

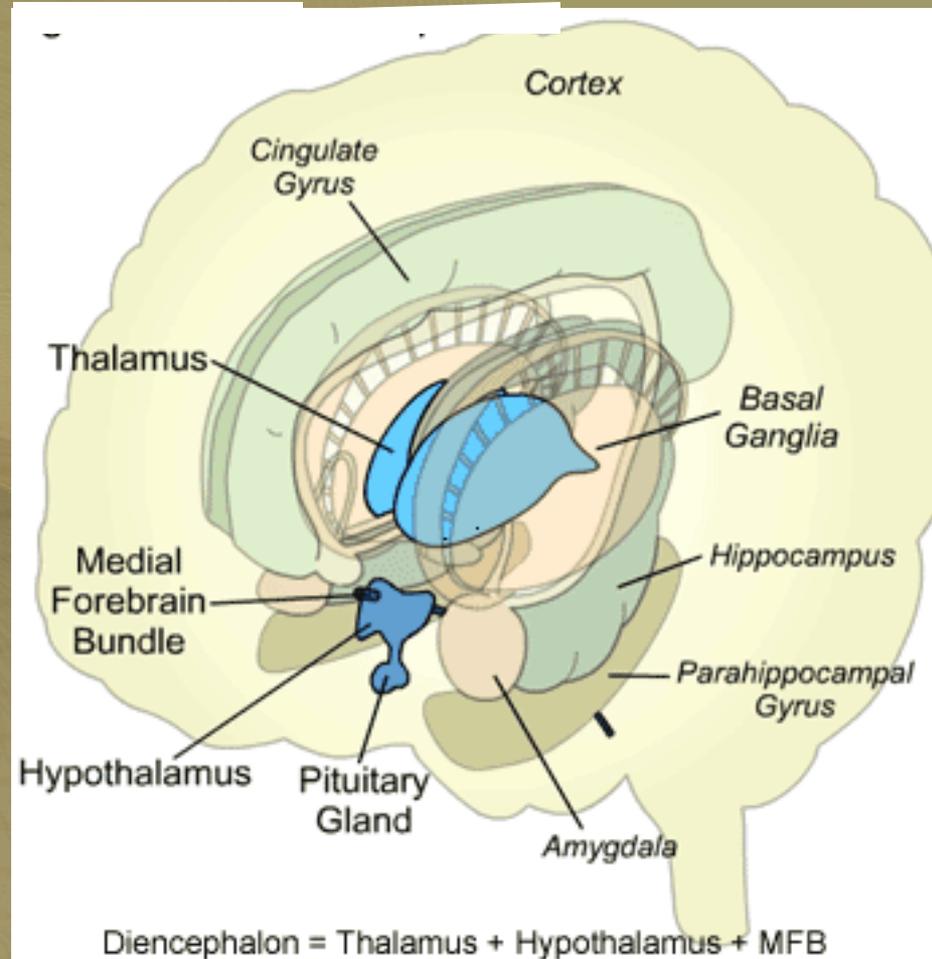
**Reading Disorders**



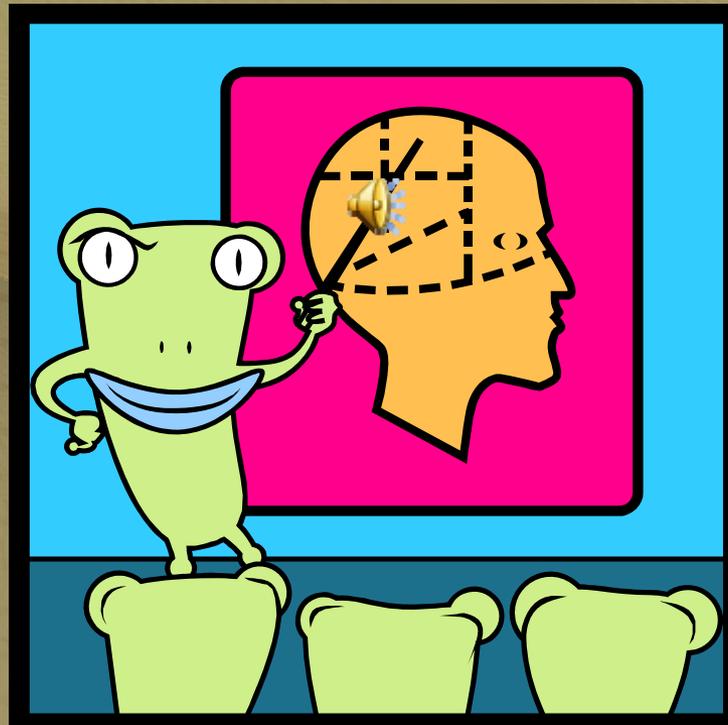
**and**

**Cortical (Brain) Function**

# Beneath