The human MT complex, also known as the middle temporal complex (MT or MT+), is a critical region in the brain involved in the processing of visual motion. Here are some key aspects of the MT complex:

Location The MT complex is located in the temporal lobe, specifically in the posterior part of the superior temporal sulcus. It is situated near other important visual processing areas, including the primary visual cortex (V1) and the lateral geniculate nucleus (LGN) of the thalamus. Function Motion Perception: The MT complex is primarily responsible for detecting and processing motion in visual stimuli. It plays a vital role in interpreting the direction, speed, and trajectory of moving objects.

Visual Motion Processing: Neurons in the MT complex respond selectively to motion in specific directions. This ability allows for the integration of motion information from various parts of the visual field, contributing to our perception of dynamic scenes.

Depth Perception: The MT complex is also involved in processing depth and three-dimensional motion, aiding in the perception of how far away objects are and how they move in relation to one another.

Neural Properties The MT complex contains a high density of direction-selective neurons, which respond more strongly to motion in one direction compared to others. This selectivity is critical for distinguishing different types of motion.

The MT complex is part of a broader network involved in visual processing, including areas such as V1, V2, and V3, as well as higher-order areas responsible for complex visual perception.

Connectivity The MT complex has extensive connections with other regions involved in visual processing and motor planning, allowing for the integration of visual and motor information. This connectivity is essential for guiding actions based on visual stimuli, such as tracking moving objects or navigating through space. Clinical Significance Visual Motion Deficits: Damage to the MT complex can result in specific deficits in motion perception, a condition known as akinetopsia (motion blindness). Individuals with akinetopsia may have difficulty perceiving moving objects, which can significantly impact their ability to interact with the environment.

Research: The MT complex is a focus of research in fields like neuroscience and psychology, particularly in studies related to visual perception, motion processing, and the neural mechanisms underlying visual awareness.

Understanding the human MT complex is crucial for comprehending how the brain processes dynamic visual information and how these processes relate to behavior and cognition.

The prevailing opinion emphasizes that the fronto-parietal network (FPN) is key in mediating general fluid intelligence (gF). Meanwhile, recent studies show that the human middle temporal complex (hMT+), located at the occipitotemporal border and involved in 3D perception processing, also plays a key role in gF. However, the underlying mechanism is not clear, yet. To investigate this issue, our study targets visuospatial intelligence, which is considered to have a high loading on gF. We use ultra-high field magnetic resonance spectroscopy (MRS) to measure GABA/Glu concentrations in hMT+ combining resting-state fMRI functional connectivity (FC), behavioral examinations including hMT+ perception suppression test and gF subtest in the visuospatial component. Our findings show that both GABA in hMT+ and frontal-hMT+ functional connectivity significantly correlate with the performance of visuospatial intelligence. Further, the serial mediation model demonstrates that the effect of hMT+ GABA on visuospatial gF is fully mediated by the hMT+ frontal FC. Together our

findings highlight the importance of integrating sensory and frontal cortices in mediating the visuospatial component of general fluid intelligence [1)]

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Gao Y, Cai YC, Liu DY, Yu J, Wang J, Li M, Xu B, Wang T, Chen G, Northoff G, Bai R, Song XM. GABAergic inhibition in human hMT+ predicts visuo-spatial intelligence mediated through the frontal cortex. Elife. 2024 Oct 1;13:RP97545. doi: 10.7554/eLife.97545. PMID: 39352734.