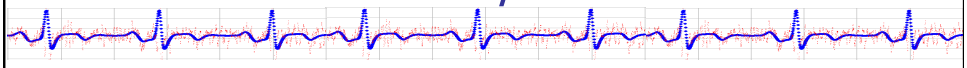
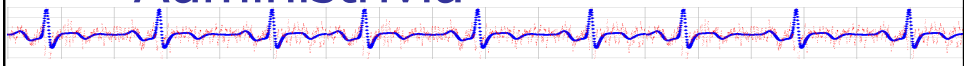
Empirical Research Methods in Information Science

IS 4800 / CS 6350



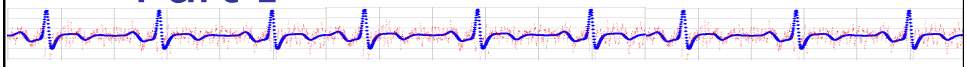
Lecture 3

Administrivia



- Office hours
  - Weds 10-11, starting 1/24
  - Or by appointment
  - 911-177 (177 Huntington, 9th floor)
  - Please let me know in advance: I have to let security know you are coming

Exercise from last class Part I



- Describe how knowledge acquired from conducting the study specified in the sample research plan meets (or does not meet) the criteria for "scientific explanations".
  - Empirical; Rational; Testable; Parsimonious; General Tentative; Rigorously evaluated

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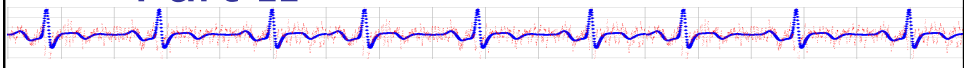
Exercise from last class Part II



- Describe the roles that background research play in the sample research plan, giving an example of each.

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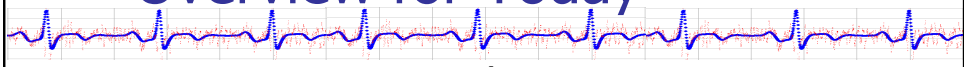
Overview for Today



- Using Human Subjects
  - Sampling
  - Ethical issues
  - Confidentiality & Identification
  - Eligibility
  - Recruiting
  - Compensation
  - NU IRB & Student projects

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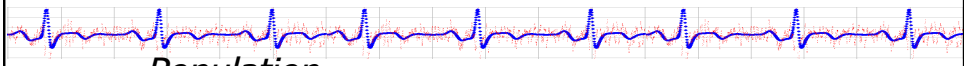
Populations and Samples



- *Population*
  - Large group including all potential subjects
  - May be defined in many ways
    - All children in day care
    - Children in day care in a particular city
- *Sample*
  - Small subgroup of subjects chosen from the population

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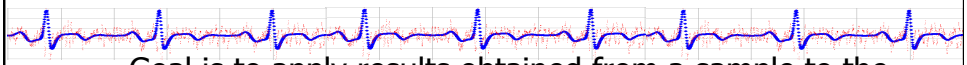
Sampling and Generalization



- Goal is to apply results obtained from a sample to the population
- *Generalization* is the ability to apply findings from a sample to the population
  - Aka "External Validity" of a study
- *Random sample:* A sample in which every member of the population has an equal chance of being chosen
  - Ideal that is not often met
- *Nonrandom sample:* A sample from a specialized population (e.g., college students)

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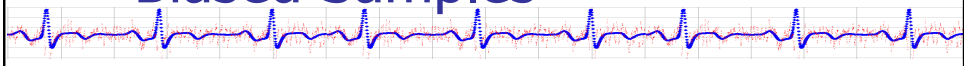
Biased Samples



- Examples?

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Biased Sample – Example
The Literary Digest Poll

- 1936, depression
- FDR, Democrat, running for re-election against Kansas governor Alfred Landon, Republican.
- Literary Digest did a poll, mailing 10M questionnaires using addresses from the phone book and club membership lists.
- 2.4M people responded (largest number ever sampled)
- The Digest had correctly called the winner in every presidential election since 1916.

	Prediction
Roosevelt	44%
Landon	56%

- Selection Bias, magnified due to depression
- They tended to miss the poor, who did not have phones and did not join clubs. (Only one household in four had a phone

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Biased Sample – Example
Are kids worth the trouble?

- Letter to Dear Abby – should we have kids?
- 10k letters, 70% say "no, don't do it"
- Random sample: 91% say it's worth it

Dear Abby

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What happened to the polls in the 2016 election?

