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Statistical Literacy Assessment

The purpose of this survey is to examine the statistical knowledge of second language acquisition researchers and applied linguists. The survey consists of five scenarios that might be encountered in second language research, and twenty-six multiple-choice questions related to these scenarios. The survey takes about 25 minutes to complete. The results will be provided at the end of the survey.

Scenario-1: Read the following information before answering Questions 1-4

An English language center collected data from 2,581 English language learners (ELLs) at 50 different language institutions; institutions and ELLs were randomly selected to participate. To determine “what proportion of ELLs think that grammar instruction is necessary in English education,” ELLs were asked whether they thought grammar instruction was important. A total of 2,189 ELLs voted yes, and 392 ELLs voted no.

1. The sample is

- a. the 392 ELLs who voted no
- b. the 2,189 ELLs who voted yes
- c. the 2,581 ELLs in the study
- d. I don't know

2. The population is

- a. all ELLs in the world
- b. ELLs who think that grammar instruction is important
- c. ELLs who do NOT think that grammar instruction is important
- d. I don't know

3. The parameter in this scenario is

- a. the proportion of ELLs who voted yes
- b. the proportion of all ELLs in the world who think grammar instruction is necessary.
- c. the proportion of ELLs who voted no
- d. I don't know

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4. Which of the following statements is TRUE?

- a. Descriptive statistics can provide information about the *sample*, and inferential statistics can provide information about the *population*.
- b. Descriptive statistics can provide information about the *population*, and inferential statistics can provide information about *only the sample*.
- c. Descriptive statistics can provide information about the *parameter*, and inferential statistics can provide information about the *population*.
- d. I don't know

Scenario-2: Read the following information before answering Questions 5-9

Part-I: A group of interactionist researchers investigate the number of language-related episodes (LREs) produced by 8 dyads during three different tasks (i.e., picture differences task, consensus task, and map task). The table below shows a subset of the raw data for the consensus task.

Dyad ID	1	2	3	4	5	6	7	8
Consensus task	0	5	2	17	3	2	1	2

5. The researchers calculate the mean, median and mode. One of the values they find is 2. What does the value 2 represent?

- a. the value of the mean, but not the median or mode
- b. the value of the median and the mode, but not the mean
- c. the value of the mean, median and mode
- d. I don't know

6. Based on this data set, which of the following options would be best to use to summarize the consensus task data?

- a. Use the most common number, which is 2
- b. Add up the 8 numbers in the bottom row and take the square root of the result
- c. Remove number 17, add up the other 7 numbers and divide by 7
- d. I don't know

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7. The standard deviation of the new consensus data is 1. Which of the following statements gives the best interpretation of standard deviation?

- a. All of the LREs are one point apart
- b. The difference between the highest and the lowest number of LREs is 1 point
- c. The majority of LREs fall within one point of the mean
- d. I don't know

Part-II: The table below shows the descriptive statistics for all three tasks.

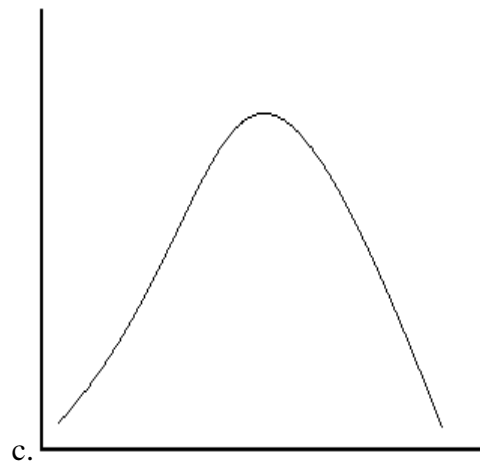
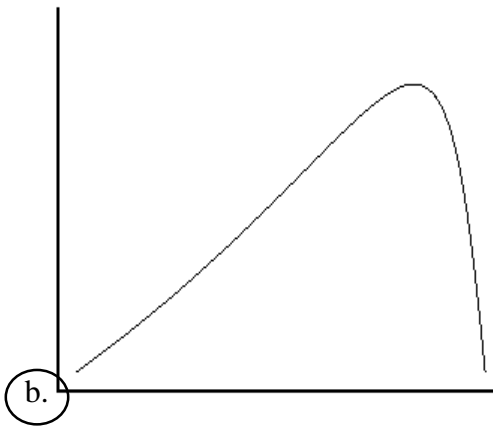
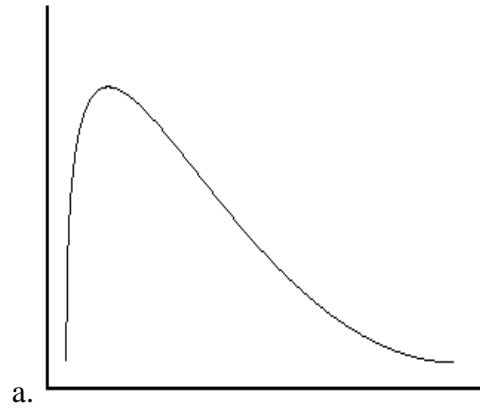
	Mean	Median	Mode	SD	95% Confidence Intervals	
					Lower bound	Upper bound
Picture difference task	7.09	8	9	3.91	5.03 - 9.15	
Consensus task	4.00	2	2	0.50	2.36 - 4.88	
Map task	6.23	9	11	5.61	6.17 - 10.29	

