
Anarchic-hand syndrome: ERP reflections of lost control over the right hemisphere

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Abstract

In patients with the callosal type of anarchic-hand syndrome, the left hand sometimes does not act as intended and counteracts the right hand. Reports are scarce about the underlying neurophysiological mechanisms. In our patient G.H. the syndrome developed after infarction of the left arteria pericallosa. It has been suggested that the syndrome arises out of lacking inhibition from the dominant left hemisphere on the right hemisphere. Yet, in tests of spatial intelligence G.H. performed much better with his "anarchic" left hand than with his dominant right hand, similar to split-brain patients. Left-right manual choice responses and ERPs to laterally presented stimuli were measured. Asymmetries were evident in G.H.'s behavior and ERPs. His right-hand responses were fast and unaffected by incompatibility with stimulus location, whereas his left-hand responses were variable and accompanied by a large negative central-midline potential, probably reflecting efforts in initiating the response. His N1 component peaked earlier and was larger at the right than the left side of the scalp, and the P3 component was grossly reduced at the right side. The effort indicated by the midline negativity and the asymmetrically reduced P3 might directly reflect G.H.'s lack of control on his right hemisphere's processing. The N1 asymmetry might reflect that the right hemisphere processes stimuli faster such that control impulses cannot exert their effect. Altogether, these results tend to support the split-brain account which assumes that the syndrome arises by the lack of communication between hemispheres that act according to their respective competences.

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