Towards a Type-Theoretical Account of Lexical Semantics

Christian Bassac · Bruno Mery · Christian Retoré

Abstract    After a quick overview of the field of study known as “Lexical Semantics”, where we advocate the need of accessing additional information besides syntax and Montague-style semantics at the lexical level in order to complete the full analysis of an utterance, we summarize the current formulations of a well-known theory of that field. We then propose and justify our own model of the Generative Lexicon Theory, based upon a variation of classical compositional semantics, and outline its formalization. Additionally, we discuss the theoretical place of informational, knowledge-related data supposed to exist within the lexicon as well as within discourse and other linguistic constructs. The formalization of the structure of natural language utterances around a surface form (phenogrammatics), a deep structure (tectogrammatics) and the meaning thereof as a logical form (semantics) has developed from the original theories of Curry and Montague to form coherent, type-driven models. Most of these new theories rely upon variations of the compositional analysis of the sentence: from pheno to tectogrammatics, and then to semantics. Our contribution to this work aims at giving such a model a means to overcome the problems posed by polysemous lexical units during the semantical analysis of the tectogrammatical form. Building upon an assumed “deep structure”, we formalize parts of Pustejovsky’s Generative Lexicon Theory, linguistically motivated in Pustejovsky (The generative lexicon, MIT Press, Cambridge, MA, 1995), in a pre-processing of the semantics of the sentence. The mechanisms of Lexical Semantics we propose are an additional layer of classical Montague compositional semantics, and, as such, integrate smoothly within such an
analysis; we proceed by converting the lexical data to modifiers of the logical form. This treatment of Lexical Semantics furthermore induces us to think that some sort of non-evident background knowledge of the common use of words is necessary to perform a correct semantic analysis of an utterance. This “commonsense metaphysics” would therefore not be strictly confined to pragmatics, as is often assumed.

Keywords  Montague semantics · Lexical semantics · Type theory

1 The Need for Lexical Semantics

After a brief review of common assumptions occurring in many modern theories of semantics and grammar, we will take polysemy and the creative use of words as a basis to advocate the need for lexical semantics, and place it within the analysis.

1.1 The Twofold Montagovian Analysis

We assume the existence of a neo-Curryan framework composed of tectogrammatics as the deep structure that yields, on the one hand, the actual written or uttered language, i.e., phenogrammatics, and on the other hand, its intended logical meaning, i.e., semantics. The process of the classical Montagovian analysis of a sentence would be to use the rules of the phenogrammar to infer the tectogrammatical structure from the sentence, by phonological and syntactic means, and then to compute the semantics of the tectogrammatical structure by a type-driven composition of lexemes. Refinements, such as intensionality or modality, might take place, but most systems use a lexicon to associate a semantic type to each word, and let the mechanism operate.

1.2 Polysemy and Meaning

The association of single types (and therefore logical behaviour) to lexemes is hampered by the fact that polysemous words in natural language are the rule, not the exception. Contrastive ambiguity (the fact that the same sequence of phonemes have come to represent different and unrelated senses during the evolution of the language) led to the construction of lexicons with several possible types for every lexeme, and ad hoc mechanisms to select the correct typing in context. But those heuristics are problematic, and, as Pustejovsky (1995) points out, sense-enumeration lexicons do not solve the problems of logical polysemy, in which lexemes might assume many different, yet related senses in context. The need for the speaker to use preliminary, background knowledge of at least some information about every word used appears there clearly: that data enables one to distinguish between the correct and incorrect uses of the word, and to create and recognize new ones. This is not a new idea: it has been expressed in Searle (1979), for instance, and many ontology-based approaches of Natural Language Processing assume such a stance.