GÖTEBORGS UNIVERSITET

STUDENT

0003-PNK

TENTAMEN

TIG109 Tentamen

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TIG109: Metod 2 och projekt, 15 hp, VT 2024

Delkurs 2: Statistisk analys av data, 6 hp

OMTENTAMEN

Frågorna är av typerna: ett korrekt svarsalternativ bland fyra möjliga och sant/falskt. Frågorna är formulerade på engelska.

Maxpoäng är 38, gränsen för **Godkänt** är 23 och för **Väl godkänt** 33 poäng.

Tillåtet hjälpmedel: tryckt engelskt lexikon (utan anteckningar)

Multie-choice questions

Please choose the best alternative.

1 The _____ tells us approximately how far scores vary from the mean on the average.
Välj ett alternativ:

- standard deviation ✓
- standard error of the mean
- sum of squared deviations
- range

Rätt. 1 av 1 poäng.

2 To help interpret the effect size measure, *d*, the statistician J. Cohen classified effect sizes as small, medium, and large. According to Cohen, a medium effect size corresponds to a *d* ratio of

Välj ett alternativ:

- .20
- .05
- .50 ✓
- .80

Rätt. 1 av 1 poäng.

3 The confidence interval for a population mean is centered around

Välj ett alternativ:

- the sample mean ✓
- the estimated standard error.
- the standard error of the mean.
- the true population mean.

Rätt. 1 av 1 poäng.

4 When interpreting confidence intervals for a difference between two means, if zero is in the interval we should conclude that

Välj ett alternativ:

- the confidence interval is incorrectly calculated.
- the population means are different.
- there is definitely no difference between the population means
- we are uncertain about whether the population means differ ✓

Rätt. 1 av 1 poäng.

5 The score appearing most frequently in a distribution is called the

Välj ett alternativ:

- mode. ✓
- mean.
- frequency.
- median.

Rätt. 1 av 1 poäng.

6 A measure of effect size that is appropriate when we are comparing two means is

Välj ett alternativ:

- eta squared
- partial eta squared
- phi
- Cohen's d ✓

Rätt. 1 av 1 poäng.

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

Rätt. 1 av 1 poäng.

8 The magnitude or degree of a correlation will increase as points in a scatterplot
Välj ett alternativ:

- are spread out.
- correspond to the x- and y-axis.
- correspond to a straight line. ✓
- first increase, then decrease.

Rätt. 1 av 1 poäng.

9 A major reason why we may not make causal conclusions based only on correlational evidence is that a correlation between two variables
Välj ett alternativ:

- may be due to a third variable. ✓
- is never about variables that are causally related.
- cannot be calculated for causally related variables.
- is likely to be in error.

Rätt. 1 av 1 poäng.

10 Outliers in experimental data
Välj ett alternativ:

- should always be deleted.
- should never be deleted.
- may be deleted depending on the type of experiment. ✓
- should always be deleted if they lie outside of 1.5 times the interquartile range.

Rätt. 1 av 1 poäng.

11 A variable with the possible values "male" and "female" uses the measurement scale

Välj ett alternativ:

- nominal. ✔
- ordinal. ✖
- ratio.
- interval.

Fel. 0 av 1 poäng.

12 Null hypothesis significance testing begins with the assumption that the performance of two or more groups

Välj ett alternativ:

- differs only slightly.
- differs at a value of $p < .05$.
- differs significantly.
- does not differ. ✔

Rätt. 1 av 1 poäng.

13 A statistically significant outcome is one that has a small likelihood of occurring if the null hypothesis is

Välj ett alternativ:

- false.
- true. ✔
- accepted.
- unlikely.

Rätt. 1 av 1 poäng.

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

- reject a false null hypothesis.
- fail to reject a false null hypothesis.
- reject a true null hypothesis. ✓
- fail to reject a true null hypothesis.

Rätt. 1 av 1 poäng.

15 The likelihood that an experiment will reveal the effect of an independent variable when the independent variable really had an effect refers to an experiment's
Välj ett alternativ:

- significance.
- alpha level.
- level of significance.
- sensitivity. ✓

Rätt. 1 av 1 poäng.

16 A simple main effects analysis examines the effect of one independent variable
Välj ett alternativ:

- at one level of a second independent variable. ✓
- across all levels of another independent variable.
- in a single factor design.
- for all other independent variables.

Rätt. 1 av 1 poäng.

17 A Type II error arises when we

Välj ett alternativ:

- accept a true null hypothesis.
- fail to accept a true null hypothesis.
- reject a true null hypothesis.
- fail to reject a false null hypothesis. ✓

Rätt. 1 av 1 poäng.

18 The probability of a Type I error can be reduced by

Välj ett alternativ:

- accepting the null hypothesis.
- changing alpha from .05 to .10.
- decreasing the probability of a Type II error.
- changing alpha from .05 to .01 ✓

Rätt. 1 av 1 poäng.

19 When conducting an analysis of variance, we assume that any systematic variation due to the effect of the independent variable is added to

Välj ett alternativ:

- the denominator of the F ratio. ✗
- the null hypothesis.
- within-group variation.
- between-group variation. ✓

Fel. 0 av 1 poäng.

20 When an analysis of variance reveals a statistically significant interaction effect between two independent variables in an experiment, the researcher knows the systematic variation between groups for the interaction effect is reliably

Välj ett alternativ:

- the pattern of means supports the research hypothesis.
- all of the alternatives.
- the effect size for the finding will be at least medium.
- greater than the within group error variation. ✓

Rätt. 1 av 1 poäng.

