DISCUSSION

Our findings seem to corroborate two of the experimental hypothesis: the N350 peak is present in real action observation and it can also be found in an executive task, moreover it is mainly localized in the temporal-parietal (TP) area in both tasks.

However that ERP component hasn’t turn out to be especially sensible to the presence of biological entities (BIO-BIO interaction was not ampler than the others).

The global sharing of the site and the similarity of TP condition-dependent activation (although its effect can be seen on amplitude for execution and on latency for observation) support the existence of an inter-task component. It is generally more anticipated in execution so it’s possible that N350 is action-oriented. Some evidences have shown that areas on the temporal and parietal lobes are involved in action perception and motor representation rehearsal.

A possible conclusion is incident to N350 involvement in motor schema processing and anticipation/prediction processes. Amplitude and latency may be modulated by the number of possible schema and the relevance of transitive action: an action towards a non-biological object is simpler than one towards a biological active (and so re-active) target and can easily dispose of many more anticipated script. Other studies are necessary to widen our knowledge of this activation and give a clearer explicative frame.

BIBLIOGRAPHY


THEORETICAL BACKGROUND

THREEFOLD MODEL

Many studies have provided evidence of a functional equivalence between observing, imitating and executing actions and of sharing some neural substrates (Grèzes & Decety, 2001). We have considered in particular the first and the last link, execution and observation.

EXECUTION: after the creation of a global abstract goal-directed intentions, a covert process translate them into practical situated specific motor-related intentions, recalling motor representations whereby implementing pianification, programming and execution.

IMITATION: global abstract goal-directed intentions are interpreted and understood from the observed agent, then they are internalized. After this step, as for execution, they are translated by a covert process into practical situated motor-related intentions that recall motor representations. Finally the implementation of pianification, programming and execution takes place.

OBSERVATION: agent (human or mannequin) movements are perceived and processed, global abstract goal-directed intentions are interpreted and understood from the observed agent without carrying out execution.

ACTION vs. INTERACTION

Only few studies has compared action with interaction, but evidence can be found about the existence of a different neural system specific for object-directed and human-directed actions (Hiraki, Senju, Fukushima, & Hiraki, 2005; Pacherie, & Dokic, 2006; Handy, & Tipper, 2007; Proverbio, Del Zotto, & Zani, 2007).

ACTION: a planned intentional act towards an object, it is unidirectional and has an instrumental pragmatic goal; a BIOLOGIC—NON-BIOLOGIC relation.

INTERACTION: a planned intentional act towards an human being, it can be bidirectional and can be guided by different goals (pragmatic, affective, social, ...) and assume different meanings; generally a BIOLOGIC—BIOLOGIC relation.

ANATOMICAL-FUNCTIONAL MODEL

(POCKETT, 2006)

THE STUDY

HYPOTHESIS

Authors have found an N350 peak sensible to the nature (biological vs. non biological) of a motion. Beginning from that evidence, we suppose:

I) to find it in execution and observation because interaction and action conditions are present in both tasks;

II) that the peak share a similar scalp localization between the tasks;

III) that the component will be ampler in BIO-BIO interaction condition.

PROCEDURE

SUBJECT & STIMULI : 20 subjects (mean age=23.91 SD=2.63) have observed and executed a simple contact act towards an OBJECT non-biological target (a tube), a HUMAN ANALOGUE non-biological target (a mannequin arm) and a HUMAN biological target. During the observation task subjects have seen also a NON-BIOLOGICAL AGENT (the mannequin) act towards the object.

DATA ANALYSIS : After obtaining EEG traces, EEG reduction (bandpass 0.1-30 Hz, filtering, epoch creation, rejection of artifacts, spatial correction, averaging) has been effected.

ERPs amplitude and latency data have been analyzed by repeated measures ANOVA.

N350 amplitude

OBSERVATION: - quite spread on all the scalp but mainly located in temporal-parietal region (SITE: F=6.639 p=.007, Greenhouse-Geisser correction)

- ampler in the right hemisphere (SIDE: F=16.945 p=.001)

- no CONDITION effect

EXECUTION: - mainly located in temporal-parietal region (SITE: F=9.611 p=.002, Greenhouse-Geisser correction)

- interaction effect between CONDITION and SITE (CONDITIONxSITE: F=2.436 p=.038 Huynh-Feldt correction)

OBSERVATION/EXECUTION MATCHING:

- N350 is a temporal-parietal peak (SITE: F=12.197 p=.001, Greenhouse-Geisser correction)

- it has a different scalp distribution according to different tasks (TASKxSITExSIDE: F=3.177 p=.039, Greenhouse-Geisser correction)

N350 latency

OBSERVATION: - remarkable trend for the interaction effect between CONDITION and SITE (CONDITIONxSITE: F=1.769 p=.057)

EXECUTION: - no significative evidences

OBSERVATION/EXECUTION MATCHING:

- we have noted an interesting trend for N350 component to have different onset times for different cortical areas according to different tasks (TASKxSITExSIDE: F=2.381 p=.068)