Chapter 1
Computational Semantics Requires Computation

Yorick Wilks
Florida Institute of Human and Machine Cognition, USA

ABSTRACT
This chapter argues, briefly, that much work in formal Computational Semantics (alias CompSem) is not computational at all, and does not attempt to be; there is some mis-description going on here on a large and long-term scale. The aim of this chapter is to show that such work is not just misdescribed, but loses value because of the scientific importance of implementation and validation in this, as in all parts of Artificial Intelligence. It is the raison d’etre of this subject. Moreover, the examples used to support formal CompSem’s value for the representation of the meaning of language strings often have no place in normal English usage, nor in corpora. This fact, if true, should be better understood as should how this paradoxical situation has arisen and is tolerated. Recent large-scale developments in Natural Language Processing (NLP), such as machine translation or question answering, which are quite successful and undeniably both semantic and computational, have made no use of formal CompSem techniques. Most importantly, the Semantic Web (and Information Extraction techniques generally) now offer the possibility of the large scale use of language data so as to achieve concrete results achieved by methods usually deemed impossible by formal semanticists, such as annotation methods, which are fundamentally forms of Lewis’ (1970) “markerese,” the term he coined to dismiss methods that involve symbolic “mark up” of texts, rather than using formal logic to represent meaning.
INTRODUCTION

As one of the earliest users of the phrase *Computational Semantics*, I feel a certain historical disappointment about the way the term has come to be used for much work having no relation to computation at all. The book long ago with that title (Charniak and Wilks 1976) included such bizarre items as my tutorial on the work of Wittgenstein and Montague and their possible relevance to CompSem. Linguists had then only recently discovered Montague and his influence was rising in computational linguistics, whereas Wittgenstein, who had never had much, was losing even the tight grip his disciples had held on linguistic philosophy or at least that philosophy as practiced in Britain. I remain as convinced now as then of both the relevance of Wittgenstein (Wilks 2008a) to computational language processing and the lack of relevance of Montague to it. Wittgenstein (1953) had claimed that understanding a language is inseparable from humans’ goals and beliefs about the world, and also that we cannot understand meaning in general by escaping into some world of ideal formal logical objects nor even, in the general case, in terms of the objects in the real world. Meaning is, in the end, explained in terms of language itself, and it is the exceptional case, not the norm, that we can point to something so as to explain a word’s meaning.

I am certain time has proved that view right, even in the over-simplified few sentences above, and that aspects of that position are close to the traditional concerns of Artificial Intelligence. My aim in this paper is to justify that position, not only as regards Montague (1974) himself but also the work of those still in the CompSem tradition he founded. I will try to specify loosely what the main features of that tradition now are. The paper is not intended to be negative in tone, and suggests that CompSem may at last coming of age, on the improbable coat-tails of the Semantic Web (Antoniou and van Harmelen 2008) movement, which is itself related to several forms of earlier CompSem in ways that are not yet fully appreciated.

When I refer to, and criticize, formal CompSem in this paper, I mean representation methodologies for language meaning descending from Montague, even if not explicitly, including attempts to use model theoretic semantics, and all strong methods that extend methods beyond the mere use of predicate calculus as a descriptive language. My target is therefore the use in Computational Linguistics (and CompSem) in particular of attempts to provide a formal semantics of the meaning of natural language utterances. I will avoid criticism of the work of contemporary authors: It is this whole tradition I wish to contrast with the core task embodied in the name CompSem, namely the computational processing of meaning, which I take to be a real, desirable and important task, and one that should and can be directed towards practical tasks, such as machine translation (MT).

Computation is Essential for CompSem

The thesis of this paper is that CompSem must involve computation, or it is mis-described; yet a considerable amount of what calls itself CompSem makes no pretence at computation at all, nor establishes any links with it, just as Montague did not. If we look at the successes over the last ten years of machine translation, freely available on the web, as well as, to a more limited degree, Information Extraction (IE), Question Answering (QA) and dialogue processing, one surely cannot deny that, in reaching the levels they have, they must have been processing some form of meaning, which is to say doing CompSem. MT is, almost by definition, the origin of all NLP and Computational Linguistics and is also by definition the transfer of meaning by computation from one set of language strings to another. So it is surely not possible to deny that the reasonably effective MT we now have available is doing CompSem in some form.
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