

Introduction



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Abstract This chapter is an introduction to the volume. It briefly traces the history of the LENLS workshop and discusses some themes of the volume, as well as providing brief summaries of the papers.

Keywords Introduction · Summary

This volume is a collection of selected papers mostly presented during the first 5 years of the conference Logic and Engineering of Natural Language Semantics (LENLS), held annually in Japan since 2003; some of the papers are (revised versions of) papers presented at a session of the conference, while the others were specifically written for this volume in lieu of papers presented at the conference.

Before introducing the papers themselves, we will give a bit of background on the workshop itself. Logic and Engineering of Natural Language Semantics (LENLS) was originally envisaged by the late Norihiro “Norry” Ogata around the turn of the century, when he joined the faculty of Osaka University. Before LENLS had there been no regularly scheduled international workshops or conferences dedicated to natural-language formal semantics/pragmatics in Japan. Ogata and McCready later discussed the possibility of realizing such a workshop, and in the end Ogata organized the first instantiation in 2004. This instance of the workshop was held

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in Kanazawa, Japan, together with the annual meeting of the Japanese Society for Artificial Intelligence; this connection has remained through the first ten years of the workshop.

LENLS initially was one of the international workshops collocated with the Annual Conference of the Japanese Society for Artificial Intelligence (JSAI). Since 2009, it has been held as a workshop of the JSAI International Symposia on AI. When it started eight years ago in Kanazawa, it had only twelve participants. Since then, the workshop has developed into a reasonably well-known international academic meeting on formal semantics and pragmatics. At this point it seems fair to say that it is the highest profile such meeting held regularly in Asia; we hope that its success will encourage others to begin such workshops themselves to further the development of the semantics/pragmatics(/philosophy) community in Asia. Norry Ogata obviously played a crucial role in the success of LENLS until his untimely death in 2008. His positive and broad-minded attitudes towards scholarship and people have been inherited by the workshop (we hope). We wish Norry were with us now; this volume is dedicated to his memory.

Let us now turn to a brief discussion of the themes of the volume and the papers. The volume includes several papers relating to proof theory, substructural logics, and monads. The first of these is by Daisuke Bekki and Moe Masuko and is entitled ‘Meta-Lambda Calculus: Syntax and Semantics’. As the name suggests, the meta-lambda calculus is a lambda calculus with terms and types for meta-level operations. The types represent judgements on base-level types; operations on these types correspond to functions relating judgements. The meta-lambda calculus has been presented by Bekki in a series of papers (see the chapter for references), but each of these presentations have their problems (as Bekki and Masuko note in their Sect. 1.2); the paper in the present volume provides a solution to these problems in the form of a new syntax and a categorial semantics for the meta-lambda calculus, together with an equational theory. Bekki and Masuko prove the soundness of the operations of the theory using these new formulations. Most of the paper is occupied with these tasks, making its contribution largely foundational. However, a lengthy appendix considers how monads have been used in linguistic analysis and shows that the meta-lambda calculus is well-suited to representing monads of the kind needed for dealing with natural language. It then proceeds to indicate how monads, in particular monads represented in the meta-lambda calculus, can be used to analyze three linguistic phenomena: non-determinism of the kind encountered in ambiguity and underspecification, contextual parameters including those standardly used in the analysis of demonstratives and indexicals (Kaplan 1989), and, finally, continuations, as utilized in the analysis of focus movement and inverse scope.

A second foundational paper is Norry Ogata’s ‘Towards Computational Non-Associative Lambek Lambda-Calculi for Formal Pragmatics’. This paper takes as a starting point resource logical views of Lambek calculi and the categorial semantics associated with them. Ogata notes that such calculi, in particular the non-associative Lambek (NLC) lambda calculus which is useful for modeling tree structures. However, this calculus disallows certain kinds of variable bindings which seem to be necessary for analyzing natural language semantics (and pragmatics). Ogata

therefore generalizes this calculus to a class of calculi lying between linear and NLC calculi, in which associativity can be controlled, and in which bindable positions can be made available. He then enriches these calculi further with various monads, based on the work of Moggi (1991) and others (with substantial detail about the required background on categories and monads in an appendix); finally, the resulting systems are shown to allow treatments of focus, topicalization, word order, and discourse anaphora. This paper is the last paper Ogata wrote before his untimely death, and we are very pleased to have the opportunity to publish it in this volume.

