
Research Methods in Behavioral and Social Sciences

— Alex Gamero-Garrido —
Chen Shen

SESSION'S LEARNING GOALS

1. Research Methods in Behavioral & Social Sciences
 - What are the methods?
 - How do you use them?
 - How do you verify that you used them correctly?

2. Creative Hypothesis Generating in Psychology
 - Five categories
 - What's the point?

Doing research is like working on your backyard



There isn't a swiss army knife for your research

- Research happens in three domains
 - Substantive
 - Conceptual
 - **Methodological**
- Methods: “Bounded opportunities to gain knowledge”
- Possible advantages: **generalizability, precision or realism**
- Using patterned methods improves research quality



If research were a Swiss Knife, it would have... (1/2)

I. Field Strategies

- “Observation of natural systems”
- The observer is invisible



II. Experimental Strategies

- Artificially study behavior
- Observer creates the context



If research were a Swiss Knife, it would have... (2/2)

III. Respondent Strategies

- Estimating population variables
- Representative samples

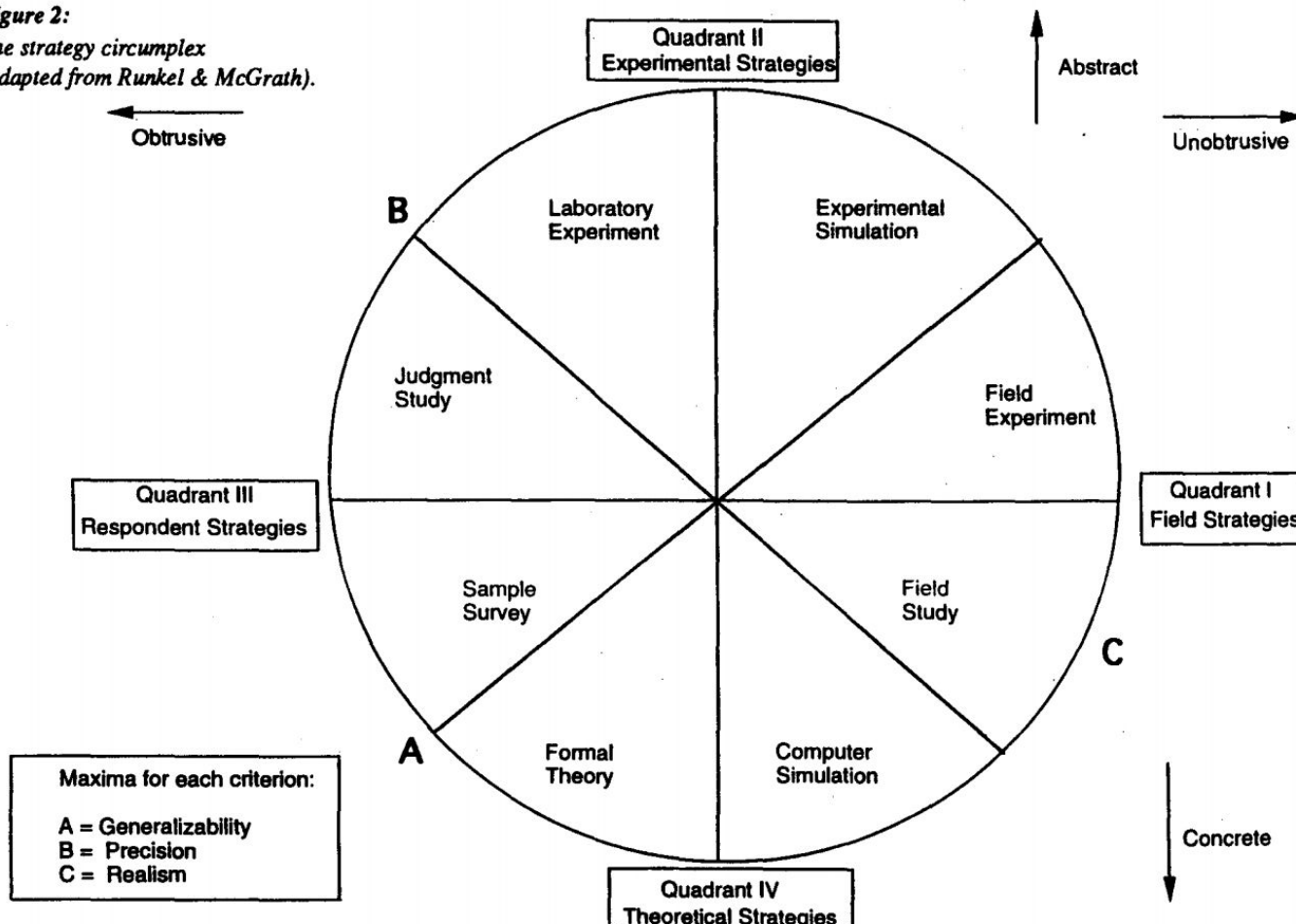
IV. Theoretical Strategies

- Relationship between variables
- No evidence gathered

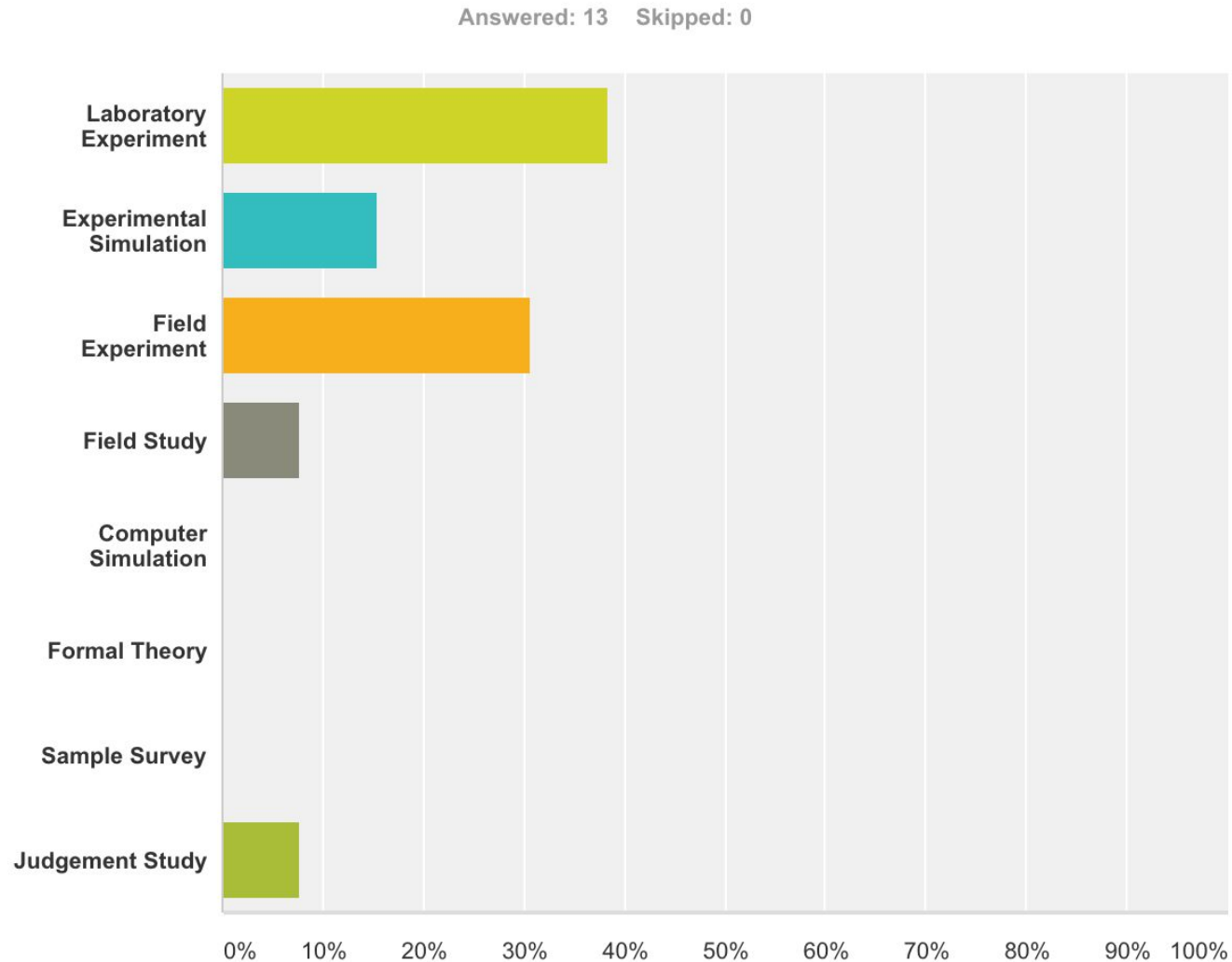


This is what a Research Swiss Knife looks like

Figure 2:
The strategy circumplex
(adapted from Runkel & McGrath).



Which Research Method are you using?



ACTIVITY

In groups of 2-3, discuss **which research strategy does your project use** (experimental, field, respondent, or theoretical), and why did you choose it?

Does your strategy maximize **generalizability, precision or realism?**

Feel free to critique each other's reasoning.

Comparison techniques: watering your plants

- Baserates

- Generally, how much of a variable is “normal”?
- *How green is my yard at current watering levels?*



