Critical Reasoning/Statistics WS 6-2 am   May 9, 2008

I.   A. **(Individual)** review the answers for the assignment Answers at End
      B . **(In small group)** discuss any items that you found difficult
      C.   **Plenary**
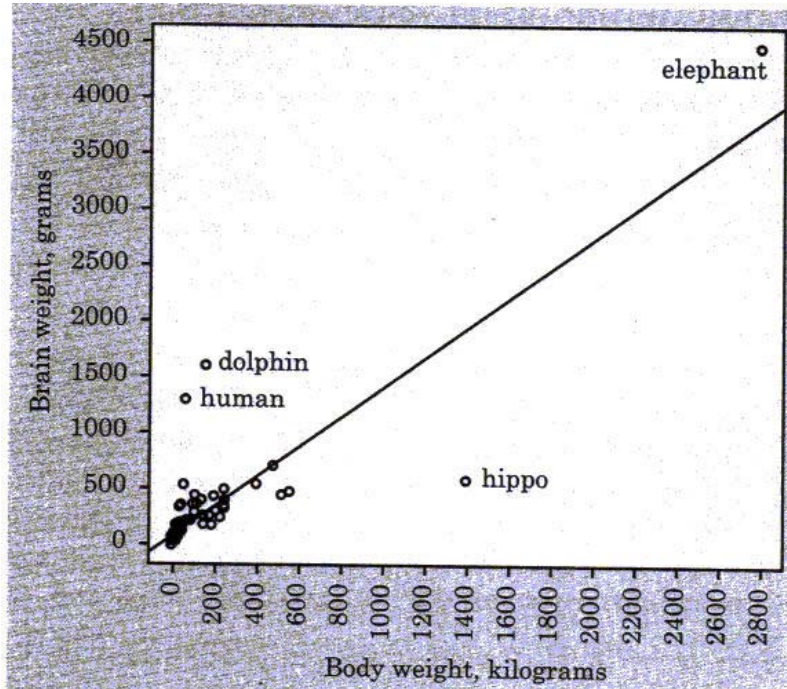 **II Review Lecture/Discussion on Sampling**

 III Lecture/Discussion on Correlation Arguments. To be continued after lunch if necessary.

 IV Workshop on the statistical concept of Correlation and of criticism of correlation arguments.
   A (In Small Groups) Carry out the following Tasks
     1   Reasoning Using Scatterplots. Note: no calculation, except minimal for Task 4
  The following scatterplot plots the average brain weight versus average body weight for many species of
  mammal. There a many small mammals whose points at the lower end overlap. Use this plot for the
  tasks listed..

 Scatterplot of the average brain weight (grams) against the
  average body weight (kilograms) for 96 species of mammals

Task 1. Read from the graph the approximate body weight and brain weight for the points labeled *dolphin* and *hippos.*

Task 2. One reaction to this scatterplot is "Dolphins are smart, hippose are dumb." What features of the plot lies behind this reaction?

Task 3. The African elephant is much larger than any other mammal in the data set but lies roughly in the overall straight-line pattern. Dolphins, humans and hippos lie outside the overall pattern. The correlation between body weight and brain weight for the entire data set is r = .86.
 (a) If we removed the elephant, would this correlation increase or decrease or not change much? Explain your answer.
(b) If we removed dolphins, hippos, and humans, would this correlation increase or decrease or not change much? Explain you answer

Task 4. Given the correlation between body weight and brain weight r = .86, how well does body weight explain brain weight for mammals? Give a number to answer this question, and briefly explain what the number tells us.

Task 5 (optional) The line on the scatterplot is the least-squares regression line for predicting brain weight from body weight . Suppose that a new mammal species is discovered hidden in the rain forest with body weight 600 kilograms. Predict the brain weight from body weight.

   B. Plenary

   C. In small groups discuss whether these passages contain a faulty move from correlation to cause. If so, state your criticism.

1. There is a correlation between heavy consumption of coffee and heart attacks. So coffee drinking causes heart attacks.

2. There is a significant correlation between going to the hospital and dying, so hospitals are important causal factors in the occurrence of deaths.