- Proposed reasons:
  - Nonresponse bias. Some groups – including less educated voters – are consistently hard for pollsters to reach
  - Social desirability bias. Support for Trump may have been seen as socially undesirable
  - Errors in identifying likely voters (who actually showed up to polls).
  - Late breaking of undecided voters for Trump
  - Errors in education weighting. Well-educated voters are much likelier to take surveys

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Amazon Mechanical Turk

- Younger, more educated, less employed, more liberal
- Does it matter?
- Probably not

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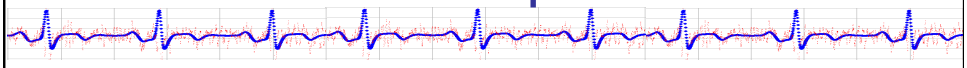
How do you get a random, non-biased sample?



Wait 'til B&A Ch 9 for more sampling methods.

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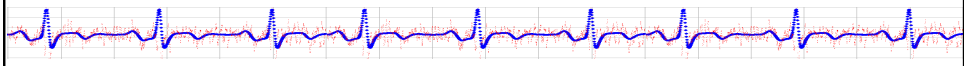
Nonrandom Sampling and Internet Research



- Internet research uses a nonrandom sample
  - Participants are self-selected volunteers
  - Participants know how to use computers
  - Participants have access to computers
  - Participants are Internet savvy
- Two ways to demonstrate the validity of Internet research
  - Compare Internet with non-Internet results
  - Compare Internet results with theoretical predictions
- Internet and non-Internet samples may not differ significantly

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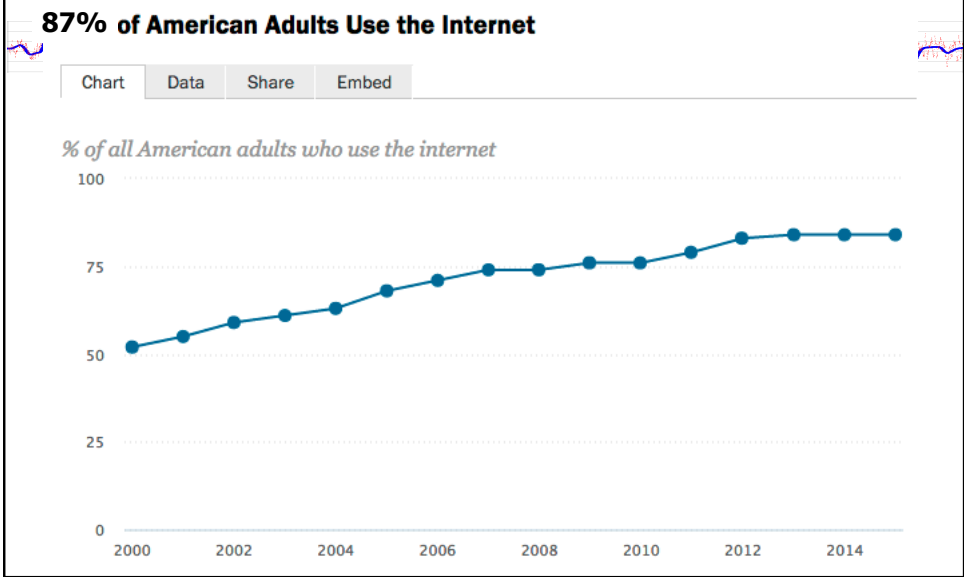
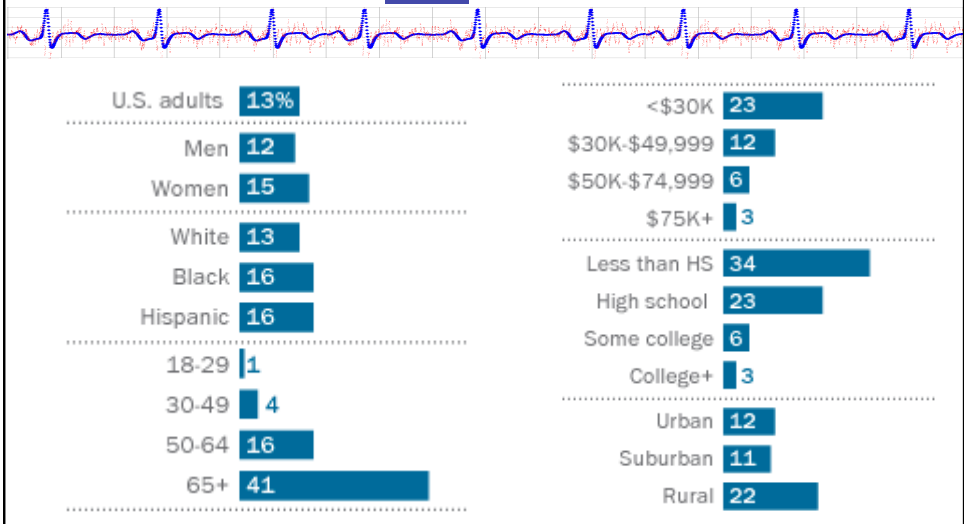
Digital Divide – Pew 2016



Digital Divide - 2016 Pew
Who does not use the Internet?



