

Important Methods for Studying the Brain

<i>Accidents & Lesions</i>			
<i>Method</i>	<i>How It Works</i>	<i>Advantages</i>	<i>Disadvantages</i>
Accidents (e.g. Phineas Gage)	<ul style="list-style-type: none"> Examine an individual's behavior after experiencing damage to a specific part of the brain due to an accident 	<ul style="list-style-type: none"> Allows for educated guesses about links between brain structure & function Allows research on fluke circumstances that are impossible/unethical to recreate in lab 	<ul style="list-style-type: none"> Little or no experimental control Issues associated with case studies
Lesions (removal, destruction of part of brain)	<ul style="list-style-type: none"> Examine an individual's behavior after suffering brain damage due to disease, psychosurgery, genetic factors, etc. 	<ul style="list-style-type: none"> Allows for educated guesses about links between brain structure & function Allows research on fluke circumstances that are impossible/unethical to recreate in lab 	<ul style="list-style-type: none"> Little or no experimental control Issues associated with case studies

<i>EEG & Neuroimaging Techniques</i>			
<i>Method</i>	<i>How It Works</i>	<i>Advantages</i>	<i>Disadvantages</i>
Electroencephalogram (EEG)	<ul style="list-style-type: none"> Amplified recording of brain's electrical activity ("brainwaves") via electrodes placed on scalp 	<ul style="list-style-type: none"> High temporal resolution Non-invasive, painless procedure 	<ul style="list-style-type: none"> Low spatial resolution
Computerized Axial Tomography (CAT, CT) scan	<ul style="list-style-type: none"> X-ray cameras rotate around head, combining images into 3D picture of brain structure 	<ul style="list-style-type: none"> High resolution images of brain structure Allows direct view of level of interest 	<ul style="list-style-type: none"> Potential damage due to high radiation levels No information about brain function
Positron Emission Tomography (PET) scan	<ul style="list-style-type: none"> Tracks brain's consumption of radioactive glucose injection, providing images of brain function 	<ul style="list-style-type: none"> Allows researchers to examine which brain areas consume most energy in a given task, thus providing info about brain function 	<ul style="list-style-type: none"> Radiation injection Lengthy process Expensive equipment needed to create radioactive isotopes

			<ul style="list-style-type: none"> • No information about brain structure
Magnetic Resonance Imaging (MRI)	<ul style="list-style-type: none"> • Strong magnetic field causes disorientation of atoms in brain; reorientation = signal as to soft tissue density (picture of brain structure) 	<ul style="list-style-type: none"> • Allows researchers to examine brain structure without exposure to radiation involved with CT scan • Non-invasive, painless procedure 	<ul style="list-style-type: none"> • Can be an uncomfortable, claustrophobic experience • No information about brain function
Functional Magnetic Resonance Imaging (fMRI)	<ul style="list-style-type: none"> • Type of MRI that detects amount of bloodflow in different brain regions (proxy for oxygen consumption; brain function) 	<ul style="list-style-type: none"> • High spatial resolution (3-6 millimeters) • Non-invasive, painless procedure • Quick imaging process 	<ul style="list-style-type: none"> • Can be uncomfortable, claustrophobic experience