# Observational Research

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## Review

- What we observe depends not just on what is before us, but how our visual system works, what we attend to, what we already know and expect to see, etc.
- What we observe with instruments likewise depends on how the instruments work, the conditions under which they are used, and what we know and expect to observe
- One way to corroborate observations is to consult multiple independent observers and multiple independent instruments
- We also need to appraise the plausibility of what we think we observe

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## Review - 2

- The categories we use play a major role in determining *what* we see
  - Different categories enable us to see different things
  - Must choose categories appropriate to the knowledge we want to obtain
- Prior to collecting data it is important to establish the categories to be used
  - Sometimes guided by the hypothesis under consideration
  - But sometimes the categories already adopted constrain the hypotheses that can be formulated
- Frequent issue--whether
  - to split: record each different model of car
  - to lump: count each different model of car as a car
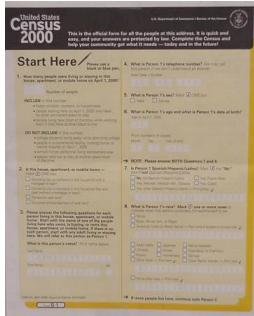
# Review - 3

- Developing a category system before collecting observational information is critical
  - Only what can be captured in the chosen categories is available for later analysis
  - Consider the controversies over developing census forms



# Exclusive and exhaustive categories

- Given the analysis one might want to do with the categorized items, it is sometimes important to design categories that are exhaustive and exclusive
  - Exhaustive categories: each item fits into a category
    - Important so as to insure that each individual gets counted (otherwise percentages are meaningless)
  - Exclusive categories: no items fits into two categories
    - Important so that no one gets counted twice

# Clicker Question

What is the relation between categories and names in a language?

Languages have names for all the categories we might develop

Languages only have names for some categories, those deemed important

Languages should add names for all possible categories

Names in a language are irrelevant to how we categorize things

## Clicker Question

The categories *farmer*, *business person*, *teacher*, *minister* are

>Exhaustive but not exclusive
>Exclusive but not exhaustive
>Both exclusive and exhaustive
>Neither exclusive nor exhaustive

## Coding and Recording Daily Life Activities

- On the job (work for pay)
- In transit *
- Get exercise *
- In class
- Off-line study/class assignments
- On-line study/class assignments
- On-line (personal)
- Tasks of daily living *
- Eat
- On the telephone/cellphone
- Relax/socialize *
- Sleep Start_____ Finish_____
- Other * (optional to specify)

## Clicker Question

Adding the category *other* to the list makes the list

>Exhaustive
>Exclusive
>Both exhaustive and exclusive
>None of the above

## Clicker Question

Since the categories are not exclusive (you can eat while in class), what strategy should we use?

Eliminate categories such as eating until all the categories are exclusive

Have people record all applicable activities (count the same time for eating and going to class)

Rank order the categories and record only the highest ranking

## Observational Research

- Involves careful recording of what is observed and analysis (qualitative, quantitative, statistical) of the results
  - If the process of recording information is contaminated, any knowledge claims (theories) built upon it are suspect
- Recording may take the form of written notes, audio or videotaping, etc.
- In purely observational research, investigators seek to **avoid manipulating what happens**
  - If the researcher manipulates features of the situation and then observes what results, the researcher is conducting an **experiment**

## Why conduct observational research?

- Although much scientific research involves manipulating variables (experiments), there is an important role for careful observation with little or no intervention on the part of the observer

- Gain a good description
  - Make sure that any subsequent experimentation is ecologically valid

- Explore: search for a hypothesis

- Confirm or falsify a hypothesis
  - Determine whether a predicted relation between variables occurs
    - An observational study can help rule out hypotheses but is not alone sufficient to establish causal hypotheses

## Observation as source of hypotheses

"I find that during the long hours of observation in the field, I not only learn about behavior patterns, but I get ideas, 'hunches,' for theories, which I later test by experiments whenever possible" (Nikolaas Tinbergen, 1965, Nobel Laureate for his discoveries concerning organization and elicitation of individual and social behavior patterns).

Tinbergen's theories went well beyond observation to the evolution and development of behavior, but good field observations of animals (esp. sea gulls) under natural conditions was his reference point

## Observation as source of hypotheses

Tinbergen observed that black-headed gulls displayed an odd behavior: when eggs hatch, parents pick up the broken egg shells and carry them away from the nest before dropping them... Why bother?

