STUDENT

0002-PHJ

TENTAMEN

TIG109 Tentamen

Kurskod	--
Bedömningsform	DO
Starttid	30.05.2023 08:30
Sluttid	30.05.2023 11:30
Bedömningsfrist	--
PDF skapad	19.04.2024 16:51
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ℹ

TIG109: Metod 2 och projekt, 15 hp, VT 2023

Delkurs 2: Statistisk analys av data, 6 hp

OMTENTAMEN

Maxpoäng är 32, gränsen för Godkänt är 18 och för Väl godkänt 27 poäng.

Frågorna är formulerade på engelska.

Tillåtet hjälpmedel: tryckt engelskt lexikon (utan anteckningar)

ℹ

Results and analysis

Assume that a repeated measures design was used to assess performance of participants before and after a cognitive training procedure. Results of NHST with alpha set at .05 revealed: $t(22)$ = 1.96, p = .067.

True or False? The researcher may reasonably conclude on the basis of this outcome that:

1 The experiment may contain a Type II error.
Välj ett alternativ:

⊙ True	✅
○ False	

Rätt. 1 av 1 poäng.

2 Performance differed before and after the training procedure.
Välj ett alternativ:

○ True

◉ False ✅

Rätt. 1 av 1 poäng.

3 There were 24 participants in the experiment.
Välj ett alternativ:

○ True

◉ False ✅

Rätt. 1 av 1 poäng.

4 The effect of the training is larger than if the *p* value would have been .07.
Välj ett alternativ:

○ True

◉ False ✅

Rätt. 1 av 1 poäng.

5 The experiment may contain a Type I error.
Välj ett alternativ:

○ True

◉ False ✅

Rätt. 1 av 1 poäng.

i

Multiple choice

6 If one score in a distribution changes in value then we can be confident that the _____ also changes.

Välj ett alternativ:

- ○ mean ✅

- ○ median

- ○ range

- ○ mode

Rätt. 1 av 1 poäng.

7 The confidence interval for a population mean is centered around

Välj ett alternativ:

- ○ the standard error of the mean.

- ○ the estimated standard error.

- ○ the true population mean.

- ○ the sample mean. ✅

Rätt. 1 av 1 poäng.

8 The smaller the range of values defining a confidence interval, the

Välj ett alternativ:

- ● better our estimate of the population value. ✓
- ○ greater the error in estimation.
- ○ more likely the population means differ.
- ○ smaller the estimate of the population value.

Rätt. 1 av 1 poäng.

9 When interpreting confidence intervals when there are three or more means, if two or more intervals do not overlap, we may conclude that

Välj ett alternativ:

- ○ the population means do not differ.
- ● the population means differ. ✓
- ○ the population standard deviations differ.
- ○ the true population mean difference is zero.

Rätt. 1 av 1 poäng.

10 What is the relation between Type I and Type II errors in hypothesis testing?
Välj ett alternativ:

○ Statistically significant results decrease both Type I and Type II errors

◉ Decreased risk of Type I errors increases risk of Type II errors ✅

○ Type I and Type II errors are independent

○ Decreased risk of Type I errors decreases risk of Type II errors

Rätt. 1 av 1 poäng.

11 The Pearson correlation coefficient r is used for variables when
Välj ett alternativ:

◉ both have interval scales. ✅

○ both have nominal scales.

○ one has a nominal scale and one has an interval scale.

○ one has an ordinal scale and one has an interval scale.

Rätt. 1 av 1 poäng.

12 A boxplot shows
Välj ett alternativ:

○ the categories of a nominal variable

○ any possible linear trends in the data

◉ the distribution of values of an interval scale variable ✅

○ whether the confidence intervals of two variables' means overlap

Rätt. 1 av 1 poäng.

13 A Type I error arises when we
Välj ett alternativ:

○ fail to reject a true null hypothesis.

○ reject a false null hypothesis.

○ fail to reject a false null hypothesis.

◉ reject a true null hypothesis. ✅

Rätt. 1 av 1 poäng.

14 The level of significance in psychological research is equivalent to
Välj ett alternativ:

○ a Type II error.

◉ a Type I error. ✅

○ power.

○ .50.

Rätt. 1 av 1 poäng.

15 The Chi square test of independence involves
Välj ett alternativ:

○ two interval variables.

○ one nominal variable and one interval variable.

○ one nominal variable and two or more interval variables.

