ISS 305:002
Evaluating Evidence:
Becoming a Smart Research Consumer
Instructor: Dr. Jonathan Weaver

Course location: G008 Holden Hall
Course time: T/TH 3:00pm – 4:50pm

Introduction to the Course

- An illustration (Dennis Adams)
  - http://www.dennisadamsmasterhealer.com/default.htm
- A hot debate
  - http://freakonomics.com/podcast/bad-medicine-part-1-story-rebroadcast/
- Four attitudes at the core of the scientific approach
  - Critical thinking, skepticism, Objectivity, and Curiosity
    - A cautionary story (on Candides, Skeptics, and skeptics)
- Some basic concepts
  - Assertions and Arguments
  - Deductive and Inductive arguments
  - Heuristic (adj. & noun)

An illustration (Dennis Adams)

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- **Just what are these articles claiming?**

- **What is the evidence for those claims?**

- **How good is the evidence?**

- **Who's likely to be convinced? Who's not?**

A hot debate

- **98.6 is one of the most famous numbers there is, why? What's this number mean to us?**

- **How do we know this number is right? Who says it's right? What's the evidence for this number?**

- **What are the implications if this number is wrong?**

- **Wait… Is this number wrong?**

Four attitudes at the core of the scientific approach
- **Critical thinking** – the process of reflecting deeply and actively, asking questions, and evaluating evidence.
  - "Thinking about your thinking, while you're thinking, in order to improve your thinking." *-Linda Elder, educational psychologist; president, Foundation for Critical Thinking*
  - Asking ourselves __how__ we know something.
  - Critical thinkers question and test what some people say are facts. They examine research to see if it soundly supports an idea.
  - **Is critical thinking important? Why, or why not?**

Becoming a smart consumer of evidence: A cautionary story
- Background: Jurors' use of eyewitness testimony
  - A number of studies have shown that jurors tend to accept eyewitness accounts rather uncritically.
- For example, Exhibit 1: Brigham & Bothwell (1983)
- Method:
  - Described 3 studies with staged crimes
    - e.g., conditions of witnessing,
    - length of observation;
    - delay before identification sought; etc.
  - Ps asked to estimate the % of accurate eyewitness identifications

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Exhibit 1: Brigham & Bothwell (1983)
- **What were the overall results/conclusions?**
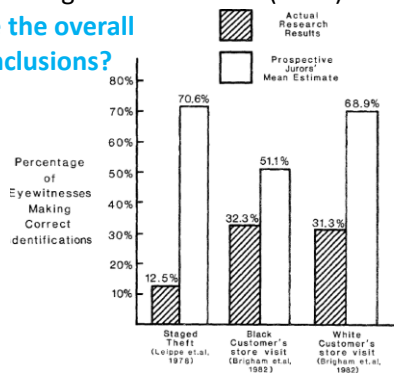
Fig. 1. Prospective jurors' accuracy in estimating research results.

Exhibit 2: Wells, Lindsay, & Ferguson (1979)
- Method: Staged "crime"
  - Confederate "finds" and "steals" a calculator in the presence of witness/participants
  - Participants/witnesses made identification from 6-photo spread
  - Each witness cross-examined while videotaped and asked to:
    - Describe the event and
    - Pick out suspect from photo spread
  - Videotaped testimony shown to another group of "jurors" and asked:
    - Do you believe the witness?
    - How sure are you?

Wells et al. (1979): Results
- Accuracy of eyewitnesses fairly good
  - 58% correct,
  - 20% incorrect,
  - 21% made no identification
- **Overall results/conclusions?**
  - When the witness was accurate, jurors tended to believe
    - 80% of the time. BUT
  - **What happened when the witness was inaccurate?**

What are the implications?
- Investigators and Jurors may trust eyewitness testimony too much
  - Officials (police, prosecutors) seeking a conviction may suborn/taint eyewitness testimony
  - Both intentional and unintentional mistakes (e.g., by police) may lead to false convictions
    - "Eyewitness misidentification is the single greatest cause of wrongful convictions nationwide, playing a role in more than 70% of convictions overturned through DNA testing." see http://www.innocenceproject.org/understand/Eyewitness-Misidentification.php

How might jurors' evaluation of eyewitness evidence be improved?

