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Spatial processing occurs in what lobe

The brain is divided into two halves, called hemispheres. There is evidence that each brain hemisphere has its own distinct functions, a phenomenon called lateralization. The left hemisphere seems to dominate speech functions, language processing and comprehension, and logical reasoning, while the right is more dominant in spatial tasks such as vision-independent object recognition (such as identifying an object by touch or other nonvisual sense). However, it is easy to exaggerate the differences between the functions of the left and right hemispheres; both hemispheres are involved in most processes. In addition, neuroplasticity (a brain's ability to adapt to the experience) allows the brain to compensate for damage to one hemisphere by taking additional functions in the other half, especially in young brains. Corpus Call Callsum The two hemispheres communicate with each other through the callosum corpus. The corpus callosum is a large flat bundle of neural fibers under the cortex that connects the left and right cerebral hemispheres and facilitates interhemispheric communication. The corpus callosum is sometimes involved in the cause of seizures; epileptic patients may undergo a callostomy corpus, or the removal of the callosum corpus. The brain is separated into four lobes: the frontal, temporal, occipital and parietal lobes. The brain is divided into four lobes, each associated with different types of mental processes. Clockwise from left: the frontal lobe is blue, the parietal lobe is yellow, the occipital lobe is red and the temporal lobe is green. The frontal lobe The frontal lobe is associated with executive functions and motor performance. Executive functions are some of the first-rate cognitive processes that humans have. Examples include: planning and engaging in goal-based behaviour; Recognize the future consequences of current actions Choose between good and bad deeds prevail and suppress socially unacceptable responses; determine similarities and differences between objects or situations. The frontal lobe is considered the moral center of the brain because it is responsible for advanced decision-making processes. It also plays an important role in preserving emotional memories derived from the limbic system, and modifying those emotions to adapt to socially accepted norms. The temporal lobe The temporal lobe is associated with the preservation of short- and long-term memories. It treats sensory input, including auditory information, language comprehension and naming. It also creates emotional reactions and controls biological impulses such as aggression and sexuality. The temporal lobe contains the hippocampus, which is the memory center of the brain. The hippocampus plays a key role in the formation of emotionally charged long-term memories amygdala. The left temporal lobe holds the primary auditory cortex, which is important for the treatment of speech semantics. A specific part of the temporal lobe, the Wernicke region, plays a key role in the understanding of speech. Another part, the Broca region, underlies the ability to produce (rather than understand) speech. Patients with damage to the Wernicke area can speak clearly, but the words make no sense, while patients with damage to the Broca area will not form the words properly and the speech will be stop and slurred. These disorders are known as Wernicke's aphasia and broca respectively; aphasia is an inability to speak. The places in the Broca and Wernicke areas in the brain. The occipital lobe The occipital lobe contains most of the visual cortex and is the visual processing center of the brain. The cells on the posterior side of the occipital lobe are arranged like a spatial map of the retinal field. The visual cortex receives raw sensory information through sensors in the retina of the eyes, which is then transmitted through the optical pathways to the visual cortex. Other areas of the occipital lobe are specialized for different visual tasks, such as visuospatial processing, color discrimination, and motion perception. Damage to the primary visual cortex (located on the surface of the posterior occipital lobe) can cause blindness, due to holes in the visual map on the surface of the cortex caused by the lesions. The parietal lobe The parietal lobe is associated with sensory skills. It incorporates different types of sensory information and is particularly useful in spatial processing and navigation. The parietal lobe plays an important role in integrating sensory information from various parts of the body, understanding numbers and their relationships, and manipulating objects. It also processes information related to the meaning of touch. The parietal lobe is composed of the somatosensory cortex and part of the visual system. The somatosensory cortex consists of a map of the body that processes sensory information from specific areas of the body. Several parts of the parietal lobe are important for language and visuospatial processing; the left parietal lobe is involved in symbolic functions in language and mathematics, while the right parietal lobe specializes