|  |
| --- |
| IMPORTANT METHODS FOR STUDYING THE BRAIN |

|  |  |  |  |
| --- | --- | --- | --- |
| **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)* |
| 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)* |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |
| 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 information 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 in 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 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 |