Orders, Questions and Feedback
For further request please contact us.

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Internet: www.rehacom.com

System Requirements
• Regular PC, not older than 3 years • 1 GB RAM • DVD drive
• 100 GB hard drive • Windows XP SP3 or newer
• 128 MB RAM Direct3D Graphic card (Nvidia, ATI)
• Screen, at least 19", preferably touch screen • Printer

Languages
• German • English • French • Spanish • Italian • Portuguese
• Russian • Dutch • Greek • Finnish • Norwegian • Swedish
• Polish • Turkish • Estonian • Korean • Hebrew • Arabic • Chinese

Further information about our products: www.hasomed.com
Our products are EN/ISO-13485-certified.

• RehaMove - Functional Electrical Stimulation
• RehaWatch - Motion Analysis
• Biofeedback Systems
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Cognition works as an "interface" between the brain and its environment, directing the mental processes involved in gaining knowledge and understanding. These processes, including mental activities and performances such as attention, perception, awareness, memory, action planning, and reasoning are all essential for completing everyday activities. Loss of one or more of these functions may affect a person's quality of life.

The effects of brain damage, whether caused by stroke, traumatic brain injury (TBI), tumours, or multiple sclerosis, occur both physically and mentally. These impairments vary widely from person to person and depend on many factors, including an individual's personality and the severity of the brain damage. Clients often experience difficulty with concentration and sometimes develop speech disorders. They may also experience difficulty recognising or naming objects or persons. Frequently, spatial orientation and memory are also affected. Changes in personality may occur as well.

Different diagnostic measures are used depending on the severity and the type of brain damage. Clients may undergo physical, occupational and speech therapy as well as neuropsychological therapy, which includes cognitive therapy. The aim of cognitive rehabilitation is to minimize the damage, to regain lost skills, to develop compensation strategies, and to help the client to progress to the most independent level of functioning possible. Intact functions should be trained first because success leads to better self-confidence. After that, affected functions can be trained specifically by using clear and explicit instructions.
**RehaCom:**
- has been developed in collaboration with experts and therapists. The program is updated regularly and adapted to the demands and ideas of the user
- is market leader for computer-based rehabilitation in Germany and provides more than 25 years of development and experience
- is a scientifically based and clinically tested part of cognitive rehabilitation and is used in addition to other therapeutic interventions
- offers numerous training material and tasks for all cognitive fields in all rehabilitation phases
- is available in 21 languages at no extra cost. Patients train in their native language
- offers customized solutions for clinics and supervised home training
- no diagnosis tool available? RehaCom offers Screenings to detect impairments and recommend corresponding cognitive training modules

**Profit from a wide range of Benefits**

In 1986, Professor Regel, one of the “founding fathers” of computer-based cognitive rehabilitation in Germany, developed a concept which was converted into RehaCom. Thousands of patients and clinicians worldwide profit benefit from a successful training with RehaCom due to the program’s:

**Modular structure:** RehaCom includes modules for training basic functions as well as specialised and more complex modules for training several affected cognitive functions. Starting at a low level of difficulty, the client will be able to solve increasingly complex tasks.

**Continuity and control:** RehaCom saves all training results. A new training session starts where the last one has been finished. Thus, it is possible to control the course of training and to adjust parameters promptly. The therapist has the ability to analyse all client data to further develop training strategies.

**Effectiveness:** Numerous studies scientifically support the effectiveness of RehaCom. Please visit our website: www.hasomed.com to find all the latest RehaCom studies.

**Adaptivity and Individualisation:** RehaCom is a self-adapting program which adapts the complexity of each task automatically to the clients’ actual performance. Each training module has different levels of difficulty consisting of varied range of training tasks. The individualisation of the program provides the user with a ‘just right’ challenge - the requirements are neither too high nor too low. This makes training with RehaCom very motivating and frustration is avoided. Error-Specific Feedback: The computer functions as a neutral observer making objective comments on the clients’ performance and giving, if necessary, error-specific feedback. This leads to a higher sense of selfconfidence of the clients and can minimise the risk of side effects often caused by brain damage such as depressions or low self-esteem.

**Multilingual structure:** Most of the RehaCom modules are multilingual and available without additional costs. Patients can train in their native language.