Self-disclosure

- Social desirability bias
- People may disclose more undesirable behavior to computers than to people
- This may introduce a bias in online vs. in-person studies when measures include potentially stigmatizing behaviors

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Internal vs. External Validity of a study..

- Internal:
  - ability to prove/disprove hypotheses
  - appropriate methods (well designed)
  - conducted properly
  - data analyzed correctly
  - correct inference
  - replicability: could someone else conduct your study and get the same result?
- External:
  - generalizability

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Volunteer Bias

- How can it affect external validity?
- How can it affect internal validity?
- Characteristics of volunteers?
- How do you address volunteer bias?

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Characteristics of Individuals Who Volunteer for Research

Volunteers…

1. Tend to be more highly educated than nonvolunteers
2. Tend to come from a higher social class than nonvolunteers
3. Are of a higher intelligence in general, but not when volunteers for atypical research (hypnosis etc)
4. Have a higher need for approval than nonvolunteers
5. Are more social than nonvolunteers
6. etc.

What can you do about this?

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Sampling: Bottom Line

- You rarely get to measure all members of a population for a study.
- All of the statistical methods we'll discuss assume random sampling.
- This is very difficult to do. You usually settle for a biased sample – but you need to be able to justify it and understand the nature of the bias.

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Ethical Principles in Human Subjects Research - History

- Nazi Experiments
  - 1939-1945 - Thousands of 'subjects'
- Tuskegee Syphilis Study
  - Study of 600 black males by US Public Health Svc, 1930's – 1972
  - No consent ('special treatment')
  - No treatment – just observation
- US Govt Radiation Experiments
  - 1944-1974 – exposed thousands to radiation
- NY Jewish Chronic Disease Hospital Study
  - 1963 – injected live cancer cells into subjects
  - Improper (oral only) consent, deception
- NY Willowbrook School Study
  - 1963-66 – infected children with hepatitis ("would get it anyway")

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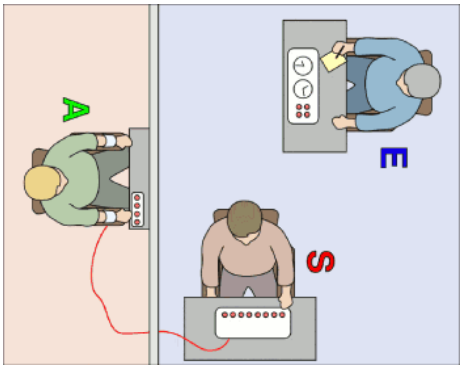
Stanley Milgram Experiment

1963 - Obedience (65% full compliance)



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The New York Times

Opinion

WORLD | U.S. | N.Y. / REGION | BUSINESS | TECHNOLOGY | SCIENCE | HEALTH | SPORTS | OPINIO

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EDITORIAL OBSERVER

Four Decades After Milgram, We're Still Willing to Inflict Pain

By ADAM COHEN
Published: December 28, 2008

In 1963, Stanley Milgram, an assistant professor of psychology at Yale, published his infamous experiment on obedience to authority. Its conclusion was that most ordinary people were willing to administer what they believed to be painful, even dangerous, electric shocks to innocent people if a man in a white lab coat told them to.

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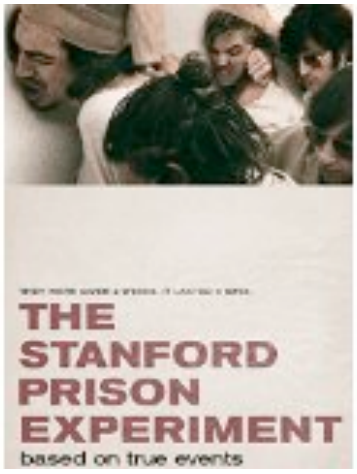
Stanford Prison Experiment 1971 – study power & roles



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Ethical Principles in Human Subjects Research - History

