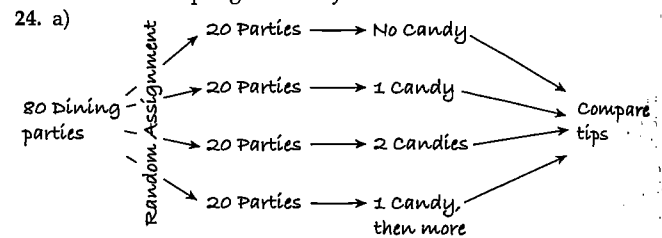


PART III REVIEW

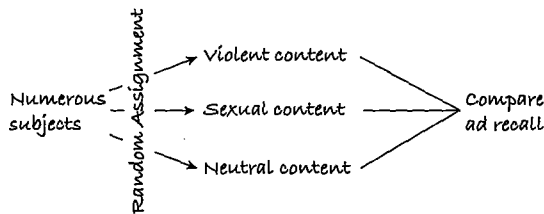
1. Observational prospective study. Indications of behavior differences can be seen in the two groups. May show a link between premature birth and behavior, but there may be lurking variables involved.
2. Observational retrospective study. Can conclude there *may* be a link between tea drinking and survival after a heart attack. But lurking variables may also be involved.
3. Experiment, matched by gender and weight, randomization within blocks of two pups of same gender and weight. Factor: type of diet. Treatments: low-calorie diet and allowing the dog to eat all it wants. Response variable: length of life. Can conclude that, on average, dogs with a lower-calorie diet live longer.
4. Random sample. Population is all homes on the property tax list. Parameter is level of radon contamination. Procedure is probably a stratified random sample. May make inference about radon levels from sample to general population.
5. Observational prospective study. Indicates folate *may* help in reducing colon cancer for those with family histories of the disease.
6. Observational retrospective study. Indicates that during past 47 years first flowering has gotten earlier.
7. Sampling. Probably a simple random sample, although may be stratified by type of firework. Population is all fireworks produced each day. Parameter is proportion of duds. Can determine if the day's production is ready for sale.
8. Experiment, though there is no indication of a control group or differing treatments. Cosmetics *may* damage male reproductive systems in laboratory animals. Extrapolating to humans is risky.
9. Observational retrospective study. Living near strong electromagnetic fields may be associated with more leukemia than normal. May be lurking variables, such as socioeconomic level.
10. Observational retrospective study. Indicates no long-term risk of prostate cancer because of vasectomy.
11. Experiment. Blocked by sex of rat. Randomization is not specified. Factor is type of hormone given. Treatments are leptin and insulin. Response variable is lost weight. Can conclude that hormones can help suppress appetites in rats, and the type of hormone varies by gender.
12. Experiment. Factors are glaze type and temperature. Treatments are combinations of 4 glaze types and 3 temperatures. Response is age appearance of the pottery. Assuming an unbiased evaluator, can make a conclusion about best combination of glaze and temperature.
13. Experiment. Factor is gene therapy. Hamsters were randomized to treatments. Treatments were gene therapy or not. Response variable is heart muscle condition. Can conclude that gene therapy is beneficial (at least in hamsters).
14. Observational study (neither retrospective nor prospective). There seems to be a relationship between eye size and time of singing.
15. Sampling. Population is all oranges on the truck. Parameter is proportion of unsuitable oranges. Procedure is probably simple random sampling. Can conclude whether or not to accept the truckload.
16. Sampling. Population is all bottle-cap seals. Parameter is proportion with inadequate seals. Procedure is probably simple random sampling. Used to decide whether the bottling process is all right or needs to be adjusted.
17. Observational prospective study. Physically fit men may have a lower risk of death from cancer.
18. Experiment. Subjects blocked by calculus or not for analysis. Probably no randomization (students self-select into sections). Factor is software usage. Treatments are use of software or not. Response variable is final exam score. Can decide whether computer software is beneficial, and if so, is there a difference between the calculus and the noncalculus groups.