8. Which of the following statements is TRUE?

- a. The variance in the map task data is the highest
- b. The variance in the picture difference task data is the highest
- c. The variances in the picture difference task data and the map task data are the same
- d. I don't know

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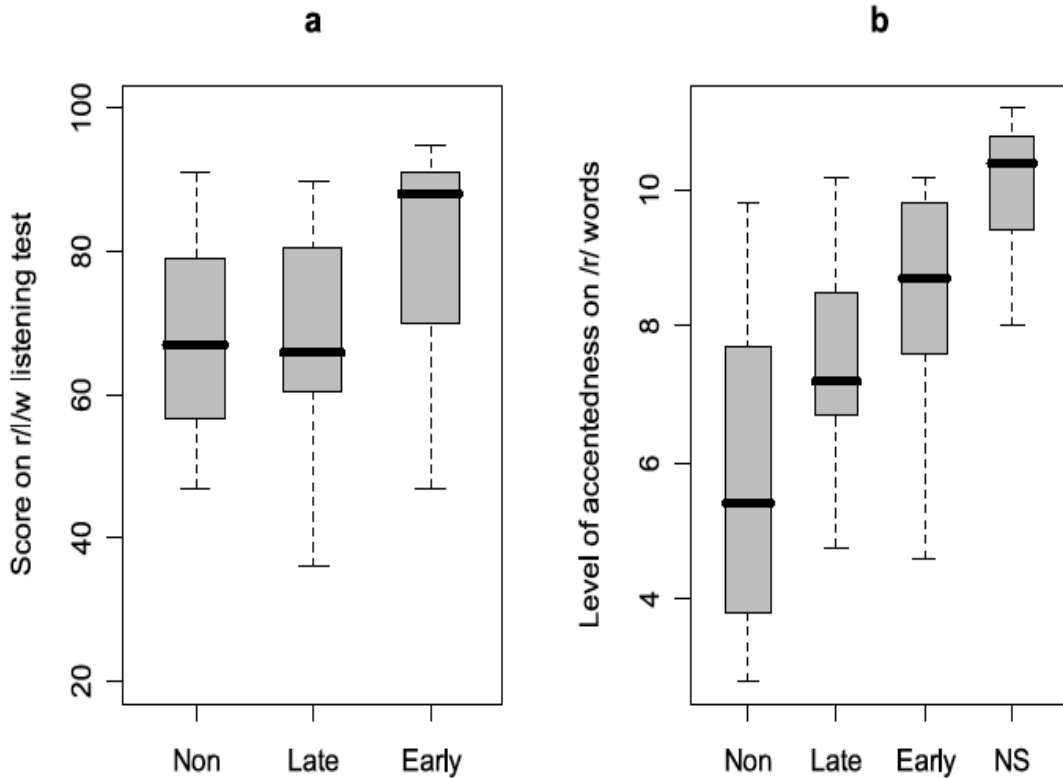
Q9. Choose the graph that best represents the map task data.



d. I don't know

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Part III: Use the following boxplots to answer Questions 10-11



10. Which is the best interpretation of the homogeneity of variance assumption based on these box-plots?

- a. Graph a shows similar variance among the three groups.
- b. Graph b shows similar variance among the four groups.
- c. Both graphs show similar variance among the groups.
- d. I don't know

11. What does the solid line in the middle of the box-plots represent?

- a. Mean
- b. Median
- c. Mode
- d. I don't know

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Scenario-3: Read the following information before answering Questions 12-17

Part -I: An English language program offers three unconventional foreign language courses (i.e., Dothraki, Klingon, and Esperanto). An L2 researcher working at this English language center is interested in studying whether male and female students differ in their choices of foreign language to study. The researcher counts how many male and female students are in each of these three courses. The researcher uses a statistical test to investigate if there is a relationship between gender and the choice of foreign language to study.

12. Identify the type of variables in this study.

- a. Categorical
- b. Continuous
- c. Ratio
- d. I don't know

13. Choose the statistical test that is the most appropriate for this research study.

- a. Paired sample t-test
- b. Repeated measures analysis of variance (ANOVA)
- c. Chi-square
- d. I don't know

Part-II: The researchers decide to use a chi-square test to investigate if there is a relationship between gender and the choice of foreign language to study (i.e., Dothraki, Klingon, and Esperanto). The results of the chi-square test are $X^2(2, n=50) = 2.10, p = .58, \text{Cramer's } V = .09$.