- 1947: Nuremberg Code
- 1948: Universal Declaration of Human Rights was adopted by UN
- 1953: 1ST NIH Federal Policy
- 1964: Declaration of Helsinki (Int'l)
- 1974: 1st Federal legal protection
- 1979: Belmont report – 'cornerstone' of federal ethical principles
- 1991: 'Common Rule' – federal guidelines for most agencies (DHHS, NSF, NASA, Defense, etc etc)

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Terminology

- Federal guidelines still refer to human participants as "subjects"
- Many object to this term, prefer "participants" or "volunteers"

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Ethical Principles in Human Subjects Research

- Respect for persons
- Beneficience
- Justice

Identified in Belmont Report and enshrined in all subsequent federal guidelines

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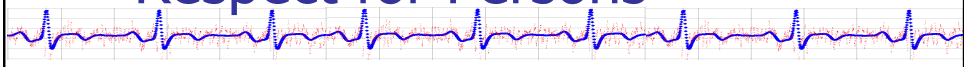
Respect for Persons



- Individuals should be treated as autonomous agents
- Persons with diminished autonomy may need special protections
  - Who?

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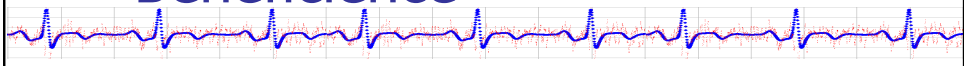
Beneficience



- Maximize benefits
- Minimize possible harm

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Justice

- Treat subjects fairly
- Risks vs. benefits must be equitably distributed across society

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Protection of Privacy & Confidentiality

- Privacy
  - Having control over the extent, timing and circumstances of sharing oneself with others.
- Confidentiality
  - the treatment of information an individual has disclosed in a relationship of trust
  - 2003 Health Insurance Portability and Accountability Act

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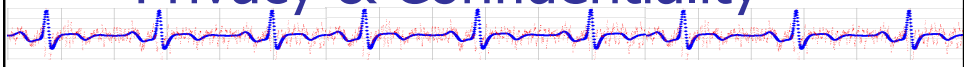
Privacy & Confidentiality



- How related to 3 ethical principles?
- How to ensure?

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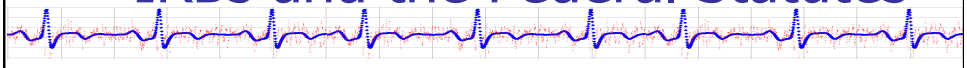
IRBs and the Federal Statutes



- Why care?

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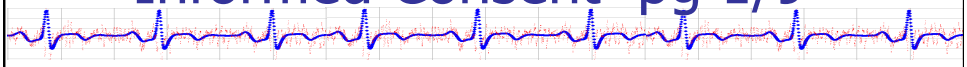

Consent to Participate in a Research Study

We are inviting you to take part in a research study. This form will tell you about the study, but the researcher will explain it to you first. You may ask this person any questions that you have. When you are ready to make a decision, you may tell the researcher if you want to participate or not. You do not have to participate if you do not want to. If you decide to participate, the researcher will ask you to sign this statement and will give you a copy to keep.

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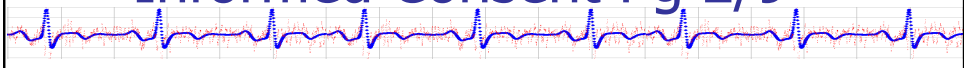

Why am I being asked to take part in this research study?
You are being asked to participate in this study because you are an English speaking adult.

Why are you doing this research study?
The purpose of this research is to learn how to build new computer systems that will assist people in making positive changes in their health behavior.

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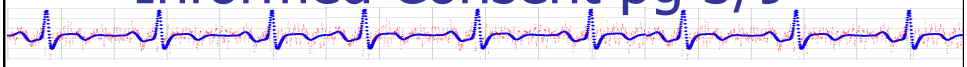

What will I be asked to do?

If you decide to take part in this study, we will have you sit at a desk with computer, fill out questionnaires on your background and your current mood, and then answer a series of simple math problems, all on the computer. You may be asked to interact with an animated computer character. While you are doing all of this you will wear a small clip on one of your fingers, which monitors your heart rate, and straps on two other fingers to monitor your skin conductivity. The researcher will show you how to use the computer system, but during the tests the researcher will leave the room. Your activity during the test may be videotaped, but you may request that the tape segment be erased after we analyze it.

