

Titles and abstracts for
[workshop] The Logical Dynamics of Information, Agency and Interaction

Jan van Eijck: *Belief, Probabilities, Updates, and Model Checking*

The talk will present epistemic probability models with probabilistic updates, and will discuss an implementation that allows model checking the results of updates in a multi-agent setting. I will do my best to connect this to the themes of the workshop.

Kaile Su: *On Symbolic Model Checking DEL*

In this talk, I will introduce a symbolic technique BDD (Binary Decision Diagram), and propose an approach to symbolic Model Checking DEL.

Joshua Sack: *The Logic of Bias*

Probabilities provide measures of uncertainty, but the numbers assigned as probabilities to events also reflect some certainty, a certainty of the likelihood of the event. But there are times when the probability values themselves are uncertain, such as when flipping a biased coin with an unknown bias. Uncertainties of probabilities have been modeled in logic in different ways. This talk introduces a compact way of modeling uncertainty of probabilities by using variables for unknown biases. A dynamic probabilistic logic for reasoning about such unknown biases is proposed and discussed.

Chanjuan Liu: *A Dynamic Logic on Games with Short Sight*

Extensive Games with Short Sight (Egss) is a variant of extensive games, in which players may have no access to the complete game structure. It weakens the unrealistic assumption in traditional extensive games. I will discuss a dynamic logic for reasoning about Egss. I will show that this logic is well suited for characterizing the solution concept in extensive games with short sight.

Paolo Galeazzi: *Fixpoints in network dynamics*

The problem at hand is the spreading of a behavior in a population connected via a social network. Given some (rationality) rule, each agent chooses whether to adopt the new behavior or not. Many approaches in the literature (e.g. Easley and Kleinberg's Networks, Crowds, and Markets, CUP 2010) assume a set of "special" initial adopters, who adopt according to a rule different from anyone else's. We try to drop this "special" assumption, that would automatically generate inflationary adoption dynamics, and show that the diffusion still reaches a fixpoint.

Pingzhong Tang: *Economics and computation*

I summarize recent developments at the interface of computer science and microeconomics. Within this framework, I present several on-going research topics at IIS, Tsinghua University.

Soroush Rafiee Rad: *Voting, Deliberation and Truth*

There are various ways to reach a group decision on a yes-no question. One way is to vote and decide what the majority votes for. This procedure receives some epistemological support from the Condorcet Jury Theorem. Alternatively, the group members may prefer to deliberate and will eventually reach a decision that everybody endorses — a consensus. In this talk we introduce a Bayesian model for non-strategic deliberation, study some of its epistemic properties and finally give a comparison between the truth tracking properties of this deliberation process and majority voting.

Nina Gierasimczuk: *Epistemic Topology – A topological characterization of limiting solvability*

This work provides a topological view on epistemic spaces. In particular, I present a topological characterization of the limiting solvability of questions (understood as partitions of epistemic spaces) in an inductive setting. This is joint work with A. Baltag and S. Smets.

Sonja Smets: *An Evidence-based Framework for Belief and (Defeasible) Knowledge*

I tackle the problem of obtaining a notion of (consistent) belief and a corresponding notion of (defeasible) knowledge from a given collection of (possible false, possibly mutually inconsistent) pieces of evidence. I present a general class of models, called “justification models”, that naturally generate plausibility models for (conditional) belief, generalizing the work of van Benthem and Pacuit on “evidence models”, in a way that subsumes both AGM theory and other theories of belief revision. Focusing on models for AGM revision, I isolate a natural class of justification models, called “weighting models”, and study the associated logic. This talk is based on joint work with Baltag and Fiutek.

Fenrng Liu: *Evidence and Trust Make a Difference*

I introduce a framework to model belief revision in social network. Agent’s own judgment towards evidence for her beliefs, as well as how much trust she has towards other agents will be taken into account. Some further results will be presented. This is an ongoing work with Baltag and Smets.

Zoe Christoff: *Dynamic Epistemic Logic for Threshold Models*

This is joint work with A. Baltag, R. Rendsvig and S. Smets. I introduce a dynamic epistemic logic for reasoning about diffusion dynamics in social networks. I compare three diffusion policies: one which does not depend on knowledge, one which depends on knowledge of the present, and one which depends on knowledge of the future.

Bryan Renne: *Nonmonotonic Reasons and Revisable Justified Belief*

I discuss some recent work, joint with A. Baltag and S. Smets, on a logic for reasoning about justified conditional beliefs and nonmonotonic inference.

Johan van Benthem: *Tracking Evidence and Information*

Generalizing the themes and style of analysis of evidence in van Benthem & Pacuit 2012, we discuss the role of evidence in a general perspective of tracking our epistemic past and enriching our present, but also, how forgetting structure is essential to our

functioning. After a recapitulation of existing systems for evidence statics and dynamics, we explore what the two-level harmony of Liu 2011 means in terms of tracking inquiry in terms of evidence and of plausibility order, and just when it holds. Next, we add priority order on evidence, point out how this changes the picture so far, and try to disentangle different intuitions about relative plausibility between propositions. Given the many similar ideas floating around in our community, many connections might come up in discussion.

Chenwei Shi: *Evidence and Reliability*

What information the agent concludes from her evidence can qualify as reliable information? By taking each piece of evidence as a set of hypotheses it can support, I address this question. And during the discussion, more related questions will be considered, e.g. what is evidence; what is “evidence support” and so on.

Alexandru Baltag: *A Bayesian Framework for the Defeasibility Theory of Knowledge*

I propose a probabilistic version of the so-called defeasibility theory of knowledge. A proposition P is *undefeated* iff its degree of belief stays high (above a fixed threshold) when *any true* information is learnt. This is a quantitative version of the “robustness” or stability requirement that underlies the defeasibility theory. Undefeated belief is a factive attitude, but is not (positively) introspective, nor even additive (both P and Q can be undefeated without their conjunction being so). However, there is a *reflexive* version of this concept, definable by a circular definition: let us say that P is *known* iff both P and the fact that P is known are undefeated. The resulting theory fits well with the latest developments in Bayesianism: its relationship with Leitgeb’s “stability theory of belief” is similar to the relationship between the usual (qualitative) notion of defeasible knowledge and the AGM theory of belief revision. Time-permitting, I show that only minimal assumptions about probability are in fact needed (namely, de Finetti’s axioms of *qualitative probability* minus the comparability axiom).

Malvin Gattinger: *Model Checking DEL for Guessing Games and Cryptography*

We look at two variants of Dynamic Epistemic Logic based on a concise Kripke representation of what it means to know a number. The Logic of Guessing Games GG formalizes number guessing games and information updates happening in such games. We provide a sound and complete axiomatization. Epistemic Crypto Logic ECL applies the idea of register models to the analysis of cryptographic protocols, allowing to analyze computation and communication in a single framework. For example, we can translate the famous Diffie-Hellman protocol and its goal to ECL formulas. We implemented model checkers for both GG and ECL in Haskell, which are waiting to be adapted to other epistemic frameworks. Our bonus feature is an automated visualization of Kripke frames.