VISIT social science slides

Slide 1: Welcome to VISIT's introductory course on social science. The is a basic course that's designed for those who don't know very much about social science. It is meant to provide a brief glimpse into what makes Social Science a science. To fully understand this topic you'd have to attend the better part of one or more, full semester, freshman-level courses. Still, even if feel you have a lot of these basics, please don't hang up. It's bad for my ego, and you might still learn a couple of things.

Slide 2: The goals of this course are simple:

First, we want to provide physical scientists with a little insight as to how social scientists study people and populations.

Second, we want to compare and contrast principles and methods used by the physical versus the social sciences including the differing focus variables, data collection methods, different data analysis techniques and various error sources

- VISIT is currently working on a course that discusses designing effective surveys. The present course provides an overview the principles upon which that course will rest.

Slide 3: So what is social science? Generally, the social sciences are *concerned with understanding individual and societal behaviors*. There are numerous sub-disciplines and most of them constitute separate university degree programs. I've a few listed here that can have *direct application to our work*

- Communications – one of our main missions/problems
- Psychology – for us this involves understanding how do people react to education, messaging, and natural emergencies?
- Anthropology – for us, this means mostly the problem of cultural differences
- Sociology – institutional characteristics & behaviors (fire police, EMs, school officials)
- Economics – managing infrastructure and cost balancing

Slide 4: Communications has always been an important part of NOAA's mission

The problems inherent in communications exemplify the complexities of individual and societal behaviors. Consider these factors:

- Does the target audience even hear your messaging?
    - Who are they and where are they? Think about individual citizens, emergency responders, college kids, public officials, the media, and so on. Each group reacts differently.
    - Plus, there is a wide range of behaviors and attitudes within every societal group
- Once you have a solid communications channel open, you'd like to know
    - Whether your target audience understand you?
    - Do you understand them?
    - Do they care?
- So let's look at each of these in a little more detail…as a social scientist might.

Slide 5: First, of all … does your intended audience even hear you?

- People are seldom in a single location throughout the day.
    - How do we reach people at work, at home, in their cars, shopping, at a bar, picking up the kids, exercising, or whatever?
    - The question here is, "Where are the people we want to reach and how do we reach them there?" This is a problem that's *made* for social science.

Slide 6: Then, you've got to ask …

- Does your intended audience understand you?
    - What is their knowledge-base? Do they understand the event you're warning on?
    - They might have problems with your terminology, language, etc.?
    - Do they completely understand the nature of the threat?
    - Do they understand how to respond, even if they do believe you?
        - NWS programs, such as Storm Ready, or Impact-based Warnings, are invaluable in this regard.

Slide 7: But it's a two-way street. Do we really understand our target audience?

- Do you understand them?
- How do they think about your topic?
- How did they react in the past, and why did they react that way?
- Do you have a preconceived idea about how and why they will react?
- You may think you know why people react the way they do, but can you prove it?
- We must <u>never</u> assume that, because we have seen people react in the past, we understand their motivation and know how they will react in the future. This particularly true when it comes to populations

Slide 8: Finally, does your audience even care about the message?

- Previous experiences make a big difference
    - Perhaps they've experienced a lot of false alarms
    - Maybe they've experienced the events you're warning on in the past, with little or no problem.
- Remember that personal priorities can always play a role.
    - Getting to work, picking up kids, personal commitments may place your message very low priority on the list.
- Social factors you may not think about can also play a big role. Consider …
    - <u>*Groupthink*</u> involves any social group with a common goal and strong leadership. Think about a situation where a warning's been issued for a particularly intense winter storm, but a sales team has an important planning meeting scheduled, downtown. Maybe it's already snowing pretty hard. When people talk about not coming in the boss pressures the team to come in anyway – emphasizing the importance to common goals. Several members are worried, but they push doubts aside and decide to drive in, though several are a little worried. Groupthink is when team-needs override even personal safety.

- The *bandwagon effect* comes about when people observe group behavior and make decisions based on the majority. In our snow storm warning example, this might be turning on the TV and seeing crowded highways, and deciding that it must be okay, cause everyone else is doing it.
- Combining "*illusion of control*," and *overconfidence*, a person might believe that they've driven in winter weather many times before and can handle whatever comes up. Or think about tornado chasers who get in too close, thinking that they've done it all before, they understand severe storms, and so they can handle whatever comes up
- The *status quo effect* is a lot like wishful thinking. A person reasons that the extreme possibility is unlikely, that the really bad stuff happens to others, and make themselves believe that "everything will be alright," simply because they want it to be.
- These are all important issues that catch the interest and attention of the social scientist.

