PS1006 Research Design, Stats, Computing I (Autumn 2005)

- Fridays: Stats
- Postgraduate tutorials
- Dr. Alex Holcombe, rm 3.07
- Dr. Simon Rushton, rm 3.09
- I'll be here next week!

- 10 one-hour research design lectures
- 2hr Research Methods test, 100 MCQs (24% of mark)
- Davis, S.F. & Smith, R.A. An Introduction to Statistics and Research methods: Becoming a psychological detective (1st edition)
  - In store and not in library?


- Holcombe lectures
- Reduced version of powerpoint on my webpage (Google: Alex Holcombe) and on Blackboard
- Posted after each lecture
- Testing (from Holcombe & Rushton)
  - Davis & Smith, An Introduction to Statistics and Research Methods
  - Anything in an assigned book chapter is fair game
  - Lecture material mostly covers important subset of book topics
  - If in lecture and book, likely to be on test
  - If in lecture only, somewhat likely
  - If in book only, less likely

psychology a science?

Science

- Without experimental science, little or no electric lighting, mobile phones, computers, vaccines, jet planes, antidepressants
- Without experimental science, vast domains of knowledge are inaccessible
- Most people have trouble effectively utilizing new knowledge because don’t understand science
Goals of the course

- Study and experiment design
- Learn a variety of research designs
- Learn to assess quality of research designs
- How do we know something is true or not?
  - An advert said taking resveratrol prolongs life- is it true?
  - An advert said Cardiff Uni has the best psych program
- Wise knowledge consumers know how to evaluate claims in newspapers, on TV, in adverts
  - (Newspapers’, TV’s job is to make money)
- Understanding experiments and their role in knowledge
- Practics
- Essays

Today’s lecture

- Reading: Chapters 1 & 2. Also for more fun reading, read www.venganza.org
- Not many technical terms, definitions
- What is psychology/ psychological explanation?
  - Aspects, levels
- Why science?
  - ways of acquiring knowledge
  - Kinds of evidence
    - Descriptive
    - Anecdotal
    - Experimental
    - Correlation, causation

What is psychology?

- Study of the mind and behavior
- Descriptive facts
  - The amygdala is connected to the splenium is connected to the...
  - Schizophrenia afflicts 1.3% of people
- Want to explain behavior and the mind
- Causal explanations
  - What causes autism?

Kinds of explanation in psychology

- What causes pupil dilation? (growth)
  - Functional
  - When there is not enough light hitting the eye the pupils grow to let in more
  - Social
  - Pupils dilate when a person is attracted to another
  - Cognitive
  - Pupils dilate during great mental effort
  - Biological
  - Retinal photoreceptors-> ganglion cells -> pretectal nucleus >> ciliary ganglion -> sphincter
Most human behaviors are affected by many different factors. Often a factor from each area of psychology!

**aspects of explanation EXAMPLE**

- **evolutionary**
  - Human ancestors who had more sex, had more babies, creating more people like John who like to have sex.
- **functional**
  - Sex is used to make children, which is a major purpose of human beings.
- **physiological**
  - Testosterone is secreted from John’s testes, it and other chemicals in the brain make John lust.
- **developmental (physiological)**
  - At age 15, John’s testes descended into the scrotum and increased their production of testosterone.
- **developmental (psychological)**
  - At age 15, John entered puberty, giving him a strong sex drive.

- **behavioral (psychological-classical conditioning etc.)**
  - When John has sex, he typically orgasms, is very pleasurable. This keeps him coming back for more.

- **social-cultural (psychological)**
  - John watches a lot of MTV and reality TV and is constantly barraged with sex-related images and programs which show people like him trying to get with the opposite sex. He rarely sees shows where “cool” people model the advantages of chastity.
- **behavioral (psychological-classical conditioning etc.)**
  - When John has sex, he feels better.

Most people think things have only one explanation.

Most people are biased towards biological explanations.

Hence the impression that psychology not much of a science.

**levels of physiological explanation**

- **biological**
  - Hormones, neurotransmitters, etc.
- **network**
  - E.g. cortical columns ~10,000 neurons
- **individual neuron**
- **synapse**
- **ion channel**
- **ligand, ion**
- **electrical bonds**
- **quantum electrodynamic theory**

Best explanation can depend on what you need it for:

- treatment
- unification of phenomena

**Why did you get up this morning?**

**which aspect?**

- evolutionary
- functional
- socio-cultural
- developmental
- behavioral
- physiological
- psychological (straight)
- abnormal
Hypothesis

- A formally stated expectation or guess
- Scientific hypotheses are testable
- Some causal, some descriptive
- A supreme being powers the universe
- Hot weather during pregnancy causes schizophrenia

Hypothesis criteria

- Testable
- Falsifiable (p.39)
- Precise
- Rational
- Parsimonious

How to acquire knowledge

- Authority
  - My teacher said so
  - A book said so
  - God said so
- Logic, argument, and intuition
  - Heavy things fall faster than light things

Authority: often how society makes decisions

- Bush, Blair: “Iraq has WMD”
- Decision to go to war
- Better than relying on authority is relying on objective evidence
- “When I fight authority, authority always wins”
- Science tries hard to make decisions based on evidence
How to acquire knowledge: Evidence

There is more to science’s methods than experiments!

Descriptive
- Just describe what you see
- don't interact with people/animals you are studying

Correlation
- Go beyond qualitative description and look for quantitative associations

Experiment
- "That man can interrogate as well as observe nature was a lesson slowly learned in his evolution" Sir William Osler

Modern conveniences- computers, televisions, plastics, very few would be available without science

Acquiring knowledge: Evidence contd

- Descriptive
  - Just describe what you see, without interacting with people/animals you are studying
  - led to some great ideas and great theories
  - Darwin’s evolutionary theory
    - On island, 13 species, each with distinct beak appropriate for its food, all finches that were otherwise similar
    - Finches that question not only shape of beak but also show variation in size, average weight group of finches; came from similar lineage but the environment produces variety in the beak shape, something Darwin has been known to talk about the finches of the Galapagos.

- Correlation
  - led to some incorrect theories
  - Aristotle etc.: heavier objects fall faster than lighter ones

- Experimental

Acquiring knowledge: Anecdotal Evidence

- Descriptive
  - Just describe what you see, without interacting with people/animals you are studying
  - Anecdotal
    - Joe says, "I saw a talking pig once..."

- Correlation

- Experimental