THURSDAY, OCTOBER 22, 2009

Symposium 1.1

LEVELS OF MEANING: CURRENT NEURAL PERSPECTIVES ON THE N400

Chair: Joseph Dien, University of Maryland, College Park

The best known language-related event-related potential (ERP) is clearly the N400. Since it was first reported by Kutas and Hillyard (1980), this robust response has attracted intense interest because of its sensitivity to semantic manipulations. While it has yielded many insights into semantic processing in both healthy and clinical populations, the original consensus that it reflects integration of the stimulus into the current semantic context has become increasingly questioned. The present set of speakers debate the cognitive significance and the attentional status of the N400. Concerning its cognitive significance, Debruille and Renoult suggest that the N400 effect reflects a post-lexical inhibition of irrelevant information. Lau, on the other hand, argues for it reflecting facilitation of lexico-semantic access with a model based on functional neuroanatomy. Similarly, van Berkum also postulates that the N400 reflects ease of lexico-semantic access but from the standpoint of a multiple-level cognitive model. With regards to the N400's attentional status, Laszlo and Federmeier see the N400 as an index of automatic lexical-semantic activation, and stress that N400 processing can be engaged by a wider variety of inputs than is often assumed. Conversely, Dien argues for an information processing view in which multiple N400 processes operate in parallel under attentional control. Thus, this symposium provides a forum in which to contrast new work (unpublished and in press) on the N400 and its significance for understanding language processing.

N400S: INDEXES OF A LATE AND UBIQUITOUS INHIBITION PROCESS?

J. Bruno Debruille, & Louis Renoult
McGill University

The occurrence of a meaningful stimulus in our environment defines a new situation. Understanding how this new situation is represented in the brain has been the object of many, if not most, experimental designs in cognitive neuroscience. When the new situation was not anticipated, that is, when the meaningful stimulus was not expected, it triggers brain processes that are responsible for the N400 potential. Nevertheless, after almost 30 years of research, the nature of the computations performed by these processes remains a matter of debate. We have proposed that they perform a particular inhibition. This inhibition would pertain to representations that were activated, either by anticipation or by the new stimulus itself, but that should not be included in the representation of the situation. The theoretical framework in which this inhibition hypothesis is included will be presented, as well as the way it accounts for literature data. One of the consequences of this theory is that the N400 should be evoked when subjects only have to inhibit inappropriate representations, even if the meaningful stimulus does not define a new situation. The results of a series of unpublished experiments will be presented to show that this is the case and that well-known N400-effects can be studied in these conditions. The new avenue of research opened by these findings will be developed.

THE N400 EFFECT AS AN INDEX OF FACILITATED LEXICAL ACCESS

Ellen Lau
University of Maryland, College Park

We propose that the N400 effect is not solely a post-lexical index of semantic integration as often argued, but reflects facilitated lexical access. In other words, differences in N400 amplitude to words in supportive and non-supportive contexts are at least partially due to differences in the ease of accessing stored lexical information rather than differences in the ease of integrating lexical information with the context. This argument is based on numerous fMRI and MEG studies localizing N400 effects to posterior middle temporal cortex, which has been independently shown to support storage of lexico-semantic representations. Assuming this position, a remaining question is whether these lexical areas are the only contributors to the N400 effect, or whether other cortical areas sometimes modulated by N400 paradigms also impact the amplitude of this component. We present new evidence from concurrent MEG-EEG recordings which further supports the role of facilitated lexical access in the N400 effect, but which also points to at least one additional source in the latter part of the effect. The early phase of the N400 effect ($\sim$250–350 ms) shows MEG activity consistent with a left posterior temporal source, as we predict. However, the later phase ($\sim$350–500 ms) shows additional differences over bilateral anterior MEG sensors, suggesting involvement of at least one additional cortical area. In sum, the data support the hypothesis that the N400 effect reflects more than one mechanism, but critically that one of these mechanisms is access of stored lexical information.

