Distinguishing Between Frontal and Parietal or Frontal and Temporal Lobes on an Axial MRI Brain Scan

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Distinguishing between the frontal and parietal lobes versus the frontal and temporal lobes on an axial brain scan involves identifying specific anatomical landmarks and understanding the typical appearances of these regions. Here are some key points to help you make this distinction:

Frontal and parietal lobes

- **Location:** These lobes are seen together more dorsally (superior) in the brain.
- **Landmarks:**
  - **Central Sulcus (Rolandic Fissure):** The prominent groove that separates the frontal lobe (anterior) from the parietal lobe (posterior).
  - **Precentral Gyrus:** The gyrus immediately anterior to the central sulcus, part of the frontal lobe, associated with the primary motor cortex.
  - **Postcentral Gyrus:** The gyrus immediately posterior to the central sulcus, part of the parietal lobe, associated with the primary somatosensory cortex.

Frontal and temporal lobes

- **Location:** These lobes are seen together more ventrally (inferior) and lateral in the brain.
- **Landmarks:**
  - **Sylvian Fissure (Lateral Sulcus):** The prominent groove that separates the frontal and parietal lobes dorsally from the temporal lobe ventrally.
  - **Insula:** Located deep within the Sylvian fissure, can be seen if the scan is through the depth of the Sylvian fissure.

- **Temporal Horn of the Lateral Ventricles:** The temporal horn extends into the temporal lobe and can serve as a useful landmark for identifying the temporal lobe in axial scans.

Key tips to differentiate the frontal/temporal from frontal/occipital lobes on an axial brain MRI

1. **Central Sulcus vs. Sylvian Fissure:**
   - The **central sulcus** is oriented more vertically on axial images and does not descend deep into the lateral aspect of the brain.
   - The **Sylvian fissure** is more horizontal and extends deeply into the lateral aspect of the brain, creating a clear separation between the frontal and temporal lobes.
2. **Depth and Position:**
   - When viewing more **superior (dorsal) sections** of the brain, you are likely observing the frontal and parietal lobes.
   - In **inferior (ventral) sections**, particularly those showing the Sylvian fissure, you are likely observing the frontal and temporal lobes.
3. **Axial Plane Position:**
   - **High Axial Planes:** Show more of the parietal lobe in conjunction with the frontal lobe.
   - **Mid-Low Axial Planes:** Show the frontal lobe in conjunction with the temporal lobe and the Sylvian fissure.

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We have put together an excellent list of links to the best neuroanatomy learning resources - these include labelled MRI brain scans. You may also be interested in our axial brain MRI localisation article.