the cerebral lobes



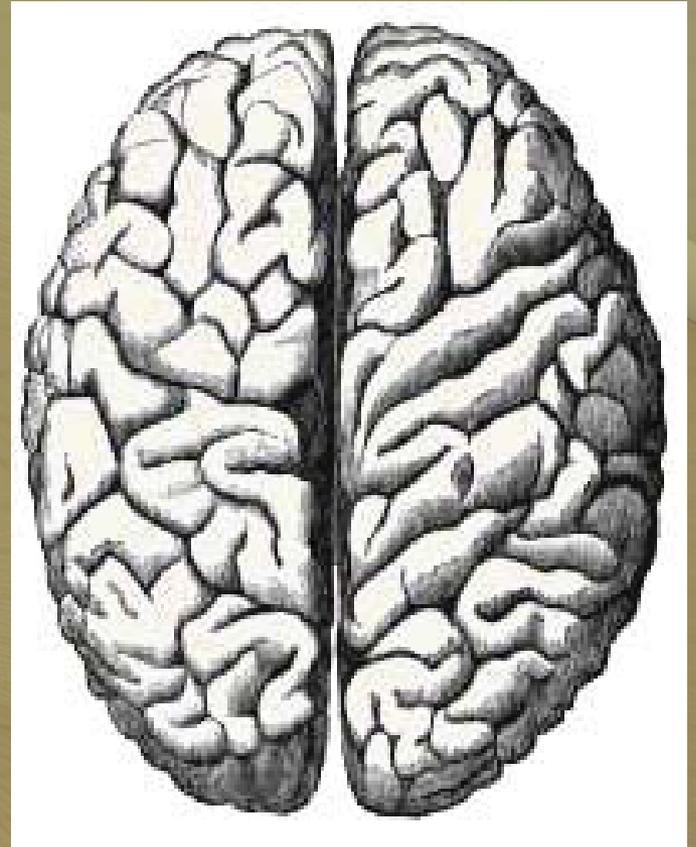
**Scientists are aware that difficulty with specific cortical regions influence learning.**



