

Social Robotics

B. Nebel, F. Lindner, L. Wächter
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University of Freiburg
Department of Computer Science

Classwork Sheet 5

Exercise 5.1 (Correction)

Consider the following four null hypotheses and their respective p-values (assume $\alpha = 0.05$):

- (A) $H_A : p = 0.040$ (Primary Hypothesis)
- (B) $H_B : p = 0.029$
- (C) $H_C : p = 0.015$
- (D) $H_D : p = 0.008$

Use the following correction method to counteract the problem of multiple comparisons. Which hypotheses are accepted?

- (a) Bonferroni correction
- (b) Holm-Bonferroni method
- (c) Two-Step procedure (Frane Method)

Exercise 5.2 (Statistical Advice)

One of your colleagues, Alice, is wondering which of the statistical tests she should pick to test the hypothesis she is currently trying to find support for in her Master's Thesis. Alice's hypothesis is that children fall asleep faster when a robot reads a story to them than one of the children's parents. Alice has collected data from 68 trials where she recorded the time-to-sleep, viz., the total amount of time (in seconds) the children listened to the story until they fell asleep. In 34 trials, the robot read the story, and in the other 34 trials, one parent read the story. Can you help Alice?

Exercise 5.3 (Wilcoxon Signed-Rank Test)

Eight persons rated their interest in buying a Nao robot before and after interacting with it on a 7-point Likert-Scale (from "very much" (1) to "not at all" (7)).

Before Interaction	1	2	5	3	4	4	7	1
After Interaction	5	6	4	3	6	7	2	3

Is there a significant difference in the interest of the potential customers before and after the interaction ($\alpha = 0.05$)?

Exercise 5.4 (Wilcoxon Rank-Sum Test / Mann-Whitney U-Test)

At a childrens hospital some of the little patients had the possibility to get to know a toy robot. It can make jokes, and answer their questions about the hospital and their individual treatment in an understandable manner. Some children interacted with a yellow, and others with a green version of this robot. After the conversation the children were asked to rate how cute they perceived the robot.

Green Robot	1	7	7	1	3
Yellow Robot	8	16	4	18	12

Is there a significant difference between both groups ($\alpha = 0.05$)?

Exercise 5.5 (Kruskal-Wallis H-Test)

In an experiment it was examined how good 9-year-old children in different countries (A, B, C, and D) can transfer the solution process of an example to equivalent tasks after being instructed by a robot. Their performance in the transfer tasks were rated by five independent raters using scores between “a” (very good) and “z” (very bad). The ratings are listed in the table below. Use the Kruskal-Wallis H-Tests to investigate if the groups significantly differ ($\alpha = 0.05$).

A	B	C	D
k	i	q	t
a	b	g	j
e	p	n	s
p	b	d	k
i	q	g	k