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## AN INTRODUCTION TO THE SPECIAL ISSUE ON QUESTION PROCESSING

Logic of questions starts with a simple observation that all problem solving begins with a problem, which can be expressed in a question. This is a branch of logical inquiry which investigates the phenomena of posing, processing and answering questions in strict, formal and logical terms.

Logic of questions (or erotetic logic, from Greek *erotema* – question) aims at solving three fundamental problems concerning questions and questioning. The first one is the problem of representation: how to formalize questions [Harrah, 2002]? Should they be considered independent linguistic entities, and formalized accordingly, as claimed by proponents of non-reductionist approach? Or should they be interpreted in terms of some other expressions, like imperatives, or demands for information, and represented via existing logics, as claimed by followers of various reductionist approaches? The second is the problem of semantics: what semantic properties should be ascribed to questions [Ciardelli et al., 2015; Ginzburg, 2012; Wiśniewski, 2015]? In particular, are they true or false, or bear some semantic characteristics other than truth values? The third is the problem of formalizing reasoning with questions. A question, before it is asked or posed, needs to be arrived at. What are the principles underlying this process [Hintikka et al., 2002; Wiśniewski, 1995]? What counts as an answer to a question, and what counts as a satisfactory one? What rules govern erotetic transformations, by which one question logically follows from the others, or from some declarative sentences?

Papers collected in this special volume address all these problems, with particular emphasis on the third one. Question processing occurs, when reasoning agents cannot accomplish the task of answering an initial question with informational resources which are directly accessible to them [Hintikka, 1999; van Benthem and Minică, 2012]. In such cases initial question needs to be processed. If systematic, this results in either a new question or in some strategy of reducing the initial question into auxiliary questions [Wiśniewski, 2013].

The focus of contemporary logic of questions is on logical theory of erotetic reasoning, in which questions play the roles of premises or conclusions [Hintikka, 2007]. Thus logic of questions finds its natural place within a new paradigm, called practical, or cognitive turn in logic [Gabbay and Woods, 2001; Urbański, 2011], which aims at applications of enormous achievements of mathematical logic to analyses of actual human reasoning processes [Stenning and van Lambalgen, 2008]. This approach is also reflected in papers collected in this volume.

This volume opens with the paper “Generalized Entailment” by Andrzej Wiśniewski. He defines and examines a semantic relation between a family of sets of formulas and a set of formulas, dubbed generalized entailment, and its subrelation, called constructive generalized entailment. On the one hand, they are generalizations of the standard notion of entailment and of the concept of multiple-conclusion entailment. On the other hand, they enable explication of some concepts of interrogative entailment, framed within Inferential Erotetic Logic (IEL) and inquisitive semantics as well.

Paweł Łupkowski in his paper “IEL-based Formal Dialogue System for Tutorials” uses IEL as a formal basis for development of a formal dialogue system for tutorials. He then applies this system to analyses of tutorial dialogues from the Basic Electricity and Electronics Corpus.

In the paper “Question meaning = resolution conditions” Ivano Ciardelli argues for alternative semantic analysis of questions. Instead of indirect approach, via the notion of an answer, he proposes a perspective taken recently within the inquisitive semantics, according to which the meaning of a question is equated with its resolution conditions.

Finally, Michal Peliš in his paper “Erotetic Epistemic Logic” presents a logic of questions developed as an extension of S5 interpreted as epistemic logic, discussing formalization and semantics of questions, answerhood conditions, and structures of reasoning involving questions.

## References

- Ciardelli, I., J. Groenendijk, and F. Roelofsen, 2015, “On the semantics and logic of declaratives and interrogatives”, *Synthese* 192 (6): 1689–1728. DOI: [10.1007/s11229-013-0352-7](https://doi.org/10.1007/s11229-013-0352-7)
- Gabbay, D. M., and J. Woods, (2001, “The new logic”, *Logic Journal of the IGPL* 9 (2): 141–174. DOI: [10.1093/jigpal/9.2.141](https://doi.org/10.1093/jigpal/9.2.141)
- Ginzburg, J. (2012), *The Interactive Stance: Meaning for Conversation*, Oxford University Press: Oxford. DOI: [10.1093/acprof:oso/9780199697922.001.0001](https://doi.org/10.1093/acprof:oso/9780199697922.001.0001)
- Harrah, D., 2002, “The logic of questions”, pages 1–60 in D. Gabbay and F. Guenther (eds.), *Handbook of Philosophical Logic*, second edition, Vol. 8, Kluwer: Dordrecht, Boston, London. DOI: [10.1007/978-94-010-0387-2\\_1](https://doi.org/10.1007/978-94-010-0387-2_1)
- Hintikka, J., 1999, *Inquiry as Inquiry: A Logic of Scientific Discovery*, Kluwer: Dordrecht, Boston, London. DOI: [10.1007/978-94-015-9313-7](https://doi.org/10.1007/978-94-015-9313-7)
- Hintikka, J., 2007, *Socratic Epistemology: Explorations of Knowledge-Seeking by Questioning*, Cambridge University Press: Cambridge. DOI: [10.1017/CB09780511619298](https://doi.org/10.1017/CB09780511619298)
- Hintikka, J., I. Halonen, and A. Mutanen, 2002, “Interrogative logic as a general theory of reasoning”, pages 295–337 in D. Gabbay, R. Johnson, H. Ohlbach, and J. Woods (eds.), *Handbook of the Logic of Argument and Inference*, Studies in Logic and Practical Reasoning, North-Holland: Amsterdam. DOI: [10.1016/S1570-2464\(02\)80009-X](https://doi.org/10.1016/S1570-2464(02)80009-X)
- Stenning, K., and M. van Lambalgen, 2008, *Human Reasoning and Cognitive Science*, The MIT Press: Cambridge, MA.
- Urbański, M., 2011, “Logic and cognition: Two faces of psychologism”, *Logic and Logical Philosophy* 20 (1–2): 175–185. DOI: [10.12775/LLP.2011.009](https://doi.org/10.12775/LLP.2011.009)
- van Benthem, J., and Ş. Minică, 2012, “Toward a dynamic logic of questions”, *Journal of Philosophical Logic* 41 (1): 633–669. DOI: [10.1007/s10992-012-9233-7](https://doi.org/10.1007/s10992-012-9233-7)
- Wiśniewski, A., 1995, *The Posing of Questions: Logical Foundations of Erotetic Inferences*, Kluwer: Dordrecht, Boston, London. DOI: [10.1007/978-94-015-8406-7](https://doi.org/10.1007/978-94-015-8406-7)
- Wiśniewski, A., 2013, *Questions, Inferences, and Scenarios*, Vol. 46 of Studies in Logic, College Publications: London.
- Wiśniewski, A., 2015, “Semantics of questions”, , pages 273–313 in S. Lappin and Ch. Fox (eds.), *The Handbook of Contemporary Semantic Theory*, second edition, Wiley-Blackwell. DOI: [10.1002/9781118882139.ch9](https://doi.org/10.1002/9781118882139.ch9)

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