in image processing and map interpretation (i.e. spatial relationships). Model of neural treatment of vision and hearing The hypothesis of the two streams is a model of neural treatment of vision as well as hearing. [1] The hypothesis, given its characterization in a 1992 article by David Milner and Melvyn A. Goodale argues that humans have two distinct visual systems. [2] Recently, there appears to be evidence of two distinct auditory systems as well. As the visual information comes out of the occipital lobe, and the sound leaves the it follows two main routes, or creeks. The ventral current (also known as which pathway) leads to the temporal lobe, which is involved in visual object and object identification and recognition. The dorsal flow (or where the path) leads to the parietal lobe, which is involved in the treatment of the spatial location of the object in relation to the viewer and with the repetition of speech. History where the dorsal flow (green) and the ventral flow (violet) are shown. They come from a common source in the visual cortex Several researchers had proposed similar ideas previously. The authors themselves attribute the inspiration for weiskrantz's work on the viewfinder, and previous research on neuroscientific vision. Schneider first proposed the existence of two visual location and identification systems in 1969. Ingle describes two independent visual systems in frogs in 1973. [4] Ettlinger examined the existing neuropsychological evidence of a distinction in 1990. In addition, Trevartlen had provided an account of two distinct vision mechanisms in monkeys in 1968. In 1982, Ungerleider and Mishkin distinguished the dorsal and ventral streams, respectively as a treatment of spatial and visual characteristics, from their studies of ape lesions - proposing the original where vs. what distinction. Although this framework has been replaced by that of Milner and Goodale, it remains influential. [8] An extremely influential source of information that informed the model was experimental work exploring the existing visual agnosic patient capabilities D.F. The first and most influential report came from Goodale and his colleagues in 1991[9] and the work is still being published on it two decades later. [10] This has been criticized with respect to the model because of the perceived over-reliance on the findings of a single case. Two Goodale and Milner visual systems[2] amassed a range of anatomical, neuropsychological, electrophysiological and behavioural evidence for their model. According to their data, the ventral perceptual flow calculates a detailed map of the world from the visual input, which can then be used for cognitive operations, and the dorsal flow of action transforms incoming visual information to the self-centered (head-centered) coordinate system required for skilled motor planning. The model also posible that visual perception encodes the spatial properties of objects, such as size and location, in relation to other objects in the visual field; in other words, it uses relative measurements and scene-based frames of reference. Planning and planning visual action, on the other hand, uses absolute measurements determined using self-centered frames of reference, calculating the actual properties of objects in relation to the observer. Thus, it has been shown that input movements directed at objects embedded in ambiguous waist-contrast-contrast scenes illusions, as different frames of references and measurements are involved in the perception of illusion in relation to the execution of the act of seizure. [11] Norman[12] proposed a similar model to dual vision processes, and described eight main differences between the two systems compatible with other two-system models. Ventral system factor (what) Dorsal system (where) Function Recognition/identification Visually Guided BehaviorMent Sensitivity High Space Frequencies - Details High Temporal Frequencies - Movement Long-Term Memory Stored Representations Only very short-term storage Relatively Slow Storage Speed Relatively Slow Consciousness Relatively High Typically High Reference Framework Or Focused on the Egocentric Object or vision centered visual input Mainly foveal or parafoveal Through the monocular vision of the retina Generally fairly small effects Often large effects e.g. parallax motion Dorsal flap The dorsal flow is proposed to be involved in the orientation of actions and recognition where objects are in space. Also known as parietal flux, the ù flow, or ommen, this pathway extends from the primary visual cortex (V1) in the occipital lobe forward into the parietal lobe. It is interconnected with the parallel ventral flow (the what) that descends from V1 into the temporal lobe. General Characteristics The dorsal stream is involved in spatial awareness and action orientation (e.g., reaching). In this, it has two distinct functional characteristics: it contains a detailed map of the visual field, and is also good at detecting and analyzing movements. The dorsal flow begins with purely visual functions in the occipital lobe before gradually transferring to spatial consciousness at its end in the parietal lobe. The posterior parietal