

The strange case of the "third hand"

A case report

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Background

Right hemisphere damage may determine the feeling of a presence of one or more **supernumerary limbs**. This phenomenon does not necessary give rise to confabulations and the patient may retain a critical attitude toward his experience of an "extra limb" (1). This delusional perceptual distortion raises many questions about brain processing after a lesion.

Case Report

A 74-year-old right-handed man, a retired trader, was admitted to Rehabilitation Department of San Paolo Hospital in Milan two months later a cardio-embolic right hemisphere stroke.

He was well oriented in time and place, cooperative, anosognosic for his neurological deficits, with mild personal and peripersonal spatial neglect, left hemianopia, mild hemiparesis with facial involvement, and mild left hemianaesthesia for superficial sensory disturbances without profound sensory deficits.

The magnetic resonance imaging (MRI) revealed a **right parietal-temporal-occipital ischemic lesion**, with the involvement of the **ipsilateral thalamus** (Fig. 2).

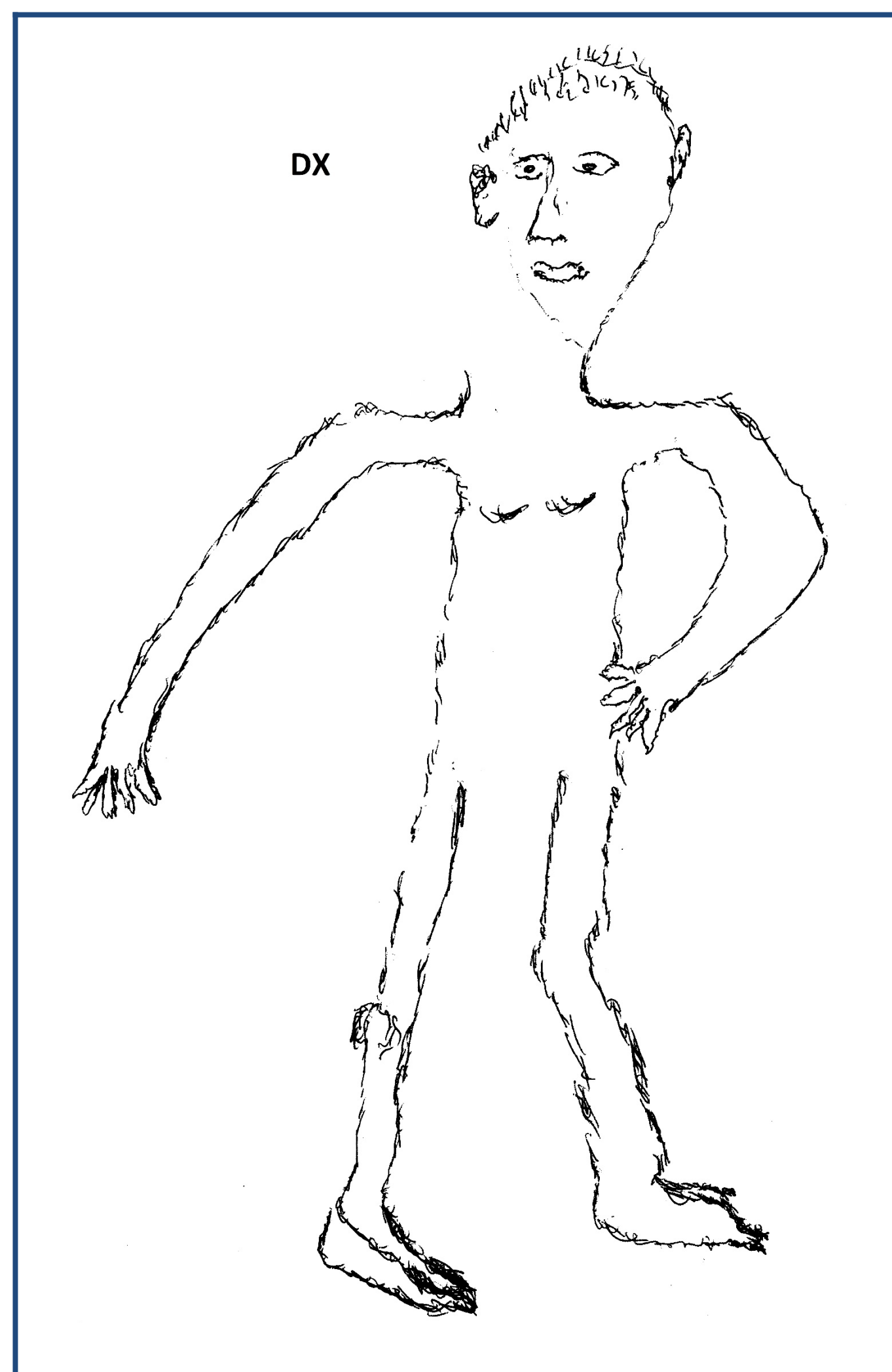


Fig. 1 - The representation of his body drawn by the patient.

