

## Chapter 2-Basic Concepts

2.1 Nominal: names of students in the class; Ordinal: the order in which students hand in their first exam; Interval: the student's grade on that first exam; Ratio: the amount of time that the student spent studying for that exam.

2.3 If the rat lies down to sleep in the maze, after performing successfully for several trials, this probably says little about what the animal has learned in the task. It may say more about the animal's level of motivation.

In this exercise I am trying to get the students to see that there is often quite a difference between what you and I think our variable is measuring and what it actually measures. Just because we label something as a measure of learning does not make it so. Just because the numbers increase on a ratio scale (twice as much time in the maze) doesn't mean that what those numbers are actually measuring is ratio (twice as much learning).

- 2.5 We have to assume the following at the very least (and I am sure I left out some)
1. Mice are adequate models for human behavior.
  2. Morphine tolerance effects in mice are like heroin tolerance effects in humans,
  3. Time on a warm surface is in some way analogous to a human response to heroin.
  4. A context shift for mice is analogous to a context shift for humans.
  5. A drug overdose is analogous to pain tolerance.

Having the whole class create a list is a useful exercise. Having them provide realistic estimates of the legitimacy of this list is even more useful. Keeping them from becoming overly cynical about any kind of research that involves such assumptions (and virtually all research does) is more easily said than done.

2.7 The independent variables are the sex of the subject and the sex of the other person.

2.9 The experimenter expected to find that women would eat less in the presence of a male partner than in the presence of a female partner. Men, on the other hand, were not expected to vary the amount that they ate as a function of sex of their partner. (They're kind of clueless.)

You might take the opportunity to point out, in a very non-technical way, that what we have predicted here is what we will later call an interaction.

Ask the students if they share this prediction. If so, they are sharing in the idea of one variable (sex of subject) having a differential effect depending on the level of another variable (sex of partner). We are talking here about gender differences in response to social situations.

2.11 We would treat a discrete variable as if it were continuous if it had many different levels and was at least ordinal

2.13 When I drew 50 numbers 3 times I obtained 29, 26, and 19 even numbers, respectively. For that third drawing only 38 percent of my numbers were even, which is probably less than I might have expected—especially if I didn't have a fair amount of experience with similar exercises.

2.15 Eyes level condition:

- a)  $X_3 = 2.03; X_5 = 1.05; X_8 = 1.86$
- b)  $\sum X = 14.82$
- c)  $\sum_{i=1}^{10} X_i = 14.82$

2.17 Eyes level condition:

- a)  $(\sum X)^2 = 14.82^2 = 219.6324; \sum X^2 = 1.65^2 + \dots + 1.73^2 = 23.22$
- b)  $\sum X/N = 14.82/10 = 1.482$
- c) This is the mean, a type of average.

2.19 Putting the two sets of data together:

- a) Multiply pairwise
- b)  $\sum XY = 22.27496$
- c)  $\sum X \sum Y = 14.82 * 14.63 = 216.82$
- d)  $\sum XY \neq \sum X \sum Y$ . They do differ, as you would expect.

e) 
$$\frac{\sum XY - \frac{\sum X \sum Y}{N}}{N-1} = \frac{22.27496 - \frac{14.82 * 14.63}{10}}{9} = \frac{1.0679}{9} = .1187$$

2.21 

$X$	5	7	3	6	3	$\sum X = 24$
$X + 4$	9	11	7	10	7	$\sum (X + 4) = 44 = (24 + 5*4)$

2.23 In the text I spoke about room temperature as an ordinal scale of comfort (at least up to some point). Room temperature is a continuous measure, even though with respect to comfort it only measures at an ordinal level.

Here is a good place to beat home the idea again that the scale of measurement doesn't depend on the numbers themselves, but on what we think they are measuring.

2.25 The Beth Peres story:

- a) The dependent variable is the weekly allowance, measured in dollars and cents, and the independent variable is the sex of the child.
- b) We are dealing with a selected sample—the children in her class.
- c) The age of the students would influence the overall mean. The fact that these children are classmates could easily lead to socially appropriate responses—or what the children deem to be socially appropriate in their setting.
- d) At least within her school, Beth could randomly sample by taking a student roster, assigning each student a number, and matching those up with numbers drawn from a random number table. Random assignment to Sex would obviously be impossible.
- e) I don't see negative aspects of the lack of random assignment here because that is the nature of the variable under consideration. It would be better if we could randomly assign a child to a sex and see the result, but we clearly can't.
- f) The outcome of the study could be influenced by the desire of some children to exaggerate their allowance, or to minimize it so as not to appear too different from their peers. I would suspect that boys would be likely to exaggerate, and the data are consistent with that expectation.
- g) The descriptive features of the study are her statements that the boys in her class received \$3.18 per week in allowance, on average, while the girls received an average of \$2.63. The inferential aspects are the inferences to the population of all children, concluding that “boys” get more than “girls.”

2.27 I would record the sequence number of each song that is played and then plot them on a graph. I can't tell if they are *truly* random, but if I see a pattern to the points I can be quite sure that they are not random.