Current topics

PSY 200

Greg Francis

Lecture 35

Advice for further exploration

Purdue University

1

Studying cognitive psychology

- There is a Brain and Behavioral Sciences Major in psychology
  - More natural sciences than typical psych degree
- Most of psychology requires experimentation, you need
  - PSY 201: Introduction to statistics in psychology
  - PSY 203: Introduction to research methods in psychology
- More statistics
  - PSY 202 Introduction to Quantitative Psychology
  - STAT 225 Introduction to Probability Models
  - STAT 311 Introduction to Probability
  - STAT 350 Introduction to Statistics
  - STAT 511 Statistical Methods

Purdue University

2

Research

- PSY 390 Research in…
  - Actively participate in a research laboratory
  - Details vary dramatically across labs
  - Advisors can identify some positions
  - Talk to faculty about possibilities
- Research Focused Honors program
  - 3 semester sequence (starts Spring of penultimate year)
  - Design and carry out your own research study (with guidance from a faculty member) https://hhs.purdue.edu/undergraduate-students/honors-program/psychological-sciences/

Purdue University

3

Useful background

- Computers
  - Most experiments are run on computers
  - Models are simulated on computers
  - Learn to program in a computer language
    - » MatLab, C / C++, Java, JavaScript, Python, Julia
  - Possible courses
  - CS 15800 C Programming
  - CS 17700 Programming With Multimedia Objects
  - CS 18000 Problem Solving/Object-Oriented Programming
  - CS 24000 Programming In C
  - CNIT 105 Introduction to C Programming
  - CNIT 15500 Introduction to Object-Oriented Programming
  - CNIT 17500 Visual Programming

Purdue University

4

Useful background

- Mathematics
  - Many psychologists have little mathematical background
  - But it is especially useful for cognitive psychology
  - Take as much mathematics as you can, especially
    - » Calculus (MA 161, 165 or 223)
    - » MA 375 Discrete Mathematics
    - » Linear (matrix) algebra (MA 262, 265)
    - » Differential equations (MA 266)

Purdue University

5

Further study

- Brain characteristics
  - PSY 222: Introduction to behavioral neuroscience
  - PSY 322: Neuroscience of motivated behavior
  - PSY 324: Introduction to cognitive neuroscience
  - PSY 352: Introduction to Neuropsychology
  - SLHS 401: Language and the Brain
  - PSY 512: Neural systems

Purdue University

6

Further study

- Perception and attention
  - PSY 310: Sensory & perceptual processes
  - PSY 376: Attention and Cognitive Control
  - PSY/ECE 511: Psychophysics
  - PSY 520: Attention & performance
  - PSY 577: Human Factors in Engineering
- Memory:
  - PSY 311: Human Memory
  - PSY 314: Introduction to learning

Purdue University

7

Further study

- Language (many courses in Speech, Language, and Hearing Sciences - SLHS)
  - SLHS 227: Elements of linguistics
  - SLHS 309: Language development
  - PSY/SLHS 401: Language & the brain
  - PSY 403: Psycholinguistics
  - PSY 426: Language development
  - PSY 484: The Psychology of Consciousness
- Problem solving & decision making
  - PSY 514: Introduction to mathematical psychology

Purdue University

8

Hot topic 1

- Relating cognition to the brain (and vice-versa)
- Several big initiatives
  - Human Brain Project
    - » https://www.humanbrainproject.eu
    - » €1.2 billion over 10 years
    - » Develop technologies to bring together disparate neurophysiological, anatomical, molecular, and behavioral data
    - » Database (big data)
    - » Modeling (supercomputers, specialized hardware)

Purdue University

9

Hot topic 1

- Relating cognition to the brain (and vice-versa)
- Several big initiatives
  - Human Connectome Project
    - » http://www.humanconnectomeproject.org
    - » Building a "network map" that will shed light on the anatomical and functional connectivity within the healthy human brain

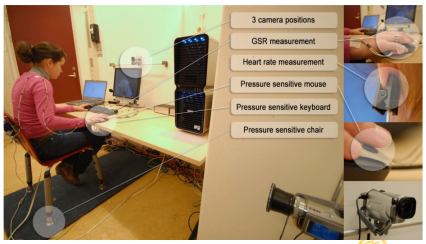
- Connections to cognitive psychology are (hopefully) in the future

Purdue University

10

Hot topic 2

- Big data
- Technology allows gathering of *way* more information than we know what to do with



Purdue University

11

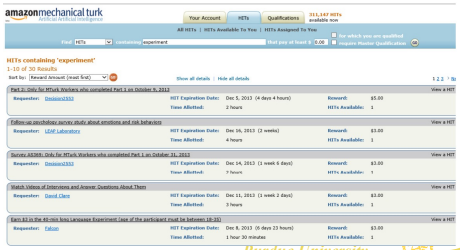
Hot topic 2

- Big data
- Technology allows gathering of *way* more information than we know what to do with

12

Hot topic 2

- Big data
- Many experiments can be run on-line with thousands of subjects

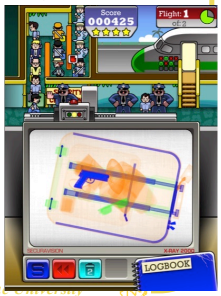


Purdue University

13

Hot topic 2

- Big data
- Data can be gathered in novel ways
- *Airport Scanner*
- 1 billion trials of visual search!



Purdue University

14

Hot topic 3

- Data analysis
- Big data requires a different kind of statistics than has been used for simple experiments
- Moreover, there seem to be problems with present statistics even for simple experiments
- Areas of science that depend on statistics (e.g., psychology, biology, medicine) are facing a crisis as findings that satisfied old criterion are found to be false
  - And unbelievable findings meet the statistical criteria
  - "Pre-cognition"

Purdue University

15

Graduate school

- Grades
- Financing
- After graduation

Purdue University

16

Next time

- Review for final exam

Purdue University

17