Abstract

Discourse processing represents complex communication behavior in that integrated knowledge of linguistic principles, organizational structure, and pragmatic rules, are required to create and comprehend a coherent message. Discourse is communication that extends beyond the word, phrase or sentence level, is related, and takes on a larger meaning when appreciated in context as a holistic unit. Examples include reading a textbook or listening to a friend's story, where meaning emerges as information is integrated across multiple utterances. Current neuroimaging data support the activation of a bilateral network (i.e., anterior prefrontal cortex, medial prefrontal cortex, and the precuneus) involved in narrative discourse processing. Previous fMRI work in our lab has demonstrated that reading well-organized, structurally simple discourse significantly reduces processing resources compared to less well-organized information. This phenomenona is appreciable in the prefrontal cortex (e.g., BA 10, L>R) and we propose to study this phenomena by replicating our fMRI results using a nascent technology; functional near infrared spectroscopy (fNIR). Unlike fMRI, fNIR offers researchers with a portable optical neuroimaging research tool that can be used in any setting (e.g., clinic, bedside, office/laboratory). An fNIR system is capable of monitoring brain's hemodynamics (i.e., changes in oxy- and deoxy-hemoglobin) during cognitive processing as participants perform tasks in naturalistic contexts (e.g., during naturally occurring communication behaviors, during exercise). Due to the functionality of the fNIR and its relative size and compatibility with cognitive processing studies, the problems associated with an fMRI (expenses, noise, etc.) can be eliminated. An fNIR system is the only stand-alone and field-deployable technology able to determine localizable brain activity.