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# An analysis of differences in Japanese existential expressions as revealed by event-related brain potentials

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A left anterior negativity (LAN) is a response peaking between 300 - 500 ms that can be measured with electroencepharography (EEG). In the Indo-European language family, LAN can be generally caused by some syntactic violations, for example, subject-verb number agreement or gender agreement. It is, however, difficult to observe the LAN in Japanese sentence. For one reason, there are no syntactic rules such as the subject-verb number agreement or the gender agreement in Japanese. Nevertheless, the left anterior negativity is elicited by incorrect numeral classifiers in a Japanese auditory experiment (Muller et al, 2003). It is possible that processing the classifier agreement in Japanese is of syntactic nature.

The purpose of this thesis is to investigate the LAN effects from irregular or incongruent existential expressions "aru" and "iru", utilizing event-related brain potentials (ERPs), namely, brain electrical activities time-locked to human cognitive process, recorded from the scalp. The syntactic function of the existential expressions "aru" and "iru" corresponds to that of verbs 'be' or 'exist' in English. "Iru" classifies the dynamic noun (DN : human and animals, etc.) and "aru" does the static noun (SN : things and plants, etc.), although the distinction does not always hold.

I performed two experiments to observe the LAN effect. The following conditions were compared in visual experiment:

- (1) a. (DN + Iru)  
 ojiisan-ga kotatsu-ni iru.  
 grandfather-Nom kotatsu-at exist  
 'There is a grandfather at a kotatsu.'
- b. \*(DN + Aru)  
 ojiisan-ga kotatsu-ni aru.  
 grandfather-Nom kotatsu-at exist  
 'There is a grandfather at a kotatsu.'
- c. (SN + Aru)  
 mikan-ga kotatsu-ni aru.  
 mandarin-Nom kotatsu-at exist  
 'There is a mandarin orange at a kotatsu.'
- d. \*(SN + Iru)  
 mikan-ga kotatsu-ni iru.  
 mandarin-Nom kotatsu-at exist  
 'There is a mandarin orange at a kotatsu.'

In a first experiment without putting the button, I reported that all conditions were no significant as a result of repeated-measures analysis of variance (ANOVA).

In a second experiment with putting the button, all incorrect conditions produced more negative ERP effects than correct conditions in the time range from 300 to 400ms. This effects can be N400. And, also a (2) condition only produced more positive ERP effects than a (1) condition in the time range from 600 to 700ms. This effects can be Late Positive Component (LPC). It produced an effect contrary to my intention.

These results lead to the conclusion that Japanese existential expressions were not of syntactic nature, but of semantic nature.