# Let's Look At Specific Differences In Brain Structure In Individuals With Reading Disorders.

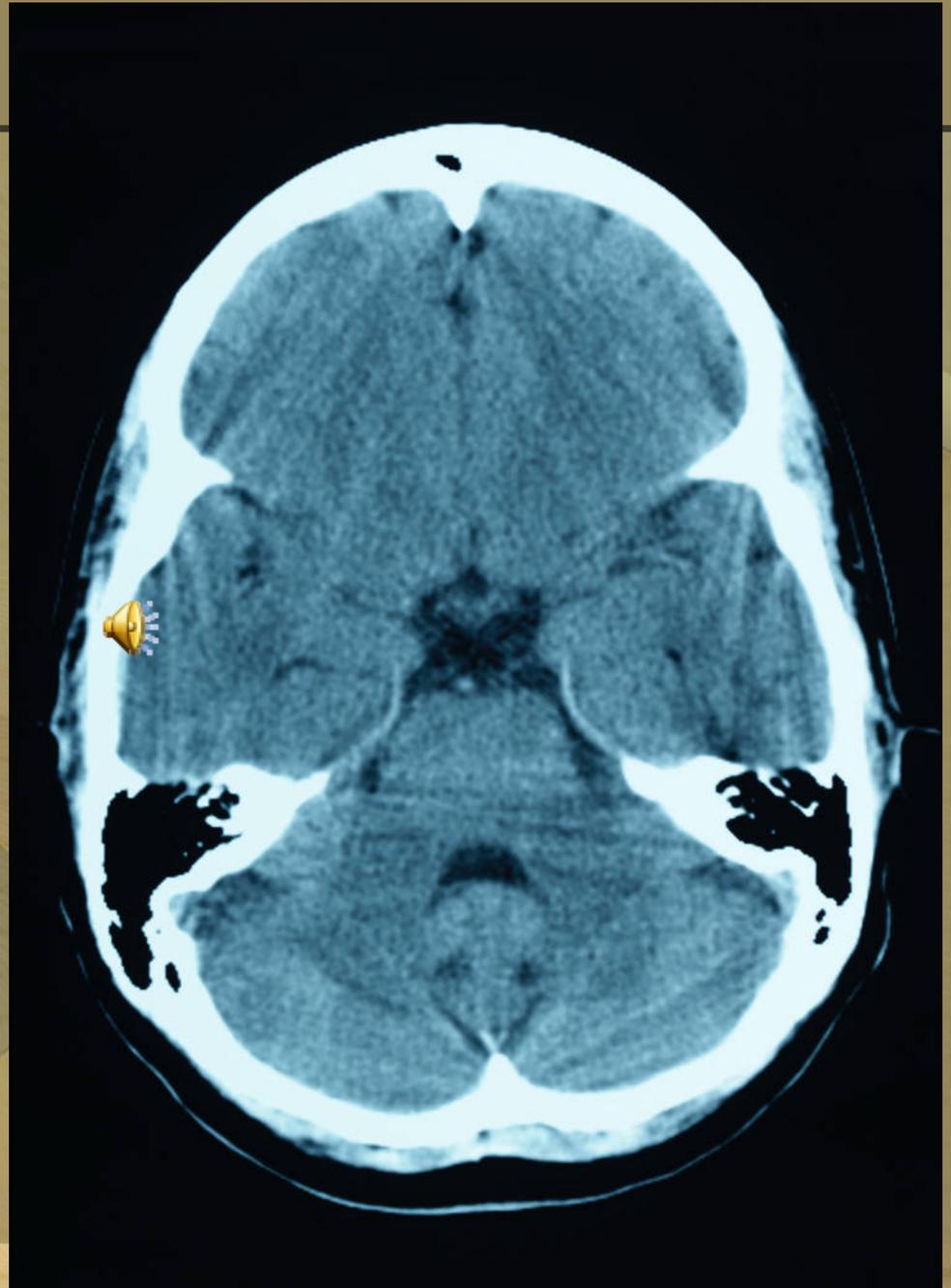
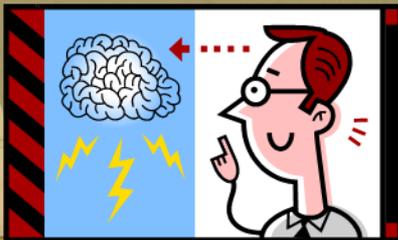


- Studies have shown that brains of subjects with reading disabilities have no asymmetry in brain structures. 🗣️
- Both hemispheres are equal in size.



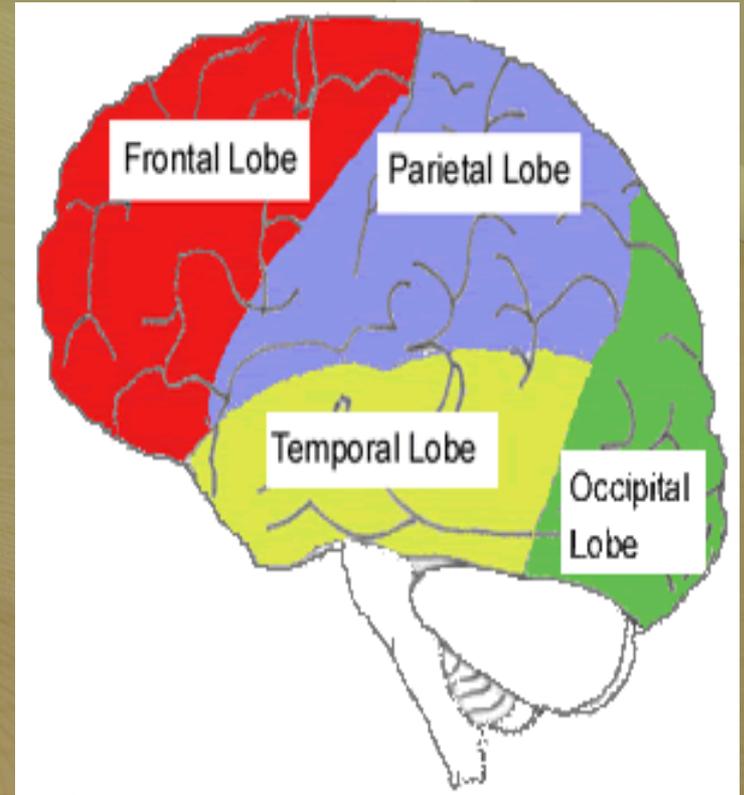
# Asymmetry

Means that the left and right hemispheres are different in size.