- Cannot
  - Eliminate eyewitness testimony
  - Eliminate juror observation of eyewitnesses
  - Not seat jurors who might be more accepting of such testimony (e.g., poorly educated jurors)
- **Might?**

Expert witnesses on eyewitnesses? (Wells, Lindsay, & Tousignant, 1980)

- Goal:
  - To see if having an expert testify to jurors about the unreliability of eyewitnesses would
    - reduce over-acceptance of evidence of eyewitness testimony
    - increase attention to other evidence [viz., factors that affect how accurate eyewitnesses are (e.g., are the conditions of eyewitnessing good or poor?)]
- Method (like Wells, Lindsay, & Ferguson (1979))
  - Staged a crime. Varied the conditions of eyewitnessing:
    - Poor (witness far from crime, low light, brief exposure, culprit's hat covered face) vs.
    - Moderate (witness close to crime, plenty of light, long exposure, culprit wore no hat)
  - Had witnesses judge a line-up of suspects and then testify about what they saw. Testimony videotaped.
 - Videotapes shown to mock jurors in mock trial. Two versions of trial:
    - No expert testimony on eyewitnesses
    - Expert testimony on eyewitnesses from Prof. Gary Wells, who reviewed research on eyewitness unreliability and the value of considering "condition of witnessing" information
  - Jurors then decided if they <u>did or didn't believe</u> that the eyewitness identified the right person.

Expert witnesses on eyewitnesses? (Wells, Lindsay, & Tousignant, 1980)

Results:
- Witness accuracy:
  - **What would you expect?**
- Juror belief in eyewitnesses:
  - **Based on prior research, what would you expect WITHOUT any expert testimony?**
  - **What should happen WITH expert testimony (if such testimony had the intended effect)?**
  - **What actually happened?**
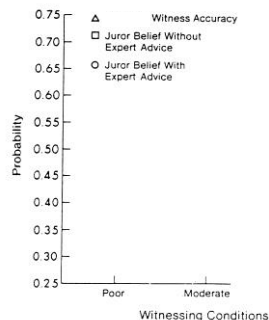
Expert witnesses on eyewitnesses? (Wells, Lindsay, & Tousignant, 1980)

Results:
- **Without expert testimony, what were the jurors?**

- **With the expert testimony, what happened to the jurors?**

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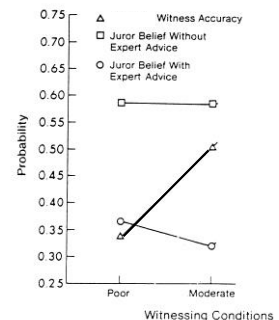
skep·tic noun

- 1. a person who <u>questions</u> the validity or authenticity of something purporting to be factual.
- 2. a person who maintains <u>a doubting attitude</u>, as toward values, plans, statements, or the character of others.
- 3. a person who doubts the truth of a religion, esp. Christianity, or of important elements of it.
- 4. <u>S</u>keptic. Philosophy.
  - a) a member of a philosophical school of ancient Greece, the earliest group of which consisted of Pyrrho and his followers, who maintained that <u>real knowledge of things is impossible</u>.
  - b) any later thinker who doubts or questions the possibility of real knowledge of any kind.

Moral?

- Not smart to
  - Accept any or all evidence without question (be a "Candide") OR
  - Reject any or all evidence, without question (be a **S**keptic)

- Instead, we should strive to be a skeptic
  - "One who habitually doubts, questions, or suspends judgment"

Developing skepticism

- One goal of this course is to nurture skepticism (for certain questions), NOT Skepticism
- But it's easier to create Skeptics than skeptics (or Candides)
- Suggestive evidence:
  - *Negativity effects* in human judgment
    - For example, suppose on an 11-point scale (-5=very bad; +5=very good)
      - "mean" = -4
      - "attractive" = +4
      - how would you rate someone who is "mean and attractive"?
    - **What's the point?**
- Hard core Skepticism can also be pervasive in its effects...

