Modelling Shifty Hierarchies In Formal Theory (SHIFT): Anchoring syntactic hierarchies in theory of mind

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1 Overview/Abstract

In a world where we talk about facts vs. "alternative facts" and news vs. "fake news" as a matter of pedestrian discussion, it becomes highly relevant to consider that human language deploys special linguistic strategies to express subjective, as opposed to objective, truth. If you and I express disagreement about exactly how many apples are in a bowl between us, our differing utterances cannot both constitute an accurate description of the world. But we *can* disagree about whether the apples are beautiful and both be right. Intuitively, 'beautiful' means 'beautiful according to someone; beauty really is in the eye of the beholder. Predicates like *four* lack this property: the number of apples on the table is part of ground-truth, not a matter of opinion. While the question of how to linguistically model such contrasts has been hotly debated, the mere fact that some linguistic expressions are *perspective-sensitive items (PSIs)* while others are not, remains indisputable.

The linguistic expression of perspective-sensitivity is closely related to that of context-sensitivity. An utterance doesn't exist in a vacuum, after all. It is uttered against a context – a speech event which minimally includes a speaker, one or more addressees, a place and a time of utterance, these constituting the *parameters* of the context. Where PSIs are perspective-sensitive, so-called *indexical* pronouns like 'I', 'you', 'here' and 'now', are context-sensitive, and derive their meanings directly from contextual parameters (e.g. 'I' denotes the utterance-speaker, 'you' its addressee(s), and so on).

A PSI (e.g. 'beautiful') seems initially to have little in common with an indexical (e.g. 'I'). But a closer look at *perspective shift* and *indexical shift* – linguistic strategies by which the perspective-holder and referent of the indexical pronoun shift from the utterance-speaker to someone else – suggests that there are deep parallels holding across them. A fundamental shared property is that attested variations for both types of shift are implicationally ordered. E.g. if the perspective expressed by a particular PSI (e.g. 'beautiful') shifts under a verb of thought (e.g. 'believe'), it must also shift under a verb of speech (e.g. 'say'). But the reverse is not entailed. If 'you' shifts, 'I' must shift too – but crucially not vice-versa. Such patterns raise these questions: (i) why aren't all logical possibilities for shifty variation linguistically attested?; (ii) why is the attested shifty variation scalar across languages?, (iii) why is it scalar in this particular way?, and (iv) how do we grammatically model these patterns to explain why every child – regardless of native language – correctly acquires them?

We seek seed-grant funding for a project (henceforth PROJECT) to lay the groundwork for a larger research program (henceforth PROGRAM) pursuing the leading idea that implicational hierarchies in linguistic properties of perspective- and context-shift reflect the nature of the cognitive categories that underpin the shifting. This PROJECT will serve as the basis for two NSF grant proposals – a CAREER grant (PI) and a collaborative project targeting the NSF's Computational Cognition (CompCog) initiative. We will additionally apply for funding from the NSF for an interdisciplinary workshop, to be hosted towards the end of the PROJECT.

The envisioned PROGRAM is groundbreaking in two ways. First, we will seek to root scalar orderings of shifty behavior in fundamental cognitive principles, specifically in ordering restrictions that arise under models of cognition, i.e. our own cognitive state (beliefs, desires, intentions, knowledge) and our mental projections about the cognitive states of others ("theory of mind" and "common ground"). Second, we will seek to model shifty variation in syntax – the module of grammar concerned with the hierarchical representation of sentence-structure in the human mind. In so doing, we will seek to understand the scalar nature of shifty hierarchies in terms of a mapping between formal, computational models of cognitive state and hierarchies that are innate to sentential syntax. Since these judgments are highly context-dependent and subtle, we propose to use corpora supplemented by annotations to find context-appropriate examples to enrich the empirical basis of our claims.