**Efficiency:** With RehaCom, many clients can train almost independently. At the beginning and at the end of the training, the client and the therapist determine the training goal/target and discuss the results face-to-face. As the client can complete their cognitive rehabilitation independently using RehaCom, the therapist can spend less time building cognitive capacities, and more time working on other goals such as developing communication strategies. Implementing RehaCom in a clinic setting also allows therapists to work with several clients at the same time - one more reason why RehaCom has become market leader for computer-based cognitive rehabilitation in Europe.

Experiences with RehaCom show that not only intended therapy targets but also positive side effects can be achieved. Clients are very motivated to train at their computer independently.
Customised RehaCom solutions

The rehabilitation of cognitive impairments requires continuous treatment over time. Training begins in the clinic and can be continued at home under supervision of a therapist. The duration of a therapy session with RehaCom depends on the client's personal performance. According to German clinical guidelines, clients should train:

- Several times a day for 10 to 15 minutes in the acute phase
- In the following 6 to 8 weeks, training sessions of 45 to 60 minutes should take place at least 3 times per week
- In the late phase of rehabilitation, and in the subsequent home training, clients should train 2 to 3 times a week for about 3 to 5 months

Hasomed provides several solutions to enable permanent access to RehaCom training in clinics and at home.

RehaCom Home Training

For daily training at home, the therapist creates a therapy plan that is individually adjusted to the clients’ needs. The client-specific treatment plan is stored on an internet platform. As soon as the client wants to train, the RehaCom system downloads the training plan, the client performs the training and afterwards, the system saves training results automatically.

Thus, the therapist can evaluate the results promptly and has the possibility to supervise and control the performance as well as the results of the home training. It is possible to adapt the training plan optimally to the individual needs and the actual performance of the person concerned. Based on the training results, the therapist has the possibility to control the course of therapy and to respond to changing performance directly.

The integration of caregivers is possible and can be very motivating for clients, particularly with severe cognitive disorders. Family support is essential for promoting long term active participation in daily life.

Benefits of Home training:
- improved outcomes by continuing cognitive rehabilitation at home
- increased independence in the home environment
- increased self-confidence and self-esteem
- better vocational opportunities
Licencing RehaCom
We offer different options to activate RehaCom:
• Single work station in the institution or at home
• Central network solution in the institution to use several work stations
• Internet license for home training

Chin Rest / Head Rest
We recommend using a chin rest / head rest for training the visual field. This allows the client to stay in a comfortable and reproducible position in front of the monitor, remaining the same throughout the training session. The chin rest is adjustable in height and can be adapted individually. It is made of a light and stable aluminium wood construction and can be fixed to the table with a screw clamp. The aluminium/ varnished wood design makes it very easy to clean.

RehaCom Panel
A conventional PC keyboard is sometimes inappropriate as an input device for computer-based therapies. Therefore, RehaCom offers a special keyboard to allow clients with severe motor impairments to use the PC.
Targeted cognitive therapy is an important instrument in the rehabilitation process of brain injured clients based on cognitive deficits identified during an assessment. Before commencing therapy, a diagnostic assessment of all brain functions is made in order to pinpoint the impairment as well as determine which functions are still intact. Then, a therapy plan is created, which is customized to meet the clients’ specific needs, and specific goals are defined together with the client so that the therapy is as successful as possible.

RehaCom is a therapy tool. As such, its focus is on rehabilitation of cognitive impairments. In contrast to a complex assessment, the screening tool just gives a hint according to the deviation from the norm. Specially adapted screenings can help to identify suspected cognitive weaknesses or impairments. This area can be assessed with further specific diagnostic tools afterwards. The results then give a quick overview of which cognitive functions are affected.

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 clients with neurological and/or psychiatric diseases. Evaluate the screening results of your clients and get recommendation with which training the client should start the RehaCom training.
• **Alertness (ALET):**
In this module the *tonic alertness*, the *phasic alertness*, and *intrinsic alertness* is measured. 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).

• **Divided Attention (GEAT):**
In this test the client has to solve a visual and an auditive task parallel simultaneously in one trial. One trial contains 80 visual stimuli with about 15% relevant stimuli as well as 160 auditive stimuli with approximately 10% relevant stimuli. For a visual as well as an auditive stimulus, the client has to push the same button on the keyboard. Both tasks start at the same time.

• **Response Control (GONT):**
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.

• **Working Memory and Orientation (PUME):**
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.