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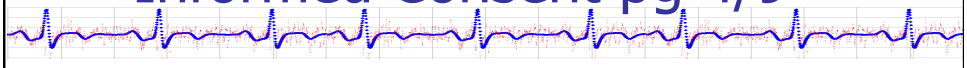

Where will this take place and how much of my time will it take?
The study will take place in the Human-Computer Interaction Laboratory here at Northeastern University and it will take approximately one hour.

Will there be any risk or discomfort to me?
You will give up approximately one hour of your time in the laboratory. The experiment involves your answering a series of simple math problems on a computer. There is a possibility that you may feel some emotional distress or discomfort due to your performance on this test. Also, there is a possibility that some of the questions you will be asked might make you feel uncomfortable. In that case, you are free to refuse answering those questions. In addition, the study may have risks that are not now known. You will be told if new information becomes available that may affect your willingness to participate.

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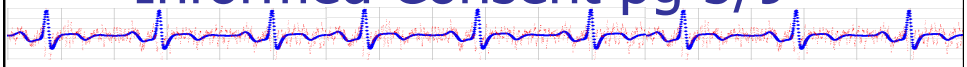

Will I benefit by being in this research?
You will receive no direct benefit from your participation in this study. However, your participation may help the investigators learn to build new computer systems that will help people make healthy changes in their behavior.

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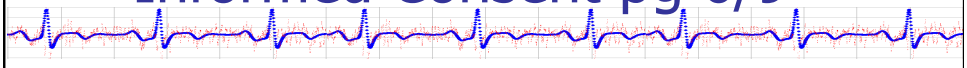

Who will see the information about me?
Information from this study may be used for research purposes and may be published; however, your name will not be used in any publications. Note that all videotapes will be stored in a locked cabinet, accessible only to the researchers, and will be destroyed at the end of the study unless you give explicit permission for them to be used for teaching purposes. In rare instances, authorized people may request to see research information about you and other people in this study. This is done only to be sure that the research is done properly. We would only permit people who are authorized by organizations such as Northeastern University or the federal government to see this information.

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If I don't want to take part in the study, what choices do I have?
You have the option to not participate in the study.

What will happen if I suffer any harm from this research?
No special arrangements will be made for compensation or for payment for treatment solely because of your participation in this research.

Can I stop my participation in this study?
Your participation in this research is completely voluntary. You do not have to participate if you do not want to. Even if you begin the study, you may quit at any time. If you do not participate or if you decide to quit, you will not lose any rights, benefits, or services that you would otherwise have.

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Who can I contact if I have questions or problems?
If you have questions or concerns at any time, or if you need to report an injury while participating in this research, contact TIMOTHY BICKMORE at (617) 373-5477.

Who can I contact about my rights as a participant?
If you have any questions about your rights as a participant, you may contact Nan C. Regina, Coordinator, Human Subjects Research Protection, Division of Research Integrity, 413 Lake Hall, Northeastern University Boston, MA 02115 tel. 617-373-7570. You may call anonymously if you wish.

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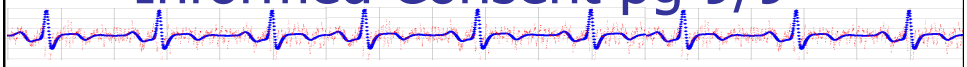

Will I be paid for my participation?
You will be paid $10 for participating in this laboratory session.

Will it cost me anything to participate?
There are no costs to you for participating in this research study.

Is there anything else I need to know?
You must be at least 18 years old to participate.
You will be one of approximately 350 subjects to be asked to participate in this study.

I agree to take part in this research.

Signature _____ Date_____

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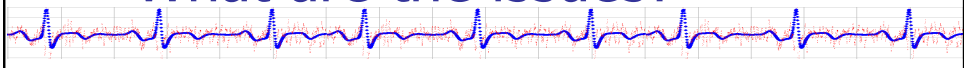
Exercise
What are the issues?



Middlemist, Knowles, and Matter (1976) conducted a study investigating whether or not invasions of personal space are physiologically as well as psychologically arousing. The experiment was run in a men's lavatory, in which the investigators closed off one or another urinal. Participants were forced to urinate either in the urinal next to a male confederate of the experimenter or in the urinal one away from the confederate. A second confederate positioned in a toilet stall adjacent to the urinals observed the subjects via periscope and recorded the latency to onset of urination and its duration.

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Exercise
What are the issues?

