to no one. We show that there are exactly countably many possible levels of knowledge which are regular sets of strings on the obvious alphabet and show how different kinds of protocols can be used to achieve these levels.

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[1] We apologize for not being able to offer a free lunch to the attendees.

[2] This paper is joint work with Pawel Krasucki

Alexandru Baltag: Playing with Kripke Structures: Logics for Communication Games

The title of this talk is intended to be a pun on the ambiguity between (1) "modeling games using Kripke structures", (2) "playing games on Kripke structures (as your objects of playing)" and (3) "playing games having Kripke structures as your opponents". I mean them all, of course.

I present a logical approach to communication actions in games. There are three ways to look at these actions, each corresponding to one of the three mottos above: (1) as "actions in a game model", i.e. transition relations in a temporal/dynamic Kripke model of a game; (2) as "ways to transform (update) an arbitrary Kripke structure", i.e. specific ways of acting on (epistemic) Kripke structures as your objects of playing, or in other words: ways to change/influence/manipulate people's beliefs/knowledge; (3) as coming with their own (epistemic) "Kripke structures of actions", describing the player's knowledge about actions themselves: your opponent's chosen actions can thus be seen as pointed Kripke structures, and you get to play against *them*. I show how this last aspect is hidden in the first two (more standard) features, and how it can be used to explain and compute the other two aspects.

I apply this to some epistemic puzzles produced by communication: some cryptographic variation of the Byzantine attack, a puzzle on the impossibility of ever achieving common knowledge concerning the fact that nobody knows if extraterrestrials exist and the "surprise examination puzzle" (...or "surprise execution" as Martin Gardener has put it, ... or "surprise attack", as I would rather put it, to avoid any bloodshed). I've got a surprise here, but you're not going to believe it: that's why it's a surprise.

Joe Halpern: A Computer Scientist Looks at Game Theory

I consider issues in distributed computation that should be of relevance to game theory. In particular, I focus on (a) representing knowledge and uncertainty, (b) dealing with failures, and (c) specification of mechanisms.

Peter van Emde Boas: Imperfect Information Games; Looking for the Right Model

The theory relating the endgame analysis of "reasonable games" with the complexity class PSPACE, which was developed 25 years ago breaks down for imperfect information games. The forthcoming InIGMA project which will start in 2002 is an attempt to extend the existing theory to include imperfect information games as well.

In the talk I will indicate the few results available in the literature, what we know about this problem, and how we hope to solve it.

Valentin Goranko: Completeness of Extended Coalition Logics

I will discuss a variety of extended coalition logics, some of which were introduced in Marc Pauly's dissertation. They can be regarded as multi-modal versions of fragments of CTL, with modalities indexed by subsets (coalitions) of a set of players, and neighbourhood, rather than Kripke, semantics. I will present axiomatizations for these logics and will outline proofs of finite model property and completeness. The proof methods are adaptation of the well-known canonical model and filtration methods, but it is reassuring that the old techniques still work here.