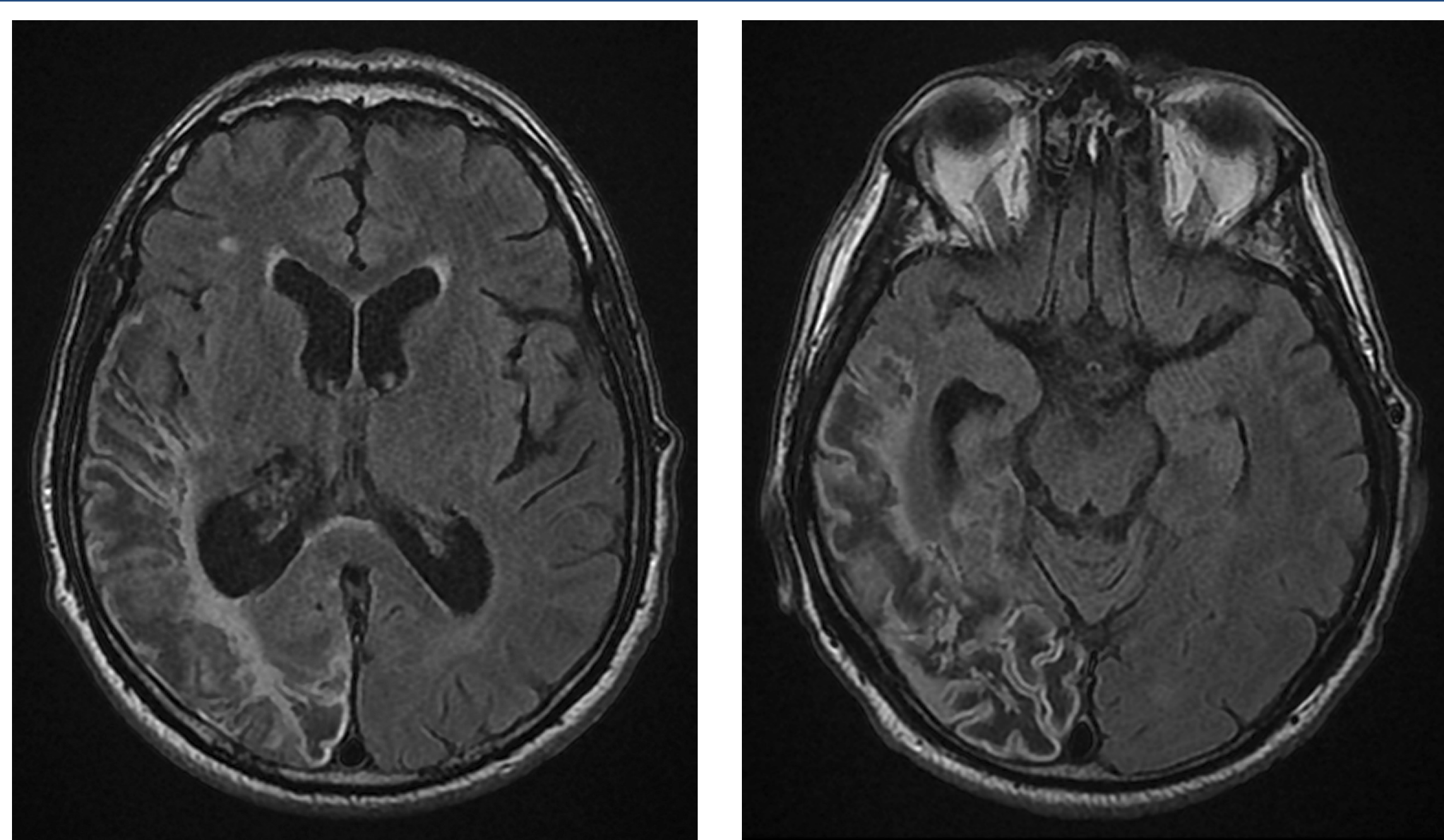


Fig. 2 - Magnetic Resonance images (MRI).

	O.S.	C.S.	E.S.
LOGIC SKILLS			
Raven test	10	13.3	0
Verbal judgments	49/60	49.5	3
MEMORY AND LEARNING			
Spatial span	4	4.25	2
Digit span forward	5	5.25	4
Prose memory			
immediate recall	5.3	5.7	3
delayed recall	5.6	6.3	4
EXECUTIVE FUNCTIONS			
Digit span backward	4	4.39	4
Weigl test	8/15	9.2	1
ATTENTIVE FUNCTIONS			
Attentive Matrices	32/50	32.3	2
VISUAL-SPATIAL AND CONSTRUCTIVE SKILLS			
Clock drawing test	9		**
Constructive apraxia	4	4.25	0
Rey-Osterrieth Complex Test - Copy	26/36	28.25	0
Stars cancellation (omissions) - BIT	3 sin 2 dx		**
Reading of senteces	6		**

Tab. 1 - Neuropsychological assessment.

O.S.: Original Score; C.S.: Correct Score; E.S.: Equivalent Score.

0: Pathological; 1: Borderline; 2,3,4,**: Normal

He had good communication and social skills and neuropsychological examination (Tab.1), excluded diffuse cognitive alteration (*Mini-Mental State Examination*: 27/30).

He referred to his left hand as if it has a personality: if "she" behaved well he rewarded "her" by kissing or by watching a football match; if "she" behaved badly, he was aggressive with "her". Sometimes he perceived an intact and healthy "third hand" to the left of his left hand. He related to us that he tried to overlap the "third hand" on his left hand, but every time he tried to move the "third hand", his left hand "run away" to the right. When it happened, he was annoyed and, when he did not feel the "third hand" anymore, he said: "Fortunately it has gone!". This phenomenon decreased progressively over the next few months.

Discussion

The right hemisphere seems to be involved in the internal representation of the body state. An extensive cortical fronto-temporal-parietal network constitutes the neural underpinnings of the body ownership and, in particular, posterior temporo-parietal structures have a relevant role (2). In the right brain-damaged patients, the failure to correctly integrate multimodal sensitive and motor information, may produce an erroneous perception (e.g. as if the limb is in two different places).

Conclusion

The "mismatch" between afferent and efferent information may cause a sort of "strange" perceptual illusion (e.g. third hand). "Incoherent reorganization" of brain networks may cause a perceptual completion with positive symptoms, such as the phenomenon of supernumerary limb.