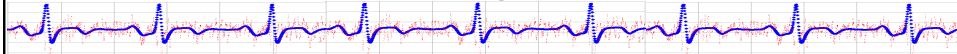


Empirical Research Methods in Information Science

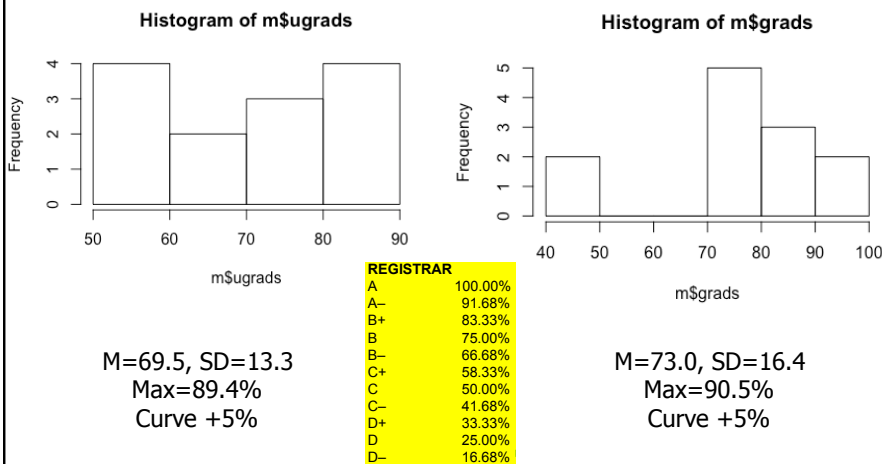
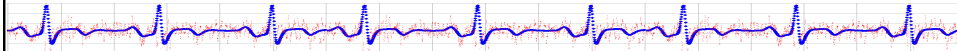
IS 4800/CS 6350



Lecture 16 Finding Good Research Problems

1

Midterm Review



Scientific Theory



Take-aways

- What is a theory?
 - Difference between hypothesis and theory
- How theories are used
- Ideas for new research

Example: Hypothesis -> Theory

Wait Time Sign in Student Center
vs.
No Sign



Satisfaction

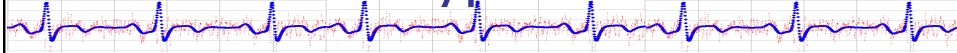
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Example: Theory -> Hypothesis

- Social Penetration Theory
 - People have layers of intimate information.
 - As dyads build trust they disclose more, and vice versa.
 - Self-disclosure creates a reciprocal obligation.
- You're building a marketing site and want users to disclose as much info as possible.

6

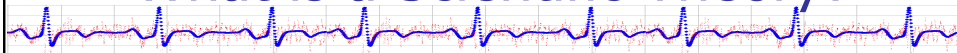
What is a Hypothesis?



- A specific, testable statement.
- Something you design an experiment to prove or disprove.

7

What is a Scientific Theory?

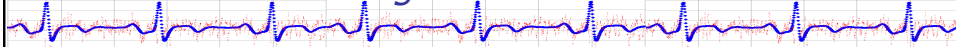


- “a comprehensive explanation of an important feature of nature that is supported by many facts gathered over time. Theories also allow scientists to make predictions about as yet unobserved phenomena.”
 - *American Academy of Sciences*

8

Scientific Theory

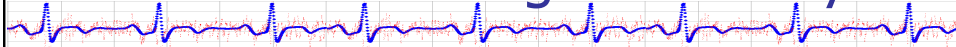
not hunches or guesses...



- “a logically self-consistent model or framework for describing the behavior of a related set of natural or social phenomena.”
- More general than a hypothesis
 - e.g. involves multiple variables and/or more abstract variables
 - Can be used to generate hypotheses
- Must still be (potentially) testable, but not necc true
 - But, usually impossible to completely test
- Thus, often stated as a set of propositions
- Usually has some empirical basis
- Examples:
 - Media Equation – “People treat media as other people.”
 - Exchange Theory – “People track costs vs. benefits in relationships.”

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What makes a good Theory?



- *Ability to Account for Data*
 - Theory must account for existing data and well-established facts within its domain
- *Explanatory Relevance (~face validity)*
 - Theoretical explanation must offer good grounds for believing that the phenomenon would occur under specified conditions
- *Testability*
 - A theory must be testable.
 - It must be capable of failing some empirical test.
- *Prediction of Novel Events*
 - A theory should predict phenomena that the theory was not specifically designed to account for but that are within its domain
- *Parsimony*
 - A theory should explain phenomena within its domain with the fewest possible assumptions

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Theory Quality

- a theory is a good theory if it satisfies two requirements:
 - It must accurately describe a large class of observations on the basis of a model that contains only a few arbitrary elements (assumptions), and
 - it must make definite predictions about the results of future observations

Stephen Hawking

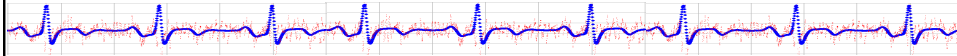
11

Theory vs. ...

- Theory vs. hypothesis
 - Theory is more complex (eg multiple variables)
- Theory vs. law
 - A law is a theory that has been substantially verified empirically
- Theory vs. model
 - A model may be a specific implementation of a general theory – casting a qualitative theory into a quantitative framework
 - e.g. exchange theory

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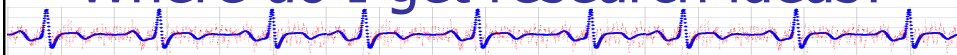
What do you do with a Theory?