Slide 9: Comparing the social with the physical sciences

- We'll begin the discussion of how social scientists tackle the challenges in their field, by comparing the goals and methods of the social sciences with those of the physical sciences. I'm going to use atmospheric science as our physical science benchmark, but the principals hold for any of the physical sciences.

Slide 10: Here I'm going to define the term "focus variables" to mean the variables of interest for each of our sciences – that is, our data.

- For *Atmospheric Science*, focus variables include such things as temperature, dew point, pressure, wind speed & wind direction, so that we can model and predict future atmospheric behavior
- The *Social Sciences* attempt to quantify various aspects of human behavior – such as attitude, resilience, anxiety and so forth – through prescribed measures, observations, surveys and experiments.

Slide 11: Let's pause a moment and look a little more closely at the focus variables in the social sciences.

- When we talk about individual behaviors and traits we're thinking about how people's traits and personalities affect how they react in a variety of situations. Traits include things like agreeability, resilience, intelligence, decisiveness, personality, and so on. There are many pre-established tests available for individual traits based on the refereed literature.
- We must also consider individual behaviors within groups – The effects of societal groups can be easily overlooked. For example:
    - Each group is its own entity and includes its own demographic variables – think about family, different cultures, socio-economic status, age, gender, etc. These variables can significantly affect how a person deals with situations. This also

means that an individual's reaction can be different in the same situation, depending on the group they are associating with at the time.

- And last, but no least, think about group or institutional dynamics – Institutional groups all have their own unique characteristics, beliefs, behaviors, missions, expectations, procedures, and prejudices
    - Consider groups like police officers, firefighters, school officials, and even National Weather Service forecasters. They all basically have their own take on events and their own rules for dealing with the.

Slide 12: Let's continue on with our contrast between the physical and social sciences …

- Both the physical and social sciences require data, but observation and data collection methods can differ appreciably.
    - Atmospheric Science – uses mostly direct measures
        - Things like thermometers, hygrometers, barometers, anemometers, radars, satellites and so forth are used to quantify their observations. Physical sciences depend almost entirely on instrument-based observations.
    - Social Science – uses mostly indirect measures
        - They primarily depend on field observations, surveys, case studies, established tests, manipulative experiments, and so forth. And when we talk about field observations in the social sciences, we're talking about observation of behavior in controlled environments. Think candid camera.
        - There may be a place for a few direct measures (e.g., fMRIs, biofeedback techniques {BP, EEG, or ERP}), but in the vast majority of instances, people's behaviors are not directly measureable.

Slide 13: When it's time for data analysis, the approach is often very different.

- For atmospheric science analysis generally depends on the so-called governing equations which are based on the principals of physics and can be expressed as differential equations, integral equations, vectors, and so forth. Also, statistical techniques might also be used by climatologists or modelers.
- For social science, there are no governing equations – at least that we know of. Fortunately, most processes associated with human populations are statistically distributed amongst populations. That's why analysis usually relies on statistical techniques. Social science researchers are usually VERY good with statistics, since this is often their only analysis tool. The majority of these scientists have the equivalent of a bachelors, or even a masters, degree in statistics.

Slide 14: Error Sources.

- All scientists strive to design experiments based on hypotheses, that can be tested with data, and provide the researcher with solid conclusions and reproducible results**.** Measurements are crucial, but there are errors both in the physical and the social sciences.
- *Both sides of this aisle have many processes that are not fully understood*

- Both work with mathematics that, of necessity require assumptions, approximations and models, so that no solutions are exact.
- Both have trouble with collecting representative data
  - For atmospheric scientists, think about the sparsity of observations
  - For the social sciences the trick is often finding a population to poll that represents the population you are trying to learn about. For example, if you poll students, how representative is that of the middle-class, middle-aged working people?
- Both the physical and social sciences *always* have inherent errors in measurements

Slide 15: Just as an interesting aside

- For the social sciences there are generally two broad categories of research – descriptive and experimental
  - *Descriptive research* includes things like natural observations, interviews, surveys, and so forth.
    - *Pros* –
      - least complex, fairly easy to design and carry out
      - Gaining IRB (Institutional Review Board) approval fairly straight forward.
    - *Cons* –
      - Natural observations are often difficult to quantify,
      - Properly designed questionnaires can be quantified, but we can only establish correlation, not causation, at best. (Good example, violence and television study).
      - Sometimes these provide sufficient information to solve the problem, otherwise they are good for an overview, quick looks, pilot studies
  - *Experimental research* actually manipulates subject groups
    - Questions are designed to divide subjects into experimental versus control groups in order to manipulate different experiences
    - *Pros* – designed to determine cause and effect
    - *Cons* – very difficult to design and carry out – development process for such an experiment can take months
      - clarifying questions or conditions, assuring that the manipulation is ethical, removing ambiguities, fitting to previous research, correcting for confounding variables, testing various manipulations through pilot studies.
      - Gaining Institutional Review Board (IRB) approval is much more difficult.

