

## Logics of questions

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Traditional logical theories are concerned with the characterization of valid reasoning. For such logical theories, the main object of investigation is the notion of *entailment*, a notion that is construed as a relation between two or more declarative statements, dictating when one of them can be legitimately inferred from the others.

In the course of the previous century, however, and especially since the 1970s, the scope of logical theories has become much broader. In particular, logic is no longer only concerned with declarative statements, but also with *questions*. Accordingly, the field is no longer focusing exclusively on the entailment relation that may hold between two or more statements, but also aims to characterize fundamental relations that may hold between questions, or between questions and statements. For instance, when does a statement *resolve* a given question? When does a statement *evoke* a certain question? And when does the resolution of one question *depend* on the resolution of another question?

Since questions are ubiquitous both in linguistic communication and in scientific inquiry, logical theories of questions play a central role both in linguistics (especially in semantics and pragmatics) and in philosophy (especially in the philosophy of language, the philosophy of science, and epistemology). Indeed, the logical theories of questions that have been developed so far are usually explicitly motivated either by linguistic considerations or by philosophical issues. The various theories

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often take rather different perspectives, some being concerned primarily with the role that questions play in communication (e.g., Hamblin 1973; Belnap and Steel 1976; Karttunen 1977; Bennett 1979; Belnap 1982; Groenendijk and Stokhof 1984; von Stechow 1991; Ginzburg 1995a, b; Krifka 2001; Aloni et al. 2007; Ciardelli et al. 2013) and others focusing on their role in scientific inquiry and the acquisition and revision of knowledge and beliefs (e.g., Bromberger 1966; Hintikka 1999, 2007; Wiśniewski 1995, 2013; Olsson and Westlund 2006; Enqvist 2009; Genot 2009; van Benthem and Mincă 2012).<sup>1</sup>

The field has witnessed a wealth of activity in the past decade. On the one hand, substantial contributions have been made to several established approaches, such as the INTERROGATIVE MODEL OF INQUIRY and INFERENTIAL EROTETIC LOGIC, culminating in two book-length expositions (Hintikka 2007; Wiśniewski 2013). Moreover, these established approaches, in particular the INTERROGATIVE MODEL OF INQUIRY, have found new applications in recent work, especially in connection with belief revision theory (Olsson and Westlund 2006; Enqvist 2009; Genot 2009). On the other hand, several new logical theories of questions have emerged as well, in particular within the framework of DYNAMIC EPISTEMIC LOGIC (e.g., van Benthem and Mincă 2012), and in INQUISITIVE SEMANTICS (e.g., Ciardelli et al. 2013).

The purpose of this special issue is to bring together a collection of articles that present the core elements of these different approaches in an accessible way, and establish new connections between the various perspectives. In order to achieve this, we selected a number of papers that were presented at workshops on logics of questions in the period 2011–2013,<sup>2</sup> and invited the authors to submit extended versions of these papers for this special issue. We asked each of the authors to introduce one of the approaches in a broadly accessible way, and encouraged them to investigate possible connections with at least one of the other approaches, either evaluating the main differences and commonalities between the two, or combining their respective strengths to explore new territories. Moreover, most papers were reviewed by specialists from at least two different traditions, whose excellent feedback considerably enhanced the overall coherence of the special issue, and enriched the substance of each individual contribution.<sup>3</sup>

This resulted in the following collection of papers:

1. **Inferential erotetic logic meets inquisitive semantics** by Andrzej Wiśniewski and Dorota Leszczyńska-Jasion explores connections between INFERENTIAL EROTETIC LOGIC and INQUISITIVE SEMANTICS by investigating the interrelations between the notions of *question raising* and *inquisitiveness*. This is achieved by

<sup>1</sup> For extensive overviews, see Groenendijk and Stokhof (1997), Harrah (2002), Ginzburg (2010), Krifka (2011), Cross and Roelofsen (2014).

<sup>2</sup> In particular, the workshop on Logics of Questions in Prague, October 26–27, 2011; the workshop on Questions, Games, and Logic in Amsterdam, December 1, 2011; the workshop on Inquisitiveness in Amsterdam, December 19–21, 2011; the workshop on the Interrogative Model of Inquiry in Paris, January 30–31, 2012; the workshop on Questions in Discourse in Frankfurt, March 7–9, 2012; and the conference on Logic, Questions and Inquiry in Paris, May 30–June 1, 2013.

<sup>3</sup> To avoid conflicts of interest, *Synthese* Editor-in-Chief Wiebe van der Hoek acted as editor of the contributions that were authored or co-authored by one of the guest editors.

establishing several technical results connecting properties of these two notions as formalized within the two frameworks.

2. **The interrogative model of inquiry meets dynamic epistemic logics** by Yacin Hamami brings together insights from the INTERROGATIVE MODEL OF INQUIRY and DYNAMIC EPISTEMIC LOGIC in the development of a formal system representing the intertwined informational dynamics of questions and inferences in a multi-agent setting. The resulting framework is used to define *multi-agent inquiry games*, offering a multi-agent formulation of the INTERROGATIVE MODEL OF INQUIRY and a definition of inquiry games in the DYNAMIC EPISTEMIC LOGIC paradigm.
3. **Inquisitive dynamic epistemic logic** by Ivano Ciardelli and Floris Roelofsen integrates DYNAMIC EPISTEMIC LOGIC with INQUISITIVE SEMANTICS, resulting in a framework in which it is not only possible to model and reason about the information that a number of agents have but also about the issues that they entertain, and how such issues are raised and addressed in the process of exchanging information.
4. **On the semantics and logic of declaratives and interrogatives** by Ivano Ciardelli, Jeroen Groenendijk, and Floris Roelofsen develops an INQUISITIVE SEMANTICS for a logical language consisting of declarative and interrogative sentences, shows how this framework yields a cross-categorial entailment relation that unifies several important notions of a logic of information and issues, and establishes a complete axiomatization of the associated logic. The architecture of the system that is developed makes it possible to transfer several key notions from INQUISITIVE SEMANTICS to INFERENTIAL EPISTEMIC LOGIC and the INTERROGATIVE MODEL OF INQUIRY.
5. **A uniform semantics for embedded interrogatives: *an answer, not necessarily the answer*** by Benjamin Spector and Paul Egré investigates the semantics of attitude verbs that embed both questions and declaratives, exploring whether the meaning of the question-embedding variant of the verb can be connected in a systematic way to the meaning of the declarative-embedding variant. In doing so, special attention is given to presuppositional aspects of meaning.

We hope that the special issue provides a useful entry point into the contemporary literature on logical analyses of questions, witnessing how lively the field is today. Moreover, we hope that it builds some valuable bridges between logical theories of questions that originated in linguistics and those that originated in philosophy, and that it will spark new interactions between the various research communities.

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