- Understanding
 - Highest role in science
 - Theory helps you understand phenomena better
- Prediction
 - Theory provides predictions about behavior under varying circumstances
 - Predictions are tested empirically
- Organizing and Interpreting Research Results
 - A theory provides a framework for understanding research
 - Research results can be interpreted based on a theory
- Generating Research
 - A theory is a source for new research ideas
 - Known as the *heuristic value* of a theory
 - A theory can be wrong, but still have heuristic value

13

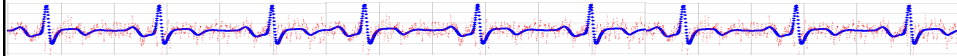
Where do I get research ideas?



- Unless you become a researcher, your research questions will usually be given to you.
- But, if you're lucky...

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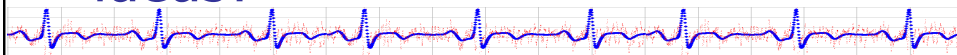
Where do you get research ideas?



- Broad familiarity with theories (remotely) related to your area of investigation...
 - Can a theory be applied to a new domain?
 - Would the Media Equation theory predict why MS Clippy was a failure?
 - Is there a phenomenon that would put two theories in conflict?
 - Maximization vs. Consistency...
- The “future work” section of research papers.
- Observation ... *Ask Why!*

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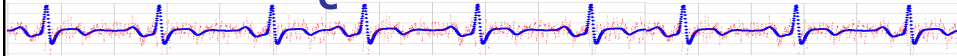
Where do you get research ideas?



- Make sure...
 - It hasn't been done before.
 - It's worth doing.
 - You know how to conduct the study.
 - Your study will answer the question.

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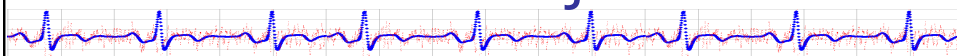
Some Questions



- Can you prove a theory true?
- Can you prove a theory false?
- Can a theory be false sometimes (inaccurate) but still useful?
- Why are theories tentative?
- What's wrong with letting theory exclusively drive research?
- What's wrong with letting data exclusively drive research?

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IS4800 Team Projects



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Team Projects



- Goals
 - Give every student 3 cycles of proposal, execution, analysis, reporting of studies
 - Ethnography/Descriptive Study
 - Correlational / Quasi-experimental
 - Experimental
 - Give every student (at least) one experience giving oral presentation of study results

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Team Projects



- 5 teams per cycle
 - 2-3 members each
- On 3/20, 4/3 and 4/17 one member from each team presents results for 10 minutes

20

Team Projects



- Each project has 2 week duration
- Study proposal
 - Due 2-3 class sessions before deadline (you may submit early)
 - Typically 1-2 pages
 - You may not collect data until I approve
 - I'm acting as your IRB
 - Exact measures you are using (questions)
- Data collection, analysis, writeup and preparation for oral presentation by due date

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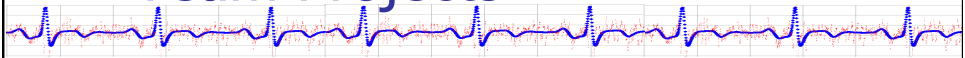
Team Projects



- Topic constraints
 - Related in some way to IS/IT/Health
 - Within NU IRB constraints discussed in class
- Writeup
 - At least 3-5 pages long
 - Contain both raw data (usually in appendix) and visualization
 - Analysis (statistics)
 - Discussion (interpretation & implications)
 - More on 3/13

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Team Projects



- Oral presentation
 - 10 minutes (hard upper bound)
 - 5 minutes critique (from all)
 - Research question & motivation, hypotheses, study design, results, conclusions
 - Visualization of data
 - Either
 - Email ppt to me by noon, or
 - Bring memory stick with ppt
 - Put on web
 - Put on your laptop

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	Project		
	1	2	3
Brody, Benjamin J.	1	1	1
Driesman, Joshua S.	1	2	5
Filippou, Demi A.	1	3	3
Hanna, Nicolas L.	2	4	4
Horen, Elliot A.	2	5	1
Hubbell, Sydney	2	1	2
Patel, Devanshi H.	3	2	3
Perkins, Matthew G.	3	3	5
Perny, Ryan	3	4	1
Shah, Suhani S.	4	5	2
Stern, Jeremy Z.	4	1	3
Walter, John E.	5	2	4
Zhang, Xi ("Erin")	5	3	2

3/20

4/3

4/17

Team assignments

Highlighted student presents

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Team Projects

- At completion of each project I will ask you to evaluate your teammates via email

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First Team Project

- Ethnographic and/or Descriptive
- Proposals due 3/13
 - Only one paragraph for this one
 - I'll give approval within 48 hours
- 1 week to conduct, writeup & present on 3/20
- Priorities:
 - Motivation
 - Methodology
 - Descriptive stats
 - Form of writeup & presentation
 - Conclusions/Lessons learned

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First Team Project

- This is a descriptive study. It can be as simple as the ethnographic exercise you did in I2, as involved as a behavioral study, or involve the administration of a survey as you did in I4. In any case it should involve some measures that you can do descriptive statistics on.
- Proposals only need to be one paragraph long, but need to describe the general topic you will be investigating, the motivation for the study, and a description of the measures you will collect.
- If you are doing a questionnaire or a structured or semi-structured interview I need to see the exact list of questions you will be asking, so I that I can ensure that you are following the IRB guidelines for non-sensitive topics.

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Homework

- T1
 - Meet with your team
 - Start thinking about your study & proposal

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