Assignment 3
Statistical Analysis

by
Bob Daumer
EDD 9300 (33696)
Methods of Inquiry

Nova Southeastern University
March 8, 2006

The following research investigation will be used to perform basic statistical analysis.

> Social psychologists Rind & Bordia (1996) investigated whether or not drawing a happy face on customers' checks increased the amount of tips received by a waitress at an upscale restaurant on a university campus. During the lunch hour a waitress drew a happy, smiling face on the checks of a random half of her customers. The remaining half of the customers received a check with no drawing.

Forty-five participants completed the investigation, twenty-three of which received no happy face on their checks and twenty-two which did receive a happy face on their checks. The following 12 questions analyze the investigation and the results.

1. What type of research question (i.e., descriptive, comparative, relationship) is being asked by the researchers? Briefly explain your answer.

> This type of research question is a comparative question. The investigation hopes to compare the tip amount (percent) left by customers who receive a check with a happy face to customers who receive a check without a happy face.

2. What were the independent and dependent variables in the study?

> The independent variable is the existence of the happy face or the non-existence of the happy face. The dependent variable is the amount of tip left by the customer. Compared to a cause-and-effect relationship, where the cause is an independent variable and the effect is the dependent variable, one could say that the existence, or non-existence, of a happy face causes the effect of a particular tip amount.

3. What is the level of measurement for the independent and dependent variables?

The level of measurement of the independent variable is nominal, where 0 equals no happy face and 1 equals a happy face. The level of measurement for the dependent variable is a ratio measure because absolute zero equals no tip and the value of tip percent is weighted based on that zero, such that a 50% tip is twice as much as a 25% tip.

4. Before performing data analyses, make a prediction about the pattern of results you expect to see and why. That is, which condition do you think will result in the highest percentage of tips, on average? Why? Note: do not base your prediction on the data itself, rather your expectations going into the study. That is, before you collect any data, what would you expect to see?

Customers who receive a check with a happy face will tend to leave a greater tip than customers who receive a check without a happy face. It can be presumed that the happy face on the check acts as a non-verbal communicator of the waitress' positive and friendly attitude, which may be conveyed to the customer, after which they may be willing to leave a greater tip.

5. Calculate the mean, median, and mode and the standard deviation for the experimental group using SPSS.

Table 1.
Statistical Analysis of Experimental Group
Participant Tip Percent

N	Valid	22
	Missing	0
Mean		33.0455
Median		28.5000
Mode		21.00(a)
Std. Deviation		13.95393
Sum		727.00

(a) Multiple modes exist.
The smallest value is shown

6. Suppose you had to explain the standard deviation value in the previous question to someone who has not taken a statistics course. In a sentence or two, write your explanation.

The standard deviation represents the range, on either side of the mean, in which the majority of participant samples will fall. The range between 1 deviation measure greater and less than the mean represents 68% of the samples and the range between 2 deviation measures greater and less than the mean represents 95% of the samples.

7. Compare the means for the two groups. Does the pattern of mean differences match your predictions from question #4?

The mean of the control group is 27.7826, where as the mean of the experimental group is 33.0455. The preliminary prediction of a happy face positively effecting the tip amount matches the pattern presented by the mean comparison.

8. Write null and alternate hypotheses. If you decided to perform a one-tailed test, be sure to specify which of the two groups you predict will be higher/lower.

Null hypothesis:

Customers who receive a happy face on their check will leave a similar or equal tip amount to customers who do not receive a happy face on their check.

Alternate hypothesis:

Customers who receive a happy face will leave a greater tip amount (percentage) than customers who do not receive a happy face on their check.

9. One of the assumptions of the independent T-test is homogeneity of variance. If you had to explain this assumption to someone with little statistical expertise, how would you explain it? Also, explain the use of the Levene's test in the T-test.

Homogeneity of variance is a way of saying likelihood of occurrence, or how often within a sample group is the behavior likely to occur. Levene's test is associated with this because it tells whether two samples have similar likelihoods of occurrence or different likelihoods of occurrence.

10. Obtain the appropriate test statistic. From the SPSS menus choose Analyze and Compare Means, followed by the appropriate test. What is the value of the t statistic and probability value on the SPSS printout?

Since the value (Sig.) from Levene's test is 0.053, equal variances can be assumed. The t value is -1.572 and the probability value is 0.123.

11. What is your decision concerning the null hypothesis? Did you reject or retain? Provide a rationale.

The null hypothesis should be rejected because the significance level (probability value) is greater than 0.05 at 0.123.

12. What are some variables unaccounted for that may have impacted your results? Write this paragraph in terms of potential limitations of your results.

The provided description of this research investigation is limited and does not provide a true picture of the experiment's possible variables. The preliminary look at the details seems to show decent internal validity; however, some external influences or unknowns could impact the validity. For one, it is not known if either waitress disclosed information about the investigation to the customers.

Perhaps the waitress explained the happy face on checks. Also, the demographics (socioeconomic status) of the customer population are minimally known, only from an assumption that is concluded based on the fact that the restaurant is upscale and on a university campus. Additionally, it is not known if customers who left a smaller tip were unhappy with their dining experience prior to receiving a check due to other restaurant influences. Based on assumptions, the alternate hypothesis seems to be accurate, but should be interpreted with the understanding that assumptions were made.