cortex is essential for the perception and interpretation of spatial relationships, precise body image and learning tasks involving the coordination of the body in space. [13] It contains individually functioning lobules. The lateral intraparietal sulcus (LIP) contains neurons that produce improved activation when attention is shifted to the animal stimulus or jerks to a visual stimulus, and ventral intraparietal sulcus (VIP) where visual and somatosensory information are integrated. Effects of Damage or Injury Damage to the posterior parietal cortex causes a number of spatial disorders, including: Simultanéagnosia: where the patient can describe only simple objects without the ability to perceive it as a component of a set of details or objects in a context (as in a scenario, for example, the forest for trees). optics: where the patient cannot use visuospatial information to guide arm movements. Hemispatial neglect: when the patient is not aware of half the space (i.e., he is not aware of things in his left field of vision and focuses only on in the right field of view; or seem to ignore things in one field of view when they perceive them in the other). For example, a person with this disorder may draw a clock, then label the twelve numbers on one side of the face and consider the complete drawing. Akinetopsia: inability to perceive movement. Apraxia: inability to produce discretionary or voluntary movements in the absence of muscle disorders. Ventral flow The ventral flow is associated with the recognition of objects and the representation of shapes. Also described as the what, it has strong connections to the medial temporal lobe (which stores long-term memories), the limbic system (which controls emotions) and the back flow (which deals with the locations and movement of objects). The ventral flow obtains its main entrance from the parvocellular layer (as opposed to magnocellular) of the lateral gene nucleus of the thalamus. These neurons project successively to the sublayers V1 4C, 4A, 3B and 2/3a. From there, the ventral pathway passes through V2 and V4 to the areas of the lower temporal lobe: PIT (posterior inferotemporal), CIT (central inferotemporal), and AIT (anterior inferotemporal). Each visual area contains a complete representation of the visual space. That is, it contains neurons whose receptive fields together represent the entire visual field. Visual information enters the ventral flow through the primary visual cortex and moves through the rest of the areas in order. Moving along the V1 to AIT flow, receptive fields increase their size, latency, and the complexity of their setting. All areas of the ventral stream are influenced by extra-natural factors in addition to the nature of the stimulus in their receptive field. These factors include attention, working memory, and stimulus salinity. Thus, the ventral current not only provides a description of the elements in the visual world, it also plays a crucial role in assessing the meaning of these elements. Damage to the ventral current can cause the inability to recognize faces or interpret facial expression. [15] Two auditory systems Ventral flow understanding of the expression on cô in the extended version of the Hickok and Poeppel double-track model With the visual ventral pathway being important for visual processing, there is also an emerging ventral auditory pathway from the primary auditory cortex. [16] In this way, phonemes are treated later with syllables and environmental sounds. [17] The information then joins the visual ventral flow to the middle temporal gyrus and the temporal pole. Here, auditory objects are converted into audiovisual concepts. [18] Backflow The function of the auditory dorsal pathway to map auditory sensory representations on articulatory motor representations. Hickok and Poeppel assert that the auditory dorsal pathway is necessary because, 'learning' learning talking is essentially a driving learning task. The main entrance to this is sensory, speech in particular. Therefore, there must be a neural mechanism that encodes and maintains instances of speech sounds, and can use these sensory traces to guide the adjustment of speech gestures so that sounds are reproduced accurately. [19] Repetition of the phrase what is your name? in the extended version of the Hickok and Poeppel double-track model Unlike auditory processing of ventral flow, information enters the primary auditory cortex in the posterior upper temporal gyrus and the posterior upper temporal sulcus. From there, the information moves to the beginning of the dorsal pathway, which is located at the edge of the temporal and parietal lobes near the sylviane crack. The first stage of the dorsal pathway begins in the sensorimotor interface, located in the left Sylvian parietal temporal (Spt) (in the sylviane crack at the parietal-temporal boundary). Spt is important for collecting and reproducing sounds. This is evident because its ability to acquire a new vocabulary, be disturbed by lesions and auditory feedback on speech production, articulatory decline of late deafness and non-phonological residue of Wernicke's aphasia; poor self-monitoring. It is also important