

Evidence or “How do you know that?”

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how do you know?

- Many ways we come to believe things
- Often, we get to wrong conclusions
- How?
- Look at
 - Gilovich, How we know what isn't so, 1991.
 - Huff, How to lie with statistics, rev 1993.
 - Campbell and Stanley, Experimental and quasi-experimental designs for research, 1963.
 - Cohen, Empirical methods for artificial intelligence, 1995.
 - Polya, How to Solve it, 1945



cognitive (I)

- Something out of nothing
 - the misperception and misinterpretation of random data
- We often see patterns in random data
 - we then mistakenly assume the pattern is significant
 - we are also good at explaining patterns we believe are there.



the hot hand

- Many basketball fans and players believe in the *hot hand*
 - shooting success comes in streaks
 - No statistical evidence
 - Consider the sequence
 - OXXXOXXXOXXOOOXOOXXOO
 - random
 - 62% of subject believe shows streaks



cognitive (2)

- Too much from too little
 - misinterpretation of incomplete data
- People like positive examples
 - this can be useful for survival
 - if somebody eats a berry, then dies, after to assume the berry caused the death

illusion of validity

- anecdotal evidence
 - I followed the new x diet and lost 25 lbs.
- need more information
 - look at all four quadrants

lost weight		anecdotal evidence in advertising
no lost weight		
	no diet	diet

cognitive (3)

- Seeing what we expect to see
 - biased evaluation
 - like evidence/research that supports what we already believe
- Examples
 - scrutinizing contrary evidence more closely
 - gamblers' rationalization of losses
 - polarizes people of opposing viewpoints (eg., capital punishment)



social (I)

- Seeing what we want to see
 - motivational determinants of belief
- The Lake Wobegon effect

“... the women are strong, the men are good-looking, and all the children are above average.” (Garrison Keillor)



examples

- the large majority of the general public believes that they are
 - more intelligent
 - more fair-minded
 - less prejudiced
 - more skilled at driving
- than the average person



social (2)

- Believing what we are told
 - the biasing effects of second hand information
- Where there is smoke there is fire?
 - if you hear it often enough, it must be true
- Alterations in recounted stories
 - it was this big



social (3)

- The imagined agreement of others
 - exaggerated impressions of social support
- People are not inclined to give us their true opinion if it is socially uncomfortable
- We can interpret the lack of criticism as support
 - false consensus effect



How to talk back to a

- Huff, “How to Lie with Statistics”, Norton, New York, 1954.
 - Who says so?
 - How does he know?
 - What is missing?
 - Did somebody change the subject?
 - Does it make sense?
 - the illusion of data



examples (I)

- U of C 101
 - Higher Grades have been achieved by students who attended U of C 101 according to the research.
Overall GPA of frosh who did not attend U of C 101: 2.26
Overall GPA of frosh who did attend U of C 101: 2.68



examples (2)

- Can humans identify gender from gait?
 - Barclay et al, Kozlowski and Cutting say yes,
 - but ...

gait

- short exposures to gait are random
- long exposures (4s or more) showed significant rates
 - 66%
 - random is 50%
- is this the widely cited conclusion?



can we know anything?

- Yes, with
 - Experimentation plus statistics
 - Campbell and Stanley show how to design experiments that have **validity**



experiment design

- One-shot case study (quasi)
 - X O
- One-group pretest-posttest design (quasi)
 - O X O
- Pre-test-post-test control group design(true)
 - R O X O
 - R O O



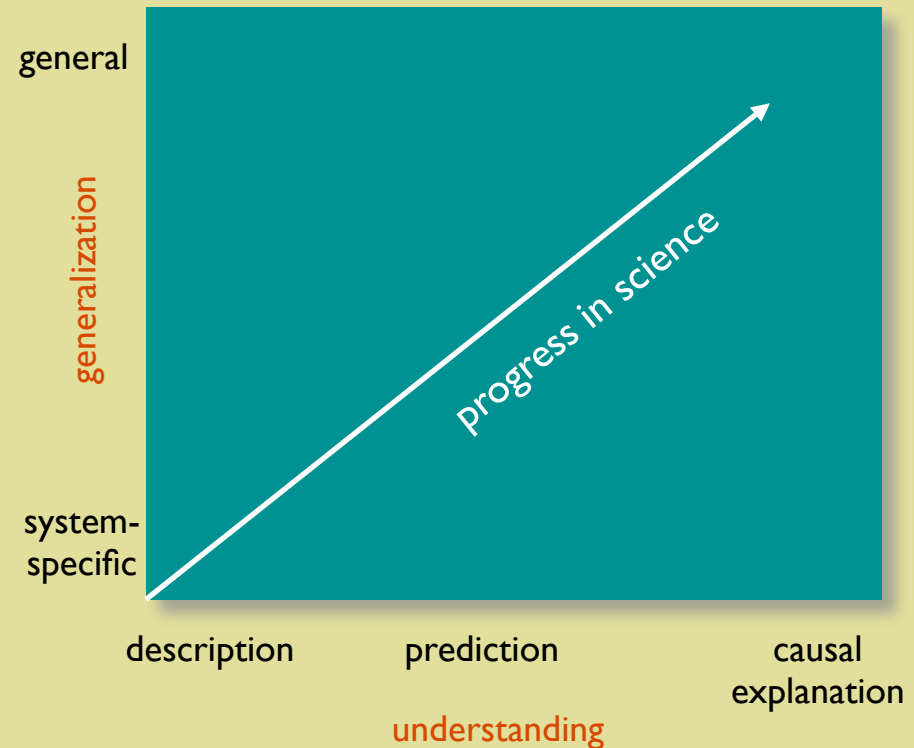
validity

- internal
 - does an experiment give a valid answer to the problem posed?
- external
 - can the results of an experiment transfer to other contexts?
- ecological
 - do the results have anything to do with conditions that occur in the real world?



3 research questions

- early
 - what will happen if ...?
 - what happens when ...?
- middle
 - does this predict what will happen?
- end
 - what causes this to happen
 - i.e., a causal explanation



experiments and research questions

- experiments that do not have an underlying research question are
 - face value experiments
 - anything learned about a research question is incidental
- Should try to have experiment address underlying research question

