ANOSOGNOSIA FOR PLEGIA: SPECIFICITY, EXTENSION, PARTIALITY AND DISUNITY OF BODILY UNAWARENESS

Anthony J Marcel[1], **Richard Tegnér**[2] **and Ian Nimmo-Smith**[1]

([1]Medical Research Council, Cognition and Brain Sciences Unit, Cambridge, UK; [2]Department of Clinical Neuroscience, Neurology Section, Karolinska Hospital, Stockholm, Sweden)

ABSTRACT

This study of anosognosia for hemiplegia investigated: whether it is homogeneous; specificity to plegia of unawareness; extension to different kinds of and objects of awareness regarding plegia; partiality of unawareness. Sixty-four hemiplegic stroke patients were assessed with control subjects on (a) motor and somatosensory function, immediately followed by participants' evaluations of performance; (b) conventional structured interview questions addressing awareness of various capacities; (c) Neglect, Mental Flexibility, General Mental State, Verbal Fluency, Short-Term Memory; (d) pre- and post-performance estimates of ability on the last two; (e) estimates of current ability on bilateral and unilateral tasks, addressed by questions in 1st- and 3rd-person forms, explanations of how overestimated tasks would be accomplished, attempts at 3 bimanual tasks and post-attempt estimates of ability on these.

Anosognosia for plegia was mostly associated with right-brain damage. No single factor or combination accounted for all patients. Double dissociations indicated that anosognosia can be specific to plegia; and patients do not generally overestimate other abilities. Although unawareness of paralysis and of its consequences appear linked, the latter is more widespread and persistent. Double dissociation showed that concurrent unawareness of movement failures is a separate deficit from these.

There was differential awareness of different aspects of plegia. Further, some patients who overestimated current bilateral task ability when asked in 1st-person form did not overestimate when asked how well the examiner, if he was in their current condition, could do each task. This suggests split awareness of a single aspect of plegia.

Patients anosognosic on conventional questioning showed two distinctions. (1) Some were unaware of movement failures when they occurred; others were aware but quickly forgot such failures and seem unable to update long-term body knowledge. (2) Some patients' explanations of bimanual task performance reflect unawareness of hemiplegia; others' explanations were bizarre and imply some awareness. The latter group's deficit appears to be nonspecific and linked to right-hemisphere predominance of anosognosia, an account of which is offered. Anosognosia for hemiplegia is not a unitary phenomenon: several factors underlie deficits in bodily awareness.

Key words: anosognosia, cerebrovascular disorders, consciousness, hemiplegia, body, awareness, unawareness

INTRODUCTION

Although this paper deals with several aspects of anosognosia for plegia, one thing above all motivates it. Many investigators have proposed explanations of the phenomenon; yet it is not clear that we have a secure grip on the characteristics, within and across patients, of what we are trying to account for. We wish to remedy that.

When central neurological damage yields paralysis (plegia) or loss of sensation, a variety of psychological phenomena related to the affected limbs may occur, separately or in combination. One of these phenomena is Anosognosia. The term was introduced by Babinski (1914) to describe the apparent lack of awareness of hemiplegia following an acute brain lesion. It is much more commonly reported in right-brain-damaged (RBD) than left-brain-damaged (LBD) patients and may express itself in different forms. Patients may say they are not paralyzed and that there is nothing wrong with them, or they may admit to some weakness but ascribe it to a benign cause such as a sprained ankle or arthritis. A lack of awareness of plegia may manifest itself only in the patient's continued attempts at activities involving the plegic limb, while acknowledging the paralysis in conversation almost simultaneously (Bisiach and Geminiani, 1991). Alternative to unawareness, sometimes patients concede that they are paralyzed but show an abnormal attitude towards the plegic limb(s). Most common is an apparent lack of concern or interest (anosodiaphoria; Babinski, 1914)) less common is the opposite where patients express hatred towards the affected limb(s) (misoplegia; Critchley, 1962). Other patients show a variety of bodily delusions (somatoparaphrenias; Gerstmann, 1942) whereby they disclaim ownership of the limb, or attribute it to someone else, or even treat the limb as a separate person or object in its own right. To what extent these phenomena are linked, or parts of the same primary phenomenon, or alternative secondary reactions to a primary phenomenon is a moot point.

Anosognosia is of great clinical importance, since rehabilitation is ineffective so long as the patients are unaware of or fail to explicitly acknowledge their deficit (Gialanella and Mattioli, 1992). In addition, anosognosia could be of great theoretical importance, since understanding its nature and underlying causation could contribute to understanding consciousness and self-consciousness.