21 A mixed design is a complex design where one independent variable represents an independent groups design (random groups or natural groups) and another independent variable represents

Välj ett alternativ:

- a variable with more than three levels.
- a variable with only two levels.
- the correlational design.
- the repeated measures design. ✓

Rätt. 1 av 1 poäng.

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

- two nominal variables. ✔
- one nominal variable and two or more interval variables.
- two interval variables. ✖
- one nominal variable and one interval variable.

Fel. 0 av 1 poäng.

23 Which problem is likely to arise when performing many pairwise comparisons of means?
Välj ett alternativ:

- Low power
- Type II error
- Sphericity
- Type I error ✔

Rätt. 1 av 1 poäng.

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

- effect size
- Type II error
- sample size ✔
- the level of statistical significance

Rätt. 1 av 1 poäng.

25 Why is a repeated measures design likely to be more sensitive than a random groups design?

Välj ett alternativ:

- Confounding variables are eliminated
- It contains more measurements
- It has more participants
- Individual variation is eliminated ✓

Rätt. 1 av 1 poäng.

26 An outcome that is not statistically significant in an independent design with two groups

Välj ett alternativ:

- shows that the power was too low.
- shows that there are no difference between the groups.
- shows that the independent variable did not have an effect.
- does not support the conclusion that the independent variable had an effect. ✓

Rätt. 1 av 1 poäng.

27 What is a reason a researcher uses a non-parametric statistical test to test the difference between two groups?

Välj ett alternativ:

- The dependent variable is measured on an interval scale
- The difference between means is expected to be small
- The correlation between groups is weak
- The assumptions of the t test are not met ✓

Rätt. 1 av 1 poäng.

Analysis case

Read the description of the following case and its results and answer the questions that follow with True or False.

Experimental design: Independent groups: Fictionality (fact/fiction) x Story Emotional Valence (positive/negative)

Table 2

Mean Ratings of Memory Qualities for Study 1

Measure	Fact			Fiction		
	Positive	Negative	Total	Positive	Negative	Total
Clarity	4.32 (1.52)	4.43 (1.67)	4.38 (1.59)	3.95 (1.6)	4.31 (1.68)	4.14 (1.64)
Colour	4.55 (1.65)	4 (2.09)	4.27 (1.89)	3.51 (1.61)	4.29 (1.73)	3.92 (1.71)
Visual details	3.91 (1.77)	4 (1.83)	3.96 (1.78)	3.83 (1.7)	4.02 (1.66)	3.93 (1.67)
Other senses	2.36 (1.68)	1.87 (1.14)	2.11 (1.43)	2.15 (1.49)	2.27 (1.72)	2.21 (1.61)
Emotional valence	4.14 (1.39)	3 (1.28)	3.56 (1.44)	4.56 (1.34)	3.38 (1.3)	3.94 (1.44)
Emotional intensity	3.59 (1.76)	3.48 (1.75)	3.53 (1.74)	2.88 (1.58)	3.56 (1.7)	3.23 (1.67)
Bodily reaction	2.18 (1.5)	2.17 (1.44)	2.18 (1.45)	1.85 (1.2)	1.96 (1.59)	1.91 (1.41)

Note. Standard deviations within parentheses.

Outcomes of statistical analyses

Three separate 2 (Fictionality) x 2 (Story emotional valence) ANOVAs were carried out for the dependent variables clarity, colour, and emotional valence.

Test of interaction between fictionality and story emotional valence, for clarity:
$F(1, 127) = 1.66$, $p = .69$, $\eta^2_p = .001$

Test of interaction between fictionality and story emotional valence, for colour:
$F(1, 127) = 4.21$, $p = .042$, $\eta^2_p = .032$
Negative stories were rated as being more in colour than positive stories, $p = .042$, $M_{diff} = .78$, 95% CI_{diff} [.029, 1.52]

Test of main effect of story emotional valence, for emotional valence:
$F(1, 127) = 22.58$, $p < .001$, $\eta^2_p = .15$

28 Based on the analyses above, which effects are statistically significant?

There is a main effect of fictionality, for clarity
Välj ett alternativ:

- Sant
- Falskt ✓

There is a main effect of fictionality, for colour
Välj ett alternativ

- Sant
- Falskt ✓

There is a main effect of fictionality, for emotional valence
Välj ett alternativ

- Sant
- Falskt ✓

There is a main effect of story emotional valence, for clarity
Välj ett alternativ

- Sant
- Falskt ✓

There is a main effect of story emotional valence, for colour
Välj ett alternativ

- Sant
- Falskt ✓

There is a main effect of story emotional valence, for emotional valence
Välj ett alternativ

- Sant ✓
- Falskt

There is an interaction effect between fictionality and story emotional valence for clarity

Välj ett alternativ

- Sant
- Falskt ✓

There is an interaction effect between fictionality and story emotional valence for colour

Välj ett alternativ

- Sant ✓
- Falskt

There is an interaction effect between fictionality and story emotional valence for emotional valence

Välj ett alternativ

- Sant
- Falskt ✓

Is it true that a Type I error may have occurred in the analyses?

Välj ett alternativ

- Sant ✓
- Falskt

Is it true that a Type II error may have occurred in the analyses?

Välj ett alternativ

- Sant ✓
- Falskt

Rätt. 11 av 11 poäng.