CONSCIOUSNESS AND COGNITION 4, 22–51 (1995)

Anosognosia in Parietal Lobe Syndrome

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Patients with right parietal lesions often deny their paralysis (anosognosia), but do they have "tacit" knowledge of their paralysis? I devised three novel tests to explore this. First, the patients were given a choice between a bimanual task (e.g., tying shoe laces) vs a unimanual one (e.g., threading a bolt). They chose the former on 17 of 18 trials and, surprisingly, showed no frustration or learning despite repeated failed attempts. I conclude that they have no tacit knowledge of paralysis (or, if such knowledge exists, it is not available for this particular task). Second, I used a "virtual reality box" to convey the optical illusion to the patient that she was moving her paralyzed left hand up and down to the rhythm of a metronome, and yet she showed no sign of surprise. Third, I irrigated patient BM's left ear canal with cold water, a procedure that is known to shift that patient's spatial frame of reference by stimulating the vestibular system. Surprisingly, this allowed her "repressed" memory of the paralysis to come to the surface; she said she had been paralyzed continuously for several days. I suggest that the vestibular stimulation produces these remarkable effects by mimicking REM sleep. These patients also employ a whole arsenal of grossly exaggerated Freudian "defense mechanisms" to account for their paralysis. To explain this, I propose that in normal individuals the left hemisphere ordinarily deals with small, local anomalies by trying to impose consistency but, when the anomaly exceeds threshold, an interaction with the right hemisphere forces a "paradigm shift." A failure of this process, in patients with right hemisphere damage, might partially account for anosognosia. Finally, I present a new conceptual framework that may help link several psychological and neurological phenomena such as Freudian defense mechanisms, vestibular stimulation, anosognosia, memory repression, visual illusions, anterograde amnesia, REM sleep, dreaming, and humor.

The social scientists have a long way to go to catch up, but they may be up to the most important scientific business of all, if and when they finally get to the right questions. Our behavior toward each other is the strangest, most unpredictable, and almost entirely unaccountable of all the phenomena with which we are obliged to live.

Lewis Thomas

INTRODUCTION

In 1914, the French neurologist Babinski described an extraordinary neurological syndrome. He noticed that some of his patients, who were completely paralyzed on the left side of the body as a result of a right hemisphere stroke, tended to deny their paralysis and he coined the term "anosognosia" (denial of illness) to describe the condition. Anosognosia can vary in severity from a mere indifference to one's disability to a vehement denial of the paralysis, even when con-

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fronted with incontrovertible proof. For example, if the patient is asked to perform a specific task with her paralyzed left hand, she may fail to do so but may continue to insist that she is not paralyzed. In its most extreme form, the patient may even deny that the arm belongs to her and ascribe it to either the examiner or to her spouse! (This disownership phenomenon was called "somatoparaphrenia" by Gerstmann (1942).)

One explanation for anosognosia[1] would be in psychodynamic terms: the patient denies her illness in order to "protect her ego." This interpretation doesn't account for two important aspects of the syndrome. First, the syndrome is seen only when the right parietal lobe is damaged and only rarely when the left parietal lobe is involved (Critchley, 1966; Babinski, 1914). Second, the denial is often domain specific, e.g., the patient will admit she had a severe stroke but denies paralysis or, on occasion, will even admit that her leg is paralyzed but insist that her arm isn't. For discussions on these topics, the reader is referred to several lucid and insightful recent reviews (Galin, 1992; Edelman, 1989; Damasio, 1994; Heilman, 1991; Levine, 1990; McGlynn & Schacter, 1989; Halligan, Marshall, & Wade, 1993) as well as more classic papers in the older neurological literature (Critchley, 1962; Juba, 1949; Waldenstrom, 1939; Ehrenwald, 1930; Cutting, 1978; Weinstein & Kahn, 1950).

Another more "cognitive" interpretation of the syndrome would be in terms of the hemineglect–heminattention that often accompany the denial, i.e., one could argue that the patient neglects her paralysis in much the same way that she neglects everything else on the left side. This hypothesis is probably at least partially correct but it doesn't account for why the denial usually persists even when the patient's attention is drawn to the paralysis. Nor does it explain why the patient does not *intellectually correct* her misconception even though she may be quite lucid and intelligent in other respects. Indeed, the reason anosognosia is so puzzling is that we have come to regard the "intellect" as primarily propositional in character and one ordinarily expects propositional logic to be internally consistent. To listen to a patient deny ownership of her arm and yet, in the same breath, admit that it is attached to her shoulder is one of the most perplexing phenomena that one can encounter as a neurologist.

What would happen if the patient is repeatedly asked to perform an action with her left hand? I recently tried this on a patient, Mrs. LR (clinical details for this and other patients are described in a later section). I found that if her failure to perform were pointed out to her, she would usually "rationalize" her failure with statements such as, "My shoulder hurts a lot today; I have arthritis, you know," or "I didn't really want to point that time." After several such trials, however, she eventually admitted she was paralyzed. Yet, curiously, when questioned again just 10 min later, she not only reverted to denial—insisting that her left hand was fully functional—but also claimed that she had successfully used that hand during the preceding testing session (Ramachandran, 1994a,b)! This was

[1] Throughout this paper I restrict the use of the word anosognosia to denial of hemiplegia, not to the generic use of the word to indicate denial of other types of deficits.