Applying diffusion decision models to the processing of polarity and beyond

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In this talk, I motivate the use of generative computational models from cognitive science and mathematical psychology for addressing psycholinguistic questions. I focus on a case study in which we examine the polarity effect in polar-opposite scalar expressions using a modified version of the well-established Diffusion Decision Model — scalinDDM. The polarity effect refers to the robust finding that positive expressions such as 'more than half' or 'a large proportion' are processed more slowly and with greater difficulty than their negative counterparts, 'fewer than half' or 'a small proportion', respectively.

Because the parameters of scalinDDM have transparent cognitive interpretations, applying the model to sentence–picture verification data enables us to test predictions of two long-standing theoretical accounts of the polarity effect. The two-step account attributes the effect to an additional processing stage related to the processing of covert negation, whereas pragmatic accounts relate it to contextual licensing conditions for negative expressions. Quantitative analyses using scalinDDM show that both explanations are necessary to capture the full pattern of empirical results. Moreover, the findings illustrate how scalinDDM provides a transparent framework for modeling fine-grained differences among different types of polar expressions as well as effects of the experimental task.

I conclude by outlining some potential future directions, including applying scalinDDM to other phenomena involving different types of negation, extending the model to capture processes involved in online language comprehension, and clarifying its relationship to other prominent models in adjacent domains.