

Preface

Information for real life AI applications is usually pervaded by uncertainty and subject to change, and thus demands for non-classical reasoning approaches. At the same time, psychological findings indicate that human reasoning cannot be completely described by classical logical systems. Sources of explanations are incomplete knowledge, incorrect beliefs, or inconsistencies. Generally, people employ both inductive and deductive reasoning to arrive at beliefs; but the same argument that is inductively strong or powerful may be deductively invalid. Therefore, a wide range of reasoning mechanisms has to be considered, such as analogical or defeasible reasoning. The field of knowledge representation and reasoning offers a rich palette of methods for uncertain reasoning both to describe human reasoning and to model AI approaches. Its many facets like qualitative vs. quantitative reasoning, argumentation and negotiation in multi-agent systems, causal reasoning for action and planning, as well as nonmonotonicity and belief revision, among many others, have become very active fields of research. Beyond computational aspects, these methods aim to reflect the rich variety of human reasoning in uncertain and dynamic environments.

The aim of the series of workshops is on the one hand to address recent challenges and to present novel approaches to uncertain reasoning and belief change in their broad senses and in particular provide a forum for research work linking different paradigms of reasoning and on the other hand to foster a multidisciplinary exchange between the fields of AI and cognition by bringing together researchers from artificial intelligence, automated deduction, computer science, cognitive psychology, and philosophy. Previous events of the Workshop on *Dynamics of Knowledge and Belief* (DKB) took place in Osnabrück (2007), Paderborn (2009), Berlin (2011), and Koblenz (2013). Previous editions of the Workshop on *KI & Kognition* (KIK) took place in Saarbrücken (2012), Koblenz (2013), and Stuttgart (2014).

This year, we put a special focus on papers from both fields that provide a base for connecting formal-logical models of knowledge representation and cognitive models of reasoning, addressing formal as well as experimental or heuristic issues. Reflecting this focus, the workshop *Formal and Cognitive Reasoning* at KI 2015 is organized jointly by the GI special interest groups *FG Wissensrepräsentation und Schließen* and *FG Kognition*.

Out of eight submissions, five have been selected for presentation at the workshop after a thorough review process, four of them as regular papers and one as a short paper. In consequence, the workshop hosts contributions on learning rules for cooperative problem solving, qualitative probabilistic inference with default inheritance, algebraic semantics for graded propositions, functional completeness of argumentation semantics, and approximate reasoning with fuzzy-syllogistic systems. We are happy also to have two invited talks, jointly with the *Workshop on Neural-Cognitive Integration* (NCI@KI 2015) and the *29th Workshop on (Constraint) Logic Programming* (WLP 2015). The two invited

speakers, Herbert Jaeger and Steffen Hölldobler, both outstanding researchers in their respective fields, present interesting insights in recurrent neural networks with conceptors, and aim at combining human reasoning, logic programs and connectionist systems, respectively.

Acknowledgments

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