

# PSY 1 Fall 2015

## Final Exam Study Guide

### **Research Methods**

#### Goals of Science

- 1) description
- 2) prediction
- 3) control
- 4) explanation

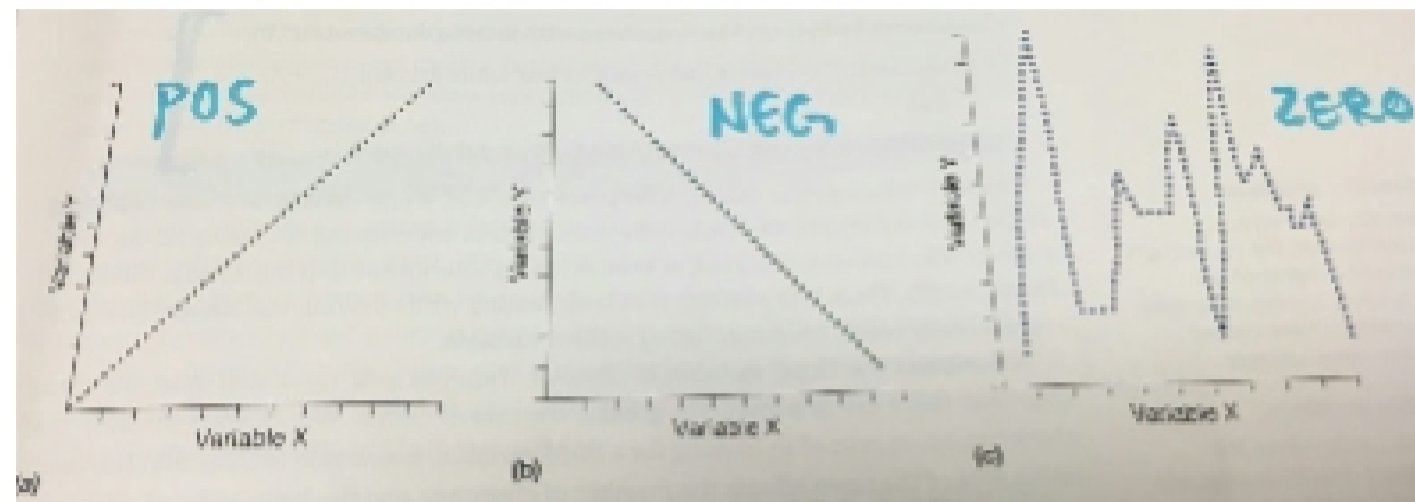
#### What is a Theory? / Scientific Method

- a theory: is an explanation or model of how a phenomenon works consisting of interconnected ideas or concepts and used to explain prior observations and make predictions about future events.
- Scientific method follows 6 steps:
  - **Form a hypothesis**- specific, testable research predictions
  - **conduct a literature review**- review of the scientific literature related to theory
  - **design a study**- deciding which research method and level of analysis you want to use to test your hypothesis
  - **conduct the study**- recruit participants and measure their responses (collect data)
  - **analyze the data**- describe it- what conclusions can you draw from this data. need to know whether results are meaningful vs. happened by chance - will findings be true for general population
  - **report the results**- scientists make their findings public to benefit society, support scientific culture, and permit other scientists to build on their work
  - scientific method is cyclical- replication involves repeating a study and getting the same (or similar) results
    - critical studies are designed to understand which theory (after the theory has been continually refined by new hypotheses and tested by new research methods) is best- they directly contrast theories to see which better explains the data

#### Correlations/Experiments/Observational Research

- correlational studies are used to describe and predict relationships between variables. cannot be used to determine the causal relationship between the variables.
  - ex) standardized test scores have been shown to correlate with college success but does not cause you to do better in college.
  - direction of correlation:
    - positive correlation- variables directly related, increase or decrease together

- negative correlation- variables move in opposite directions- one variable increases as the other decreases
- zero correlation- no relation to each other



- directionality problem- not knowing the direction of the relationship between variables aka: does less sleep cause more stress ( $A \rightarrow B$ ) or does more stress cause less sleep ( $B \rightarrow A$ )?
- third variable problem- instead of variable A causing variable B it is possible that a third variable C causes both A and B aka: texting while driving (A) is correlated with driving dangerously (B), risking taking (C) causes people to text while driving ( $C \rightarrow A$ ) AND risk taking (C) causes people to drive dangerously ( $C \rightarrow B$ )
- observational studies come in two categories:
  - participant observation: the researcher is involved in the situation
  - naturalist observation: the observer is passive, separated from the situation and making no attempt to change or alter ongoing behavior.
    - these observational techniques involve the systematic assessment and coding of overt behavior. define terms and then code the forms of behavior you observe
    - question whether the observer should be visible. the presence of the observer might alter the behavior being observed (reactivity).

