What the brain can tell us about the use of pragmatic information in language comprehension

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Comprehension requires us to decode a complex high-level message originating in another person's brain. This is enormously challenging. Our linguistic inputs are noisy and ambiguous; they unfold very quickly in real time, and our goals as comprehenders can change substantially across different communicative environments (listening to a talk, reading a book, grading papers). In this talk, I will discuss how, when, and where the brain uses pragmatic information to help meet these challenges.

I will present ERP data showing that we are able to use a variety of pragmatic cues, ranging from discourse connectives, scalar quantifiers, commas, disfluencies, and the informativeness of visual scenes, to modulate the generation of probabilistic top-down predictions about the semantic features of upcoming words. If incoming words confirm these predictions, their processing is facilitated. In the brain, this semantic facilitation manifests as a reduced neural response between 300-500ms (the N400 ERP component), localizing to the left lateral, ventral and medial temporal cortices (MEG).

Under most circumstances, we are not bound by these prior top-down semantic predictions. If they are violated by new bottom-up inputs, we are able to *update* our mental model at a slightly later stage of processing. I will argue that, in the brain, this model updating manifests as a *late frontal positivity* ERP response between 600-1000ms, and as increased activity within the left inferior prefrontal and lateral temporal cortex (MEG and fMRI).

Certain pragmatic cues, such as presupposition triggers and concessive connective, however, can constrain the mental model itself such that if new bottom-up input conflicts with these constraints, it cannot initially be incorporated, leading to a temporary comprehension failure. Even here, however, we do not simply give up. Rather, we engage in continued attempts to explain the input by reanalyzing and attempting to repair the prior context, or through second-pass attempts to revise the mental model. I will suggest that these conflict and recovery processes are reflected by the *late posterior positivity/P600* ERP component observed between 600-1000ms, and by activity within the left prefrontal cortex and temporal fusiform cortex (MEG and fMRI). I will further suggest that these neural responses may also play an important role in enabling us to quickly adapt to the broader statistical structure of new communicative environments, so that we can continue to comprehend efficiently in the future.

Taken together, these findings suggest that pragmatic information can interact with multiple levels of linguistic representation, and can influence multiple stages of language processing, thereby playing a crucial role in enabling comprehension that is fast and yet highly flexible.