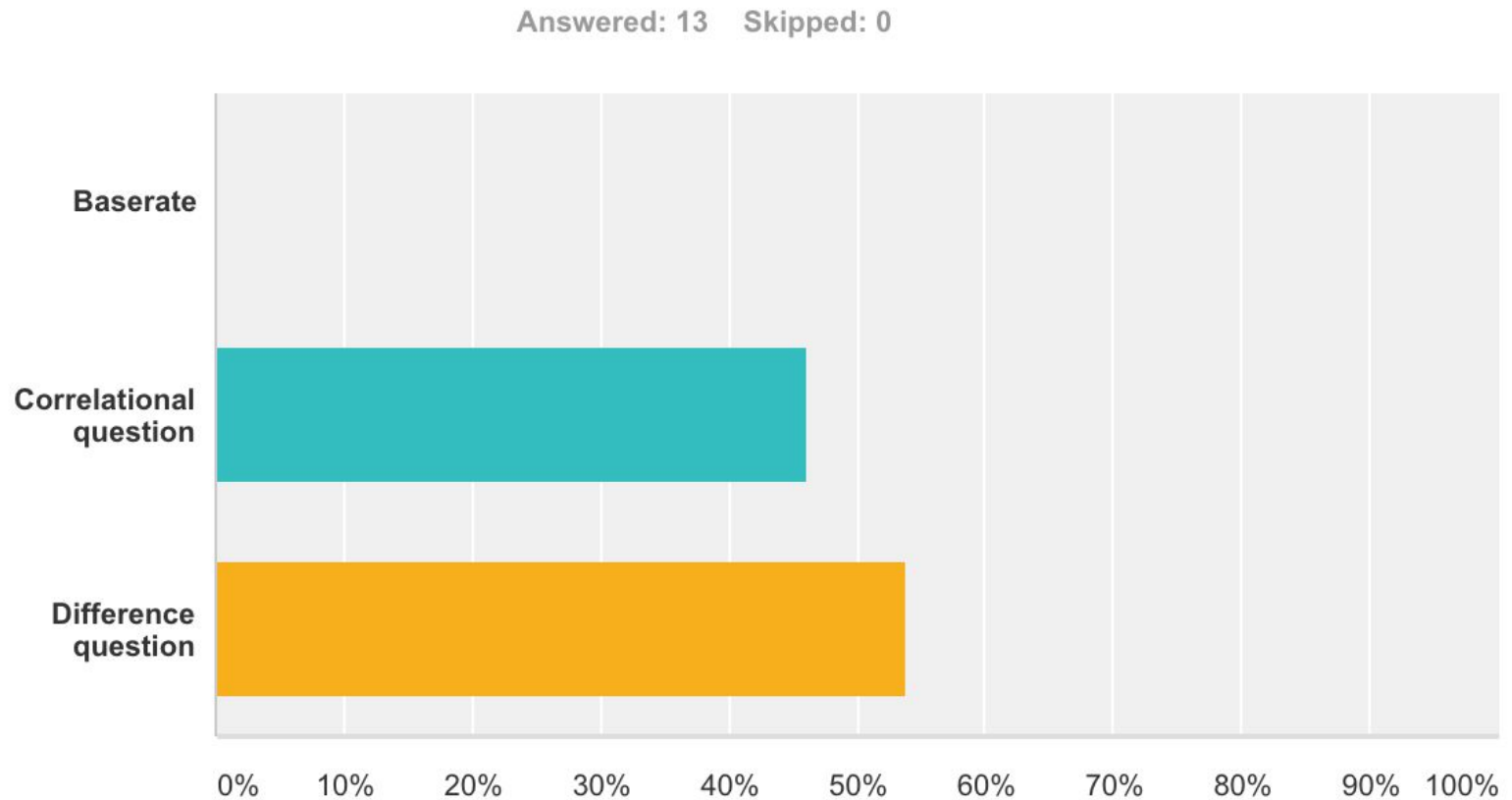
- Correlational Question

- Do these two variables **change** together?
- *Is the greenness of my yard proportional to how much I water it?*

- Difference Question

- Are two variables present or absent together?
- *Does my yard go brown if I do not water it at all?*

Which comparison technique are you using?



ACTIVITY

Which comparison technique best describes your research question (baserate, correlational or difference), and why did you choose it?

Feel free to critique each other's reasoning.

Validity: what *really* happened to your yard?

- Internal validity

- Have causal relationships been identified?
- *Did more watering coincide with cooler summer?*

- Construct validity

- How coherent is your study?
- *Do we know if watering is relevant for greenness?*



- External Validity

- Beyond your particular case, how well do your findings hold?
- Can you predict the limits of your findings?
- *More watering will increase greenness in CA, but not in OR.*

ACTIVITY

How will you test the validity of your findings?

Can you identify **contexts for which your (expected) findings will not hold?**

Feel free to critique each other's reasoning.

SUMMARY

1. Research methods have **limitations**.
2. Methods can maximize **one** of: generalizability, precision or realism.
3. Research questions generally study **relationship between two variables**.
4. Finding correlation is **insufficient** for establishing causality.

GOOD JOB GUYS!

In HCI research, methods are critical as more studies are being conducted online where controlling for variables and manipulations is not as easy as in laboratory settings. Researchers need to carefully think about the methods through which they want to obtain their metrics of interest.

Tricia Ngoon

I think it would be a pretty interesting/helpful standard to have in papers if all portions of research/data gathering were labeled with the researcher's evaluation of the desirable features (generalizability, precision, realism).

Jesse Qin

Creative Hypothesis Generating in Psychology

Some Useful Heuristics

Creative Hypothesis Generating in Psychology