Slide 16: Most social research involves questions – especially descriptive studies.

Usable results depend on careful design. There are many things to consider – various human biases need to be taken into account, properly formatting your question set is critical to later

analysis, and question sets must be designed with statistical analysis in mind. Let's look at some of these in greater detail.

Slide 17: Biases – here are just a few examples

- Sampling bias – that is, who are you talking to?
    - College students versus seniors, daytime shoppers versus those at work
        - It is probably not possible to get a completely representative sample
- Most studies are based on self-reporting data. So … are the answers true? Only the participant knows for sure. There are several factors to consider:
    - Problems include personal image, good memory, emotional responses, honesty, playful sabotage, understanding the question.
    - Volunteer bias – only getting answers from people who want to answer.
- Cultural biases – different cultures think about the same things differently
- Participant (or response) bias –
    - social desirability effect (don't want to come off looking bad)
        - Re-phrasing … "Should street drugs should be legal?," versus "Does making street drugs illegal always help contain associated problems?"
    - avoiding the extremes on Likert questions (Likert – strongly disagree, somewhat disagree, neither, somewhat agree, strongly agree)
- Experimenter bias – questions inadvertently phrased to correspond with what you want to hear.
- Extraneous variables – time of day, season, current weather, etc.

Slide 18: Formatting questions can be tougher than you think

- Use language that your participants will clearly understand.
- Keep questions short and concise – research has shown that people respond more carefully and truthfully to simpler questions, shorter surveys.
- Don't frame questions to get the answer you want. *Loaded questions* – "How often do you ignore those irritating weather warnings?" *Leading questions* – "Should responsible people heed weather warnings to safeguard their families?"

Slide 19: Formatting questions (cont.)

- Avoid vague questions like – Do you attend church regularly?
- Avoid limited options – Do you consider this product; excellent, very good, fair (versus excellent, good, fair, not very good, poor). If you don't want to hear the full truth, why do the survey?
- Avoid double barrel questions – How satisfied are you with weather forecasts and severe weather warnings?

- The order of questions can affect the way people answer.
    - Study – Bethlehem & Jelke (2009), *Applied Survey Methods*, Wiley, p. 56 gives an example from a Dutch survey on housing demand
    - One question asked about satisfaction with their housing situation. Others asked about the presence or absence of various amenities.

        - If amenity questions were asked before the question on overall satisfaction, the overall satisfaction rating was lower than if these more specific questions were asked later than the overall satisfaction question.
    - This topic of formatting questions will be covered in much greater detail in our upcoming VISIT course on creating an effective survey.

Slide 20: Designing with a statistical plan in mind

- Another factor that social scientist need to always consider when designing a study is the final analysis.
- What type is study will this be? (correlational, hypothesis testing, etc.)
- What type of measures will you be using (t-tests, regression analysis, ANOVA, etc.)
- <u>As much as possible</u>, design quantifiable and comparable questions
    - Yes/no, Likert scaling, equal number of multiple choices
    - If you use any open-ended questions, make sure they are easily coded. This can be handled somewhat by careful phrasing and pre-planning on how you're going to handle the outliers
- Keeping questions clear and concise –
    - Results in more honest answers, less ambiguity
- For psychological factors (e.g., resilience, skepticism, etc.), need to use established measures.
    - Any new measures are problematic.
    - You will need a new scale, a pilot study, a primary study, and a refereed publication
- Again this topic will be covered in greater depth when we talk about survey design

Slides 21-23: Review slides

- In summary, let's remember the commonalities of challenge faced by every science …

Slide 24: There is a lot more to it

- This course has been an extremely brief overview of social science – its goals, its strengths and weaknesses, and its data collection and analysis methods. If you are interested in following up:
    - we would suggest an introductory, college-level research methods course (e.g., Research Methods in Psychology).
    - search the literature in various social science journals to learn more about how social scientists think and work.
- If you are not interested in pursuing follow-up material, we trust that you've at least been able to develop a better understanding of some of the underlying principles of social science as they relates to the other sciences.