
**Abstract**
Research across a number of brain imaging modalities has shown that activity in the human sensorimotor cortex is modulated by executed actions as well as by the observation of those actions, suggesting a role for a mirror neuron system (MNS). Activity in the MNS, with neurons in Broca’s area (Brodmann’s area 44/45), has been attributed to high level functions including language processing, although there is a lack of research into the extent of this involvement. This study tested the hypothesis that sensorimotor cortex is involved in the processing of semantically congruent and incongruent actions by comparing the rolandic EEG mu rhythm, which has known sources in sensorimotor cortex, with a well known indicator of semantic understanding, the N400 event related potential (ERP). Subjects were shown a series of video images representing an action sequence in which the action ended in an expected or unexpected fashion. Results show significant increases in mu (8-12Hz), lower mu (8-10Hz), and upper mu power (10-12 Hz), as well as significant N400 responses to unexpected compared to expected events. Correlations between mu power and N400 responses were found for expected, but not unexpected conditions. This finding suggests that sensorimotor cortical areas are active in normal semantic processing of actions, but this involvement is disrupted in instances where semantic expectations are not met.