Tinbergen observed that while the nests and outer eggshells were adaptively camouflaged to match the landscape, the insides of the eggs were bright white. He hypothesized the shells were removed to prevent attracting birds of prey to the nest

Tinbergen went to to test this hypothesis in a field experiment in which he painted hens' eggs to resemble gull eggs. Around some he planted broken shells from gull eggs.
He predicted that eggs with shells around would be more likely to be eaten and they were

## Naturalistic vs. participant observer

For now we focus only on observational studies, studies in which the investigator doesn't try to alter the phenomenon being studied

Two types of observational studies
- Naturalistic observation: the researcher tries to remain unobtrusive, engaging in passive observation
- Participant observation: the researcher becomes a part of the population being studied by engaging in the same activities
  - If studying how an business works, work in the business
  - If studying how a scientific laboratory works, work in the laboratory

## Clicker Question

The crucial difference between naturalistic and participant observation is whether

The observer is present with those being observed

The participants can see the observer

The observer tries to fit into the ongoing activities of those being observed

The observer tries to categorize what he or she observes

## Participant observer with other species



Dian Fossey, in order to study gorillas in Rwanda, Africa, found she had to learn to behave like a gorilla—eating, grooming, and vocalizing

Why?

"One feels like a fool thumping one's chest rhymatically or sitting about pretending to munch on a stalk of celery as though it were the most delectable morsel in the world. But the gorillas have responded favorably" (Fossey, 1972, p. 211)

## Risks in observational research

1. **Reactivity**: the mere presence of an observer can alter the situation—people behave differently

2. **Observer bias**: seeing what one expects to see

3. **Anthropomorphizing**: attributing one's own mental states to those studied—including non-human organisms and artifacts

## 1. Reactivity Bias

- When being watched, people sometimes behave differently than they would otherwise
  - That is often the point of surveillance cameras—to deter unwanted behavior
  - But when conducting research that can destroy or alter the phenomenon

- Strategies
  - Try to observe without being detected
  - Allow time for subjects to habituate
    - People tend to *forget* about the observer and return to normal behavior

## Observing without detection

Irenaeus Eibl-Eibesfeldt created a camera with a fake lens, with the real lens rotated 90%, allowing him to photograph subjects without pointing the lens at them.

## Eibl-Eibesfeldt's eyebrow flash

Most people in most cultures give a brief eye-brow flash, a brief raising of the eyebrows, together with a slight smile and a quick nod of the head

## 2. Observer Bias

- Perception is affected by expectations—one is more likely to see what one expects to see
  - Sometimes one even *sees* what one expects when it is not there

- Sometimes the evidence a scientist reports is too perfect, suggesting either cheating or observer bias
  - Mendel's results too close to 3:1 ratio, suggesting observer bias

- Sometimes observations are just not credible
  - Franz Anton Mesmer (1733 - 1815), a Viennese physician, treated people with magnets and proclaimed what he called *animal magnetism*

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## Mesmer and Mesmerism



- In the center of a large hall with darkened windows, Mesmer placed a large oaken tub filled with water and iron shavings
- Iron rods protruded through the cover of the tub, which patients would hold and apply to their body
- Mesmer himself would enter in brilliant silk robes, pass among the patients, touching them with a long iron wand
- Mesmer claimed many successes of his treatment
  - Moreover, many of his patients claimed they were healed after two or three *treatments*

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## Mesmer's cures

- According to Mesmer, a patient's health depended upon the distribution of animal magnetism in the patient's body.
  - Ill health was due to an excess or a deficiency of animal magnetism in the patient's entire body, or in specific parts of the patient's body.
  - Cure involved giving, removing or redistributing the animal magnetism within the patient.
- Why did Mesmer believe his patients were cured?
- Why did patients believe Mesmer?
  - In some cases, hypnotism and hypnotic suggestion seems to have been at work (resulting in real cures)
  - People interpreted small changes as cures due to Mesmer's treatments

## A Royal Inquiry

- Louis XVI appointed a commission of inquiry as to the efficacy of Mesmerism
  - Headed by Benjamin Franklin
  - Members included Antoine Lavoisier, Jean-Sylvain Bailly and Joseph-Ignace Guillotin
- Were the purported effects of Mesmerism due to any real force, or due to the "illusions of the mind"?
- Blindfolded people were told that they were receiving or not receiving the magnetism treatment when in fact, at times, the reverse was happening
- The people being studied felt the effects of mesmerism only when they were "told" and felt no effects when they were not told, whether or not they were receiving the treatment
- Introduction of blind treatments
  - In a blinded study, the investigator is blinded to prevent observer bias
  - In a double blind study, the subject is also blinded to prevent reactivity

## 3. Anthropomorphizing

- "After returning its first assault of shock and awe in pictures, *Spirit* went to sleep, but was slated to wake up Sunday morning, January 4, when *Mars Global Surveyor* (*MGS*) flies over Gusev Crater at 7:25 a.m. PST"
- "Spirit briefly awoke from a martian slumber on Sunday to beam more photos of the red planet back to Earth as scientists prepared the rover to search for ancient signs of life-sustaining water"
- "*Spirit* did not go to sleep despite two commands from controllers to do so"
- "Rover's condition upgraded from critical to serious"

