

Hemispatial Neglect

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Hemispatial Neglect

Primary Disciplinary Field(s): Neuropsychology, Neurology, Cognitive Neuroscience

1. Core Definition

Hemispatial neglect, often referred to simply as hemineglect or unilateral spatial neglect, is a complex neurological disorder characterized by a profound failure to attend to, respond to, or even acknowledge stimuli presented on one side of space, despite intact primary sensory and motor capabilities. This condition typically arises from damage to specific brain regions, most commonly following a stroke or traumatic brain injury. Crucially, hemispatial neglect is not an eye condition or a primary visual deficit like blindness; patients possess completely healthy visual systems and can theoretically see the entire visual field. The impairment lies at a higher cognitive level, involving attentional and spatial processing in the brain.

The core problem in hemispatial neglect is a disturbance in the brain's ability to construct a complete spatial representation of the world or to direct attention effectively across space. Instead of a sensory loss, it is an attentional bias, where attention is abnormally skewed towards one side of space, leaving the contralateral side largely unnoticed or entirely ignored. This means that while sensory information from the neglected side reaches the brain, it is not consciously processed or integrated into the patient's awareness. This fundamental distinction from sensory deficits is critical for understanding the manifestation and management of the condition.

Perhaps one of the most striking and challenging aspects of hemispatial neglect is the patient's lack of awareness of their own deficit, a phenomenon known as anosognosia. Individuals with neglect often genuinely believe their perception and attention are normal, even when confronted with undeniable evidence of their impairment. This unawareness can lead to significant safety risks, hinder rehabilitation efforts, and profoundly impact their ability to perform daily activities, as the world appears complete and normal to them despite half of it being effectively "missing" from their conscious experience.

2. Etymology and Historical Development

The term "hemispatial neglect" accurately describes the nature of the deficit: "hemi" referring to half, "spatial" indicating a deficit related to space, and "neglect" denoting a failure of attention or response. The alternative term, "hemineglect," is a common abbreviation. Historically, observations of patients exhibiting unilateral inattention date back to the 19th century, with early neurologists noting peculiar behaviors in individuals with brain lesions. However, it was primarily in the mid-20th century that the syndrome gained significant recognition as a distinct neurological entity, separate from primary sensory or motor impairments.

Early descriptions often linked the condition to specific brain regions, particularly the parietal lobe. As neuroimaging techniques and cognitive psychology advanced, the understanding of neglect evolved from a simple sensory or motor deficit to a more complex disorder of attention and spatial representation. Researchers began to differentiate it from hemianopia (a true visual field cut due to damage in the visual pathways) and to explore the neural networks involved beyond single anatomical locations. This shift in understanding was crucial, as it moved the focus from what patients could physically see or move, to how their brains processed and attended to spatial information.

The development of standardized tests, such as line bisection tasks, cancellation tasks, and drawing tests, played a pivotal role in systematically identifying and quantifying neglect. These tools allowed clinicians and researchers to observe the characteristic omissions and biases that define the syndrome, such as patients only copying one side of a drawing or crossing out targets only on one side of a page. This methodological rigor helped solidify hemispatial neglect as a well-defined and extensively studied syndrome within neuropsychology, contributing significantly to our understanding of the brain's attentional systems.

3. Key Characteristics

Attentional, Not Sensory Deficit: Unlike conditions such as hemianopia, where there is a true loss of visual input from a portion of the visual field due to damage to the visual pathways, hemispatial neglect is fundamentally an attentional disorder. The eyes and primary visual cortex are typically intact, meaning sensory information from the neglected side reaches the brain. However, the brain fails to direct attention to this information or integrate it into conscious awareness. This results in a profound disconnect between sensory input and its cognitive processing.

Laterality and Brain Damage: Hemispatial neglect is most frequently observed following damage to the **right cerebral hemisphere**, particularly lesions involving the posterior parietal cortex, temporoparietal junction, frontal lobe, or subcortical structures like the basal ganglia and thalamus. Right-hemisphere damage typically leads to neglect of the **left side of space**. While neglect can occur after left-hemisphere damage, leading to right-sided neglect, it is generally less severe and less common. This asymmetry is often attributed to the right hemisphere's dominant role in mediating global, widespread attention to both sides of space, whereas the left hemisphere's attentional system is thought to be more specialized for the right side of space.

Anosognosia (Lack of Awareness): A defining and often debilitating characteristic of hemispatial neglect is the patient's consistent lack of awareness of their deficit. Patients frequently deny any problems with their attention or perception, even when their behaviors clearly demonstrate neglect (e.g., leaving food on one side of a plate, only dressing one side of their body). This profound

unawareness complicates rehabilitation and can put patients at significant risk, as they may attempt tasks requiring full spatial awareness without recognizing their limitations.

