Battling Bad Science
Let’s talk about a TED talk
https://www.ted.com/talks/ben_goldacre_battling_bad_science
Epistemology

In short, it’s basically the question of what distinguishes justified belief from opinion.

Some examples to discuss:

– Global warming (renamed climate change)
– LEED building certifications
– GMOs
– Effectiveness of active learning in large classes
– Physics of black holes
– Apollo landings?

For rest: http://www.xkcd.com/882/
Research ethics and the IRB

Origins of this trace back to the controversial work of people like Milgram (1960s Yale obedience experiment) and Zimbardo (1970s Stanford prisoner experiment).

However, taking part in any type of testing can be stressful to the participant.

- Performance anxiety even if they are testing their product, not you.
- Feeling foolish or uninformed even if the real cause is what you are testing hasn’t been built well.
- Thinking about whether others have done things faster or better or different than you.
Data Collection and Analysis

Some things to consider:

- dependent/independent variables
  - idea of causal relationships
- quantitative/controlled experiments
  - "randomizing" experimental design
- "ethnographic" studies
- feedback via story-telling (textual or pictorial)
- statistical significance analysis
  - Type I error: reject null hypothesis when we shouldn't
  - Type II error: not rejecting null hypothesis when we should

Q: Which do you think is worse?

What can we report?

- The things that we observe (descriptive).
- Variables that we can show are related (correlation, not causation).
- Causality between two variables (this needs a carefully designed controlled experiment).
  - How can ethics come into play here?
How to develop a research question?

Two key elements to the process:

– Idea Generation
– Literature Review

Designing a research proposal.

Some common things to include/consider:

– Your motivations in undertaking the research.
– The goals/outcomes you have in mind.
– Having a testable hypothesis.
– What methodologies you will use.
– How you plan to document your work.
– The schedule/timetable you plan to follow.
– Where you plan to share your results.
How to report your results?

MANY different avenues for this, but a brief list of some categories:

– long report to a supervisor or team
– poster session at a conference
– paper connected to conference presentation
  ▪ could be long, short, work-in-progress, etc.
– paper for archival journal
– magazine article in known publication