

Mind Articulation at MIT: Achievements

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The achievements of Mind Articulation at MIT can be roughly divided into three areas. First, the research associated with Mind Articulation has helped change the field of linguistics, bringing linguistic theory back to the forefront of psycho- and neurolinguistics and reunifying these disciplines that were artificially separated in the 1970's. Second, the work of graduate students in the department inspired by the goals of Mind Articulation has generated new and important results in the various subfields of linguistics, including morphology, syntax, phonology, language acquisition, language processing, and neurolinguistics. Third, Mind Articulation has brought MEG research to MIT and spurred research on speech sound processing and lexical access.

Other presentations at this conference will detail some of the research in areas two and three by students, post-docs and professors associated with Mind Articulation. In this presentation, I will discuss the general impact of Mind Articulation in the development of linguistics and also present some specific findings from the theoretical research group and from the MIT/KIT MEG Joint Research Laboratory.

I. Reunification of Theoretical and Psycholinguistics

The establishment of a separate field of psycholinguistics in the 1970's was based on the assumption that the generative operations of grammatical theory were not necessarily the same mental operations performed by a speaker or listener producing or comprehending language. Recent theoretical advances within the framework of Chomsky's "Minimalist Program" make it clear that there is a single set of mental generative operations behind all analysis or synthesis of complex linguistic objects such as words and sentences.

The research and thinking associated with the Mind Articulation project has shown how the experimental psycho- and neurolinguistic literature can be understood as reflecting and supporting the mental operations proposed in the linguist's grammatical analyses. Moreover, linguistic theory can be used to help understand how the brain manages symbolic computation.

The reunification of theoretical and experimental linguistics now promises results beyond the simple addition of the fields. I will discuss in particular how a unified linguistics sheds light on the problem for cognitive neuroscience of how the brain deals with categorization and identity.

II. Theoretical Linguistics

Here I will discuss advances made by Dr. David Embick and others on our understanding of the internal structure of words. The study of morphology within linguistic theory is of crucial importance for the connection between theoretical linguistics and neurolinguistics since the currently most widely employed experimental paradigms ask subjects to perform tasks after they are presented with (single) words. Understanding what processes must be behind word

recognition involves understanding how words are constructed and what properties are associated with the (stored) atomic combinatorial pieces of language.

III. MEG Studies

The MEG/language group has been involved in two major research initiatives.

The first set of experiments explores the initial phonetic representations speakers must form of language at the early stage of processing spoken language in the brain. These studies have explored the response at auditory cortex to speech and non-speech stimuli. Two large questions animate this research: does auditory cortex have a special speech mode for processing language stimuli? how does the brain represent the discrete phonetic categories of language?

The second set of experiments explores the storage and accessing of the “lexical” items. Employing mostly lexical decision tasks, these studies have asked questions about the spatial and temporal dynamics of the cortical processing of words. An overarching issue in this research is the balance between stored knowledge and constructive composition in the recognition of linguistic units as small as words. Here the neurolinguistic MEG research makes direct contact with the theoretical linguistic work on morphology and suggests a new paradigm for a broader linguistics in the new century.