- Our education system concentrate heavily on **procedures for testing hypotheses** and largely ignore **procedures for generating them**.
- Creative hypothesis-generating can be taught.
- Proposing hypothesis rather than testing hypothesis is the key of the research

“Yin and Yang” (McGuire 1973)

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YIN AND YANG OF PROGRESS IN SOCIAL PSYCHOLOGY: SEVEN KOAN

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as hypothesis formation is something that cannot be taught.

I admit that creative hypothesis formation cannot be reduced to teachable rules, and that there are individual differences among us in ultimate capacity for creative hypothesis generation. Still, it seems to me that we have to give increased time in our own thinking and teaching about methodology to the hypothesis-generating phase of research, even at the expense of reducing the time spent discussing hypothesis testing. In my own methodology courses, I make a point of stressing the importance of the hypothesis-generating phase of our work by describing and illustrating at least a dozen or so different approaches to hypothesis formation which have been used in psychological research, some of which I can briefly describe here, including case study, paradoxical incident, analogy, hypothetico-deductive method, functional analysis, rules of thumb, conflicting results, accounting for exceptions, and straightening out complex

own work on deriving hypotheses about techniques for inducing resistance to persuasion, where I formulated hypotheses by analogy with the biological process of inoculating the person in advance with a weakened form of the threatening material, an idea suggested in earlier work by Janis and Lumsdaine. A fourth creative procedure is the hypothetico-deductive method, where one puts together a number of commonsensical principles and derives from their conjunction some interesting predictions, as in the Hull and Hovland mathematico-deductive theory of rote learning, or the work by Simon and his colleagues on logical reasoning. The possibility of computer simulation has made this hypothesis-generating procedure increasingly possible and popular.

