Towards an efficient evaluation method of generative theories using gradient data and regression analysis

With Linear Optimality Theory (LOT), Keller (2000) introduced a framework that allows to account for gradient acceptability of syntactic structures. Each factor that is relevant for the acceptability of a sentence is formulated as an Optimality Theoretical constraint associated with a numerical weight. The sum of weights of all constraints that a given sentence violates then maps directly to its grammaticality, which is assumed to be measurable directly in terms of acceptability. The severity of the constraint is estimated by a statistical algorithm.

Like Standard Optimality Theory (Prince & Smolensky 1993), LOT also involves a generating and an evaluating component. Keller provides a detailed proposal for the latter and leaves the former unspecified, except for the statement that the generating component must be able to produce permutations of constituents. It is thus tempting to combine LOT with an explicit theory of grammatical structure-building, such as the Minimalist Framework (Chomsky 1995 and further work), to attain a more comprehensive theory as well as a way to test specific Minimalist proposals empirically. However, some non-trivial issues arise with this attempt. One of them is that it is a core assumption in Keller's work that grammaticality is gradient. In contrast, in Minimalism (and more generally, in generative grammatical models), by design, there is a categorical distinction between structures that can be derived by the set of structure-building operations/rules, and those that cannot be derived.

I want to argue that this issue can be resolved in the following way. Sentences that are derivable by a Minimalist grammar and are therefore grammatical by definition within that framework can still involve interpretative, prosodic, or processing-related problems to a varying extent. If a theory predicts such a problem for a specific type of structure, a systematic acceptability decrease should be found for it consistently across the data. Under this view, it is possible to conceptualize a generative theory in terms of weighted constraints, and to make it compatible with an LOT-inspired empirical evaluation: A constraint weight estimation algorithm (e.g. multiple regression) can be used to estimate the severity of the constraint violation and to evaluate how consistently the acceptability decrease is really found where the theory predicts it to occur. In the talk, I will show in detail how to apply the idea to a data set of gradient acceptability judgments concerning word order variation in Czech.

In sum, by establishing a link between generative grammar and the LOT framework, I hope to provide a powerful evaluation method of generative linguistic theories which can be used for a broad range of approaches.

References

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