• **Spatial Numbers Search (NUQU):**
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.
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<td>photos of 100 different goods</td>
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<tr>
<td>80 symbols in 2 sizes</td>
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<tr>
<td>words, letters, numbers, forms</td>
<td>▲</td>
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- ▲: Severe to intermediate leveled deficits
- ▲: Intermediate to mild leveled deficits
- ▲: Mild leveled deficits
### Specific training packages for a range of cognitive impairments

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<th>Category</th>
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<td><strong>Severe Traumatic Brain Injury + Early Phase of Rehabilitation</strong></td>
<td>AUFM, Attention and Concentration, REA1, Responsiveness, RAUM, Spatial Operations, WORT, Memory for Words, BILD, Figural Memory, SAKA, Saccadic Training</td>
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<td><strong>Moderate Traumatic Brain Injury + Mid Phase of Rehabilitation</strong></td>
<td>AUFM, Attention and Concentration, REVE, Reaction Behaviour, VRO1, Two-Dimensional Operations, VERB, Verbal Memory, EXPL, Exploration, LODE, Logical Reasoning</td>
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<td><strong>Mild Traumatic Brain Injury + Late Phase of Rehabilitation</strong></td>
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<td><strong>Mental Health</strong></td>
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<td><strong>Geriatrics</strong></td>
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<td><strong>ADHD</strong></td>
<td>AUFM, Attention and Concentration, VIGI, Vigilance, GEAU, Divided Attention, MEMO, Topological Memory, EINK, Shopping</td>
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Reaction Behaviour (REVE)

Reduced reaction speed (e.g. as a result of insult, ischemia demen-
tia, craniocerebral trauma, tumour development, etc.) which mostly
occurs in diffuse brain damage as well as in frontal and prefrontal
lesions. Suitable for persons aged 8 and up.

Indications

Training Task

A picture shown separately on the screen has to be compared to
a matrix of pictures. The client must find the picture in the matrix
matching exactly the “comparison picture”.

Training Material

A total of 49 picture pools have been created, each with 16 coloured
illustrations. All pictures have been optimised concerning visibility
and differentiability. According to parameter settings, either con-
crete objects (fruits, animals, faces etc.), geometric objects (circles,
rectangles, and triangles of different size and order) or letters and
numbers are displayed.

Attention and Concentration (AUFM)

The module AUFM is based on the principle of pattern comparison.
The client has to find one picture in a matrix that matches exactly
the “comparison picture”.

Indications

Attention disorders (functionally and organically caused) after ac-
quired brain damage. They are found in 80% of all persons affected
by stroke, TBI, diffuse organic brain impairments (e.g. caused by
chronic alcohol abuse or intoxication), as well as in other diseases
of the central nervous system. Suitable for clients with disorders in
attention and concentration and for children aged 11 and up.

Training Task

A realistic stimulus (traffic signs) was chosen for this training. The task
is to press the corresponding reaction button as fast as possible
whenever a relevant stimulus - a traffic sign - is shown on the screen.

Training Material

The module REVE is used to train reaction behaviour (reaction speed
and accuracy) for single or multiple choice reactions to acoustic
stimuli. At the edge of the screen, traffic signs are shown. Next to
each sign, the button of the panel is indicated which the client has to
press when the traffic sign appears.

Indications

Reduced reaction speed (e.g. as a result of insult, ischemia demen-
tia, craniocerebral trauma, tumour development, etc.) which mostly
occurs in diffuse brain damage as well as in frontal and prefrontal
lesions. Suitable for persons aged 8 and up.

Training Task

Realistic stimuli (traffic signs) were chosen for this training. The task
is to press the corresponding reaction button as fast as possible
whenever a relevant stimulus - a traffic sign - is shown on the screen.

Training Material

During the learning phase, the client has to memorise traffic signs
and the corresponding reaction buttons. During the training phase,
relevant traffic signs are presented to the client who must react with-
in a certain time interval. In higher difficulty levels also irrelevant
traffic signs are shown which require no reaction.
Divided Attention (GEAU)

The module GEAU is made for attention training. Several stimuli have to be observed simultaneously as often demanded in everyday life. Like a train driver, the client has to monitor the driver’s cab, regulate the speed, and react to different signals during the train run.

Indications
Disorders in divided attention occur with almost all diffuse brain damages (caused by e.g. intoxication or alcohol abuse) as well as with local damage of the right hemisphere, especially of parietal parts. Affected clients have difficulties in focusing attention to multiple objects at the same time. Also suitable for children aged 11 and up.

Training Task
On the lower part of the screen, a driver’s cabin is shown. Thus, the client can observe the railway like looking through the windscreen of the driver’s cab. He must react to the elements of the cabin and to relevant objects on the railway.