A fifth way of deriving hypotheses might be called the functional or adaptive approach, as when Hull generated the principles on which we would have to operate if we were to be able to learn from experience to repeat

Creative Hypothesis Generating in Psychology

Table 1 Creative heuristics used to generate psychological hypotheses

I. Heuristics Simply Calling for Sensitivity to Provocative Natural Occurrences
A. Recognizing and Accounting for the Oddity of Occurrences
1. Accounting for deviations from the general trend
2. Accounting for the oddity of the general trend itself
B. Introspective Self-Analysis
3. Analyzing one's own behavior in similar situations
4. Role playing one's own behavior in the situation
C. Retrospective Comparison
5. Extrapolating from similar problems already solved
6. Juxtaposing opposite problems to suggest reciprocal solutions
D. Sustained, Deliberate Observation
7. Intensive case studies
8. Participant observation
9. Assembling propositional inventories
II. Heuristics Involving Simple Conceptual Analysis (Direct Inference)
E. Simple Conversions of a Banal Proposition
10. Accounting for the contrary of a trite hypothesis
11. Reversing the plausible direction of causality
12. Pushing an obvious hypothesis to an implausible extreme
13. Imagining the effects of reducing a variable to zero
14. Conjecturing interaction variables that qualify a relation
F. Multiplying Insights by Conceptual Division
15. Linguistic explorations
16. Alternative manipulations of the independent variable
17. Dividing the dependent variable into subscales
18. Arranging output subcomponents into a sequence
G. Jolting One's Conceptualizing Out of its Usual Ruts
19. Shifting attention to an opposite pole of the problem
20. Alternating preferred with nonpreferred research styles
21. Expressing one's hypothesis in multiple modalities
22. Disrupting ordinary states of consciousness
III. Heuristics Calling for Complex Conceptual Analysis (Mediated Inference)
H. Deductive Reasoning Procedures
23. Generating multiple explanations for a given relation
24. Alternating induction and deduction
25. Identifying counterforces obscuring an obvious relation
26. Hypothetico-deductive sets of postulates
I. Using Thought-Diversifying Structures
27. Using an idea-stimulating checklist
28. Constructing provocative complex generating structures
29. Formalizing explanatory accounts
J. Using Metatheories as Thought Evokers
30. The evolutionary functionalism (adaptivity) paradigm
31. Transferring conceptualizations analogously

Table 1 (continued)

32. Quisnotic defense of a theory
IV. Heuristics Demanding Reinterpretations of Past Research
K. Delving into Single Past Studies
33. Accounting for irregularities in an obtained relation
34. Decomposing nonmonotonic into simpler relations
35. Deviant-case analysis
36. Interpreting serendipitous interaction effects
L. Discovery by Integrating Multiple Past Studies
37. Reconciling conflicting outcomes or nonreplications
38. Bringing together complementary past experiments
39. Reviewing and organizing current knowledge in an area
V. Heuristics Necessitating Collecting New or Reanalyzing Old Data
M. Qualitative Analyses
40. Allowing open-ended responses for content analysis
41. Participating actively in the research routine
42. Exploring a glamorous technique
43. Including low-cost interaction variables in the design
44. Pitting confounded factors against one another
45. Strategic planning of programmatic research
N. Quantitative Analyses
46. Multivariate fishing expeditions
47. Subtracting out the effect of a known mediator
48. Computer simulation
49. Mathematical modeling