19. Answers will vary. This is a simulation problem. Using a random digits table or software, call 0–4 a loss and 5–9 a win for the gambler on a game. Use blocks of 5 digits to simulate a week's pick.
20. a) Answers will vary. This is a simulation problem. Using a random-digits table or software, obtain 3 numbers between 01 and 20 for your pick, then 5 others between 01 and 20. Count how many matches.
b) With more numbers to choose from, the odds of winning go down dramatically.
21. Answers will vary.
22. a) Experiment. Treatments were actively imposed, rats were randomized, there was control (rats with no radio wave exposure), and they used many rats.
b) The differences in brain tumors were small enough that they could be explained by sampling variability.
c) May cause bias of some sort, intended or not.
23. a) Experiment. Actively manipulated candy giving, diners were randomly assigned treatments, control group was those with no candy, lots of dining parties.
b) It depends on when the decision was made. If early in the meal, the server may give better treatment to those who will receive candy—biasing the results.
c) A difference in response so large it cannot be attributed to natural sampling variability.



- b) One factor (candy) with 4 levels (none, one, two, or one then another).
- c) 4.
- d) Tip percentage.
- e) Probably blinded (diners probably weren't aware they were in an experiment), but not double-blinded.
- f) If "randomization" is done early in the meal, she may treat some better than others.
25. a) Voluntary response. Only those who feel strongly will pay for the 900 phone call.
b) "If it would help future generations live a longer, healthier life, would you be in favor of human cloning?"
26. a) Water (quality and temperature) and material can vary. Results may be influenced by these confounding variables.
b) Unrealistic conditions. This won't say how SparkleKleen works in normal situations.
c) Might work, but if all the swatches were stained at the same time, the stains on the later swatches will have more time to "set in," causing bias against SparkleKleen. Other variables (changes in water temperature or pressure) won't be randomized.
d) No guarantee that conditions are comparable.
27. a) Simulation results will vary. Average will be around 5.8 points.
b) Simulation results will vary. Average will also be around 5.8 points.
c) Answers will vary.
28. a) 10.6% chance to break at 900 pounds or less.
b) Simulation results will vary. Use groups of three digits to simulate each rivet. For every one that is less than "106," designate as a failed rivet. Count how many rivets you need until failures are reached.
29. a) Yes.
b) No. Residences without phones are excluded. Residences with more than one phone had a higher chance.

- c) No. People who respond to the survey may be of age but not registered voters.
- d) No. Households who answered the phone may be more likely to have someone at home when the phone call was generated. These may not be representative of all households.
30. a) A difference in response so large it cannot be attributed to natural sampling variability.
- b) More likely, younger looking individuals are more sexually active than older ones. We have no means of comparison (different levels of sexual activity in people of the same age, for example).
31. a) Does not prove it. There may be other confounding variables. Only way to prove this would be to do a controlled experiment.
- b) Alzheimer's usually shows up late in life. Perhaps smokers have died of other causes before Alzheimer's can be seen.
- c) An experiment would be unethical. One could design a prospective study in which groups of smokers and non-smokers are followed for many years and the incidence of Alzheimer's is tracked.
32. a) Randomized block experiment.
- b) No—in an experiment we are looking for differences in response to treatments, not trying to generalize to all adults.
- c) A sugar pill may affect digestion, confounding the experiment.
- 33.



Numerous subjects will be randomly assigned to see shows with violent, sexual, or neutral content. They will see the same commercials. After the show, they will be interviewed for their recall of brand names in the commercials.