## Anthropomorphizing risky, but not always fatal

- In describing animal behavior it is nearly impossible not to attribute intentions, desires, beliefs, etc.
- We know what it is to choose a course of action—to have a goal, consider different options, make a decision
- Nonhuman animals also perform actions, but it is controversial whether they represent goals to themselves, consider options, and select between them
- As long as we are aware that attributions of mental states goes beyond the evidence, the risks of misrepresenting the data may be minimized

## Clicker Question

An observer trying to study sex solicitation behavior in campus bathrooms stands in a bathroom corner with a video camera, moving it around to focus on different individuals. This research is likely to produce

    Observer bias because the observer is watching

    Observer bias because the observer is using a video camera

    Reactivity bias because the observer reacts to those present by moving the camera to focus on given individuals

    Reactivity bias because the observed may alter their behavior when they know they are observed

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## Clicker Question

To minimize as much as possible the risk of reactivity bias in studying sex solicitation behavior in bathrooms the researcher should

    Use a note pad to write reports of bathroom behavior rather than using a video camera

    Locate the video camera in an unobtrusive location and not have a person present

    Use a cell phone camera to record the individuals in the bathroom rather than a video camera

    Survey people to find out whether they had ever solicited or been solicited for sex in bathrooms

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## Data extraction

- Videos and even narratives typically contain too much information to recognize patterns in what is happening

- Need to extract from the data—categorize events and record instances of events satisfying the category

- Develop coding systems—the coding system will determine what you can and what you cannot learn from the observations.
  - If appropriate codes are not employed, the researcher cannot use them in analysis

## Continuous observing vs. sampling

- Continuous observation:  record what is happening at every moment of time

- Time sampling: recording what is happening at predetermined intervals such as every 10 minutes

- Event sampling: recording whenever an event of a specified kind occurs such as recording the gender of the person every time a door opens

- Situation sampling: recording what happens in a variety of different situations (locations) such as recording a several different coffee shops on campus

## Clicker Question

To determine how many students carry backpacks, a researcher sits outside this building and records, for every fifth students who comes by, whether they have a backpack. The researcher is performing
- Continuous observation
- Time sampling
- Event sampling
- Situation sampling

## Clicker Question

To determine how popular different cafeterias are, a researcher records at a different cafeteria each day how many people enter between Noon and 12:30. The researcher is engaged in
- Continuous observation
- Time sampling
- Event sampling
- Situation sampling

## Variables

- A variable is a characteristic or feature of an event that varies—takes on different values.

- Variables of a thrown ball:
  - velocity, momentum, direction, spin, . . .
- Variables of a World Series:
  - winner, number of games, fights, strikeouts, . . .
- Variables of human hair:
  - color, length, texture, . . .
- Variables of human cognition:
  - memory span, speed of reasoning, emotional state, . . .

## Types of variables

- Variables differ in the type of measurement of the values of the variable that is possible. Sometimes one refers to types of scales rather than types of variable.

- **Categorical or nominal variables**: items can be assigned to a category (whose members can then be counted, or compared on another variable).

  - Gender: male/female
  - Major: psychology, political science, economics, . . .
  - Stellar spectra: O, B, A, F, G, K, and M
  - Organisms: Plant, Animal, Bacteria, Virus, . . .

## Types of variables - 2

- **Ordinal or rank variables**: There is a rank-order to the values the variable may take.

- Numbers might be assigned to the items, but since there is no metric
  - one cannot compare how much higher or lower one item on the scale is than another

    Movies: *, **, ***, ****
    Class rank: top 10, next 10, etc.
    Patient condition: resting and comfortable, stable, guarded, and critical
    Socio-economic class: low, middle, high

## Types of variables - 3

- **Interval variables**: equal differences between numbers assigned to items reflect equal differences between the values being measured.

  - Allows additive comparison—x is three more than y
  - But lacking a natural 0, does not permit multiplicative comparison—x is three times y

    Intelligence: IQ score
    Temperature: in degrees Celsius or Fahrenheit
    Personality: degree of extroversion

## Types of variables - 4

- **Ratio variables**: items are rated on a scale with equal intervals and a natural 0-point.
  - Allows for both additive and multiplicative comparison

    Age: in year, months, days, . . .
    Temperature: in degrees Kelvin
    Time: in milliseconds, seconds, years, . . .
    Velocity, acceleration, etc.

- Interval and ratio data often treated similarly and counted as score data

## Clicker Question

The variable NUMBER OF CLICKER REPONSES is
       A categorical or nominal variable
       An ordinal or rank variable
       An interval variable
       A ratio variable