Current topics

PSY 200
Greg Francis
Lecture 35

Advice for further exploration

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

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)

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, Basic
  - 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 15500   Introduction to Object-Oriented Programming
    - CNIT 17500   Visual Programming

- 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)
    - Finite (discrete) mathematics (not easy to get at Purdue West Lafayette)
    - Linear (matrix) algebra (MA 262, 265)
    - Differential equations (MA 266)

Further study

- Brain characteristics
  - PSY 222: Introduction to behavioral neuroscience
  - SLHS 304: Anatomy and physiology of the speech and hearing mechanism
  - PSY 320: Behavioral neuroscience of sensation & arousal
  - PSY 322: Neuroscience of motivated behavior
  - PSY 324: Introduction to cognitive neuroscience
  - PSY 512: Neural systems

PSY200 Cognitive Psychology
Further study

- Perception
  - PSY 310: Sensory & perceptual processes
  - Artificial intelligence in computer science or electrical engineering
  - PSY 511: Psychophysics
  - PSY 520: Attention & performance
- Memory:
  - PSY 311: Human learning & memory
  - PSY 314: Introduction to learning
  - PSY 410: Animal memory & cognition
  - PSY 518: Memory & cognition

Language (many courses in Speech, Language, and Hearing Sciences - SLHS)

- SLHS 227: Elements of linguistics
- SLHS 309: Language development
- SLHS 401: Language & the brain
- PSY 426: Language development
- PSY 526: Psycholinguistics

Problem solving & decision making

- PSY 285: Consumer behavior
- PSY 318: Problem solving & decision making
- PSY 514: Introduction to mathematical psychology

Further study

- Problem solving & decision making
  - PSY 285: Consumer behavior
  - PSY 318: Problem solving & decision making
  - PSY 514: Introduction to mathematical psychology
  - PSY 390 with Pizlo, Proctor, Schweickert

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)

Connections to cognitive psychology are (hopefully) in the future

Hot topic 2

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

Big data

Technology allows gathering of way more information than we know what to do with
Hot topic 3
- Big data
- Technology allows gathering of way more information than we know what to do with

![Image of sensors]

Hot topic 3
- Big data
- Many experiments can be run on-line with thousands of subjects

![Image of online experiments]

Hot topic 3
- Big data
- Data can be gathered in novel ways
- Airport Scanner
- 1 billion trials of visual search!

![Image of airport scanner]

Hot topic 4
- 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"

Graduate school
- Grades
- Financing
- After graduation

Next time
- Review for final exam