Fallicists/Skeptics

- Tend to accept the *Fallicist's fallacy* , a set of **demonstrably false*** beliefs (D. H. Fisher):
  - An argument which is fallacious in **some** respect is therefore false in **all** respects
  - A fallacy in an argument is an external sign of its author's depravity (i.e., wickedness).
  - An argument which is false in some or even in **every** respect is therefore false in its conclusion.
- **How might a Fallicist/Skeptic react to Dennis Adams' arguments? Or, to 98.6?**

Objectivity

- skeptical people challenge whether a supposed fact is really true. It can mean questioning what "everybody knows."
  - There was a time when "everybody knew"…
    - that women were morally inferior to men.
    - that race could influence a person's IQ.
    - that the earth was flat.
  - We must look at such assumptions in new and questioning way and with a skeptical eye.
  - HOWEVER, we must be open to evidence!
- **Objectivity** – waiting to see what the evidence tells us rather than going with our hunches.
  - More on these later in the semester, but for now
    - This involves using the empirical method and waiting to see things as they really are, *__not as we would like them to be__*.

Curiosity

- Scientists are **curious**
  - Notice things in the world
  - Want to know what the thing is and why it is that way
- Ask questions – Even BIG questions!
- Open your mind and imagination to wondering why things are the way they are.
  - Doing so makes the world look different, and easy answers and simple assumptions become insufficient.

Some basic concepts: 1. Arguments (see Gray, Ch. 3)

- **Assertion**
  - "a linguistic attempt to state what is the case", i.e., a sentence that states something
  - for us (in ISS 305), assertion = statement = claim = conclusion
  - **Examples?**
- **Argument**
  - Definitions:
    - "A basic unit of reasoning in which an assertion/claim/statement is derived from one or more other assertions/statements" (Gray)
    - "a statement describing the world (an assertion) along with evidence or support for that assertion (Mayer)
    - *Arguments* are composed of at least two statements
      - an assertion (or claim or conclusion or ...) and
      - one or more reasons/premises to support the conclusion
- This course is primarily concerned with evaluating *arguments* whose *conclusions* are one particular type of statement (namely, an *empirical statements,* which we'll define later in the semester)
- **Examples?**

Illustration of an Argument

'U' can compete with Ivy League Schools
By. Rebekah Amos (State News, January 18, 2000)

   When it comes to financial success after college a $120,000 Ivy League education doesn't necessarily offer more than less selective colleges do, a newly released study says.
   According to "College and Beyond," a paper published by the National Bureau of Economic Research in Massachusetts, students' ambition, maturity and motivation have just as much or more to do with high earnings potential after graduation than where they attended college.
   "What we found is that the studies conducted in the past didn't really focus on who the students were but more where they went to school," said Stacy Berg Dale, an author of the paper and researcher at the Andrew W. Mellon Foundation in New York City.
   "The fact that they went to Harvard may not have as much to do with their success after college than the fact that they are gifted and are going to be successful no matter what," she said.
   Better students tend to go to better schools, but gifted students will most likely do well whether or not they attend an Ivy League school, Dale said.
   The study looked at the 1995 income of students who enrolled in a highly selective college in 1976.
   The study found students who enrolled in colleges where the average age freshman SAT score was 1,200 earned about $76,800. Students with similar test scores accepted by the highly selective colleges, but who enrolled in institutions where the average SAT was 1,000, earned $77,700.
   To some MSU students, the study's findings were something they already knew.
   "Ivy Leaguers probably do get good jobs and make good money," said Dan Rohrhoff, an engineering no-preference freshman. "But not any more than someone with a Big Ten degree and some dedication."
   Mechanical engineering freshman, Kevin Justusson, said "students' experience and hard work helps an individual succeed in the work force just as much or more than where people receive their diploma."
- **What's the conclusion of this argument?**
- **What's the evidence?**
- **How good is the evidence?**
  - https://www.usnews.com/education/blogs/the-college-solution/2011/03/01/the-ivy-league-earnings-myth
  - https://www.wsj.com/articles/do-elite-colleges-lead-to-higher-salaries-only-for-some-professions-1454295674

