Screening Tests

RehaCom is a therapy tool. Its focus stays on the fact that it fulfils the cognitive therapy. To use its application more effectively, now it offers the possibility of a screening. In contrast to a complex assessment, a screening just gives a hint according to the deviation of the norm. Especially adapted screenings can help to identify those cognitive areas which are suspected with a deficit. This area can be assessed with further specific diagnostic tools afterwards. The results then give a quick overview of affected and not affected dimensions.

The RehaCom Screening Test Set was designed in cooperation with Dr. Laco Gaál – member of the German Association for Neuropsychologists. It consists of 5 modules for screening the cognitive status of patients with neurological and/or psychiatric diseases. Data of about 200 healthy people are included as normalized values. At the end of each screening there is a recommendation which training modules should be chosen for this client. All 5 screening tests take the client about 20-30 minutes to fulfill them. Leading Neuropsychologists say that this is an optimal time for a client to do such a test.

The Screening Tests and their paradigms

- **Alertness (ALET):**

  **Task:**
  The first stage of the test is to measure the response time while the user has to push the button as fast as possible, when a fully filled square appears on the screen. For the second condition response time to the same visual stimulus is measured while a signal sound was played before the square appears. The client has to wait until the square appears on the screen to push the button (not reacting on the sound).

  ![Alertness Test](image)

  **Background:**
  In this module three different skills are measured. The first one is the *tonic alertness*, which is measured as the response time to a visual stimulus.\(^1\) The second skill is *phasic alertness*, which can be described as the improvement of the response time through an acoustic warning signal.\(^2\) Under the aspects of Sturm et al.\(^3\) there is a third part called *intrinsic alertness*. This skill describes the maintaining of reaction attendance during a longer period of time.

  **Literature:**

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**Divided Attention (GEAT)**

**Task:**
In this test the client has to solve a visual and an auditory task parallel simultaneously in one trial. In the visual task the person has to push the button if in the amount of 5 circles a closed one appears. The circles have the same position in every new set, only the position of the opening changes for each set. A new set appears every 2 seconds. One trial contains 80 visual stimuli with about 15% relevant stimuli. The auditory task is to push the button if the person hears a discontinuity in the row of the sounds. The sounds are changing from high to low and low to high synchronously to the change of the visual stimulus. If two sounds of the same kind (high-high or low-low) appear one after another, the person has to push the button. The sounds will be played every second synchronously with the appearing of a visual stimulus. One trial contains 160 auditory stimuli with approximately 10% relevant stimuli. For a visual as well as an auditory stimulus, the client has to push the same button on the keyboard. Both tasks start at the same time.

**Background:**
Empirical studies have shown that attention is not an easy construct. In fact, the four aspects are mainly independent from each other and can be distinguished as follows.1,2,3

1. Periodic activation, Alertness
2. Selective attention
3. Divided attention
4. Tonic activation
If divided attention abilities are required in cognitive tasks, then it is necessary that those tasks include at least two stimuli which have been looked out for, simultaneously. This aims to encourage the client to respond both to relevant simultaneous stimuli and to relevant sequential stimuli. When there are many stimuli appearing and disappearing fast, they interfere with each other. Thus, mistakes are likely to be made, and the performance decreases.

**Literature:**

- **Response Control (GONT)**

**Task:**
The test starts with a short introduction and one exercise. During the task a fixation stimulus is displayed in the middle of the screen. In randomly order one of two different stimuli appears. In case of the vertically striped square no response is required, in case of the horizontal stripes a response is required as fast as possible. Response should be to press a certain button.

**Background:**
Examined is the ability to react in an appropriate way under time pressure and simultaneously to control behavioural impulses. It is essential to suppress a triggered reaction by an external stimulus in favour of internally controlled behaviour. The focus of attention is directed to a predictable appearance of stimuli and the corresponding reaction, for example to react or not to react.

**Literature:**
**Working Memory and Orientation (PUME)**

**Task:**
During the task, 10 dots in one circle will be presented on the screen. Single dots will light up in red and change again to white. The sequence to memorize starts with two dots. After the pattern was shown the same sequence has to be marked in correct order. This module is adaptive. After two correct reproductions of the sequence, the number of dots which are to remember will be raised. If the user fails, the number of dots which are to memorize will be reduced. The test will end after seven minutes or by the time the maximum number of mistakes is reached.

**Background:**
In this module, it will be determined the visual-spatial memory span and the visual-spatial memory function. It is also used for testing the implicit visual-memory learning and the working memory.

