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| IMPORTANT METHODS FOR STUDYING THE BRAIN  |

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| **ACCIDENTS AND LESIONS** |
| **METHOD** | **HOW IT WORKS** | **ADVANTAGES** | **DISADVANTAGES** |
| ACCIDENTS (Phineas Gage) | * Examine an individual’s behavior after experiencing damage to a specific part of the brain due to an accident
 | * Allows for educated guesses about links between brain structure and function
* Allows research on fluke circumstances that are impossible/unethical to recreate in lab
 | * Little or no experimental control
* Issues associated with case studies (*see Research Data and Methods chart)*
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| 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 guesses about links between brain structure and function
* Allows research on fluke circumstances that are impossible/unethical to recreate in lab
 | * Little or no experimental control
* Issues associated with case studies (*see Research Data and Methods chart)*
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| **EEG & NEUROIMAGING TECHNIQUES** |
| **METHOD** | **HOW IT WORKS** | **ADVANTAGES** | **DISADVANTAGES** |
| ELECTROENCEPHOGRAM (EEG) | * Amplified recording of brain’s electrical activity (“brainwaves”) via electrodes placed on scalp
 | * High temporal resolution
* Non-invasive, painless procedure
 | * Low spatial resolution
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| 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
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| 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 information about brain **function**
 | * Radiation injection
* Lengthy process
* Expensive equipment needed to create radioactive isotopes
* No information about brain structure
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| 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 in CT scan
* Non-invasive, painless procedure
 | * Can be an uncomfortable, claustrophobic experience
* No information about brain **function**
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| FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI) | * Type of MRI that detects amount of blood flow 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
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