Polygraphy - „lie detection”
Biofeedback

Galvanic skin response, ECG and respiration measurements

Analysis and evaluation of the recorded data

ELUP students

Experiment was accomplished by:

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Teacher:
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Date:
..........................................................................................................................

Subject’s

name:..................................................

gender: male / female

age: ..................................................

height: .............................................

weight: .............................................
Goals of the practical lesson (brief definition in a few sentences)

A. Introduction (can be continued on a separate sheet if needed)
1. Physiological background of polygraphy recordings – main characteristics of physiological features changing during excitement (summary of the most important facts in regard to the analysis of the practical data)
2. Methods and materials (schematic enumeration) and technical details of the practical exercises (preparation of the subject, settings of the recording system, description of the tasks)
B. Data and calculations

Evaluate the extent of changes in skin conductivity (GSR) and compare them to the resting state (control segment). (no change: -; mild: *; medium: **; strong change: ***)

Attach the magnified, analyzed recording segments with annotations to the lab record!

I. Setting up the measurement

<table>
<thead>
<tr>
<th>Task</th>
<th>Difference compared to control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting state</td>
<td></td>
</tr>
<tr>
<td>Saying his/her own name</td>
<td></td>
</tr>
<tr>
<td>Countdown from 10</td>
<td></td>
</tr>
<tr>
<td>Countdown with increasing odd numbers from 30</td>
<td></td>
</tr>
<tr>
<td>Touching the face</td>
<td></td>
</tr>
</tbody>
</table>

Number of the attachment:.....................

II. Effect of words with various emotional charge

<table>
<thead>
<tr>
<th>Words</th>
<th>Difference compared to control</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Number of the attachment:.....................

Did you observe any significant changes in the respiratory rate or in the heart rate during tasks I or II?

Why?

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**III. Lie detection – yes or no questions**

Fill up the table with the questions and mark the answers of the Subject (Y: yes, N: no). Based on the recording, try to guess whether the Subject told the truth (T: truth) or lied (L: lie). Mark in the last column whether it was actually truth or lie. (no change: - ; mild: *; medium: **; strong change: ***)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Difference compared to control</th>
<th>Guess</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
<tr>
<td>2.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
<tr>
<td>3.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
<tr>
<td>4.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
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<tr>
<td>5.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
<tr>
<td>6.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
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<tr>
<td>7.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
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<tr>
<td>8.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
<tr>
<td>9.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
<tr>
<td>10.</td>
<td>Y N</td>
<td>T L</td>
<td>T L</td>
<td>T L</td>
</tr>
</tbody>
</table>

**Number of the attachment:....................**

At which question(s) did you observe any significant changes in the respiratory rate or in the heart rate? What could be the reason?

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**IV. "Guess the number" game**

Prepare 10 cards with numbers on them from 1 to 10. The Subject should draw a card, look at the number on it, write it down and put the card back into the stack and shuffle it. During the recording, the Investigator should draw all cards one after the other and ask the Subject whether he/she had drawn that card before. **The Subject should always say no!** Wait at least 10 seconds between the questions. Repeat the procedure 3 times, shuffle the cards between the trials.

Asking order of the numbers during the 3 trials:

<table>
<thead>
<tr>
<th>I.</th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>II.</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>III.</td>
<td></td>
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</tbody>
</table>

Fill up the table below with data derived from the trial that you consider the most successful.

(no change: - ; mild: *; medium: **; strong change: ***)

Number of the chosen trial:.........................

<table>
<thead>
<tr>
<th>Number</th>
<th>Difference compared to control</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;1&quot;</td>
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<tr>
<td>&quot;2&quot;</td>
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<tr>
<td>&quot;3&quot;</td>
<td></td>
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<td>&quot;4&quot;</td>
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<td>&quot;5&quot;</td>
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<td>&quot;6&quot;</td>
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<td>&quot;7&quot;</td>
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<td>&quot;8&quot;</td>
<td></td>
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<tr>
<td>&quot;9&quot;</td>
<td></td>
</tr>
<tr>
<td>&quot;10&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Number of the attachment:..........................

At which question(s) did you observe any significant changes in the respiratory rate or in the heart rate?

What could be the reason?………………………………………………………………………………………..

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Which number do you guess the Subject has drawn?  

Which number has he/she actually drawn?
V. "Biofeedback" (optional task)

Describe briefly your findings during the experiment.

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Number of the attachment: .............

Explain the physiological background of the biofeedback phenomenon!

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C. Data summary and conclusions

1.

a) Why is the setting up of the measurement extremely important in case of polygraphy?

b) During the setting up phase, at which task(s) did you observe significant changes in GSR? Explain your findings!

c) Did you observe any difference between the measured and the expected effects of words with various emotional charges? What can be the reason?

d) Why is it useful to record reactions to emotionally charged words?

2.

a) Could you find the lies among the truthful answers? How? If not, what could be the cause for the lack of success?

b) Could you guess the number? If yes, what was helpful? If not, what was confounding?
3.

a) What kind of physiological changes account for the galvanic skin response?

b) Give at least 2 possibilities that make a polygraphy test inconclusive. Explain your answer.

c) Based on your physiological knowledge, explain why the Subject’s heart rate may vary spontaneously during the recording!

D. Definitions:

Polygraphy: ............................................................

Sympathetic activation: ............................................................

Galvanic skin response (GSR): ............................................................