

Cognitive– behavioural syndromes of neglect and anosognosia



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Considering the neuropsychological diseases discussed during the course, critically compare and discuss theoretical interpretations of at least two syndromes

Consciousness is one of the most interesting phenomena of the human mind. Consciousness refers to the integration of the cognitive experiences about self and the external environment (Orfei et al., 2007). However, when this psychological function is damaged, it may lead to dysfunctions in the attention and awareness of personal identity. The focus of the following essay is to provide insight into why the cognitive-behavioural syndromes of neglect and anosognosia for hemiplegia that occur following right hemisphere stroke develop, and to evaluate to what extent this is true, taking into consideration their theoretical interpretations.

Anosognosia has been defined by Babinsky (1914) as an impairment leading to unawareness of neurological and cognitive deficits following a brain injury. Individuals who suffer from anosognosia present with motor impairments which lead to gait and self-care deficits and are unaware of their impairments in functioning (Kortte & Hillis, 2010). The syndrome of anosognosia often co-occurs with visuo-spatial neglect (Prigatano et al., 2011). Heilman, Watson and Valenstein (1994) defined neglect as a deterioration in attention towards or in response to a stimuli, which is not attributable to a motor or sensory impairment. Neglect is presented as a spectrum, with a variety of forms based on the regions of the lesion, the mode of outputs, reference frame and the sensory modality (Hillis & Caramazza, 1995).

Alongside their co-occurrence, anosognosia and neglect also overlap in terms of lesion sites, to be more specific, the right temporo-parietal junction, the superior and middle temporal gyri and the right insula (Beschin, Cocchini, Allen & Della Sala, 2012). The lesion in the right temporo-parietal junction is extremely important in mechanisms of selective attention. More recent neuroimaging studies have recommended that parts of the parietal and temporal cortex are creating a supramodal structure that interposes goal-directed attention in multiple sensory modalities (Chambers, Stokes & Mattingley, 2004). Furthermore, neuroimaging studies show that the insula is very important in self-awareness and in one's convictions about the functioning of their body parts (Karnath, Baier & Nagele, 2005).

Taking these in consideration, a lesion in these areas will lead to a dysfunction in directing attention towards a specific stimulus and about their beliefs of body parts functioning, therefore affecting the motor system.

The two theoretical interpretations that provide a link between anosognosia and neglect, taking in consideration the dysfunctions presented earlier, are the attentional interpretation model for neglect and the feed-forward model for anosognosia.

The attentional interpretation model is a model proposed by Heilman et al. (1993) which states that each hemisphere is provided with its own attentional neurological system, with the attentional system in the right hemisphere directing attention towards both sides of the visual field, whereas the attentional system in the left hemisphere directing attention only towards the right visual field. Therefore, if there is a damage to the left

hemisphere, there won't be a severe right neglect, whereas if there is a lesion to the right hemisphere, the patient will be unable to direct his/hers attention to the left visual field (Bisiach et al., 1998).

Corbetta et al. (1993) conducted a PET study on 24 healthy volunteers in order to identify what are the neural systems involved in changing spatial attention towards a visual stimulus in the right or left visual field. Results showed that the right parietal cortex was activated when the participant was required to shift their attention in each visual field, whereas the left parietal lobe was active only when the participants had to change their attention to the right visual field. These findings suggest that the parietal and frontal regions control different aspects of spatial selection and also support the model proposed by Heilman et al. (1993).

However, the attentional interpretation model cannot account for the dysfunctions in the motor system on its own. Therefore, we have to also take in consideration the attentional-arousal hypothesis and the directional hypokinesia. The attentional-arousal hypothesis suggests that neglect is predominantly a form of inattention emerging from the failure of triggering arousal that is needed to activate the neuronal systems necessary for spatial attention (Heilman & Valenstein, 1972; Watson et al., 1973, 1974).

Furthermore, the attentional hypothesis appears to be in close connection with the motor intention, since when one is directing his/hers attention towards a specific location, one is also ready to perform an action in that direction (Heilman & Valenstein, 2003).

Directional hypokinesia suggests that patients who suffer from neglect are reluctant in initiating movements towards the contralesional side. Moreover, even when patients are directing attention towards the neglected side and have imposed on them a strategy, their performance not only remained abnormal, but it doesn't improve (Heilman & Valenstien, 1979).

In a study conducted by Heilman and Valenties (1979), six patients with neglect were asked to identify a letter that was presented either to the left or right at the end of a line, before bisecting it. The task included lines that were placed at either the left of the body midline, the right, or the centre. Results showed that participants performed significantly better when the line was placed to the right side of the body rather than the left side. These results suggest that the neglect syndrome is a defect in the orienting response. Heilman and Valenstien (1979) suggested that this response appears in anticipation of an action, using the increased arousal to lower the sensory threshold. Therefore, lesions inducing neglect are affecting the arousal (as previously mentioned via the attentional-arousal hypothesis), leading to the inability of the hemisphere to prepare for the action.

Based on the same dysfunction of the computational model of motor control is the feed-forward model for anosognosia. More recent theories established on the recent computational models of motor control proposed by Frith et al. (2000), suggest that anosognosia results from an abnormality in motor planning. This theory suggests that, under normal circumstances, in order to develop the intention to move, "forward models" are being used in order to generate accurate indicators about the approaching sensory feedback.