Varied Manifestations: Hemispatial neglect can manifest in numerous ways, affecting various modalities and domains of spatial processing. In visual tasks, patients may omit the left side of drawings when asked to copy them, fail to cross out targets on the left side of a page (a cancellation task), or misplace the center of a line significantly to the right (a line bisection task). In daily life, they might ignore people or objects on their left, fail to eat food from the left side of their plate, or neglect to groom the left side of their face. The neglect can also extend to auditory and somatosensory domains, where patients might ignore sounds or touches on the neglected side.

Motor Neglect and Extinction: Beyond purely sensory or attentional neglect, patients can also exhibit **motor neglect**, characterized by a reduced spontaneous use of the limbs on the neglected side, even in the absence of primary motor weakness (hemiparesis). Another related phenomenon is **extinction**, where a patient can detect a stimulus on the neglected side when presented in isolation, but fails to detect it when a competing stimulus is simultaneously presented on the non-neglected side. This highlights a deficit in competing for attentional resources rather than a complete inability to perceive.

Representational Neglect: Neglect is not limited to external physical space. Some patients also demonstrate **representational neglect**, where they neglect the left side of mental images or memories. For instance, if asked to describe a familiar landmark from memory, they might only recall details from its right side. This suggests that the deficit affects the internal representation of space as well as the processing of external sensory input, pointing to a fundamental disruption in the brain's spatial maps.

4. Significance and Impact

Hemispatial neglect holds significant importance for both theoretical understanding of brain function and practical implications for patient care. From a theoretical perspective, it serves as a powerful model for investigating the neural underpinnings of attention, spatial cognition, and consciousness. The existence of neglect demonstrates that our conscious experience of the world is not a passive reception of sensory data but an active, brain-mediated construction heavily reliant on attentional allocation. Studying neglect helps scientists pinpoint the brain regions and networks critical for these fundamental cognitive processes, illuminating how the brain creates a coherent and unified perception of space.

For individuals afflicted with hemispatial neglect, the impact on daily life is profound and often debilitating. The inability to attend to one side of space significantly impairs their independence and safety. Simple tasks like eating, dressing, reading, or navigating an environment become extremely challenging, as patients may ignore food on half their plate, dress only one side of their body, read

only half a page, or repeatedly bump into objects on their neglected side. This dramatically increases the risk of falls and injuries, limits their ability to drive or perform complex tasks, and can lead to social isolation as they may ignore people interacting with them from their neglected side.

The presence of anosognosia further complicates rehabilitation. Because patients are unaware of their deficit, they often do not understand the need for compensatory strategies or rehabilitation therapies, leading to poor adherence and reduced motivation. Rehabilitation efforts, therefore, must address not only the attentional deficit itself but also the patient's lack of insight. Specialized therapies, such as prism adaptation (wearing glasses that shift the visual field), visual scanning training, and limb activation, are employed to encourage patients to reorient their attention towards the neglected side. However, the effectiveness and long-term retention of these improvements remain areas of active research, highlighting the persistent challenge of this complex condition.

5. Debates and Criticisms

Despite extensive research, several debates and criticisms surround the understanding and treatment of hemispatial neglect. One primary area of discussion revolves around whether neglect is primarily an attentional deficit, a representational deficit, or a combination of both. While it is widely accepted that attention plays a crucial role, the extent to which internal spatial maps are distorted or incomplete remains a subject of investigation. Different theories propose that neglect arises from a disruption in the allocation of attention, a failure to update internal spatial representations, or an imbalance between the two hemispheres' attentional systems.

Another ongoing debate concerns the precise neural correlates of neglect. While lesions in the right parietal lobe are classically associated with left-sided neglect, it is increasingly understood that neglect often results from damage to a distributed network involving the frontal lobe, temporoparietal junction, cingulate gyrus, and subcortical structures. The complexity of this network makes it challenging to pinpoint a single "neglect center" and highlights that the syndrome can arise from disruptions at various points within this highly integrated system. Understanding the exact contribution of each component to the overall deficit is critical for developing targeted therapies.

Furthermore, the variability in the presentation and severity of neglect poses diagnostic and therapeutic challenges. Neglect is not a monolithic condition; its specific manifestations can differ significantly between patients, depending on the lesion's location and extent, as well as individual differences in brain organization. Developing standardized, sensitive diagnostic tools that can capture the full spectrum of neglect, including its subtle forms and its impact across different modalities (visual, auditory, tactile, motor, representational), remains an active area of research. This also extends to the development of rehabilitation strategies, as a "one-size-fits-all" approach is unlikely to be effective for such a heterogeneous syndrome.

Further Reading

[Hemispatial Neglect on Wikipedia](#)

[Unilateral Spatial Neglect - StatPearls - NCBI Bookshelf](#)

[Hemineglect: a review of current theories and rehabilitation strategies - Frontiers in Human Neuroscience](#)

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