

Brain Signatures of Communication (BraiSiCo) project

**Neurophysiological evidence for rapid processing of verbal and gestural information in understanding communicative actions**

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**Abstract**

During everyday social interaction, gestures are a fundamental part of human communication. The communicative pragmatic role of hand gestures and their interaction with spoken language has been documented at the earliest stage of language development, in which two types of indexical gestures are most prominent: the *pointing* gesture for directing attention to objects and the *give-me* gesture for making requests. Here we study, in adult human participants, the neurophysiological signatures of gestural-linguistic acts of communicating the pragmatic intentions of naming and requesting by simultaneously presenting written words and gestures. Already at ~150ms brain responses diverged between naming and request actions expressed by word-gesture combination, whereas the same gestures presented in isolation elicited their earliest neurophysiological dissociations significantly later (at ~210ms). There was an early enhancement of request-evoked brain activity as compared with naming, which was due to sources in the frontocentral cortex, consistent with access to action knowledge in request understanding. In addition, an enhanced N400-like response indicated late semantic integration of gesture-language interaction. The present study demonstrates that word-gesture combinations used to express communicative pragmatic intentions speed up the brain correlates of comprehension processes – compared with gesture-only understanding – thereby calling into question current serial linguistic models viewing pragmatic function decoding at the end of a language comprehension cascade. Instead, information about the social-interactive role of communicative acts is processed instantaneously.