



Conducting Human Research

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14. ABSTRACT Many scientists would strongly argue that the understanding of natural phenomena require investigations under rigorously controlled laboratory conditions. Understanding human behavior for modeling and simulation efforts, then also, requires that some experimentation be undertaken to investigate human behavior in situations of interest. This presentation will give an overview of how human laboratory research is conducted. The presentation falls under the presentation topic area ???understanding human behavior??? and ???Socio-cultural data acquisition, extraction, and management.??? First the idea of a theoretical framework will be very briefly discussed as well as hypothesis development and experimental design. Then the required approval process for conduct of ethical research will be outlined. Technical aspects of laboratory set-up and conduct of research, including informed consent and manipulation checks will be presented. Statistical issues particularly relevant to human behavior will be discussed including the ideas of statistical power, appropriate n, effect sizes, and variability. The goal of the presentation is to shed light on the process of human experimentation for those M&S efforts that involve collaboration with behavioral scientists.					
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The Question



How can we get kids to stop throwing rocks at our convoys?



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More specific questions



- How to scare people away?
- How to make them decide not to throw rocks?
- How can we “punish” those who throw rocks?
- How can we make them stay too far away to throw rocks?



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Theoretical Framework/ Conceptual Model



- Helps to dissect the question, design experiments, interpret results
 - Psychoanalytic Theory...?
 - Social Cognition Theory...?
 - Field Theory...?
 - Learning Theory!



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Hypothesis Development



- Propose hypotheses (alternative and null) based on conceptual model
- “Loud sound, bright light, or blunt impact hits, directed at people, will elicit fewer thrown rocks & more behaviors to get away from the source, than will no threat.”



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- How to test the hypotheses?
 - What variables to manipulate?
 - Treatments
 - What variables to measure?
 - How many rocks do people throw
 - How many rocks hit the truck
 - How many people escape
 - How many people avoid
 - How many people evade
 - What factors to keep constant?





Statistical Issues in Experimental Design



- Power – How likely is this design to find reliable results if effect is truly there?
- N – How many subjects to run how many times under how many experimental conditions?
- Effect Size – How much of an effect is enough?
- Alpha levels – How much confidence do you need that the effect is reliable?



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Variability in Human Behavior



- Difference in behavior between people
- Differences between behavior of a person from one time to the next
- Differences between behavior of a person under one treatment condition vs. another treatment



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References for Experimental Design



- *Research Design and Methods*, 3rd Ed, by Bordens and Abbott
- *Research Methods in Psychology*, by Shaughnessy and Zechmeister



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Institutional Review Board Approvals



- Before conducting research on human subjects, need to have approval from the Institutional Review Board (IRB).
- IRB reviews experiment protocols to ensure ethical treatment of research participant
 - Protect the rights and welfare of participants
 - “Respect for Persons, Beneficence, Justice”



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Institutional Review Board (IRB)



- Protocol scrutinized for
 - Scientific validity & value, societal value
 - Ethical treatment of subjects
 - Recruitment
 - Payment
 - Safety
 - Informed Consent
 - All subjects must read and sign
 - Explains all procedures so they can decide to participate
 - Reiterates their rights to withdraw at any time



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References for IRB & Ethics



- *CITI research ethics training course: www.citiprogram.org*
- *Institutional Review Board Member Handbook by Amdur and Bankert*



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Conducting Experiments



- Set-up, troubleshoot, dry run, test readiness review
- Recruit Subjects
- Phone Pre-Screen
 - Meet inclusion and exclusion criteria
- Informed Consent & Self-Screen
- Screening tests/Harm assessments
- Conduct Experiment/Collect Data
- Debrief and Pay



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Conducting Experiments



- How best to measure and record relevant behaviors?
 - Video recordings
 - Real-time recording of behavior
 - Self-report questionnaires
 - Interview
 - Physiological measures
 - Other automated recording of data
- Manipulation Checks
- Redundant overlapping measures



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Conducting Experiments



- Experimental Control
 - Systematically vary independent variables (aversive stimuli presented to subjects)
 - Keep constant other variables (speed of truck, distance from aversive stimuli)
 - Conditions must be run multiple times to assess reliability of findings in same individual



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Was the hypothesis supported?



- Hypothesis Testing: Reliability of Findings?
- Statistical Analyses
 - Different analyses for different experimental designs (ANOVA, Regression, Non-parametrics, etc.)
- Meaning: “Significance” “Probability of finding...”
 - p values- At what level do you decide the effect is reliable
 - Effect Sizes- How much does the effect matter?



