
LEARNING GUIDE

**DISCOVERING THE HUMAN BRAIN:
NEW PATHWAYS TO NEUROSCIENCE**

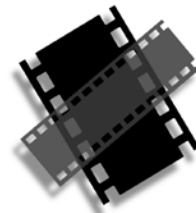
With

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DAVIDSON *films*



**classroom
productions**

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INTRODUCTION

Neuroscience: The scientific study of the structure and functions of the nervous system. In this film we concentrate on brains.

EARLY OBSERVATIONS

The Study of Brain Injuries

- Paul Broca's patient who could not speak, had a lesion in the left hemisphere
- Phineas P Gage had a rod through his skull and had a personality change

Naming Brain Areas

- For people who discovered them: Broca's area
 - For location: superior gyrus
 - For external characteristics: hippocampus, seahorse
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SPECIALIZATION OF AREAS

Microscopic and Electronic Views

Electronic microscope enabled us to see neurons

- Neurons have dendrites that pick up messages
- Axons carry the messages down the neuron

Action Potential

- Cell body has -70 ml volts in resting condition, pumps sodium out
- Neurotransmitters change resting potential to -50

EEG (electroencephalogram)

- Measures combined electrical signal
- ERP: Event Related Potentials measure reaction to single event

Imaging

Depends on variations in blood flow to brain

- Metabolism: Burning glucose for energy
Increased rate of firing of neurons when working increases this need for glucose in brain which results in more blood flow

PET Scan (Positron Emission Tomography)

- Positron: Positively charged electron
- Tomography: Making a picture
- Uses a radioactive form of glucose which is injected

MRI Scan (Magnetic Resonance Imaging)

- Non-invasive
- Uses a large magnet that tracks blood flow
- fMRI's: the "f" stands for "functional"
Always have to compare brain's reaction two activities
More accurate to location of activation but not to timing than EEG

Application

- Mirror neurons in autistic and normal children
 - Localization of brain areas for brain tumor surgery
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RELATED FILM

Also available from Davidson Films

Human Brain Development: Nature and Nurture (2007) 27 minutes