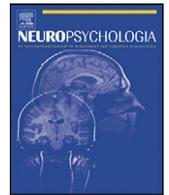




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## Note

## Scanning your body is different from performing body movements: A double dissociation between body representational neglect and apraxia

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## ABSTRACT

Body representational neglect (BRN) and apraxia can be found after left hemisphere (LH) lesions. Additionally, both disorders recruit knowledge about certain body parts, their position in space, and their spatial relationship to each other. Hence, the present study examined whether BRN and apraxia can be functionally dissociated at the behavioral and neural level. 23 LH lesioned patients were examined with a standardized body neglect test (Vest test) and a standardized test of apraxia (imitation of meaningless gestures). At the behavioral level BRN and apraxia showed a double dissociation. Moreover, these deficits were associated with specific brain lesions: while BRN was related to lesions in Brodmann areas 6 and 44 and frontal white matter, apraxia was linked to lesions in the superior longitudinal fasciculus and parietal and central white matter. The results are discussed as indicating dissociable representations of the human body within the left cerebral hemisphere.

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## 1. Introduction

Neglect refers to the inattention to the contralesional hemispace after unilateral brain damage (particularly right hemispheric). It is not due to primary sensory (e.g., hemianopia) or motor (e.g., hemiplegia) deficits and can be observed in any modality. Hence, although neglect is noticed most often in the visual domain, it manifests also in audition, touch, and body representation. This latter form has been labeled body representational neglect (BRN) and can be found after left or right temporo-parietal lesions (Cocchini, Beschin, & Jehkonen, 2001; Glocker, Bittl, & Kerkhoff, 2006). Another neuropsychological disorder often encountered after LH lesions is apraxia (Goldenberg, 1996). This refers to a class of symptoms that manifests in deficits in imitating hand or finger movements, in pantomiming, or in object and tool use.

Beyond a potential vicinity of the underlying neural substrates of apraxia and BRN, both disorders are functionally related to body part movements and may thus share the recruitment of knowl-

edge about certain body parts, their position in space, and their relative spatial relationship to each other. On this note, a concept that is central to *both* BRN and the imitation of meaningless gestures is the *body schema* (Coslett, 1998). Following Coslett and colleagues (e.g., Coslett, Saffran, & Schwoebel, 2002; Schwoebel & Coslett, 2005) it can be assumed that there are at least three different types of body representations. The first is termed the *body image* (or *body semantics*) and is conceived as a lexical-semantic representation of the body including body part names and functions. The Gerstmann syndrome (Gerstmann, 1940) is thought to reflect a disorder of this representation. The second representation, termed the *body structural description*, is a topological map of the body and provides information about the shape and contours of the surface of the human body as well as the local relationship between body parts. This representation is thought to be impaired in autotopagnosia (Ogden, 1985). Finally, the third representation is the *body schema* that refers to a dynamic 3D representation of the body in space. It provides information on the relative positions of body parts derived from multiple sensory and motor inputs and interacts with motor systems in the execution of actions. Coslett (1998) investigated three patients with left-sided visual neglect and argued that these patients' deficits in recognizing the identity of left vs. right hands were compatible with a disorder of the body schema. Hence, he suggested that disruptions of the body schema

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