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Interpretation of Findings



- May be more than one way of interpreting findings
- May have conflicting findings
- Have to know how findings fit with previous work
- Have to know limits of findings
- No single experiment answers the question
- Should lead to the next step in research



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References for Statistics



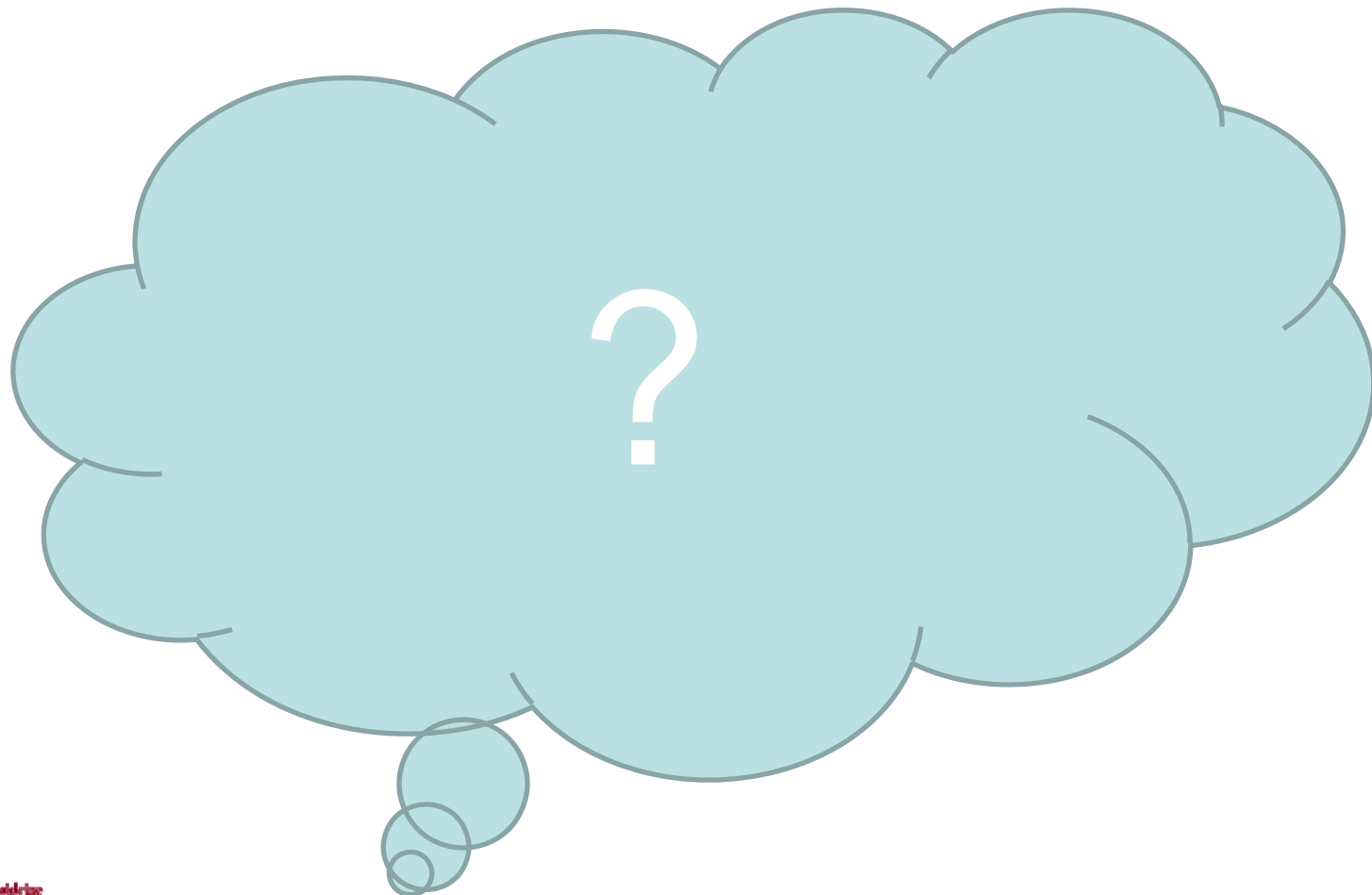
- *The Practical Statistician: Simplified Handbook of Statistics* by Linton and Gallo
- *The Basic Practice of Statistics*, 2nd Ed by Moore
- *Statistics for Behavioral Sciences* by Gravetter and Wallnau



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QUESTIONS?



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TBRL Presentations



- Thu 6 Aug 9:00-9:25 PM Grand Dominion 3
 - **“Crowd Human Behavior for Modeling and Simulation”**
- Thu 6 Aug 10:30-10:55 PM Monroe
 - **“Social Network Analysis of Crowds”**
- **Thu 6 Aug 2:30-2:55 PM Madison**
 - **“Results from Experimentation on Driver Behavior at Controlled Entry Points”**
- Thu 6 Aug 4:00-4:25 PM Grand Dominion 4
 - **“Data Sources for Human Behavior“**
- Thu 6 Aug 5:00-5:25 PM Grand Dominion 4
 - **“Subject Matter Experts from Academia”**
- Thu 6 Aug 5:00-5:25 PM Grand Dominion 3
 - **“Empirical data sets for agent based modeling of crowd scenarios“**



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