The Skill of Argument

- D. Kuhn (*The Skill of Argument*) suggests that
  - Most people (of all ages) do not engage in presenting conclusive evidence to defend their beliefs or claims;
    - **What do they do?**

  - This is largely due to people not thinking of alternatives to their own preferred conclusions

- One of the objectives of the course is to nurture the *skill of* (making and evaluating) *argument*, i.e.,
  - to recognize alternative possibilities
  - to require relevant evidence on those possibilities
  - to evaluate and weigh that evidence

Basic concepts: 2. Deductive & Inductive Arguments
Deductive arguments

- The conclusion is <u>specific</u>, the evidence (premises) are more <u>general</u> (at some point, refer to everyone or everything)
- Example (a syllogism = 2 premises ➔ conclusion):
  All men (P) are mortal (Q).
  Jim is a man (P).
  Therefore, Jim is mortal (Q).

- Deductive arguments can be *valid* or *invalid* (also, validity only applies to deductive arguments)
  - Matter of how the argument is structured
    - That the premises support the conclusion!
  - NOT the truth of the conclusion!
  - Specifically, a valid deductive argument DOES NOT guarantee a true conclusion
    All dogs (P) can fly (Q).
    Harper is a dog (P).
    Thus, Harper can fly (Q).
  - Your readings have more examples

Deductive Arguments

All toasters are items made of gold.
All items made of gold are time-travel devices.
Therefore, all toasters are time-travel devices.
VALID or INVALID

All tigers are mammals.
No mammals are creatures with scales.
Therefore, no tigers are creatures with scales.
VALID or INVALID

Deductive Arguments

All basketballs are round.
The Earth is round.
Therefore, the Earth is a basketball.
VALID or INVALID

All popes reside at the Vatican.
John Paul II resides at the Vatican.
Therefore, John Paul II is a pope.
VALID or INVALID

Deductive Arguments

- The form those last two took was like this:

- *All P's are Q;*
  X is Q;
  Therefore, X is a P.

- Another invalid argument
  If you are at MSU then you must be East Lansing.   If P then Q
  You are in East Lansing.   Q
  Thus, you are at MSU.   P

Deductive Arguments

- However, ***valid*** arguments are ones which allow you to conclude that the conclusion is true **IF** the premises are true
  - if a deductive argument is valid AND the premises are true, then the conclusion MUST be true
  - this is the distinctive thing about deductive arguments—**if** they're put together well (are valid) and have correct evidence/premises, one can know that the conclusion is definitely, 100% true.
  - but if premises are false, even if an argument is valid, conclusion may not be true
    - deductive argument's validity ≠ conclusion's truth

Deductive arguments

- some common deductive arguments involve *conditional statements* ("if P - then Q" statements)
  - P is called the *antecedent*
  - Q is called the *consequent*
- Example: If you smoke, then you'll get lung cancer.
  - P = antecedent is "you smoke"
  - Q = consequent is "you'll get lung cancer"

Valid <u>deductive</u> arguments

1. Affirming the antecedent (in Latin, *Modus Ponens*)
- Generally
  If p then q
  p
  Therefore, q
- Example:
  If you smoke, then you'll eventually get lung cancer. ("You" is <u>anyone</u>; general premise)
  Jon smokes.
  Therefore, Jon will eventually get lung cancer.
- Because the form here IS a valid/logical one, as long as the (general) premises are true, the (specific) conclusion MUST be true.
- However, one can get to a false conclusion using a valid argument IF the premises are false.
  - **What about here? Are the premises true?**