for basic neural mechanisms for short-term phonological memory. Without Spt, language acquisition is compromised. The information then moves over the articulatory network, which is divided into two distinct parts. The articulatory network 1, which treats motor syllable programs, is found in the left posterior lower temporal gyrus and Brodmann's zone 44 (pIFG-BA44). The 2 articulatory network is for engine phoneme programs and is located in the left M1-vBA6. [20] Conduction aphasia affects a subject's ability to reproduce speech (typically by repetition), although it has no influence on the subject's ability to understand spoken language. This shows that conduction aphasia should reflect not a weakening of the auditory ventral pathway but instead of the auditory dorsal pathway. Buchsbaum et al.[21] found that conduction aphasia may be the result of damage, especially lesions, to Spt (Sylvian parietal temporal). This is demonstrated by the involvement of Spt in the acquisition of a new vocabulary, because while experiments have shown that most conduction aphasiacs can repeat simple words at high frequency, their ability to repeat complex words at low frequency is impaired. The Spt is responsible for connecting the engine and auditory systems by making the auditory code accessible to the motor cortex. It seems that the motor cortex recreates simple, high-frequency words (such as the cup) to access them faster and more efficiently, while complex, low-frequency words (such as temporal parietal sylvian) require more active online regulation by the Spt. This explains why conduction aphasiacs have particular difficulties with low-frequency words that require a more practical process for the production of speech. Functionally, conduction aphasia has been characterized as a deficit in the ability to encode phonological information for production, namely due to a disturbance in the motor-auditory interface. [22] Conduction aphasia has been more specifically related to the damage of the fasciculus arcuate, which is vital for understanding speech and language, as fasiculus arcuate constitutes the link between Broca and wernicke zones. [22] Goodale and Milner's innovation reviews have been to shift the perspective from an emphasis on entry distinctions, such as the location of objects versus properties, to an emphasis on the functional relevance of vision to behavior, for perception or for action. However, contemporary perspectives, based on empirical work over the past two decades, offer a more complex narrative than a simple separation of function into two parts. [23] Recent experimental work, for example, has challenged these findings and suggested that the apparent dissociation between the effects of illusions on perception and action is due to differences in attention, task requirements and other confusions. [24] [25] There are other empirical findings, however, that cannot be dismissed so easily that provide strong support for the idea that qualified actions such as seizure are not affected by pictorial illusions. [26] [27] [28] [29] In addition, recent neuropsychological research has questioned the validity of the dissociation of the two streams that provided the cornerstone of the model's evidence. The dissociation between visual agnosia and optic ataxia has been disputed by several researchers as not being as strong as initially portrayed; Hesse and his colleagues demonstrated dorsal flow deficiencies in the DF patient; Himmelbach and his colleagues reassessed DF's abilities and applied a more rigorous statistical analysis showing that dissociation was not as strong as previously thought. [10] A 2010 review of the evidence accumulated for the model concluded that, while the spirit of the model was justified, the independence of both components was overestimated. [31] Goodale and Milner themselves have proposed the analogy of tele-assistance, one of the most efficient systems designed for remote control of robots working in hostile environments. In this account, the back flow is considered a semi-autonomous function that works under the direction of executive functions that are themselves informed by the processing of ventral flows. Thus, the emerging perspective within neuropsychology and neurophysiology is that, while a two-system framework was a necessary advance to stimulate the study of the very complex and differentiated functions of the two neural pathways; Reality is more likely to involve between vision for action and vision for perception. Rob McIntosh and Thomas Schenk summarize this position as follows: We should consider the model not as a formal hypothesis, but as a set of heuristics to guide experience and theory. The different information requirements of visual recognition and action orientation still offer a convincing explanation for the large relative specializations of the dorsal and ventral streams. However, in order to advance the field, we may need to abandon the idea that these flows work largely independently of each other, and to address the dynamic details of how the many visual areas of the brain organize from task to task in new functional networks. 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