The third paper on these issues is ‘Continuation Hierarchy and Quantifier Scope’ by Chung-Chieh Shan and Oleg Kiselyov. Shan and Kiselyov aim to give an account of scope ambiguities on the basis of a well-understood and relatively simple formalism, without resorting to standard measures such as nondeterminism (QR). The resulting account is directly compositional and has the advantage of keeping lexical entries for non-scope-taking terms simple. Shan and Kiselyov begin by introducing continuation-based approaches to natural language quantification, developing a series of fragments with more and more complex elements. By the end of this explication, they have set up a continuation-passing style (CPS) semantics for quantification, meaning that each expression receives as argument a function representing its context; this semantics is implemented in the direct style, so that terms which do not manipulate continuations need not reference them in their semantics. This is admirably simple. This setup enables Shan and Kiselyov to give a semantics capable of deriving inverse scope readings of quantifiers via the continuation hierarchy, which is well-studied in computer science. This hierarchy is constructed by iterating the change from standard lexical entries to CPS expressions. The transformation to CPS can be performed multiple times; doing so leaves continuation-insensitive terms equivalent to lower versions, but continuation-sensitive terms such as quantifiers exhibit a changed behavior. Shan and Kiselyov exploit this effect by making quantifiers polysemous, with denotations corresponding to distinct scoping behaviors. Once the choice of level is made, the semantic computation is entirely deterministic, a feature not present in earlier approaches. They then use versions of this semantics to analyze scope islands, wide-scope indefinites, and inverse linking.

The collection also includes several papers which take a game-theoretic approach to issues in linguistic analysis. These two papers take radically different angles on how game theory can be applied to linguistic issues.

The first is concerned with how game theory, and evolutionary game theory in particular, can be used to deepen our understanding of linguistic universals. This contribution is Gerhard Jaeger’s ‘What is a Universal? On the Explanatory Potential of Evolutionary Game Theory in Linguistics’. Jaeger begins by discussing possible explanations for linguistic universals, separating them into nativist and functionalist views. The former assume that the basis of universals is something internal to the human organism; the latter take their basis to lie in adaptive considerations on communication and thus fitness. Jaeger then claims that evolutionary game theory allows a unification of the two kinds of approaches, in that it is able to analyze behavior at the individual and social levels simultaneously. He proceeds to show how evolutionary game theory can (and has) been used to model language evolution. The basic

idea is to consider the case of signaling games in an evolutionary setting. Here, it can be shown that (as usual) signaling games have multiple equilibria, but that most of the undesirable equilibria are not evolutionarily stable, meaning that from most initial settings the system will not alight in such a state. Still, equilibria which are (neutrally) stable but not evolutionarily stable are always available in the sense that they cannot be ruled out by initial settings. He concludes that it is exceedingly hard to derive true universals, though statistical universals are available given the right set of dynamics.

The other paper on game theory is Nicholas Asher's 'The Noncooperative Basis of Implicatures'. This paper takes a very different tack from that of Jaeger: the game theory used here is of a kind which takes players to be rational agents as opposed to (as it were) instruments of evolutionary processes. This is the usual perspective taken by scholars who implement Gricean reasoning in terms of game theory, but Asher points out a problem with the standard view: it explicitly relies on assumptions about cooperation which are not always realized. Implicature generation on the Gricean picture requires that reasoners assume that their interlocutors are being cooperative in their speech. What happens in contexts where it is clear that cooperation is not happening, such as in the courtroom, or when being asked for money, or trying to avoid a fight with a white lie? Here the Gricean picture does not clearly apply. Asher proposes a replacement. He begins with the observation that in question-answering contexts it is best to simply answer the question if doing so is not harmful to the answerer's interests; if it is harmful, one can at least try to be polite, which has the minimum benefit of not producing an interaction with negative consequences for 'face'. With this in place, conversational participants can engage in default reasoning about likely moves given an observed piece of semantic content. In particular, given full information about the game, one can conclude that one's interlocutor is maximizing payoffs by not answering, which will in turn lead to certain inferences: implicatures. This system then does not require cooperativity as a basic assumption, but instead can derive implicature generation from reasoning about the behavior of rational agents.

In 'Coordinating and Subordinating Binding Dependencies', Alastair Butler attempts to account for parallel pronominal binding dependencies observed for coordination and subordination. He suggests that the similarity derives from the same mechanism underlying the two types of dependency. By developing a formal system called Scope Control Theory, he successfully simulates the opening of a variable binding by quantification, its linking to the subject or object argument of a predicate, and the handover to the pronominal sequence.

The volume also contains a number of papers which analyze Japanese linguistic expressions or constructions or to propose an analysis for a linguistic phenomenon drawing crucially on Japanese data, which is to be expected given the origin and the location of LENLS.

In 'A Categorical Grammar Account of Information Packaging in Japanese', Hiroaki Nakamura applies a Categorical Grammar approach to truth-conditional effects brought about by the choice between the topic marker *wa* and the nominative case particle *ga* in Japanese. Based on Combinatory Categorical Grammar

(e.g. Steedman 2000), a lexical semantics is specified for *wa* to produce a tripartite information structure, i.e., the topic operator, the restrictor, and the nuclear scope. A sentence-internal topic is also dealt with by extending the framework. He also suggests that the contrastive interpretation of sentence-internal topics is induced by its heavier complexity profile load obtained from the semantic trip of proof nets.