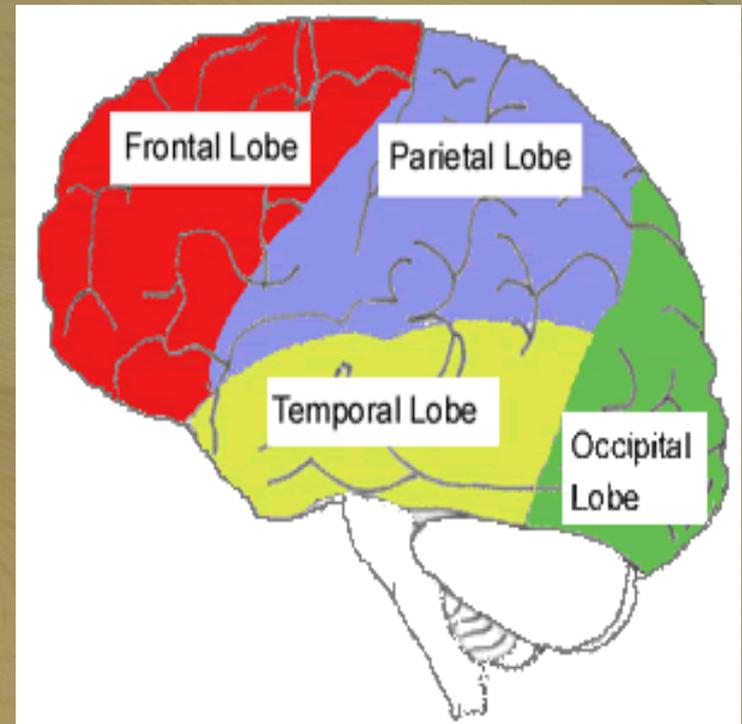
The differences are specific to the temporal lobe.

The temporal lobe or planum temporale area.



In normal individuals there is asymmetry in the size of the temporal lobes.

In subjects with LD,  
the left hemisphere  
has been found to  
be the same size as  
the right  
hemisphere.

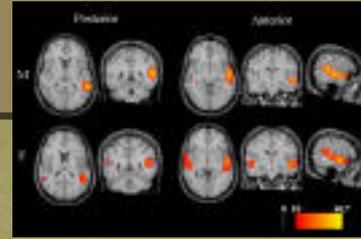


# This is a logical finding since...

- It makes sense that when this area is diminished in size, skills housed in the region will be compromised. 



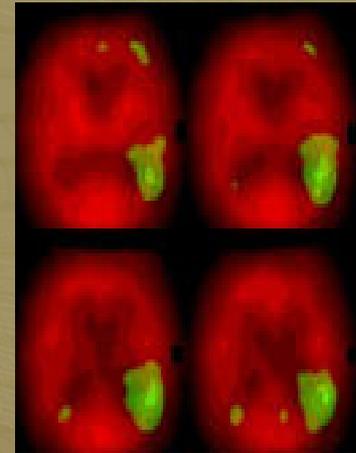
# The CT Scan



- One technique for studying the brain is the CT scan (computed tomography).
- With this technique, an x ray beam is shot through the brain, identifying bone, grey matter, and fluid.
- A computer then reconstructs an image of each slice or brain section allowing abnormalities in structure to be detected.

# The Occipital Lobe Is Located At The Back of the Cerebral Cortex

- CT scans of the occipital lobe have shown asymmetry of the occipital pole in subjects without LD,
- and symmetry in subjects with LD.



# Scientists believe differences in the

**occipital lobe...**



- Are related to how the individual sees words rather than how the individual processes words.
- Many individuals with reading disorders have difficulty with letter stabilization.

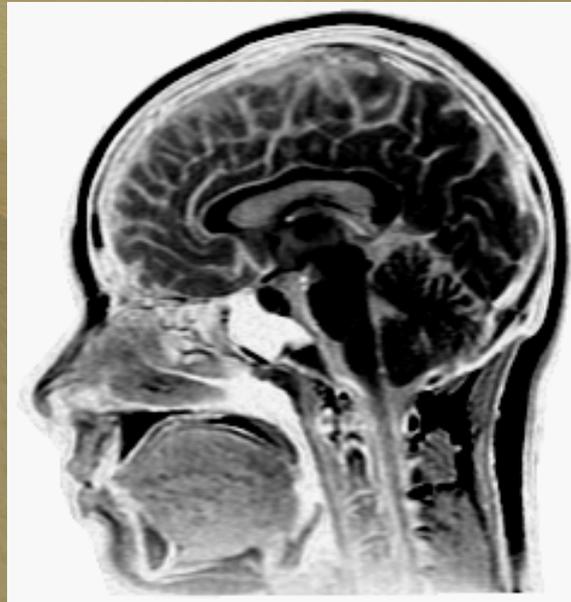
# Letter Stabilization Has To Do With The Orientation Of Letters.