Creative Hypothesis Generating in Psychology

- I. Heuristics Simply Calling for Sensitivity to Provocative Natural Occurrences
- II. Heuristics Involving Simple Conceptual Analysis
- III. Heuristics Calling for Complex Conceptual Analysis
- IV. Heuristics Demanding Reinterpretations of Past Research
- V. Heuristics Necessitating Collecting New or Reanalyzing Old Data

I. HEURISTICS REQUIRING SENSITIVITY TO PROVOCATIVE NATURAL OCCURRENCES

- A. Recognizing and Accounting for the Oddity of Occurrences
- B. Introspective Self-Analysis
- C. Retrospective Comparison
- D. Sustained, Deliberate Observation

Category I: Observe something and study it



II. Heuristics Involving Simple Conceptual Analysis (Direct Inference)

- E. Simple Conversions of a Banal Proposition
- F. Multiplying Insights by Conceptual Division
- G. Jolting One's Conceptualizing Out of its Usual Ruts

Category II: Considering other conclusions from a study & take a different point of view



Activity (in groups of 2 – 4)

You are considering a research topic regarding on how drug-addicted people keep using drugs despite the fact that most addicts already know the negative effects of drugs.

Practicing generating a hypothesis using one of the heuristics introduced in Category II

push a relation to extreme

focus on the independent variable

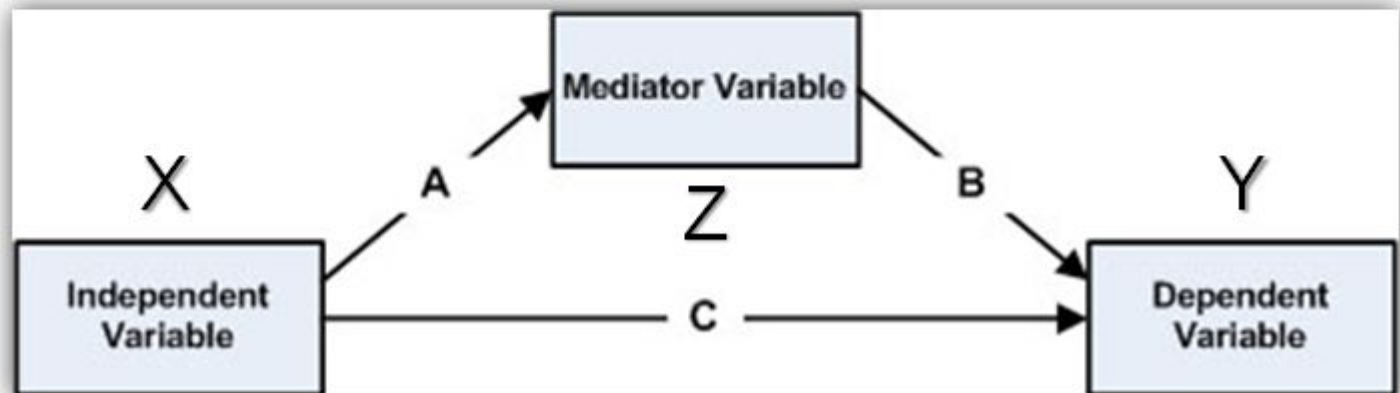
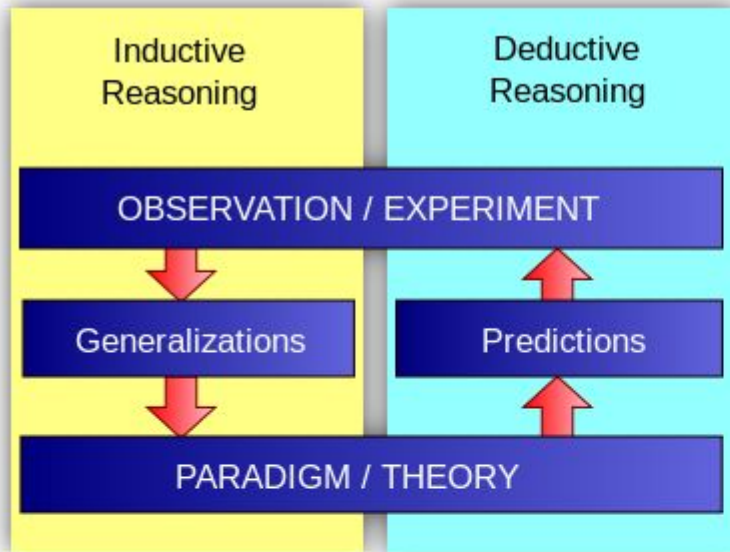
focus on the dependent variable

shift attention to an opposite pole of the problem

III. Heuristics Calling for Complex Conceptual Analysis (Mediated Inference)

- H. Deductive Reasoning Procedures
- I. Using Thought-Diversifying Structures
- J. Using Metatheories as Thought Evokers

