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Connecting Language, Perception and Interaction using Type Theory with Records

In Larsson (2011) and Larsson (2015), a formal semantics for low-level perceptual aspects of meaning is presented, tying these together with the logical-inferential aspects of meaning traditionally studied in formal semantics. The key idea is to model *perceptual meanings as classifiers of perceptual input*. Furthermore, it is shown how perceptual aspects of meaning can be updated as a result of observing language use in interaction, thereby enabling fine-grained semantic plasticity and semantic coordination. This requires a framework where intensions are (1) represented independently of extensions, and (2) structured objects which can be modified as a result of learning. Both of these criteria are fulfilled by Type Theory with Records (TTR) Cooper (2012), a formal semantics framework which starts from the idea that information and meaning is founded on our ability to perceive and classify the world, i.e., to perceive objects and situations as being of types.

An essential notion here is that of the *(statistical) classifier*, a computational device determining what class an item belongs to, based on various properties of the item. Crucially, these properties need not be encoded in some high-level representation language (such as logic or natural language). Instead, it may consist entirely of numeric data encoding more or less "low-level" information about the item in question, for example perceptual data. By using TTR, we are able to account for both intensions as classifiers in a framework which also encompasses accounts of many problems traditionally studied in formal semantics (such as inference, quantification, modality, etc.). As many other type theories, TTR is based on the notion of *judgements* of entities being of certain types – for example, a judgement that a certain situation is of a certain type. TTR starts from the idea that information and meaning is founded on our ability to perceive and classify the world, i.e., to perceive objects and situations as being of types.

The notion of a judgement is also connected to the notion of an agent making the judgement. Throughout, we will be modelling not meanings and situations *per se*, but only agents' *takes* on meanings and situations. This may appear to be a solipsistic view which fails to account for the fact that we as humans (or at least as members of linguistic communities) share a world and a language. However, we take an essential part of the account of linguistic meaning to be a description of how agents *coordinate* their takes on the world and on the meanings of their linguistic expressions. The essential vehicle for this coordination is dialogue, or more generally linguistic interaction. By interacting with each other, agents reciprocally learn from each other and thereby come to have more or less coordinated (shared) takes on the world and on language. Interactive coordination and reciprocal learning require semantic plasticity, i.e. the ability to modify meanings. A requirement on our semantics is therefore that it enables the kinds of modifications needed to account for semantic coordination of perceptual meanings.

The question of whether possible worlds semantics can be revised to account for the learning and coordination of perceptual meaning is an interesting research problem. However, we believe there are also good reasons to explore alternative semantic frameworks such as TTR which are designed from the outset to enable explicit representation of intensions and modelling of perception, learning and coordination.

References

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