Valid <u>deductive</u> arguments

2. Denying the consequent (in Latin, *Modus Tolens*)
- Generally
  If p then q
  Not q
  Therefore, not p
- Examples:
  If you ever smoke, then you'll eventually get lung cancer.
  Jon never got lung cancer.
  Therefore, Jon didn't smoke.
- This <u>is</u> another, second valid/logical form
  - thus, as long as the (general) premises are true, the (specific) conclusion MUST be true.
  - again, though, if one of the premises is false, then the conclusion need not be true.
  - **In the example above, are the premises true? What does that mean for the conclusion?**

Invalid <u>deductive</u> arguments

- certain forms of arguments are <u>invalid</u>
  - even if the premises are true, the conclusion need not be true
1. Affirming the consequent
- Generally
  If p then q
  q
  Therefore, p
- Examples:
  If you ever smoke, then you'll eventually get lung cancer.
  Jon got lung cancer.
  Therefore, Jon smoked.
- This is an <u>invalid</u> (illogical) form
  - **Are the premises for this example true?**
  - **Suppose they were true. Why <u>isn't</u> the conclusion necessarily also true?**

Invalid <u>deductive</u> arguments

2. Denying the antecedent
- Generally
  If p then q
  Not p
  Therefore, not q
- Examples:
  If you ever smoke, then you'll eventually get lung cancer.
  Jon never smoked.
  Therefore, Jon never got lung cancer.
- This <u>is</u> an invalid/logical form
  - **From your own knowledge, is the conclusion above <u>necessarily</u> true (for any smoker; Jon)? Why?**

Inductive Arguments

- Remember deductive arguments "are intended to provide <u>conclusive</u> support for their conclusion" (p. 158, Schick & Vaughn), that is, one <u>can</u> use deduction to come to conclusions which MUST be true (how?).
- Inductive Arguments "Are intended to provide <u>probable</u> support for their conclusions"
  - Validity is not a relevant concept here!
  - Concerned with the strength of the argument!
    - at best, the conclusion from an inductive argument is only <u>probably</u> true
    - *strong* inductive arguments are ones that work well (let us have high confidence in the conclusion)
    - *weak* inductive arguments are ones that don't work well (leave us with little confidence in the conclusion)
- For <u>most</u> of this course, we'll be primarily be concerned with evaluating inductive arguments, trying to determine which are strong and which are weak
- Your readings have examples

Inductive Arguments

- The evidence (premises) is more <u>specific</u>, while the conclusion is more <u>general</u>
- Example 1:

    I've never seen an adult without a car.

    Therefore, all adults have cars.

    Do you think this is a good argument? Are you convinced that the conclusion is true? Why?

    Example 2:

    Most adults that I've seen, at least in our culture, have cars.

    Therefore, all adults in our culture probably have cars.

    Do you think this is a good argument? Are you convinced that the conclusion is true? Why?

Some basic concepts: 3. Heuristics

2 Modes of thinking/evaluating

- "Thoughtful" (or Central or Systematic or Elaborated or …)
    - look for all relevant evidence
    - evaluate all evidence carefully
    - weigh all evidence to reach one's conclusion
    - be a real skeptic (habitually doubt, question, suspend judgment)
- "Quick and dirty" (or **Heuristic** (adj.) or Peripheral or …)
    - settle for whatever evidence is handy
    - decide quickly and don't ever reconsider
    - use simple rules or shortcuts to evaluate the evidence and decide

- Heuristics (noun) are these simple rules/shortcuts
    - Example 1: How to get from the east to the west side of uptown Manhattan?
        - Cut through Central Park.
    - Example 2: How to tell if Dennis Adams really is a healer?
        - Does he look like one?
    - Example 3: How to tell if someone is healthy?
        - Are they physically attractive?
    - Example 4: What's a quick and dirty way of dealing with any argument?
        - The Fallicist's fallacy.

•<u>**Why**</u> **do we rely on heuristics?**
•<u>**When**</u> **do we rely on heuristics?**
•**Why should we** <u>**not**</u> **rely on heuristics?**