DOES THE N400 DIRECTLY REFLECT COMPOSITIONAL SENSE-MAKING?

Jos Van Berkum
Max Planck Institute for Psycholinguistics

A not uncommon assumption in psycholinguistics is that the N400 directly indexes high-level semantic integration, the compositional, word-driven construction of sentence- and discourse-level meaning in some language-relevant unification space. The various discourse- and speaker-dependent modulations of the N400 uncovered by us and others are often taken to support this 'compositional integration' position. In my talk, I will argue that these N400 modulations are probably better interpreted as only indirectly reflecting compositional sense-making. The account that I will advance for these N400 effects is a variant of the classic Kutas and Federmeier (2002, TICS) memory retrieval account in which context effects on the word-elicited N400 are taken to reflect contextual priming of LTM access. It differs from the latter in making more explicit that the contextual cues that prime access to a word's meaning in LTM can range from very simple (e.g., a single concept) to very complex ones (e.g., a structured representation of the current discourse). Furthermore, it incorporates the possibility, suggested by recent N400 findings, that semantic retrieval can also be intensified in response to certain 'relevance signals', such as strong value-relevance, or a marked delivery (linguistic focus, uncommon choice of words, etc). In all, the perspective I'll draw is that in the context of discourse-level language processing, N400 effects reflect an 'overlay of technologies', with the construction of discourse-level representations riding on top of more ancient sense-making technology.

THE UNSTOPPABLE JUGGERNAUT: ELECTROPHSYIOLOGY REVEALS THE OBLIGATORY NATURE OF SEMANTIC ACCESS

Sarah Laszlo
University of Illinois, Urbana-Champaign

Classical views of the N400 tend to suggest that the lexical-semantic processing it indexes is gated or filtered by lexical characteristics of inputs, such that only orthographically legal items that are familiar on at least a subpart level (e.g., words, pseudowords) are eligible to elicit lexical semantic processing. Based on recent research from our lab demonstrating that even meaningless, illegal strings can elicit clear N400s when embedded in supportive contexts, we suggest that N400 processing is considerably more automatic and obligatory than has traditionally been thought, and that previous cases where "no" N400 activity was observed in response to orthographic inputs are best explained in terms of relatively incoherent N400 processing being engaged by those inputs, rather than a failure by those inputs to engage N400 processing at all.

VARIETIES OF N400: AN ATTENTIONAL PERSPECTIVE ON SEMANTIC PROCESSING

Joseph Dien
University of Maryland, College Park

One of the dominant themes in current research on the nature of semantic processing is between the contrasting serial information processing perspective and the parallel connectionist perspective. This debate has been especially enriched by EEG/MEG and neuroimaging data which, respectively, highlight the serial and parallel aspects of neural activity. Of course, the truth likely lies between these two extremes. A series of studies are presented which suggest that there are a number of ERP components active in the N400 window and that they reflect a set of serial cognitive processes that can operate in parallel, under attentional control. These results are interpreted in the framework of Neely and Keef's (1989) Hybrid Model of Lexical Decision, as updated by more recent findings. Implications for current models of cognition and functional neuroanatomy are discussed.

Symposium 1.2

THE AFFECT - MOTIVATION LINK: CENTRAL AND PERIPHERAL NERVOUS SYSTEM PROCESSES

Chairs: Guido H.E. Gendolla, & David Sander, University of Geneva

Joining researchers from universities of three different countries this symposium presents new perspectives on the relation between affective states and behavior. In a multi-method perspective, the discussed research links the neurosciences, endocrinology, and peripheral physiology to human behavior and related affective experiences. The empirical evidence presented in this symposium challenges a number of existing ideas about the affect-behavior link and the involved physiological processes. Guido Gendolla presents a new series of studies showing that effort-related cardiovascular reactivity is systematically influenced by subconsciously processed cues for activation and deactivation and subconsciously presented emotional cues. Eddie Harmon-Jones discusses research on the effects of body postures on affective experience and motivational states reflected by effects on brain activity (EEG). Jack van Honk argues that