

-trial correlational

MEG study of heteronym recognition.

Olla Solomyak* and

Abstract

We present an MEG study of heteronym recognition, aiming to distinguish between two theories of lexical access: the ‘early access’ theory, which entails that lexical access occurs aa

(the Type II response of Tarkiainen et al., 1999, also sometimes referred to as the letter s

The correlational analysis method that we employ in the current study is a novel approach to MEG data analysis, although it is based in part on the approach of Hauk et al

for the study.¹ Each heteronym had two distinct pronunciations with unrelated meanings. These were presented along with twenty mono-morphemic controls, and forty non-words. Control words were matched to the heteronyms on frequency, length and bigram frequency.² Non-words were matched to the entire group of words on length and bigram frequency. Orthog

region are illustrated in Figure 2. Analyses of M350 activation were conducted over the 305-355ms time window across all subjects (a 50ms window centered at the 330ms peak latency). Analyses of both components were conducted by com

Figure 1: Left hemisphere region of M170 activation, illustrated on a representative subject's infl

Figure 3: Left: Effect of the form frequency measure in the left

meanings of the heteronyms, particularly of the frequency ratio of one m

et al., 2006; Penolazzi et al., 2007). Both of these variables are highly correlated with word-form frequency, and their effects might in fact be attributable to word-form recognition rather than true lexical access. Sereno et al. (2003) and Penolazzi et al. (2007) report early effects

coherence of a word's morphological family, as reported by Hauk et al. (2006). (See Zweig and Pylkkänen (in press) for a discussion of the evidence for early morphological decomposition in visual word recognition relevant to this i

In contrast to the early M170 response, the later activation of the M350 was localized to superior temporal

often results in very limited candidate stimuli for bins in a factor

4. Formal Methods

4.1. Design and stimuli

i

Twenty heteronyms comprised the target stimuli for this study. These were chosen from the list of 240 heteronyms compiled by Tjallingii (1980). The heteronyms were chosen from the list of 240 heteronyms compiled by Tjallingii (1980).

Twenty control words were chosen from the English Lexicon Project (ELP) Database (Balota et al., 2002), to match the target words on length, mean bi

4.3.2. MEG data

4.3.2.1. Minimum-norm estimation

MEG data were noise-

magnetic field at each MEG sensor, given activity at each of the 5124 sources. This forward solution was then employed in a computation of the inverse solution, which identified the spatio-temporal distribution of activity over these sources that would best account for each subject's actual averaged MEG data. The resulting minimum-nor

4.3.2.2. M170 region

Regions of interest were defined based on positive peaks in activity in the left and right hemisphere fusiform gyrus areas, in the M170 t

component activity was therefore defined across all subjects as negative activation in the 50ms time range centered at the 330ms peak latency (i.e.

absolute value of r was taken as the statistic for that permutation.

References

Adac

D

Penolazzi, B., Hauk, O., Pulvermüller, F., 2007. Early semantic context integration and lexi