34. a) *Who*—900 Englishmen. *What*—reasons they go to a pub. *Why*—Kaliber alcohol-free beer wants to know. *When*—not stated. *Where*—England. *How*—survey (sampling method not specified).
- b) Englishmen.
- c) How those interviewed were chosen.
- d) Probably convenience samples of those in pubs.
- e) The study was financed by an alcohol-free beer.
35. a) May have been a simple random sample, but given the relative equality in age groups, may have been stratified.
- b) 35.1%.
- c) We don't know. Perhaps cell phones or unlisted numbers were excluded, and Democrats have more (or fewer) of those. Probably OK, though.
- d) Do party affiliations differ for different age groups?
36. a) Nonresponse bias by conservatives.
- b) U.S. adults. c) Results do not total 100%.
- d) Observed differences are of the same size one might expect from natural sampling variability.
37. The factor in the experiment will be type of bird control. I will have three treatments: scarecrow, netting, and no control. I will randomly assign several different areas in the vineyard to one of the treatments, taking care that there is sufficient separation that the possible effect of the scarecrow will not be confounded. At the end of the season, the response variable will be the proportion of bird-damaged grapes.
38. Since players vary in their ability to hit the ball, I will have each batter hit with both types of bats several times in a randomly chosen order. For each batter, calculate the average difference in distance, with metal or wood as the response variable.
39. a) We want all subjects treated as alike as possible. If there were no "placebo surgery," subjects would know this and perhaps behave differently.
- b) The experiment looked for a difference in the effectiveness of the two treatments. (If we wanted to generalize, we would need to assume that the results for these volunteers are the same as on all patients who might need this operation.)
- c) "Not statistically significant" means the difference in results were small enough that it could be explained by natural sampling variability.
40. Results will vary, but should be around 24%.
(Use a random-number table or software to do the simulation. Numbers 1 to 11 will represent the "worst" team, 12 to 21 the second worst, 22 to 30 your third-place team, 31 to 66 the others. Obtain random numbers in the range, ignoring any duplications of the team that gets to pick first. Count the number of times the third-place team picks first or second out of the total number of trials.)
41. a) Use stratified sampling to select 2 first-class passengers and 12 from coach.
- b) Number passengers alphabetically, 01 = Bergman to 20 = Testut. Read in blocks of two, ignoring any numbers more than 20. This gives 65, 43, 67, 11 (selects Fontana), 27, 04 (selects Castillo).
- c) Number passengers alphabetically from 001 to 120. Use the random-number table to find three-digit numbers in this range until 12 different values have been selected.
42. Simulation results will vary. Theoretically, the chance is about 3%. (Select four numbers between 01 and 20 to represent the Middle Easterners. Count the number of times in several repetitions where both to be searched are among the selected four numbers.)
43. Simulation results will vary.
(Use integers 00 to 99 as a basis. Use integers 00 to 69 to represent a tee shot on the fairway. If on the fairway, use digits 00 to 79 to represent on the green. If off the fairway, use 00 to 39 to represent getting on the green. If not on the green, use digits 00 to 89 to represent landing on the green. For the first putt, use digits 00 to 19 to represent making the shot. For subsequent putts, use digits 00 to 89 to represent making the shot.)
44. a) Answers may vary. A component in this simulation is a shot. Use pairs of random digits 00 to 99 to represent a shot. The way in which this component is simulated depends on the type of shot. For the first shot, let pairs of digits 01 to 80 represent hitting the green, and let pairs of digits 81 to 99, and 00, represent not hitting the green. If the first simulated shot misses the green, let 01 to 90 represent landing on the green, and 91 to 99, and 00, represent not landing on the green. Keep simulating shots until a shot lands on the green. Once on the green, let 01 to 20 represent sinking the putt on the first putt, and let 21 to 99, and 00, represent not sinking the putt on the first putt. If second putts are required, continue simulating putts until a putt goes in, with 01 to 90 representing making the putt, and 91 to 99, and 00, representing not making the putt. A run consists of following the guidelines above until the final putt is made. The response variable is the number of shots required until the final putt is made. The simulated average score on the hole is the total number of shots required divided by the total number of runs. According to 20 runs of this simulation, a pretty good golfer can be expected to average about 3.7 strokes per hole. Your simulation results may vary.
- b) Answers may vary. The simulation is set up identically to part a, with the exception of the second shot. Now, let 01 to 10 represent hitting the green, and let 11 to 99, and 00, represent not hitting the green. According to 20 runs of this simulation, a pretty good golfer can be expected to average about 5.3 strokes per hole. Your simulation results may vary.
- c) Answers may vary.