Functional magnetic resonance imaging (fMRI) measures the small changes in blood flow that occur with brain activity. It may be used to examine which parts of the brain are handling critical functions, evaluate the effects of stroke or other disease, or to guide brain treatment.

The temporal lobe processes auditory information and memory, while the parietal lobe is involved in sensory perception, spatial awareness, and integration of sensory information.

The temporoparietal junction (TPJ) is a brain region located at the intersection of the temporal and parietal lobes. It is involved in a wide range of cognitive functions, including social cognition, perspective-taking, theory of mind, attentional control, and processing of self-relevant information. The TPJ plays a crucial role in understanding and interpreting the actions, intentions, and mental states of oneself and others, making it essential for successful social interactions and understanding the social world.

The dorsomedial prefrontal cortex (dmPFC) is involved in various cognitive functions, including decision-making, social cognition, self-referential processing, and emotion regulation. It plays a role in monitoring and integrating information from different brain regions to guide behavior and decision-making processes.

Social cognition refers to the mental processes involved in perceiving, interpreting, and understanding social information, including the thoughts, intentions, emotions, and behaviors of oneself and others.

Perspective-taking is a cognitive process that involves mentally imagining oneself in another person's position, understanding their thoughts, feelings, beliefs, and intentions, and seeing the world from their perspective.

Theory of mind (ToM) refers to the ability to understand and attribute mental states—such as beliefs, desires, intentions, knowledge, and emotions—to oneself and others, and to recognize that others may have beliefs and perspectives that differ from one's own.

The temporoparietal junction (TPJ), dorsomedial prefrontal cortex (dmPFC), precuneus, and right and left temporal poles (rTP and lTP) are distinct brain regions with different anatomical locations and functional roles:

Temporoparietal Junction (TPJ):

Location: Located at the junction of the temporal and parietal lobes, typically in the posterior part of the brain.

Function: The TPJ is involved in various cognitive processes, including attention, theory of mind (ToM), social cognition, perspective-taking, and processing of socially relevant information. It plays a crucial role in understanding others' mental states, predicting intentions, and processing social cues.

Dorsomedial Prefrontal Cortex (dmPFC):

Location: Situated in the medial portion of the prefrontal cortex, typically in the frontal lobe.

Function: The dmPFC is associated with higher-order cognitive functions, such as decision-making, self-referential processing, social cognition, mentalizing, and monitoring of self-relevant information. It is implicated in representing self-other distinctions and integrating social information for guiding behavior.

Precuneus:

Location: Positioned in the medial parietal lobe, at the back of the brain, posterior to the parietal lobes.

Function: The precuneus is involved in various cognitive processes, including self-referential processing, episodic memory retrieval, visuospatial imagery, mental imagery, and consciousness. It plays a role in integrating information from different brain regions and is implicated in self-awareness and introspection.

Right and Left Temporal Poles (rTP and lTP; extending into the Superior Temporal Sulcus [STS]):

Location: Found at the anterior end of the temporal lobes, with extensions into the superior temporal sulcus (STS).

Function: The temporal poles are involved in social cognition, emotion processing, language comprehension, memory encoding and retrieval, and semantic processing. They play a role in understanding social cues, empathy, emotional regulation, and processing complex social information.