However, if an intended movement is not executed as planned, than a <https://assignbuster.com/cognitivebehavioural-syndromes-of-neglect-and-anosognosia/>

comparator will detect a discrepancy between what it was predicted and the absence of sensory feedback. Therefore, this error can be used to inform the motor system of a malfunction. Furthermore, Heilman and colleagues (1998) proposed that anosognosia is a 'motor intentional deficit' which appears from a failure to form motor intentions. Therefore, if the development of an intention to move is deficient, then the comparator doesn't receive any instructions about the outline of the movement and the patient considers that the movement has been executed, although no movement has taken place (Gold et. al, 1994).

Fotopoulou et al. (2008) conducted a study in which they investigated the role of motor intention in anosognosic patients compared to non-anosognosic patients by detecting whether the anosognosic patients were able to identify the presence or absence of movement focusing only in the visual evidence. False visual feedback of movement in the left paralysed arm was used on four hemiplegic with and four without anosognosic patients. This false visual feedback was delivered using a prosthetic rubber hand. Results showed that patients with anosognosia were more likely than patients without anosognosia to ignore the visual feedback and believe that they moved they hand if there was an intention to move the hand (in the self-generated condition) than when the experimenter moved the rubber hand or when there was no movement. These results support that anosognosia reflects a dominance of motor intention prior to action over the sensory information received after the movement was made (Fotopoulou et al., 2008).

Although the studies presented above do provide a lot of insight in the computational model of awareness and provide an explanation of why these <https://assignbuster.com/cognitivebehavioural-syndromes-of-neglect-and-anosognosia/>

disorders have symptoms such as dysfunctions in directing attention towards a specific stimulus and also about their beliefs of body parts functioning, there are a few limitations to whether these theoretical interpretations can account by their one for the two syndromes.

Firstly, although they may co-occur, anosognosia and neglect have also been observed separately. Cocchini, et al. (2009) investigated whether anosognosic patients present with unawareness in a group of 42 left hemisphere damaged patients, using a structured interview and the Visual-Analogue Test for Anosognosia for Motor Impairment (Della Sala, Cocchini, Beschin & Cameron, in press). Their results showed that eight anosognosic patients and another twelve patients who were aware of their motor impairments didn't showed signs of neglect. These results confirm that anosognosia couldn't be thought of always co-occurring with neglect. Secondly, these results also suggest that there is a double dissociation between anosognosia and neglect (Bisiach et al., 1986).

Dauriac-Le Massonet al. (2002) investigated this double dissociation by looking at two patients with a subacute right hemisphere stroke. Their investigation revealed that one of the patients suffered from a severe left hemiplegia which was associated with unilateral neglect and he showed signs of being aware of his motor impairment, whereas the second patient showed a severe anosognosia for hemiplegia, therefore with unawareness towards his motor impairment. These results suggest that although these two syndromes co-occur, they may rely on independent mechanisms because of their double dissociation.

And lastly, both anosognosia and neglect are multifaceted processes (Marcel et al., 2004) and only the dysfunction in the computational model of motor control cannot account for all the symptoms of these two syndromes. To be more specific, even when patients who suffer from neglect and anosognosia are aware of their deficits, they still deny them.

House and Hodges (1988) detail the case of an 89-year-old woman who suffered left-side paralysis after a right-hemisphere stroke. Although the experimenters demonstrated that her left arm was completely paralysed and her leg nearly paralysed, she failed to understand the severity of her condition and believed that she could still look after herself and walk, although she was in a wheelchair. Furthermore, Marcel et al. (2004) also described the case of several patients who although they were aware of their paralysed limbs, they still overestimated their abilities and believed they can perform bi-manual activities such as clapping their hands or tying a knot. These patients provide examples of another theory of anosognosia, the motivational theory which the patient denies his/hers deficit in order to maintain unharmed his/hers psychological balance (Weinstein & Kahn, 1955; Weinstein, 1991).

In conclusion, the focus of the essay was to provide insight into why the cognitive-behavioural syndromes of neglect and anosognosia for hemiplegia occur, and to evaluate to what extent this was true, by paying attention to their theoretical interpretations. As stated before, due to the lesions to the tempo-parietal region, the gyrus and insula there are dysfunctions in attention and beliefs about body parts functionality. The attentional intention model for neglect (together with the attentional-arousal hypothesis and the <https://assignbuster.com/cognitivebehavioural-syndromes-of-neglect-and-anosognosia/>

directional hypokenisia) and the feed-forward model for anosognosia provide a satisfactory explanation for these deficits by suggesting that there is a dysfunction in the motor system. For the neglect patients the lesions affect the arousal which leads to the inability to prepare them for action. For the anosognosic patients the lesions lead to a failure to form motor intentions, to be more specific if the intention to move is impaired, then the comparator doesn't receive instructions about the planned action and the patient considers that the movement has been executed, even if that didn't happen.

However, these theoretical interpretations of dysfunctions in motor control cannot account on their own for all the symptoms of neglect and anosognosia. Previous literature suggests that although the incidence of co-occurrence is high, there are cases where anosognosia and neglect appear independently and present double dissociations. Furthermore, as proposed by Marcel et al. (2004) both syndromes are multifaceted syndromes and it can't be possible that only one theoretical interpretation can account for these.

In conclusion, both anosognosia and neglect are very interesting phenomena which have captured the attention of many researches, however fundamental issues of theoretical interpretations have not still been answered.

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