Logical Perspectives on Language and Information

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Preface

The 5th Workshop on Logic, Language and Cognition (LLC5) took place on May 31 - June 2, 1996 at the Center for the Study of Language and Information (CSLI) at Stanford University. The organisers were Johan van Benthem, Henriëtte de Swart, Rob van Glabbeek, and Jean Braithwaite. The workshop was sponsored by the School of Humanities and Sciences, the Center for the Study of Language and Information, the Department of Philosophy, Professor Vaughan Pratt, Professor John Mitchell (all at Stanford University), and by the Dutch Research School in Logic.

Like its predecessors, the aim of LLC5 was to bring together scholars having an interest in logic – philosophers, linguists and computer scientists – with the overall aim of facilitating interdisciplinary interaction. It succeeded in doing so by presenting a program of 24 presentations by researchers from the United States, Netherlands and Spain, on a diversity of topics ranging from the role of negation in child language via dynamic epistemic logic to deductive modelchecking.

Some authors were invited after the workshop to contribute a paper related to their talk to the workshop bundle you are reading now. Each of their submissions underwent a thorough reviewing process involving two referees and one of the editors of the bundle. We thank all those who contributed to the refereeing process.

By a variety of reasons, the time lag between the workshop and the publication of this bundle extended far beyond our intentions. However, we think that the contents of each of the papers have not lost much of their interest, and we can recommend a closer study. In the sequel of this Introduction, we tell you more about their contents.

Circumscription, introduced by John McCarthy in 1977, is a form of nonmonotonic reasoning, based on minimising the extension of a predicate. In his paper *Cofinal circumscription*, Tom Costello addresses a serious problem with circumscription: in many examples of commonsense reasoning, straightforward formalisation leads to theories that become inconsistent after applying

circumscription. He goes on to propose cofinal circumscription, which turns out to preserve consistency. It is based on the mathematical notion of density, intended to capture the notion of 'reasonable belief'.

In 1982, David Marr published a seminal book on the psychology of perception. In his models, perception is a multi-layered and essentially approximative process. Building on Marr's model of perception, Michiel van Lambalgen and Jaap van der Does present in their paper *A Logic of Vision: Preliminaries* a semantics based on sequences of approximations, partially ordered by a relation of refinement or decomposition. As a consequence, reality becomes an inverse limit of such a sequence. Both the limit and the approximations are first-order models, and existing model-theoretic (and topological) machinery can be used (with some adaptations). A novel notion of generalized quantification is used to express 'blurring' of reality. The semantics is then applied to familiar observations concerning perceptual reports in natural language.

It is a common fact that most things around us are subject to change. This observation justifies the 'dynamic turn' in logic, which aims to develop logical systems that reflect this dynamic character of the objects we may reason about. An early example is V. Pratt's Quantified Dynamic Logic. In his paper *A Logic of Modification and Creation*, Gerard Renardel generalises Pratt's and other dynamic logics and tries to unify related systems like Evolving Algebras and Database Logic.

Computer aided verification aims to develop methods to verify that certain digital systems (usually given as programs) satisfy certain properties (usually given as a specification). Due to the complexity of this task, the help of a computer is indispensable. The paper *Model Checking and Deduction for Infinite-State Systems* by Henny Sipma, Tomás Uribe and Zohar Manna addresses the verification of temporal properties of reactive systems (i.e. systems with an ongoing interaction with their environment). The temporal properties are expressed in temporal logic. Parallel to the logical duality between proofs and models, there are traditionally two complementary styles of verification: one via deduction, the other via model checking. The paper contains an overview of both styles, and proposes a combination called deductive model checking that aims to combine the best of both.

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