3 Seattle(AP)—Television viewing "is a factor" in about half of the 20,000 homicides and many other violent crimes that occur each year in the United States, according to a psychiatrist who studied statistical links between homicides and the rise in television ownership. The study, published Tuesday in the April issue of the *American Journal of Epidemiology*, is billed by the University of Washington as the first study ever to look at the statistical relationships between exposure to television and acts of violence for the entire country.
The study by Dr. Brandon Centerwall, a member of the psychiatry faculty at the University of Washington School of Medicine, also indicates that as many as half of other violent crimes—including rapes and assaults—are related to exposure to television. "Television is a factor in approximately 10,000 homicides each year in the United States," Centerwall told a news conference Tuesday. "While television clearly is not the sole cause of violence in our society, and there are many other contributing factors, hypothetically if television did not exist there would be 10,000 fewer homicides a year."
    To arrive at this conclusion, Centerwall studied the white population of South Africa, where television was not introduced until 1975. Using statistics from 1945 to 1974, he compared homicide rates among South African whites to the rates among U.S. whites and the entire Canadian population. He found that homicides remained roughly flat in South Africa before television was introduced. In the United States and Canada, however, homicide rates doubled within 20 years after the widespread introduction of television, Centerwall said. It took Centerwall seven years to complete his study.
Centerwall said he hypothesized that if television ownership is followed by an increase in violence, then those populations that had television earlier should have had an earlier increase in violence. He tested his theory by comparing the change in homicide rates among white and minority populations in the United States. According to Centerwall, televisions were widespread in American white households about five years before they appeared in minority homes. Accordingly, homicide rates among minorities rose four years after the rates went up among whites, he said.
Centerwall said regions of the United States that had widespread television before the rest of the country also saw earlier increases in homicide rates. "There is a strong relationship between when a region acquired television and when its homicide rates went up," he said. According to Centerwall, the homicide rates among South African whites in 1983—the last year for which statistics were available—were 56 percent higher than in 1974—the year before the introduction of television, indicating a trend similar to what occurred in the United States after the introduction of television.

D. Plenary

➡️ Assignment for Tuesday May 13. **Read:** Chapter 9 to 239-246.
    Submit: Exercise 9.1 #4, #6, #8, #9

Answers to Assignment for today Check your own assignment. Put a check √ next to answers that are similar, an **X** next ones that miss the mark, and a question mark **?** next to any that are problematic

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Exercise 8.1#1 b,d,j #2 b,d,f,j;

1b. Generalization, statistical; d. Generalization, universal; 1j. Generalization, universal;
2b. Deductive; 2d. Deductive; 2f. Deductive; 2j. Inductive, argument with statistical premise;

Exercise 8.2 #1 b, d, f , l , m;

1b. (1) 3 percent of (the randomly sampled) cars produced on Tuesdays and   Wednesdays at the Youngstown plant are faulty.

(likely) 3 percent of all cars produced at the Youngstown plant are faulty.

The sampled cars may not be representative of those produced on other days: Friday, when workers are thinking about the weekend, and Monday, when they may be feeling the effect of too much weekend, are not sampled. A better sample could be drawn from random times during the week.

1d. (1) 1% of the cases involved adverse outcomes due to negligence [according to the Harvard Medical Practice Study]

(likely) 1% of doctors are guilty of malpractice (negligence).

There is a shift in the unit of analysis from cases to doctors. A relatively few doctors could be responsible for the adverse outcomes. Alternatively, a larger percentage of doctors might be guilty of malpractice, if teams of doctors were all negligent in these 1% of cases.

1f. (1) 53 percent of the 250 students surveyed (said that they) oppose abortion.

(likely)A majority (at least 50 percent of the 8,000 students in the student body) opposes abortion.

The sample is unrepresentative. It includes only students who are on campus at noon and who pass by the student center. Even though the racial, sexual, and religious pro-portions mirror the campus as a whole, there may be a difference of opinion between those who frequent the center and those who do not, and night students might be more conservative than those available at noon. A better sample might be obtained by calling random students from the university roster.

1l. (Among other arguments that generalize)
    (1) A fifth of the 1500 women surveyed at Harvard (said they) had been forced into sexual activity.

    (likely) Sex is forced on 19 percent (about a fifth) of all college women (at Harvard? in the United States?)

It is unclear whether the sample was random or not. If it was given out to those using the health services, for example, they might be unrepresentative of the whole population. It is also unclear whether the article wishes to generalize to a larger college population outside Harvard. If so, the sample must be taken from other colleges and universities as well. Because there might be a higher rate of forced sexual activity on a campus where most students come from other states and countries with different sexual expectations, in contrast to community colleges with predominance of local students.

1m. (1) In blood samples investigated in 1976 and 1980, the blood lead levels have dropped 37 percent.

(likely)Blood lead levels (in the United States) have dropped 37 percent between 1976 and 1980.

Federally sponsored studies generally require appropriate random sampling techniques. In this case, special care should have been taken to sample adequately the very poor who live in conditions with more old, flaking lead-based paint. If so, the argument is acceptable.