

# Briefly Noted

## Foundations of Intensional Semantics

Chris Fox and Shalom Lappin

(University of Essex and Kings College, London)

Oxford: Blackwell Publishing, 2005, xv+192 pp; hardbound, ISBN 0-631-23375-6, \$74.95, £50.00; paperbound, ISBN 0-631-23376-8, \$39.95, £19.99

Intensional logic (IL) and its application to natural language, which the present monograph addresses, was first developed by Richard Montague in the late 1960s (e.g., Montague 1970a, 1970b). Through the efforts of (especially) Barbara Partee (e.g., Partee 1975, 1976), and Richmond Thomason, who edited the posthumous collection of Montague's works (Thomason 1974), this became the main framework for those who aspired to a formal semantic theory for natural language, and these included computational linguists as early as Jerry Hobbs in the late 1970s (e.g., Hobbs and Rosenschein 1977). In fact, until the advent of the current interest in statistical linguistics with its own conception of what semantics is, IL, or some variant of it, was perhaps the main theory of semantics within computational linguistics generally. And within current computational semantics it still is.

But over the years, philosophers, linguists, and computational linguists have noted a variety of shortcomings in Montague's version of IL. Montague defined intensions as functions from possible worlds to extensions in that world. But this had the effect of making logically equivalent expressions have the same intension, thus leading to the problem of "logical omniscience" (believing/knowing all the logical consequences of what is believed/knowing). Montague had based his IL on Church's simple theory of types (Church 1940), supplemented with intensions of each type. But this implies that each natural language item accepts only arguments of some one fixed type. However, this is not true for natural language, where conjunctions, verbs, and pretty much any functional term that accepts arguments at all can accept arguments of different types. (For example, *and* can accept arguments that are of the sentence type, of the verb phrase type, of the adjective type, etc.; and indeed, it can accept arguments of differing types in its different argument

places.) Much study has gone into techniques for changing types of arguments so as to accommodate this phenomenon. One result of this has been to make the semantic structure of all complex items be binary—a consequence that seems otherwise to be without justification. And finally, Montague's version of IL is higher order, allowing quantification over entities and functions of any level. This results in the system not having a recursively enumerable set of theorems, and there has always been a desire to have a more restricted system for representing natural language.

The present monograph addresses all these problematic issues. It develops a fine-grained account of intensions from which an account of a first-order property theory is extracted. A "polymorphic" type structure is developed and the resulting system is claimed "to permit us to achieve expressive power comparable to a higher-order system like IL while remaining within the formal limits of a first-order system."

Although there are many quite difficult concepts introduced in this monograph, in the main it is very clearly written. If the claims made by the authors for their new intensional language are borne out by further research, then this is a very important addition to the literature on the foundations of semantics for natural language.—*Francis Jeffrey Pelletier, Simon Fraser University*

## References

- Church, Alonzo. 1940. A formulation of the simple theory of types. *Journal of Symbolic Logic*, 5:56–68.
- Hobbs, Jerry and Stanley Rosenschein. 1977. Making computational sense of Montague's intensional logic. *Artificial Intelligence*, 9:287–306.
- Montague, Richard. 1970a. English as a formal language. In Bruno Visentini et al., editor, *Linguaggi nella Società e nella Tecnica*. Edizioni di Comunità, Milan, pages 189–224.
- Montague, Richard. 1970b. Universal grammar. *Theoria*, 36:373–398.
- Partee, Barbara. 1975. Montague grammar and transformational grammar. *Linguistic Inquiry*, 6:203–300.
- Partee, Barbara. 1976. *Montague Grammar*. Academic Press, NY.
- Thomason, Richmond, editor. 1974. *Formal Philosophy: Selected papers of Richard Montague*. Yale University Press, New Haven.