### Hawthorne Effect

- an example of reactivity
- refers to changes in behavior that occur when people know that others are observing

## **Brain and Behavior**

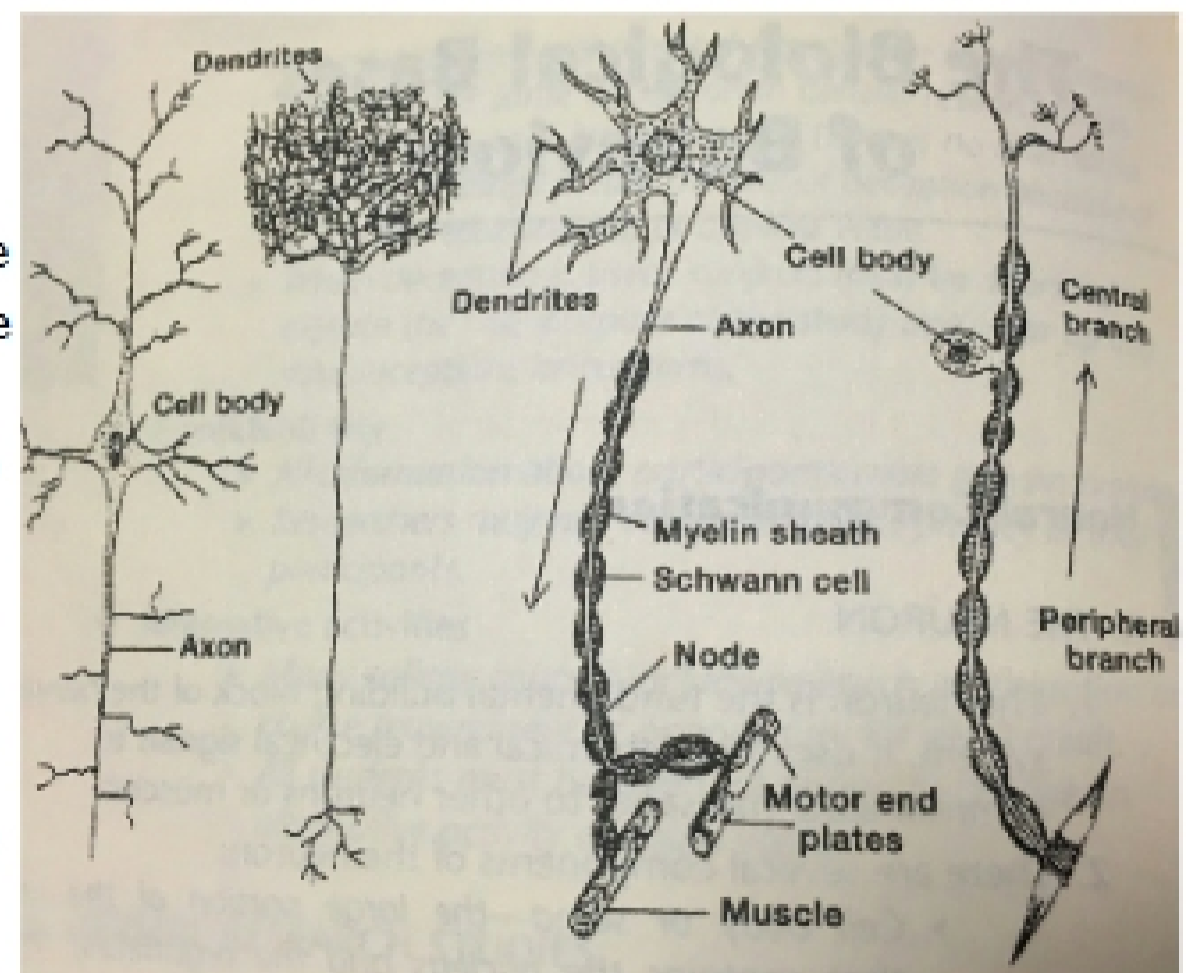
### Action Potentials

- neural communication depends on a neuron's ability to respond to incoming stimulation- it responds by changing electrically and then passing along signals to other neurons  $\rightarrow$  neuron firing is called action potential (the electrical signal that passes along the axon)
- neuron receives chemical signal from nearby neurons through dendrites.
- two types of signals: excitatory and inhibitory
  - excitatory: depolarize the cell membrane by decreasing the negative charge inside the cell  $\rightarrow$  increase the likelihood that the neuron will fire.

- inhibitory: hyperpolarize the cell by increasing negative charge inside the cell and decrease the likelihood that the neuron will fire.
- these two signals are combined within the neuron, if the total excitatory signals surpass the neuron's firing threshold then action potential is generated.
- when a neuron fires, the sodium gates in the cell membrane open allowing sodium ions to rush into the neuron causing the inside of the neuron to become more positively charged than the outside.
- potassium channels open to allow potassium ions inside the cell membrane to rush out
- this change inside the cell from positive charge to negative charge is basis of action potential.
- channels close and the electrical charge inside the cell starts out slightly negative in its initial resting state - as the cell fires and allows more positive ions inside, the charge becomes positive. natural restoration (including the sodium-potassium pump) return the charge to its slightly negative resting state.
- when the neuron fires, the cell membrane depolarization moves along the axon like a wave- sodium ions rush through channels causing adjacent sodium channels to open (like dominoes) they open in a series.
- action potential always moves down the axon away from the cell body to the terminal buttons
- myelin sheath allows the electrical signals to travel quickly down the axon.

### Structure of the neuron

- neurons are the fundamental building blocks of the nervous system; they use chemical and electrical signals to communicate messages
- parts of the neuron
  - cell body or soma: the large portion of the neuron that contains the nucleus and the organelles; received messages from the dendrites
  - dendrites: branch-like portions of a neuron that receive and communicate the nervous signal from the tips of the neuron to the cell body
  - axon: conduit that communicates the signal down the neuron to the cell body
  - myelin sheath - lipid/fat based insulation around the Schwann cells that stops the leaking of the electrical signal; formed by Glial cells
  - Schwann cell: chain of cells that propagates the nervous signal
  - nodes of ranvier: space or gap between the Schwann cells



### Function and structure of cortex