Statistical Methods for the Social Sciences 5th edition Agresti Solutions Manual

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Chapter 2: Sampling and Measurement

2.1. (a) Discrete variables take a finite set of values (or possible all nonnegative integers), and we can enumerate them all. Continuous variables take an infinite continuum of values.

(b) Categorical variables have a scale that is a set of categories; for quantitative variables, the measurement scale has numerical values that represent different magnitudes of the variable.

(c) Nominal variables have a scale of unordered categories, whereas ordinal variables have a scale of ordered categories. The distinctions among types of variables are important in determining the appropriate descriptive and inferential procedures for a statistical analysis.

2.2. (a) quantitative
(b) categorical
(c) categorical
(d) quantitative
(e) categorical
(f) quantitative
(g) categorical
(h) quantitative
(i) categorical

2.3. (a) ordinal
(b) nominal
(c) interval
(d) nominal
(e) nominal
(f) ordinal
(g) interval
(h) ordinal
(i) nominal
(j) interval
(k) ordinal

2.4. (a) nominal
(b) nominal
(c) ordinal
(d) interval
(e) interval
(f) interval
(g) ordinal
(h) interval
(i) nominal
(j) interval

2.5. (a) interval
(b) ordinal
(c) nominal

2.6. (a) state of residence
(b) number of siblings
(c) social class (high, medium, low)
(d) student status (full time, part time)
(e) Number of cars owned.
(f) Time (in minutes) needed to complete an exam.
(g) number of siblings

2.7. (a) Ordinal, since there is a sense of order to the categories.
(b) discrete
(c) These values are statistics, because they apply to a sample of size 1962, not the entire population.

2.8. ordinal

2.9. The correct responses are (b), (c), (d), (e) and (f).

2.10. The correct responses are (a), (c), (e), and (f).

2.11. Answers will vary.

2.12. Number names 00001 to 52000. Answers will vary 6907.

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2.13. (a) observational study

(b) experiment

(c) observational study

(d) experiment

2.14. (a) Experimental study, since the researchers are assigning subjects to treatments.

(b) An observational study could look those who grew up in nonsmoking or smoking environments and examine incidence of lung cancer.

2.15 (a) Sample-to-sample variability causes the results to vary.

(b) The sampling error for the Gallup poll is –2.1% for Obama and 2.8% for Romney.

2.16. (a) This is a volunteer sample because viewers chose whether to call in.

(b) The mail-in questionnaire is a volunteer sample because readers chose whether to respond.

2.17. The first question is confusing in its wording. The second question has clearer wording.

2.18. (a) Skip number is $k = 52,000/5 = 10,400$. Randomly select one of the first 10,400 names and then skip 10,400 names to get each of the next names. For example, if the first name picked is 01536, the other four names are $01536+10400=11936,\ 11936+10400=22336,\ 22336+10400=32736,\ 32736+10400=43136$.

(b) We could treat the pages as clusters. We would select a random sample of pages, and then sample every name on the pages selected. Its advantage is that it is much easier to select the sample than it is with random sampling. A disadvantage is as follows: Suppose there are 100 "Martinez" listings in the directory, all falling on the same page. Then with cluster sampling, either all or none of the Martinez families would end up in the sample. If they are all sampled, certain traits which they might have in common (perhaps, e.g., religious affiliation) might be over-represented in the sample.

2.19. Draw a systematic sample form the student directory, using skip number $k = 5000/100 = 50$.

2.20. (a) This is not a simple random sample since the sample will necessarily have 25 blacks and 25whites. A simple random sample may or may not have exactly 25 blacks and 25 whites.

(b) This is stratified random sampling. You ensure that neither blacks nor whites are over-sampled.

2.21. (a) the clusters

(b) The subjects within every stratum.

(c) The main difference is that a stratified random sample uses every stratum, and we want to compare the strata. By contrast, we have a sample of clusters, and not all clusters are represented—the goal is not to compare the clusters but to use them to obtain a sample.

2.22. (a) Categorical are GE, VE, AB, PI, PA, RE, LD, AA; quantitative are AG, HI, CO, DH, DR, NE, TV, SP, AH.

(b) Nominal are GE, VE, AB, PA, LD, AA; ordinal are PI and RE; interval are AG, HI, CO, DH, DR, NE, TV, SP, AH.

2.23. Answers will vary.

2.24. (a) Draw a systematic sample from the student directory, using skip number $k = N/100$, where $N =$ number of students on the campus.

(b) High school GPA on a 4-point scale, treated as quantitative, interval, continuous; math and verbal SAT on a 200 to 800 scale, treated as quantitative, interval, continuous; whether work to support study (yes, no), treated as categorical, nominal, discrete; time spent studying in average day, on scale (none, less than 2 hours, 2–4 hours, more than 4 hours), treated as quantitative, ordinal, discrete.

2.25. This is nonprobability sampling; certain segments may be over- or under-represented, depending on where the interviewer stands, time of day, etc. Quota sampling fails to incorporate randomization into the selection method.

2.26. Responses can be highly dependent on nonsampling errors such as question wording.

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2.27. (a) This is a volunteer sample, so results are unreliable; e.g., there is no way of judging how close 93% is to the actual population who believe that benefits should be reduced.

(b) This is a volunteer sample; perhaps an organization opposing gun control laws has encouraged members to send letters, resulting in a distorted picture for the congresswoman. The results are completely unreliable as a guide to views of the overall population. She should take a probability sample of her constituents to get a less biased reaction to the issue.

(c) The physical science majors who take the course might tend to be different from the entire population of physical science majors (perhaps more liberal minded on sexual attitudes, for example). Thus, it would be better to take random samples of students of the two majors from the population of all social science majors and all physical science majors at the college.

(d) There would probably be a tendency for students within a given class to be more similar than students in the school as a whole. For example, if the chosen first period class consists of college-bound seniors, the members of the class will probably tend to be less opposed to the test than would be a class of lower achievement students planning to terminate their studies with high school. The design could be improved by taking a simple random sample of students, or a larger random sample of classes with a random sample of students then being selected from each of those classes (a two-stage random sample).

2.28. A systematic sample with a skip number of 7 (or a multiple of 7) would be problematic since the sampled editions would all be from the same day of the week (e.g., Friday). The day of the week may be related to the percentage of newspaper space devoted to news about entertainment.

2.29. Because of skipping names, two subjects listed next to each other on the list cannot both be in the sample, so not all samples are equally likely.

2.30. If we do not take a disproportional stratified random sample, we might not have enough Native Americans in our sample to compare their views to those of other Americans.

2.31. If a subject is in one of the clusters that is not chosen, then this subject can never be in the sample. Not all samples are equally likely.

2.32. Answers will vary

2.33. The nursing homes can be regarded as clusters. A systematic random sample is taken of the clusters, and then a simple random sample is taken of residents from within the selected clusters.

2.34. The best answer is (b).

2.35. The best answer is (c).

2.36. The best answer is (c).

2.37. The best answer is (a).

2.38. False; this is a convenience sample.

2.39. False; this is a voluntary response sample.

2.40. An annual income of $40,000 is twice the annual income of $20,000. However, 70 degrees Fahrenheit is not twice as hot as 35 degrees Fahrenheit. (Note that income has a meaningful zero and temperature does not.) IQ is not a ratio-scale variable.

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