Category III: Mediated Inference



IV. Heuristics Demanding Reinterpretations of Past Research

- K. Delving into Single Past Studies
- L. Discovery by Integrating Multiple Past Studies

Category IV: Look into single past studies, discover by integrating multiple past studies



Activity (in groups of 2 - 4)

You are working on discovering the effects of mass communication (TV and Radio and newspapers, for instance) on attitude change. The attitude change is measured by **experiments (laboratory studies)** and **sample surveys (field studies)**.

You discovered that most results from **field studies** has shown little correlation. Yet **experimental research** has shown large effects (1/3 to 1/2 of subjects changed).

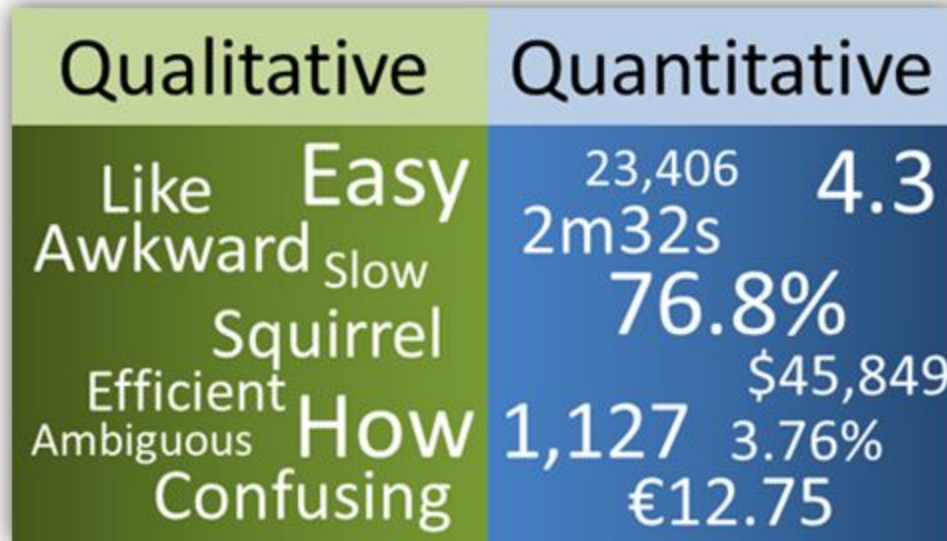
Generate some hypotheses that might explain this difference.

(3 min)

V. Heuristics Necessitating Collecting New or Reanalyzing Old Data

- M. Qualitative Analyses
- N. Quantitative Analyses

Category V: Qualitative Analyses and Quantitative Analyses



Some Comments from students

- “The amazing goal of the paper is to bring to readers attention 49 techniques for generating hypotheses that can be effectively taught” - Irfan Mulic
- “While I can envision the utility of each heuristic described in this paper, I am particularly struck by the of potential G21...Information (or knowledge) that is 'evident' in one representation of a problem may be obscured in another.” - Amy Fox
- “...in order to make the results convincing, we have to analysis the limitations of the method we're going to use and to see if we could use other methods to offset the weakness. “ -Weichen Liu
- “The hypothesis can largely shape the way experimentation and testing is carried out, as well as the method in which results are interpreted.” -Jesse Qin

What's the Point?

- Creative hypothesis generating can be taught
- Hypothesis generation is central to knowledge development
- The heuristics have been described in isolation, but they can work together.
- Provides a way to think about the ways to do research and initialize new ideas that allow readers to pick what is applicable to their needs