

The Department of Linguistics Presents:

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Friday, May 8th, 2015

3:30PM - 5:00PM

Lattimore Hall

Bayesian pragmatics: lexical uncertainty, compositionality, and the typology of conversational implicature

A central scientific challenge for our understanding of human cognition is how language simultaneously achieves its unbounded yet highly context-dependent expressive capacity. In constructing theories of this capacity it is productive to distinguish between strictly semantic content, or the "literal" meanings of atomic expressions (e.g., words) and the rules of meaning composition, and pragmatic enrichment, by which speakers and listeners can rely on general principles of cooperative communication to take understood communicative intent far beyond literal content. However, there has historically been only limited success in formalizing pragmatic inference and its relationship with semantic composition. Here I describe recent work within a Bayesian framework of interleaved semantic composition and pragmatic inference, building on the Rational Speech-Act model of Frank and Goodman and the game-theoretic work of Degen, Franke, and Jäger. These models formalize the goal of linguistic communicative acts as bringing the beliefs of the listener into as close an alignment as possible with those of the speaker while maintaining brevity. First I show how two major principles of Levinson's typology of conversational implicature fall out of the most basic Bayesian models: Q(antity) implicature, in which utterance meaning is refined through exclusion of the meanings of alternative utterances; and I(nformativeness) implicature, in which utterance meaning is refined by strengthening to the prototypical case. Q and I are often in tension; I show that the Bayesian approach constitutes the first theory making quantitative predictions regarding their relative strength in interpretation of a given utterance, and present evidence from a large-scale experiment on interpretation of utterances such as "I slept in a car" (was it my car, or someone else's car?) supporting the theory's predictions. I then turn to questions of compositionality, focusing on two of the most fundamental building blocks of semantic composition, the words "and" and "or". Canonically, these words are used to coordinate expressions whose semantic content is least partially disjoint ("friends and enemies", "sports and recreation"), but closer examination reveals that they can coordinate expressions whose semantic content is in a one-way inclusion relation ("roses and flowers", "boat or canoe") or even in a two-way inclusion relation, or total semantic equivalence ("oenophile or wine-lover"). But why are these latter coordinate expressions used, and how are they understood? Each class of these latter expressions falls out as a special case of our general framework, in which their prima facie inefficiency for communicating their literal content triggers a pragmatic inference that enriches the expression's meaning in the same ways that we see in human interpretation. More broadly, these results illustrate the explanatory reach and power of recursive, compositional probabilistic models for the study of linguistic meaning and pragmatic communication.