**Literature:**
Published by the Commission "Guidelines" the DGN. Leitlinien fur Diagnostik und Therapie in der Neurologie; 4. revised edition; Georg Thieme Verlag Stuttgart
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• **Visual Exploration (NUQU)**

**Task:**
The numbers on the screen are randomly spread and the user has to look for the numbers and mark those in ascending order. Below the matrix of numbers the current number is displayed.

```
<table>
<thead>
<tr>
<th>13</th>
<th>18</th>
<th>10</th>
<th>22</th>
<th>06</th>
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<td>04</td>
<td>02</td>
<td>11</td>
<td>23</td>
<td>09</td>
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```

**Background:**
In this module basal cognitive performance and selective attention will be tested. In addition the test can be used for screening a visual neglect.

The basal cognitive performance is associated in literature with the ability which is called perceptual speed. By selective attention is meant the ability to turn themselves to the relevant stimulus of a stimuli constellation and ignore irrelevant stimuli of this constellation, over a short time period. This task depends on the well-known “Digits-Connection-Test” developed by Oswald and Roth 1987.

**Literature:**


Published by the Commission “Guidlines” the DGN. *Leitlinien fur Diagnostik und Therapie in der Neurologie*; 4. revised edition; Georg Thieme Verlag Stuttgart
Which training modules are recommended and when?

<table>
<thead>
<tr>
<th>Alertness (ALET)</th>
<th>tonic alertness</th>
<th>reaction slowed down</th>
<th>Reaction Behaviour (REVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reaction highly slowed down</td>
<td>Responsiveness (REA1)</td>
<td></td>
</tr>
<tr>
<td>phasic alertness</td>
<td>reaction slowed down</td>
<td>Reaction Behaviour (REVE)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reaction highly slowed down</td>
<td>Responsiveness (REA1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Divided Attention (GEAT)</th>
<th>visual attention division</th>
<th>conspicuous</th>
<th>Divided Attention 2 (GEA2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>highly conspicuous</td>
<td>Divided Attention (GEAU)</td>
<td></td>
</tr>
<tr>
<td>auditive attention division</td>
<td>conspicuous</td>
<td>Divided Attention 2 (GEA2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>highly conspicuous</td>
<td>Divided Attention (GEAU)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response Control (GONT)</th>
<th>working speed</th>
<th>reaction slowed down</th>
<th>Reaction Behaviour (REVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reaction highly slowed down</td>
<td>Responsiveness (REA1)</td>
<td></td>
</tr>
<tr>
<td>impulse control</td>
<td>low</td>
<td>Reaction Behaviour (REVE)</td>
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</tr>
<tr>
<td></td>
<td>very low</td>
<td>Responsiveness (REA1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Visual Exploration (NUQU)</th>
<th>working speed</th>
<th>slow</th>
<th>Attention and Concentration (AUFM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>sustained attention</td>
<td>low</td>
<td>Vigilance (VIGI)</td>
<td></td>
</tr>
<tr>
<td>Neglect / Hemianopia</td>
<td>conspicuous</td>
<td>Overview and Reading (ZIHL)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>highly conspicuous</td>
<td>Saccadic Training (SAKA)</td>
<td></td>
</tr>
</tbody>
</table>

| Working Memory (PUME) | attention focussing | conspicuous | Topological Memory (MEMO) |
|                       |                   |            | Working Memory (WOME) |
| memory capacity       | conspicuous       | Topological Memory (MEMO) |
|                       | highly conspicuous | Working Memory (WOME) |
Result evaluation

- The results sheet consists of 2 sections, a graph at the top, and a text section further down.
- The graph consists of a red and a yellow part as well as 3 different green parts. Imagine a Gauss curve on top of the graph. The very light green section represents 68 % of the tested persons (most of the healthy people). The division between the yellow and the light green part represents standard deviation -1. The division between the red and the yellow part represents standard deviation -2.
- The numbers surrounded by circles represent the first, second, third (…) test session. One screening test, e.g. (NUQU) Visual Exploration, can contain 1, 2, or 3 parameters, e.g. Working Speed, Sustained Attention, and Neglect/Hemianopia. Always the latest test session will be commented in the texts further down.
- When clicking on one of the lines in the graph, e.g. (NUQU) Visual Exploration: Working Speed, the line will light up in blue and the corresponding text further down will light up as well. If the result of the latest test session is within the red or yellow section, then the text below will announce a recommendation, e.g. It is recommended to work with the following training module: “Attention and Concentration (AUFM)”. 

![Graph with standard deviations]
How to generate your own normalized values?

- Find healthy people of all kinds of different ages and let them do the screening tests all one after another.
- Set up those people as clients in RehaCom and name them with numbers (e.g. Test_Person_001 and so on). Then click on File in the client data and choose (healthy) test person from the drop-down box on the right.
- The test persons should all do the testing with totally the same conditions:
  - same room
  - same computer
  - same table, same chair
  - same surroundings (ideally no noises and no interruptions)
  - instructed by the same person
  - same distance to the computer
- After the testing let them all fill in the RehaCom test person questionnaire, ideally in English. Don’t write the names of the persons on that sheet, only their numbers from the testing.
- After the testing send us all the questionnaire sheets as well as the file REHACOMDB.GDB from the (standard) directory C:\RehaComDB.
- We will implement the normalized values then.