In a simulation study of plea bargaining, Gregory, Mowen, and Linder (1978) gave false feedback to undergraduate participants. Participants sat in a waiting room for an experiment to begin. In one condition, another participant who had just been in the experiment (actually **a confederate of the experimenter**) **told the waiting participant that most of the answers to the test that would be taken are "B."** In a second condition, no information was given to the waiting participant. **After the participant took the test, the experimenter accused the participant of cheating** and said that it was a serious matter that would have to be presented to a review board for action. **Participants were led to believe that the consequences of the accused cheating were severe.** The participants were told that if they admitted cheating they would simply lose credit for participating in the experiment.

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Ethics: Bottom Line

- You should consider ethics in <u>every</u> human subjects experiment, even if no IRB
- Minimal remediation: informed consent

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Eligibility

- You should state precisely what your study population consists of.
- "Eligibility criteria" (aka "inclusion criteria")
  - Set of criteria that participants must meet to be used in your study
    - e.g., right-handed males between the ages of 18 and 35
    - Usually stated on recruitment materials
- Exclusion criteria
  - Additional screening tests administered after informed consent.

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Eligibility & Recruitment

- Eligibility criteria and recruitment method must match
  - How are you going to find subjects?
  - How are you going to find enough?

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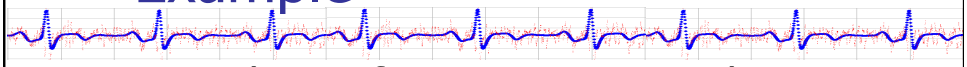
Eligibility & Recruitment Example



- Study: performance gains with new word processor after 2 weeks of use.
- Eligibility criteria
  - Administrative assistants in BigBucks, Inc.
  - Have worked at BBI for more than a year.
  - Currently use WordWize software.
- Exclusion criteria
  - Typing rate < 25 wpm.

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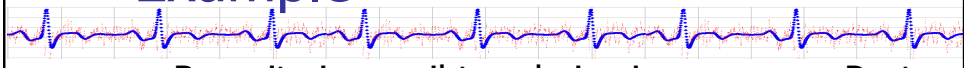
Eligibility & Recruitment Example



- Recruit via email to admins in company. Past response rate to email recruitment = 35%
- Estimate 10% of admins have been at BBI for less than a year.
- Estimate 80% of admins use WordWize.
- Estimate 90% of admins type at > 25 wpm.
- Estimate 90% retention.
- Want to base conclusions on 10 subjects.
- How many admins do we need to email?

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Compensation

- $$$
- Gift certificate for…
- Extra credit
- Altruism
- Fun
  - "Hallway methodology" used in Olympic Message System – workers asked to find their name in the system
  - Free coffee and doughnuts to Nth person who successfully performed a certain task
  - Announce winners via email to department
- What is IRB's primary concern with compensation?

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Exercise – get in to Groups re: Sample research plan – 15min

1. Describe how the plan addresses the three ethical principles of (a) respect for persons; (b) beneficience; and (c) justice.
2. What is the overall point of Section "D. 3.4.1 Study Subjects"?
3. What is the overall purpose of the "Data and Safety Monitoring Plan" described in Section E.8 of the sample research plan?

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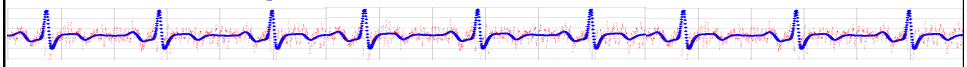
Deception



- Examples?

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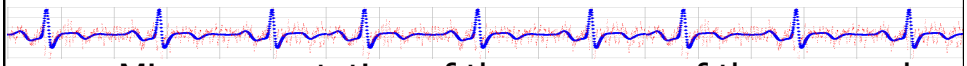
Active Deception in Research



- Misrepresentation of the purpose of the research
- False statements about the identity of the researcher
- False promises made to the participant
- Violations of a promise of anonymity
- Misleading statements about equipment and procedures

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Active Deception, cont'd

- Use of pseudosubjects (or "pseudocomputers")
- False diagnoses and other reports
- False interaction
- Using placebos or secret administration of drugs
- Misleading settings and behavior of the experimenter

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Passive Deception in Research

- Doing unrecognized conditioning
- Provoking and secretly recording negative behavior of participants
- Making concealed observations
- Doing unrecognized participant observation
- Using projective techniques and other personality tests