A major problem is that there is little consensus

on the characterisation of anosognosia for plegia or whether it is a single phenomenon (Prigatano and Schacter, 1991). Different theories apply to different characterisations. Moreover the terms "aware" and "unaware" are often used loosely. The possible characterisations are numerous: a lack of afferent proprioceptive information, of proprioceptive phenomenal experience, or of awareness of such experience, (e.g. due to attentional failure); a failure to update long-term bodily knowledge (e.g. that one cannot move one's left arm); a delusory but otherwise normal experience of limb movement; a refusal to attend to or acknowledge movement failure; a state of confusion; a superficial conversational denial for social reasons. An apparent "lack of awareness" may turn out to be different phenomena in different patients and even in a single patient. In response to the question "how can one fail to notice a sudden loss in one's physical or mental capability?", two issues have dominated the discussion. First, is anosognosia due to confusion or general intellectual loss, or does it reflect a specific cognitive impairment? Second, what are the roles of motivational and non-motivational factors?

Although studies where all anosognosic patients were disoriented (Weinstein and Kahn, 1955; Ullman, 1962) have suggested that a global intellectual impairment is a prerequisite for anosognosia, especially for its chronic persistence (Levine, 1990; Levine et al., 1991), its presence in patients with normal mentation and orientation indicates that it can be due to a specific cognitive loss (Babinski, 1914; Joltrain, 1924; Waldenström, 1939; Gilliat and Pratt, 1952; Willanger et al., 1981a). The latter view is supported by patients with more than one deficit who are aware of one while unaware of another (Bisiach and Geminiani, 1991; Berti et al., 1996).

Regarding the role of loss of proprioception, in Levine et al.'s (1991) study all patients with persistent anosognosia for hemiplegia had severe hemisensory loss. Levine (1990) took this as support for the 'discovery theory', which claims that sensory loss is not per se accompanied by any sensation but is something that has to be discovered by self-observation and inference. Levine suggests that a concomitant loss of proprioception would prevent patients from having any immediate awareness of their plegia. He claims that anosognosic patients also suffer a general intellectual loss and mental inflexibility and are therefore incapable of detecting plegia by other means (e.g. observation, inference). Reports of anosognosic patients without proprioceptive loss (Bisiach and Geminiani, 1991; Berti et al., 1996) weaken the generality of this view.

Although hemispatial neglect is correlated with anosognosia (Gross and Kaltenbäck, 1955; Willanger et al., 1981b; Bisiach et al., 1986), severely anosognosic patients exist without signs of neglect (Bisiach et al., 1986; Berti et al., 1996). Most authors therefore believe neglect is neither necessary nor sufficient for anosognosia (Cutting, 1978; Levine et al., 1991; Bisiach et al., 1986). Bisiach and Berti (1987, 1995), however, regard unawareness of cerebral hemisyndromes as just one facet of a more general representational disorder, of which other facets are neglect phenomena and somatoparaphrenic delusions.

Regarding motivation, refusal to acknowledge illness or putting it out of one's mind occurs in many disabling conditions (e.g. coronary infarction and lung cancer; Caplan and Shechter, 1987), and is a way to cope with stress. Similarly, anosognosia has been seen as a defence mechanism whereby distressing symptoms are blocked from awareness or disguised in symbolic form as in somatoparaphrenia (Weinstein et al., 1964). Yet several studies find no evidence that anosognosic patients show a tendency to deny illness of just any kind (Cutting, 1978; Willanger et al., 1981b; Levine et al., 1991), and Bisiach and Geminiani (1991) give a comprehensive critique of the motivational viewpoint.

If so many different characterising views can be held about a single phenomenon, could several of them each have a share of the truth? Could the phenomenon be multifaceted, or might it even be not singular? As the preceding paragraphs show, theorists have tried to find a unified explanation for anosognosia. We have to consider, however, whether different explanations are appropriate for lack of awareness of different deficits, or even for different types of lack of awareness of a single deficit. Aside from this a number of important issues need to be clarified (Schacter and Prigatano, 1991), especially the *extension*, *specificity* and *partiality* of anosognosia. Extension means what kinds of awareness or objects of awareness can be compromised. Knowing one has a movement problem can be quite distinct from awareness of particular failures of movement. Specificity refers to the degree to which lack of awareness is restricted to a particular deficit. Partiality refers to whether unawareness of one's deficit is less than total. These issues are related and sometimes hard to separate.

Regarding extension, Rubens and Garret (1991) describe patients who are aware of their aphasia but not aware of their on-line errors. Distinguishing between awareness of deficit and awareness of symptoms as they occur, they point out that aphasic patients may be aware of one kind of symptom but not of another. The apparent opposite of the above also sometimes occurs, where the patient is aware of inability at the time of the attempt but moments later denies having a deficit. These phenomena indicate that there may be more than one kind of awareness or that awareness may differ according to its object. This has not been studied in detail in anosognosia for hemiplegia.