Semicompositionality

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Abstract

Between the strictly compositional rules relating form and meaning in syntax and the completely arbitrary association of form to meaning in the root lexicon there lies a vast domain of semicompositional phenomena seen both in derivational morphology (Jackendoff and Audring, 2020) and in construction grammar (Goldberg, 2006). The goal of this course is to enable non-specialists, both traditional linguists who want to understand LLMs, and computational linguists, logicians, and others interested in cognitive linguistics to get a handle on semicompositional phenomena.

Lecture 1 The representation of meaning. The AI tradition (Quillian, 1969; Minsky, 1975; Sondheimer, Weischedel, and Bobrow, 1984; Pereira, 2012) used (hyper)graphs. The logic tradition begins with (Ajdukiewicz, 1935; Lambek, 1958; Lambek, 2004) and goes towards Frobenius Algebras (Coecke, Sadrzadeh, and Clark, 2010; Kartsaklis, 2014). The computational tradition (Shieber, 2006; Kornai, 2010; Abend and Rappoport, 2013; Banarescu et al., 2013) explores the connection between term rewriting and machine states (Koller and Kuhlmann, 2012). We outline the conceptual core common to all these in algebraic terms.

Lecture 2 Static word vectors (Schütze, 1993; Collobert et al., 2011), dynamic vectors, how to compute them from corpus data, and how to find word meaning in LLMs (Bricken et al., 2023).

Lecture 3 The meaning of bound morphemes. Root meaning, affix meaning, pattern meaning. Minimum requirements for a semantic calculus (Kornai, 2024). Overview of 'normal' semicompositionality in derivational affixation and phrasal verbs. Deep and surface cases, subcategorization.

Lecture 4 Overview of 'extreme' semicompositionality: metaphor, metonymy, coercion, conceptual blending, idioms (Kay and Sag, 2014; Audring and Booij, 2016). What to look for in LLMs: spreading activation in abstract nets.

Lecture 5 How to look for dynamic structure: state space recovery in LLMs (Dao and Gu, 2024). Are Hopfield networks all you need? (Ramsauer et al., 2021)

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