Abstract: Although the N400 component of event-related potentials (ERPs) is suggested to reflect language processing, exactly which language processing functions N400 is sensitive to is not clear. We investigated this component in aphasic patients with some impairments of language processing. Meaningful and meaningless words in Kana (Japanese characters) were used as stimuli under a visual oddball paradigm. Increases in N400 latency and amplitude in the aphasic group were significant in comparison with the control group. In the aphasic group, N400 latency correlated significantly with the performance intelligence quotient employed besides language quotients. Moreover, the N400 effects were seen more clearly in the left hemisphere than in the right hemisphere for both groups.

We propose that the abnormal variations in amplitude or latency of N400 in the aphasic group reflect language processing functions (controlled processing and automatic processing) that are different between slight and severe cases of aphasia. Moreover, N400 effects are sensitive to intellectual abilities besides language ability. We also suggest that N400 effects in the left hemisphere for the aphasic group are a reflection of active language processing as the substitution function.

Key words: event-related potentials, N400, aphasia, language processing, semantic memory
Experimental procedure

Subjects

Subjects comprised 32 healthy volunteers aged between 18 and 30 years, with a mean age of 23.2 years. All subjects were native speakers of Japanese. They were divided into two groups: a control group (n=16) and an aphasia group (n=16). The control group consisted of individuals without a history of neurological or psychiatric disorders and with normal hearing and speech. The aphasia group included individuals with chronic aphasia resulting from left hemisphere stroke or traumatic brain injury. The aphasia assessment was performed using the Japanese version of the Western Aphasia Battery (WAB-J).

The study was approved by the institutional review board of the University of Tokyo, and all participants provided written informed consent before participation.
Statistical analysis

3FTVMUT BSF FYQSFTTFE BT NFBOTʶTUBOEBSE EFWJ
BUJPOT 5P BTTFTT TJHOJGJDBOU EJGGFSFODFT CFUXFFO
TVCKFDUT
.BOO8IJUOFZʟT 6 5FTU XBT VTFE 5P BT
TFTT TJHOJGJDBOU EJGGFSFODFT XJUIJO TVCKFDUT
8JMDPYPO
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UP BTTFTT

Statistical analysis

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Psychometric measurements

Comparison between the control and aphasic groups

Comparison between the control and three aphasic subgroups

N400 effects

Comparison between the control and aphasic groups

Comparison between the control and the three aphasic subgroups
Comparison between C3 and C4

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- **Control**
- **Aphasia**
Relationship between psychometric measurements and N400

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Psychometric measurements

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Psychometric measurements

N400 effects

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N 400 and cerebral laterality

Psychometric measurements and N400

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