

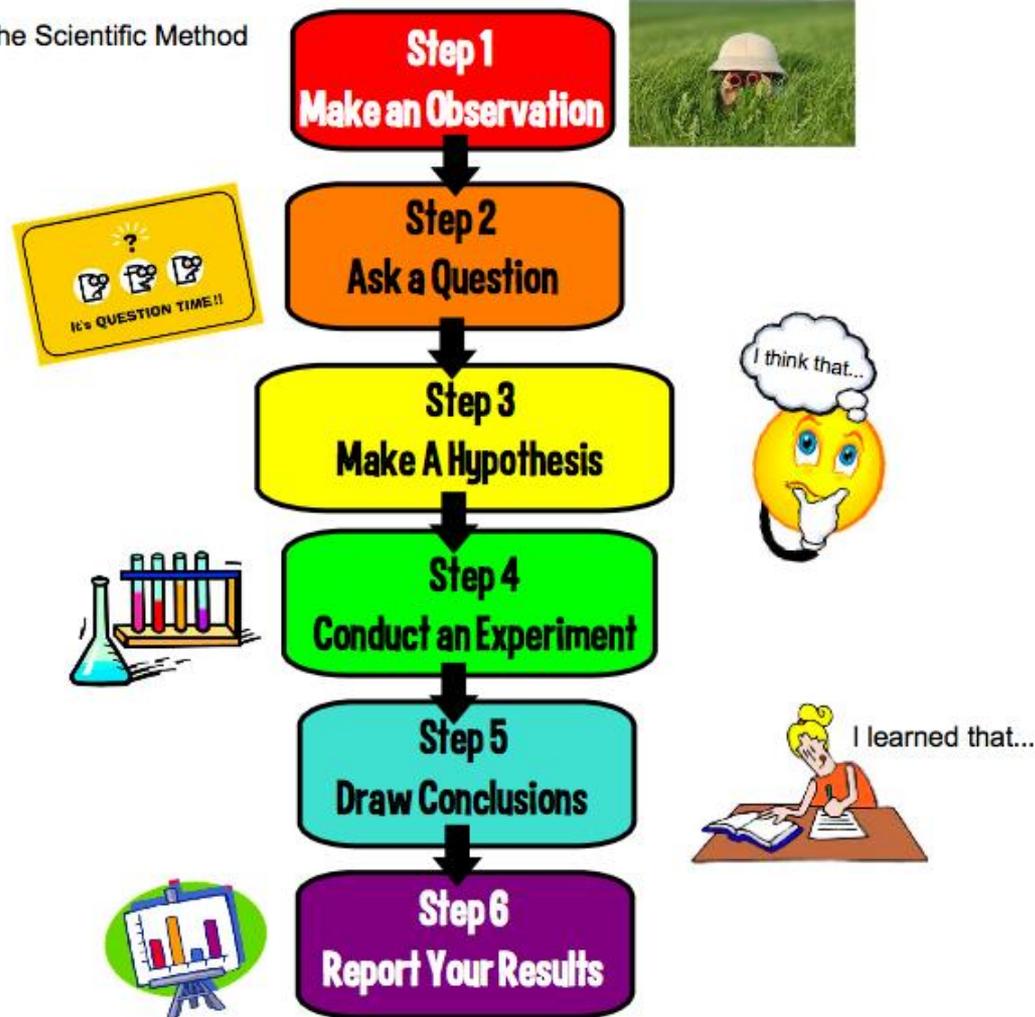


# The Research Process

RALITSA TODOROVA PSYCH 250

# The Scientific Method

Steps of the Scientific Method



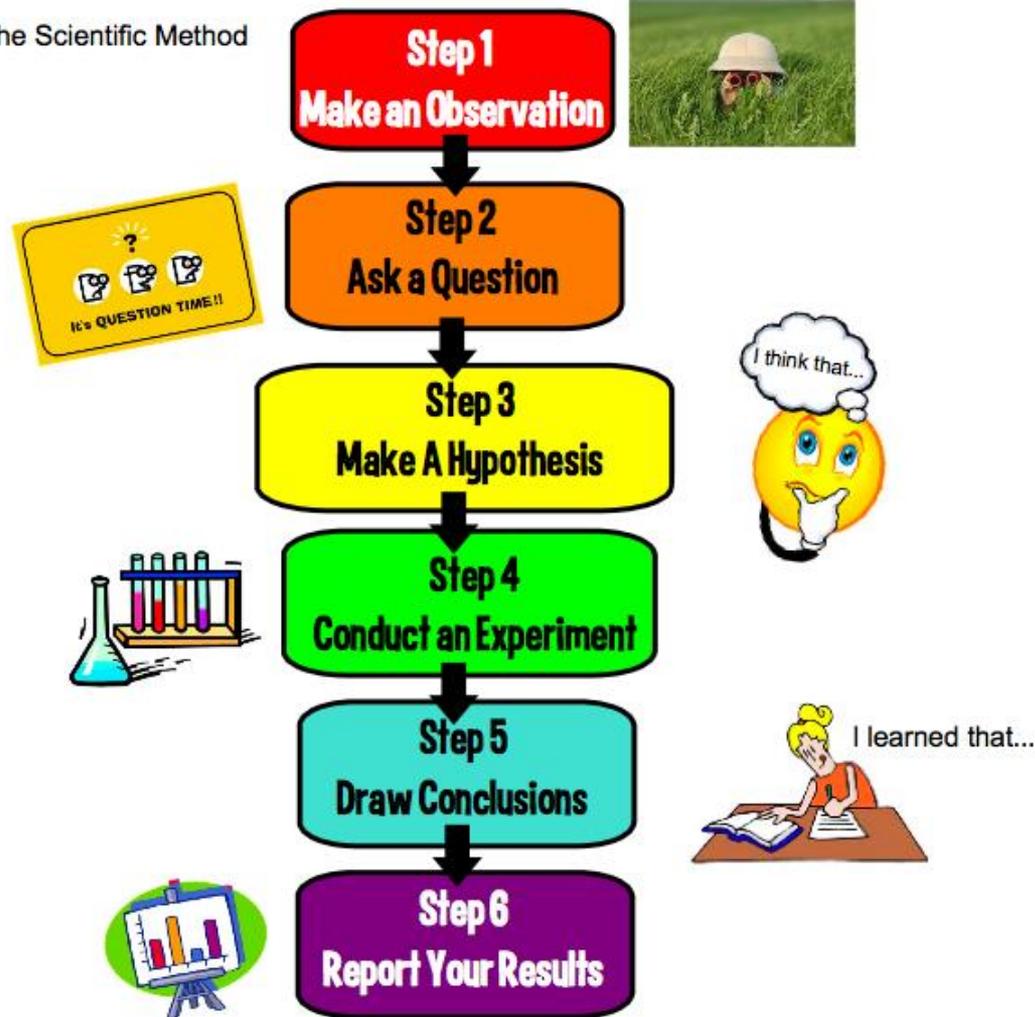
# Other Ways of Knowing



- Personal experience and common sense
  - Clean needle exchange (Ksobiech, 2004; CDC)
  - Car/train/plane safety
- Knowledge from experts and authorities
- Knowledge based on popular media
- Knowledge based on ideological beliefs
  
- Climate change
- Women are more likely to do laundry than men

# The Scientific Method

Steps of the Scientific Method



# Let's think about the squirrel experiment...

- What is our research question?
  - Does squirrel behavior differ between the summer and winter seasons?
- What are our hypotheses?
  - Pick at least 2 behaviors of focus.

# Independent Variable



- What the researcher manipulates or changes.
- Testing to see whether this variable has an affect (on another variable) (p.8)
- Squirrels?



# Dependent Variable



- What the researcher measures
- If this variable *depends* on the other variable
- Testing to see if a change in the independent variable will have a change in the dependent variable
- Squirrels?

# Operational Definition



- Tells ‘exactly what was done’ and how it was measured or produced (p.46)
  - **This is also relevant to your method section overall**
  - **Stress**
- Ethogram
  - **How were our behaviors defined?**
  - **Problems?**

# Reliability



- A reliable measure is consistent
- “Different researchers who use the same procedure to measure a phenomena should obtain same results” (p. 47).

# Internal Validity



- Are we measuring what we think we are measuring?
  - **Internal Validity:** The independent variable is causing the change in the dependent variable (and not some other variable = confound)

# Confounds



- Confound: “A factor that yields alternative explanations for the study’s results” (p.47)
  - Experimenter effect: Presence of experimenter affects results (one RA vs. another)
  - Demand characteristics: “Cues participants use to determine what is expected of them” (p.48)
  - *Are demand characteristics a problem if the participant guesses wrong about the purpose of the study?*

# External Validity



- Can the results be generalized beyond the specific participants, measures, and site of research?
- Squirrels?
- “Any investigation needs to have some external validity; an experiment with results totally irrelevant beyond the particular participants in the study is of little or no value from a scientific perspective.” (p. 48)

# External Validity



- Extraneous variables (gender and ice example)
- Greater external validity or simpler design with less external validity?