◉ two nominal variables. ✅

Rätt. 1 av 1 poäng.

16 The Chi square test tests

Välj ett alternativ:

- ⊙ whether two variables are associated. ✅

- ○ the similarity of categories between two variables.

- ○ the causal effect of one variable on another variable.

- ○ the difference in means between two variables.

Rätt. 1 av 1 poäng.

17 Which problem is likely to arise when performing many pairwise comparisons of means?

Välj ett alternativ:

- ○ Type II error

- ⊙ Type I error ✅

- ○ Sphericity

- ○ Homogeneity of variance

Rätt. 1 av 1 poäng.

18 What is true about the probability *p* in a hypothesis testing procedure (NHST)?

Välj ett alternativ:

- ⊙ none of the alternatives ✅

- ○ p is the likelihood of the null hypothesis

- ○ p is the likelihood of the alternative hypothesis

- ○ 1-p (1 minus p) is the likelihood of the alternative hypothesis

Rätt. 1 av 1 poäng.

19 What is the primary factor that researchers use to control *power*?
Välj ett alternativ:

○ the level of statistical significance

○ effect size

◉ sample size ✔

○ Type II error

Rätt. 1 av 1 poäng.

20 In a hypothesis testing procedure (NHST), what is the reason for the name *null* hypothesis?
Välj ett alternativ:

○ It has little effect in practical circumstances

◉ It represents a state of no difference ✔

○ It is always rejected

○ It is represented by the empty set

Rätt. 1 av 1 poäng.

21 What is *not* true of an omnibus *F*-test of an experiment with three conditions?
Välj ett alternativ:

○ It shows the ratio of error plus systematic variation, divided by the error variation

○ It can show the effect of the independent variable on the dependent variable.

◉ It can show differences between conditions ✔

○ The F-value gives a corresponding p-value

Rätt. 1 av 1 poäng.

ℹ ANOVA summary tables

Look over the ANOVA summary table below and answer the questions that follow.

(A note on entering numbers: Comma (**,**) and period (**.**) both work as decimal separators.)

Results of a single-factor independent groups design are as follows:

Source	Sum of Squares	df	Mean Square	F	p
Factor A	172.8	3	57.6	1.68	0.495
Error	960.2	28	34.2		

22

How many levels of Factor A are there? `4` ✅ .

Rätt. 1 av 1 poäng.

23

What is the total number of subjects in the experiment? `32` ✅ .

Rätt. 1 av 1 poäng.

24

Assuming an equal number of subjects in each group, what is the group size? `8` ✅ .

Rätt. 1 av 1 poäng.

25 Which is the result of the table?

Välj ett alternativ:

○ The results of the pairwise comparisons F-test are not statistically significant

○ The results of the pairwise comparisons F-test are statistically significant

○ The result of the omnibus F-test is statistically significant

◉ The result of the omnibus F-test is not statistically significant ✔

Rätt. 1 av 1 poäng.

26 What can the researcher reasonably conclude on the basis of this result?

Välj ett alternativ:

○ That the groups' means differ

○ There is a large difference in the groups' means

◉ That the groups' means do not differ ✔

○ There is a small difference in the groups' means

Rätt. 1 av 1 poäng.

i Look over the ANOVA summary table below and answer the questions that follow.

Results of a complex independent groups design are as follows:

Source	Sum of Squares	df	Mean Square	F	p
Factor A	156.25	1	156.25	8.95	.0112
Factor B	0.25	1	0.25	0.014	.9067
A X B	400	1	400	22.91	.0004
Error	209.5	16	17.46		

27 How many levels of Factor A are there? [2] ✓ .

Rätt. 1 av 1 poäng.

28 How many levels of Factor B are there? [2] ✓ .

Rätt. 1 av 1 poäng.

29 What is the total number of subjects? [20] ✓ .

Rätt. 1 av 1 poäng.

30 Assuming equal group size, how many subjects are there in each group? [5] ✓ .

Rätt. 1 av 1 poäng.

31 What are the numerator and the denominator for the F ratio corresponding to the interaction effect?

$F =$ [400] ✓ / [17.46] ✓ .

Rätt. 1 av 1 poäng.

32 Which results are statistically significant? (could be more than one)
Välj ett eller flera alternativ:

☑ Main effect of Factor A	✓
☐ Main effect of Factor B	
☑ Interaction effect of Factor A and Factor B	✓
☐ none	

Rätt. 1 av 1 poäng.