Important Methods for Studying the Brain

Accidents & Lesions			
Method	*How It Works*	*Advantages*	*Disadvantages*
Accidents (e.g. Phineas Gage)	• Examine an individual's behavior after experiencing damage to a specific part of the brain due to an accident	• Allows for educated guessed about links between brain structure & function • Allows research on fluke circumstances that are impossible/unethical to recreate in lab	• Little or no experimental control • Issues associated with case studies
Lesions (removal, destruction of part of brain)	• Examine an individual's behavior after suffering brain damage due to disease, psychosurgery, genetic factors, etc.	• Allows for educated guessed about links between brain structure & function • Allows research on fluke circumstances that are impossible/unethical to recreate in lab	• Little or no experimental control • Issues associated with case studies

EEG & Neuroimaging Techniques			
Method	*How It Works*	*Advantages*	*Disadvantages*
Electroencephalogram (EEG)	• Amplified recording of brain's electrical activity ("brainwaves") via electrodes placed on scalp	• High temporal resolution • Non-invasive, painless procedure	• Low spatial resolution
Computerized Axial Tomography (CAT, CT) scan	• X-ray cameras rotate around head, combining images into 3D picture of brain ***structure***	• High resolution images of brain ***structure*** • Allows direct view of level of interest	• Potential damage due to high radiation levels • No information about brain ***function***
Positron Emission Tomography (PET) scan	• Tracks brain's consumption of radioactive glucose injection, providing images of brain ***function***	• Allows researchers to examine which brain areas consume most energy in a given task, thus providing info about brain ***function***	• Radiation injection • Lengthy process • Expensive equipment needed to create radioactive isotopes • No information about brain ***structure***

Magnetic Resonance Imaging (MRI)	• Strong magnetic field causes disorientation of atoms in brain; reorientation = signal as to soft tissue density (picture of brain ***structure***)	• Allows researchers to examine brain ***structure*** without exposure to radiation involved with CT scan • Non-invasive, painless procedure	• Can be an uncomfortable, claustrophobic experience • No information about brain ***function***
Functional Magnetic Resonance Imaging (fMRI)	• Type of MRI that detects amount of bloodflow in different brain regions (proxy for oxygen consumption; brain ***function***)	• High spatial resolution (3-6 millimeters) • Non-invasive, painless procedure • Quick imaging process	• Can be uncomfortable, claustrophobic experience