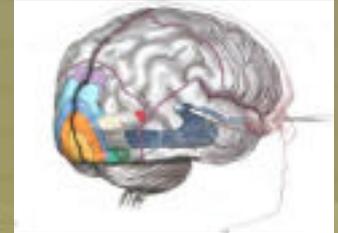
- Individuals with difficulty in this area often confuse b with p, or d, or q.
- Sometimes the letters are reversed.
- This is especially problematic with shorter words so that "was" is often read as "saw."

# **The MRI shows other important differences.**

Magnetic resonance imaging (MRI) involves recording the electromagnetic energy of brain protons and constructing an image by superimposing magnetic fields.

# **The MRI Allows The Practitioner To Gain A Valuable Perspective Of The Brain.**





- MRI's indicate that subjects without LD showed leftward asymmetry in the angular gyrus of the parietal lobe,
- Subjects with Reading Disorders do not show the expected asymmetry.

# These Individuals

- May have difficulty with sound/symbol relationships.



A is for Apple



Or they may have difficulty with movement stabilization. (Sometimes they hate amusement park rides.)



# The MRI and Other Techniques

are used to measure brain activity while subjects are engaged in a task such as reading.



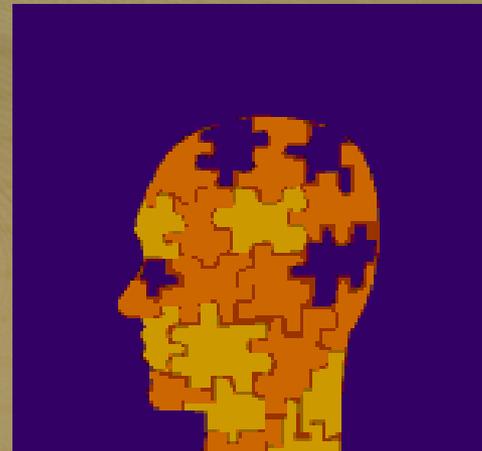
# These Techniques Measure Various Aspects Of Cortical Physiology.

- An fMRI is a non-invasive method that measures blood flow.



- PET and SPECT scans involve the injection of radioactive materials and allow the metabolic activity of specific brain regions to be measured.

SPECT scan results have indicated that subjects with LD show under-functioning in the occipital lobe when reading in comparison to subjects without LD.

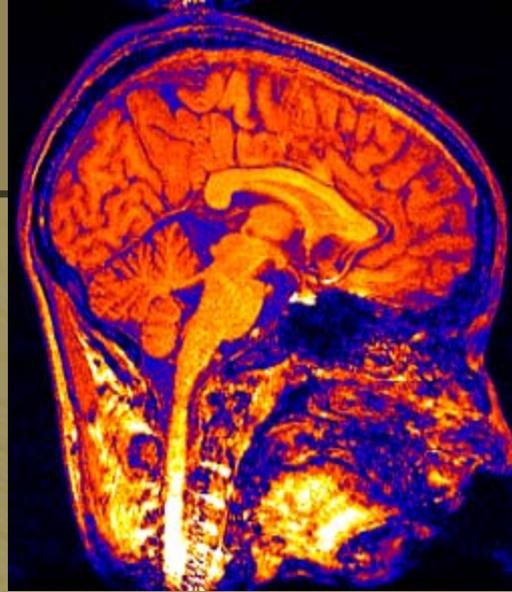


# **These imaging devices...**

**Show collaborative information that testify to cortical differences in LD individuals.**

**These differences indicate brain size and shape differ in various aspects.**

**The differences are specific to the disability.**



This research adds significant support to the hypothesis that Learning Disorders are directly related to brain anatomy.

The individual's low motivation and poor performance are a psychological response to organic differences in the brain.



# These anatomical differences do not prohibit learning...

- Individuals with LD *can* learn;
  - the process may be inefficient because of the differences in brain structure and function.
- Inefficiency presents as:
  - low accuracy or
  - slow speed in learning or performing a task.

**This is quite distinct from inability or incapacity.**

- Information can be processed,
- But it's processed
  - at a slower rate
- and/or by different methods

as compared to individuals without LD.

# **This Presentation Was Prepared For The David Program LaSalle College High School**



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