14. Which of the following statements is TRUE?

- a. There is no statistical relationship between gender and the choice of foreign language to study
- b. There is a statistical relationship between gender and the choice of foreign language to study
- c. The choice of foreign language studied can be statistically determined by gender
- d. I don't know

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15. If the probability of making a type II error in this study is 0.15, what is the power of the analysis?

- a. .85
- b. 1.15
- c. The power cannot be determined based on this information
- d. I don't know

16. If the sample size of the study was 100 instead of 50, how would the power of the study be affected?

- a. It would increase
- b. It would decrease
- c. It would not be affected
- d. I don't know

17. Which of the following statements is TRUE about the effect size of this study?

- a. It has a small effect size
- b. It has a medium effect size
- c. It has a large effect size
- d. I don't know

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Scenario-4: Read the following information before answering Questions 18-23

Part-I: A group of L2 researchers investigate whether the amount of formal instruction (in weeks) that a bilingual student receives matters to how many words they will learn in Spanish. They conduct a statistical test to examine the possible relationship between the amount of formal instruction and amount of vocabulary learned in Spanish.

18. Identify the type of variables in this study

- a. Categorical
- b. Continuous
- c. Dichotomous
- d. I don't know

19. Choose the statistical test that is the most appropriate for this research study

- a. Paired sample t-test
- b. Correlation test
- c. Factor analysis
- d. I don't know

Part-II: The researchers conduct a correlation test to examine the possible relationship between the amount of formal instruction ($M = 22.7$, $SD = 4.3$) and amount of vocabulary learned in Spanish ($M = 45.4$, $SD = 8.1$). The results of the correlation test are $r = .89$, $n = 66$, $p = .04$, $r^2 = .79$ (alpha level set at .05).

20. Which of the following statements is TRUE?

- a. The relationship between two variables is statistically significant, positive and strong
- b. The relationship between two variables is statistically significant and positive but weak
- c. The relationship between two variables is positive and strong but not statistically significant
- d. I don't know

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21. Label each type of statistic:

$M = 22.7$ Descriptive Inferential Both I don't know

$SD = 8.1$ Descriptive Inferential Both I don't know

$r = .89$ Descriptive Inferential Both I don't know

$p = .04$ Descriptive Inferential Both I don't know

22. What type of error would the researchers have committed if the statistically significant correlation they found was actually a false positive?

- a. Type I error
- b. Type II error
- c. Standard error
- d. I don't know

23. If the statistical coefficient in this study has a high standard error, which of the following statements would be TRUE?

- a. The difference between the population correlation coefficient and the sample correlation coefficient is large
- b. The difference between the population correlation coefficient and the parameter correlation coefficient is small
- c. The difference between the population correlation coefficient and the parameter correlation coefficient is large
- d. I don't know

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Scenario-5: Read the following information before answering Questions 24-26

Part-I: An L2 researcher is interested in studying how individual factors (i.e., language aptitude, age, motivation level, type of instruction, and amount of instruction) result in higher levels of tonal accuracy in second language learners of Thai. The researcher examines how much of the differences in scores on a tone test can be explained by these five factors.

24. Choose the statistical test that is the most appropriate for this research study

- a. Multiple regression
- b. Multivariate analysis of variance (MANOVA)
- c. Kruskal Wallis
- d. I don't know

Part-II: The table below shows the relationship between the level of tonal accuracy in Thai and the five predictor variables (i.e., language aptitude, age, motivation level, type of instruction, and amount of instruction) for the three groups of participants.

For the advanced learners $F(5,24) = 67.10$, $p < .001$, $(R^2 = .92)$

For the intermediate learners, $F(5,24) = 84.31$, $p = .06$, $(R^2 = .56)$

For the beginner learners, $F(5,24) = 91.49$, $p = .20$, $(R^2 = .45)$

25. Which of the following statements is TRUE?

- a. There is a statistically significant relationship between the level of tonal accuracy and the five predictor variables for the intermediate learners.
- b. There is a statistically significant relationship between the level of tonal accuracy and the five predictor variables for the advanced learners
- c. There is a statistically significant relationship between the level of tonal accuracy and the five predictor variables for the beginner learners
- d. I don't know

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26. Which of the following statements is TRUE?

- a. The five predictor variables explain 56% of the variation in the level of tonal accuracy among the intermediate learners
- b. The five predictor variables explain 67% of the variation in the level of tonal accuracy among the advanced learners
- c. The five predictor variables explain 20% of the variation in the level of tonal accuracy among the beginner learners
- d. I don't know