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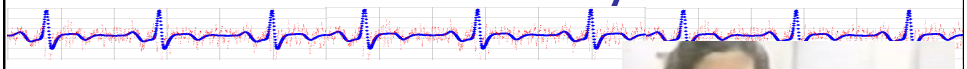
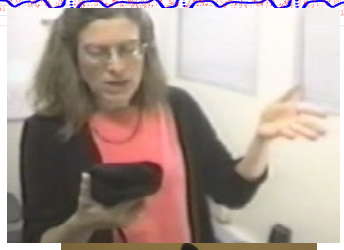
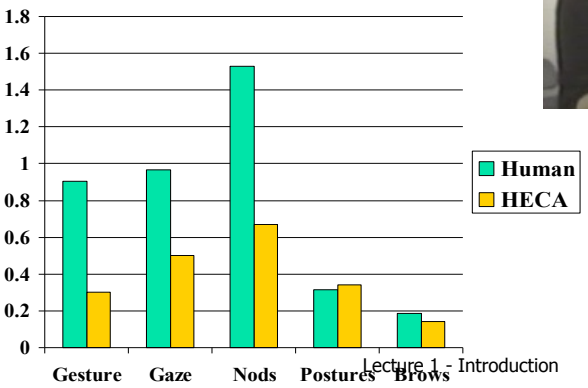
Example: Wizard-of-Oz Handheld ECA study

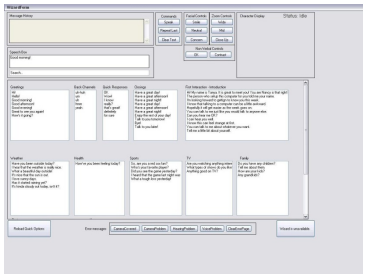






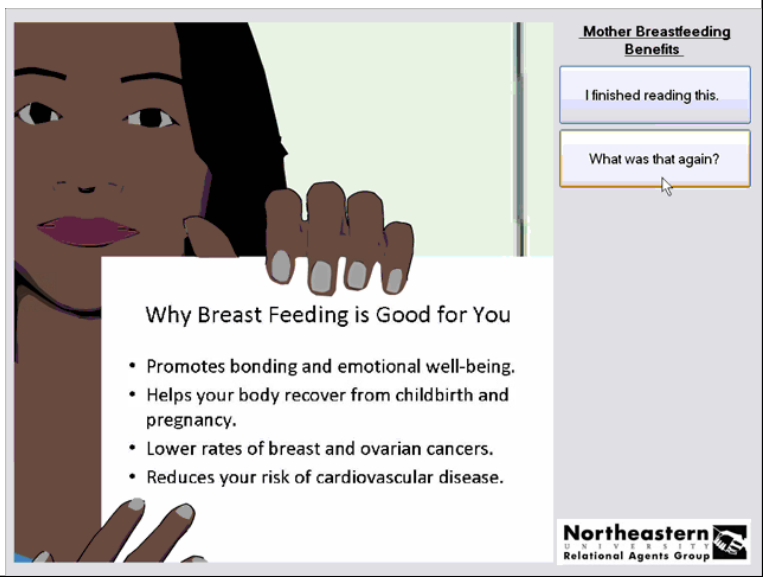
Example: AlwaysOn Remote Wizard-of-Oz

- What would isolated older adults want to talk about with a conversational agent?

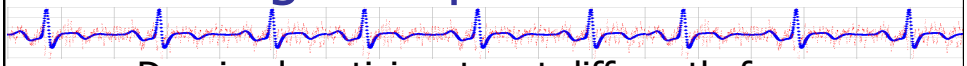


- Unconstrained speech input
- Unconstrained agent speech output

Example: Breastfeeding Promotion 3-arm Feminism Study



Problems Involved in Using Deception?



- Deceived participants act differently from nondeceived participants
- Deceived participants may feel duped and experience a loss of self-esteem
- Participants may find out something negative about themselves
- Deception may violate requirements of informed consent
- Deceived participants may be suspicious of future research participation

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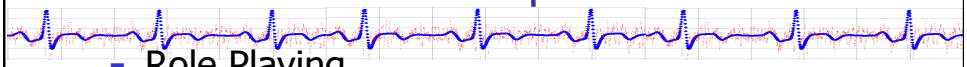
Solutions to the Problems of Deception



- Role Playing
  - Fully informed participants are asked to act as though they were exposed to an experimental treatment
- Obtaining Prior Consent to be Deceived
  - Participants told that some experiments may involve deception
  - Only those agreeing to deception are used in deception research
- Debriefing
  - Inform participants of deception AFTER participation

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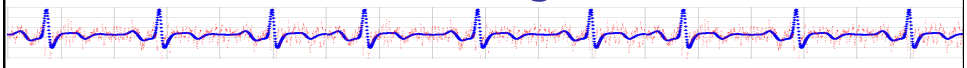
Effective Debriefing



