

HPSG in Constructive Type Theory

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In the talk I propose, following the lead of some recent work by Robin Cooper (Cooper (2005a,b)), that constructive type theory (CTT, Ranta (1994), see also Constable (2002) for an elementary introduction) is an attractive framework to underpin HPSG.

HPSG is a framework in which detailed and explicit analysis of a wide range of linguistic phenomena in several languages have been carried out. One of the virtues of the framework is that it allows for a transparent computational implementation of many of its theoretical analyses. Moreover, certain features of HPSG's architecture make it an attractive choice for underpinning one of the early 21st century's growth areas for theoretical and applied linguistic research, namely language use in dialogue.

And yet, HPSG is at present saddled with a number of problematic theoretical entities and mechanisms which hinder this development. Chief among these, I will suggest, are the use of *typed feature structures* (TFSs) as the basic representational entity of the linguistic ontology and *unification* as the combinatorial glue of TFSs. Briefly, the problem with using unification is that it often involves postulating semantic identity between a daughter—the head daughter typically—and its mother, an assumption I demonstrate is untenable. TFSs are problematic, at least for semantic analysis, on a number of grounds: they simulate rather than directly constitute semantic entities; given this, building and manipulating functions in the semantic domain—the bread and butter of much semantic analysis—is difficult to accomplish. Moreover, for certain analytic purposes I discuss one needs to have available entities both at the level of types and the actual domain (including utterance) tokens. Existing formalizations of HPSG, with one exception I am aware of, are formulated either in terms of tokens OR, more recently, types, and so do not make both readily available.

In this talk, which surveys work from Ginzburg (2005a,b), I sketch an alternative foundation for HPSG, which avoids problems such as the ones hinted above, and which can serve as a source for fruitful synthesis of a number of research programs. There has been a fair amount of interest in using constructive type theory as a foundation for NL semantics (see e.g. Fernando (2001); Krahmer and Piwek (1999)). It offers theoretically elegant accounts of anaphora and quantificational

phenomena on which much semantic work has been invested in frameworks such as Discourse Representation Theory and Dynamic Semantics. In the paper referenced above, Robin Cooper has shown that CTT can serve as a unifying framework for Montague Semantics, Discourse Representation Theory, Situation Semantics, and HPSG.

After introducing the basics of CTT, I discuss three main application areas: ontology, grammatical description, and dialogue processing.

- **Ontology:** I show that CTT allows us to recast the semantic ontology developed in Ginzburg and Sag (2000). In the latter work, non-well-founded set theory (using tools developed by Seligman and Moss (1997)) was employed as logical framework. CTT, arguably, provides a simpler, more ‘independently motivated’ formulation.
- **Grammatical Description:** I discuss data from ellipsis in dialogue that favours using λ -abstraction and application as tools for semantic composition over (head-driven) unification.
- **Dialogue Processing:** I argue that HPSG_{CTT} is well equipped to serve as a theory of utterance processing in dialogue. In particular, it allows for a straightforward formulation of partial understanding and clarification requests.

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