# Populations and Samples



- “A population is all of the organisms to which a researcher wishes to generalize results” (p. 49).
- Sample = subset of the population



# Sampling



- A random **sample** means that “all the members of the population were equally likely to be chosen”
- Convenience sample = readily available volunteers
- Random **assignment**: how participants are assigned to *conditions*

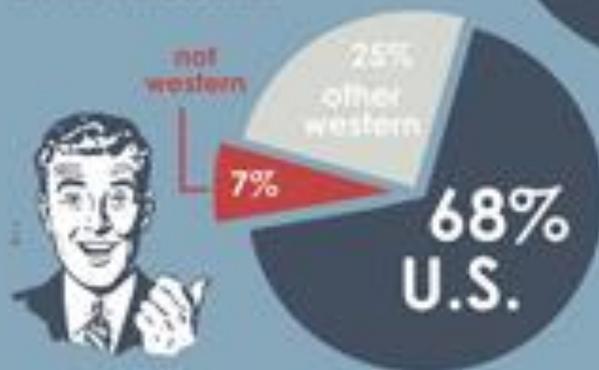
# WE ARE *NT* THE WORLD

## WESTERN BIAS IN BEHAVIORAL RESEARCH

FROM 2003 - 2007

**93%** OF STUDIES IN  
THE TOP 6  
PSYCHOLOGICAL JOURNALS USED  
ONLY WESTERNERS  
AS TEST SUBJECTS

Q: WHO MAKES UP "THE WEST"?



NEARLY **70%**  
OF THE STUDIES  
USED SAMPLES FROM ONLY



FURTHERMORE

99% of the US subjects and

80% of the other westerners

WERE UNDERGRADUATE

**12%** OF THE WORLD'S  
POPULATION

# Hypotheses



- Predictions. A statement proposing a possible explanation of phenomenon.
- One tailed: difference with direction
- Two-tailed: difference without direction
  - The two groups will differ but the researcher does not predict in which way they will differ
- Squirrels?

# Hypotheses



- Null: No difference between the groups being compared. Typically the opposite of what you expect to find.
- Alternative: There is a difference between groups (or independent variable will have an affect on the dependent variable). Usually what you are expecting to find.
- Why do we usually expect differences? Why do we design experiments in that way?

# Null Hypothesis



- Reject the null: Have found significant difference between groups. Suggests the alternative *may* be true.
- Fail to reject the null: Have not found a significant difference but that *does not mean that we have found equality*.
- If you fail to reject the null at  $\alpha = .05$  confidence level, that is pretty strong support for the alternative hypothesis – you can be pretty confident the difference did not occur by chance
  - **BUT that doesn't always mean our explanations are correct**

# Truth and Equality



# Type I & Type II Errors

## Type I

- Find a difference that does not actually exist
- Seen as more serious
  - can have policy implications
- Publish; distribute treatment

## Type II

- Fail to detect a difference even though a difference does exist
- Seen as less serious
- ‘File drawer problem’

# Significance Level



- Significance level, or alpha, is the baseline researchers have set to look for significant difference between groups
- It is small to protect null/prevent investigator from making false claims
- Alpha level  $.05 = 5\%$  chance of making Type I error
  - 5% chance of saying there is a significant difference when in fact there is not
  - 95% chance difference did not occur by chance

# The Research Process



1. Identify a topic
2. Learn about the topic
3. Form a hypothesis; have research questions
4. Design the study; select appropriate method
5. Collect data
6. Analyze data
7. Interpret results
8. Communicate results

# The Converting an Idea into a Research Hypothesis



- Make your idea testable
- Make it supportable (Avoid null – what's the reason for doing it?)
- Have a rationale: How theory can help
- Demonstrate relevance: How does this apply to daily life? Why is it important?

# Hypothesis Checklist



- Can it be proven wrong?
  - Specific prediction?
  - Operational definitions?
- Can it be supported?
  - What's the previous research?
- Do you have a rationale for your prediction?
- Are there implications of your hypothesis for theory, previous research, or a real-world concerns?
- Is it practical and ethical to test your hypothesis?

# Squirrels



- What is/are our research question(s)?
  - Is there a difference between squirrel behavior in summer and winter? Specifically, in x, y, and z behavior.

- What are our hypotheses?
  - Should have at least 2 based on behaviors