Programma VvL dag 16 maart 1996 — Jaarbeurs, Utrecht

10.00–11.00	Bernd van Linder (UU) Modal Logics for Rational Agents
11.00–11.15	koffie
11.15–12.15	Joe Halpern (IBM Almaden/Stanford) Plausibility Measures and Default Reasoning
12.15–14.00	lunch
14.00–15.00	Peter Flach (KUB) The Logic of Induction
15.00–15.15	thee
15.15–16.15	Frans Voorbraak (UvA) Combining Unreliable Pieces of Evidence
16.15–16.30	Korte ledenvergadering

Tijdens de korte ledenvergadering stelt het vernieuwde bestuur zich voor en presenteert het haar plannen voor de toekomst.

Abstracts

Modal Logics for Rational Agents – Bernd van Linder

In this talk I would like to present an overview of our work on the use of modal logics to formalise rational agents. The basis of this work concerns the so-called KARO-architecture, in which modal logics of knowledge and action are combined. In this architecture we focus on the knowledge of agents, their abilities and opportunities, and the result of the actions that they may perform. Over the years this basic framework has been extended in a number of ways. Firstly, we extended the class of actions to also include non-standard actions modelling observations, communication and the jumps to conclusions constituting default reasoning. Secondly, we formalised other informational attitudes in addition to knowledge. In particular, we considered various kinds of beliefs, each with its own degree of credibility. Lastly, we dealt with the motivational attitudes of agents by formalising wishes, goals and commitments. In my overview I plan to deal with all these different aspects of agency.

Plausibility Measures and Default Reasoning – Joe Halpern

We introduce a new formalism for reasoning about uncertainty that we call plausibility. Plausibility is a generalization of probability: the plausibility of a set is just an element of some arbitrary partial order (instead of being an element of [0,1], as in the case of probability). We believe that plausibility will provide a reasonable generalization of probability that will allow more qualitative reasoning. We focus on one application of plausibility measures: default reasoning.

Defaults are statements like "Birds typically fly". In recent years, a number of different semantics for defaults have been proposed—involving such things as preference rankings, extreme probabilities, and possibility measures—that have been shown to be characterized by the same set of axioms, known as the KLM properties (for Kraus, Lehmann, Magidor). The fact that such disparate approaches were all characterized

by the same axioms was viewed as quite surprising. We show that the KLM properties are almost inevitable, given some minimal assumptions. In the framework of plausibility, we can give a necessary condition for the KLM axioms to be sound, and an additional condition necessary and sufficient to ensure that the KLM axioms are complete. This additional condition is so weak that it is almost always met whenever the axioms are sound. In particular, it is easily seen to hold for all the proposals made in the literature.

In the literature, the focus has been on propositional default reasoning. We briefly consider the first-order case as well. Here it turns out that there are significant differences between the various proposals. Again, using plausibility helps us understand what is going on.

The talk is completely self-contained. (In particular, no previous knowledge of default reasoning is presumed.) It represents joint work with Nir Friedman.

The Logic of Induction – Peter Flach

Most logical accounts of induction, such as Carnap's inductive logic, proceed by generalising the notion of a truthvalue to a real-valued degree of confirmation, indicating the extent to which the inductive conclusion is confirmed by the premisses. The upshot of this generalisation is that the notion of a proof theory is reduced to calculating the degree of confirmation pertaining to arbitrary pairs of premisses and conclusion.

In my PhD thesis "Conjectures: an inquiry concerning the logic of induction" I propose and investigate an alternative logical account of induction, which retains the standard notion of proof theory but generalises the notion of semantics. One possible view of induction, which can be traced back to Peirce, is as a form of reasoning in which the conclusion explains at least the same things as the premisses, which can be modelled by an explanation-preserving semantics. Unlike Carnap's system, this view of induction gives rise to a full-fledged consequence relation, which is analysed in the spirit of Kraus, Lehmann & Magidor.

An alternative to this explanatory view of induction is obtained by modelling the relation of confirmation between premises and conclusion in a non-quantitative way. This alternative, originally proposed by Hempel, is closely related to recent work in Artificial Intelligence. One way to model confirmatory induction is by means of a preferential semantics.

In this talk I will give a non-technical overview of my work on the logic of induction.

Combining unreliable pieces of evidence – Frans Voorbraak

It is no surprise that logic is an important tool for Artificial Intelligence since it is hard to think of intelligent agents without reasoning capabilities. However, the information available to an agent is often uncertain, and reasoning with uncertainty is a rather neglected topic of logical investigation. An important problem one encounters when studying reasoning with uncertainty is how to combine several uncertain or unreliable pieces of information or evidence. (For example, symptoms, expert opinions, or sensor readings) We discuss several of the proposed methods for combining evidence, such as the linear, independent, and logarithmic opinion pool, and Dempster's rule of combination. We argue for the position that (1) in general, the mentioned methods are inadequate, (2) strictly speaking, the only justifiable way to go is to carefully model the situation, (3) a careful modelling of the situation requires a distinction between ignorance and uncertainty, and (4) drawing useful conclusions in the presence of ignorance may require additional assumptions.