- Make a full disclosure of purposes of research
- Give a complete description of and justification for the deception
- Provide a convincing argument for the need for deception
- Be clear that subject can withdraw data

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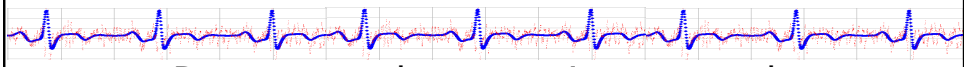

- Demonstrate bogus equipment, or show participants that actual responses were never seen by the experimenter
- Have participants observe a subsequent session showing deception in action
- Make the individual an active participant in the research (e.g., a confederate)

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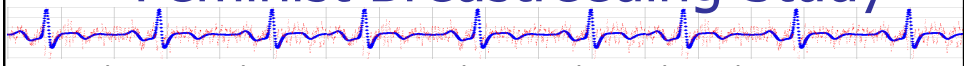
Example Debrief
Feminist Breastfeeding Study



- There were three separate conditions in this study, and you were randomly assigned to only one of them:
- 1. MEDICAL AGENT GROUP — Participants in this group talk to a computer character that describes reasons for breastfeeding from a purely medical and public health perspective.
- 2. FEMINIST AGENT GROUP — Participants in this group talk to a computer character that presents particular feminist arguments for breastfeeding in addition to the medical arguments.
- 3. CONTROL GROUP — Participants in this group do not talk to any computer character.
- The researcher will tell you which study group you were assigned to.
- You were not given complete information about the three study groups at the beginning of your session because we felt that this knowledge might bias your attitudes and reactions to the experimental stimuli.

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Example Debrief
Feminist Breastfeeding Study

- Please understand that this incomplete disclosure during the initial consent process was an essential component of our research, and that this experiment was carefully reviewed and approved by the Northeastern University Institutional Review Board, which reviews all experiments that involve human subjects.
- If at any time, now or later, you have any questions or concerns about your participation in this experiment, please do not hesitate to tell the experimenter, or to contact Dr. Timothy Bickmore at (617)-373-5477, or bickmore@ccs.neu.edu. You have the option to withdraw your data from this experiment now, with no repercussions. If you choose to withdraw, no data or audio record of your participation will be kept.

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Northeastern University IRB

- Division of Research Integrity
  http://www.northeastern.edu/research/hsrp/
- Application process takes 6-8 weeks

- NOTE: updated student research policy

http://www.northeastern.edu/research/hsrp/manual/sec_10/

"Policy on Classroom Research"

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NU Guidelines for Student Research Projects Involving Human Subjects

- If…
  - normal part of the student's coursework;
  - is supervised by a faculty member;
  - purpose is development of the student's research skills;
  - does not present more than minimal risk
  - does not include any persons under 18
  - does not include any vulnerable populations
  - does not involve any sensitive topics
  - will no result in publication
- Then, can proceed without IRB approval. But,
  - Must submit proposal to instructor first.
  - Must obtain verbal consent.
  - Must give instructor as point of contact if any questions.

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Vulnerable populations

- Minors (under eighteen years of age).
- Fetuses or products of labor and delivery;
- Pregnant women (in studies that may influence maternal health);
- Prisoners;
- Individuals with a diminished capacity to give informed consent.

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Sensitive topics

- sexual attitudes, preferences or practices;
- alcohol, drugs or other addictive products;
- illegal conduct;
- if released could damage an individual's financial standing, employability, or reputation within the community;
- would normally be recorded in a patient's medical record and the disclosure of which could reasonably lead to social stigmatization or discrimination;
- pertaining to psychological well-being or mental health;
- genetic Information.

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Example Verbal Consent

"Hi, I'm conducting a survey to find out what people think about putting computers in the Curry center food court. I'd like to ask you some questions and it will just take 5 minutes. It's for a course I'm taking in Research Methods from Prof. Timothy Bickmore in the College of Computer and Information Science. Your participation is voluntary and you can stop anytime and ask that your data not be used. Can you help me out with this?"

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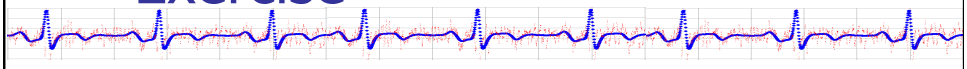
Exercise



- Break into IRB groups
- Review a proposed study (5 minutes)
- Report on any issues (5 minutes)

- Assume HIPAA (2003 Health Insurance Portability and Accountability Act) regulations apply.

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