In ‘Floating Quantifiers in Japanese as Adverbial Anaphora’, Kei Yoshimoto and Masahiro Kobayashi propose a new perspective on floating quantifiers (FQ) in Japanese by treating them as adverbial phrases which stand in an anaphoric relation to their hosts as quantified NPs. By hypothesizing real-time, incremental processing of the sentence and its information structure, the authors give an account of the grammaticality of subject-object asymmetry in the FQ position that differs considerably depending on the context. They also give an explanation on a construction in which an FQ and its host stand in a whole-part relationship in a consistent manner with the majority of FQs.

David Oshima’s ‘On the Functions of the Japanese Particle *Yo* in Declaratives’ is concerned with the function of the Japanese sentence-final particle *yo*. He reviews three influential analyses and demonstrates via the introduction of some new data that they do not derive the full picture of the meaning and use of the particle, though each is shown to partially do so. He presents a novel analysis of two central uses of *yo*, i.e. the guide to action (Davis 2009) and correction (McCready 2008, 2009) uses and shows that they do not fully account for his new data.

In ‘What is Evidence in Natural Language?’, Elin McCready addresses a foundational issue in the semantic analysis of evidentials, the question of what evidence is, or, speaking more strictly, what evidence is at work in the use and understanding of natural-language evidentials. In order to characterize such evidence, McCready examined what is to be considered justification for the propositional content in an evidential under skeptical scenarios and Gettier cases based on data involving Japanese evidentials. On the basis of this data, he (tentatively) concluded that the relevant notion of evidence is essentially a *de se* ascription of an increase in the probability of the target on the basis of the putative evidence. While it will be seen in the future whether his characterization is ultimately correct, the paper at least may spark interest in this subject.

In ‘Japanese Reported Speech’, Emar Maier argued that the traditional approach to quoted speech, i.e. the rigid dichotomy of direct and indirect quotations is not satisfactory in the face of data from, e.g. Japanese, where there are instances of quoted speech some parts of which are directly quoted and the other parts of which are indirectly quoted—“mixed” examples. He proposed a unified approach that takes every instance of quoted speech to be an indirect quotation; direct quotation will be just a special case where all the parts are mixed quoted.

Some of the papers in this collection do not fall neatly into any of the above categories. This set of papers is quite various in character, focusing on logical issues or on other problems in the semantics-pragmatics interface.

In his paper ‘Measurement-Theoretic Foundations of Dynamic Epistemic Preference Logic’, Satoru Suzuki proposes a new version of Dynamic Epistemic Logic (DEPL). DEPL can deal with dynamic interactions between knowledge and

preferences in decision making under certainty, risk, uncertainty, and ignorance. It can be put to wider use than other existing theories like Dynamic Epistemic Upgrade Logic by van Benthem and Fenrong Liu (2007), since, according to Suzuki, this system gives an account of knowledge/preference interactions only under certainty. The author proves the completeness and soundness of the logic and enhances it with measurement-theoretic semantics.

'A Question of Priority' by Robert van Rooij and Katrin Schulz is another reminder that the primitives in semantic theories are not determined a priori but (like any theory) can be somewhat arbitrary. In particular, they take up the cases of properties as sets of individuals versus features, worlds versus propositions, individuals versus properties, time-points versus events, preference versus choice, and natural-kinds versus similarity. They not only demonstrate that each pair is such that either member can be taken as primitive and the other can be constructed from it, but also show the constructions have something in common. They conclude the paper by indicating that a notion of "naturalness" can be used to determine which direction of construction is more intuitive or reasonable.

Rick Nouwen's paper 'A Note on the Projection of Appositives' works to explain the contrast between the wide-scope and narrow-scope interpretations of nominal appositives. He argues that appositives are open propositions whose subject is a pronoun anaphoric to the anchor. Adopting Schlenker's (2010a, b) flexible attachment of appositives, it is assumed that appositions can be attached to any node of propositional type dominating the anchor. While some linguistic data still remain unaccounted for, Nouwen emphasizes the need for a more fine-grained classification of appositives with indefinite anchors to investigate the heterogeneous relations of appositives to their anchors.

Finally, the paper 'A Modal Scalar-Presuppositional Analysis of *Only*' by Katsuhiko Yabushita is another addition to the already numerous analyses of the meaning of *only* in the literature. This paper is specifically concerned with a particular feature of *only*-sentences, namely the asymmetry between positive and negative *only*-sentences in the cancellability of the prejacent. The feature was originally noted and given an analysis by Ippolito's (2008), who crucially attributed a scalar presupposition to the meaning of *only*. Yabushita argues that the scalar presupposition involved is in fact not a presupposition *simpliciter*, but rather is one restricted to the speaker, i.e. a modal presupposition. Yabushita reaches this conclusion via an argument which works to show that Ippolito's proposed presupposition is not completely adequate and does not lead to a plausible analysis of the asymmetry in question. He concludes that the proper analysis involves a revision of Schulz and van Rooij's (2006) view of *only* which incorporates a modal scalar presupposition.

We hope that this collection is not just informative and useful for its readers. It should also give a picture of the state of formal semantics and pragmatics in Asia, or at least in Japan; we hope that the volume, not to mention the conference from which it springs, will play a role in the continued development of these fields in the region.

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