Training Material
The driver’s panel contains a speedometer, a so-called “deadman’s lamp” and the “emergency stop lamp”. On the speedometer, a “target speed” is set that the client must keep if possible. As soon as a lamp lights up, the client has to press the corresponding button on the RehaCom Panel (e.g. the stop button). If a relevant object appears on the railway, the client also has to react to (e.g. stopping at a red signal).

Working Memory (WOME)

The module WOME exercises the ability to memorise and manipulate information that does not (or no longer) exist in the client’s external environment. The maintenance of selective attention and the resistance to interference plays an important role. As the activity is in the format of a fun card game, the client is highly motivated to complete the activity.

Indications
Disorders of the working memory after brain damage due to stroke or TBI. The training module can be used for training the visuo-spatial sketchpad for short-term storage of visual impressions, for training the phonological loop for storing nonverbal information, and for training the central executive for linking information to the long-term memory. Since non-verbal material is used, the training is suitable for persons aged 10 and up.

Training Task
The client has to memorise and manipulate an increasing number of cards. The content to be memorised can be presented visually or acoustically. Initially, the client only has to memorise the items. In higher levels, additional tasks influence the memory process. Thus, this task trains not only the working memory, but also accompanying abilities such as problem solving, reasoning, deductive reasoning, speech comprehension, calculation performances, and intelligence.

Training Material
For the training, a complete deck (52 cards) is used. The training material is completed by diverse distractors on the cards, animated distractors for training the resistance to interference as well as graphics for increasing the performance feedback.
The module BILD is used for training the long-term non-verbal and verbal memory (working memory). The client has to memorise pictures with concrete (nameable) objects. After the “learning phase”, terms will appear like on a conveyor belt. The client has to press the OK button whenever a term of an object shown during the learning phase moves by.

**Indications**

All memory disorders (especially disorders of the working memory) for verbal and nonverbal contents. The training module is also suitable for clients with impaired ability to name objects as well as with difficulties in conceptual classification (organically or functionally caused). With average vocabulary, this module is applicable for persons aged 11 and up.

**Training Task**

At the beginning of the training, pictures of concrete objects are shown. The client has to memorise the terms of these objects. The client completes the “learning phase” themself by pressing the OK button. After that, different terms move by on the screen from the left to the right like on a conveyor belt. Whenever the term for an object shown during learning phase passes through the marked area, the client must press the OK button.

**Training Material**

About 200 pictures of concrete objects are used, of which 100 objects have a high classification safety. For the words, a big and easy to read typeface has been chosen. The movement of the words or pictures across the screen occurs continually and fluently. It is possible to adjust the speed of the terms moving by. This ensures that clients (and children) with a different speed of reading can use this module for training.

The module LODE aims to improve logical thinking (reasoning). The client has to continue rows of symbols that are based on logical rules, in a “complete the sequence” format.

**Indications**

Acquired damage of the frontal lobe, where impairments in abstract logical thinking can be observed. Those losses of performance often occur in clients with chronic alcohol abuse, dementia, and insult, as well as schizophrenia. The training can also be used for children aged 12 and up, provided that they are capable of comprehending simple abstract-logical conclusions.

**Training Task**

From several symbols (pool of answers), the client has to find out the one that correctly continues a given sequence of symbols.

**Training Material**

A sequence of symbols (circles, triangles, squares, etc.) of different shape, colour, and size are displayed on the screen being in a regular relation to each other. If the answer is wrong, special pieces of information about the type of error (shape, colour, and/or size) are given.
**Saccadic Training (SAKA)**

The module SAKA is developed for clients with reduced abilities of visual exploration and hemilateral visual neglect phenomena (neglect, hemianopsia, hemiamblyopia, etc.). The clients are instructed to push the left or right reaction button when a figure appears left or right from the centre.

**Indications**

Impairments in visual exploration on one half of the visual field. They often occur in neglects or extended cerebral infarcts in the area of distribution of the middle or posterior cerebral artery. Other organic brain disorders can also cause these functional impairments. Suitable for persons aged 8 and up.

**Training Task**

The client can see a horizon on the screen with a very simple structured landscape. In the middle of the screen, a big sun is displayed. At irregular intervals, an object appears left or right of the sun. Whenever the client notices an object, he has to press the corresponding reaction button (left or right arrow key of the RehaCom Panel).

**Training Material**

On the screen, a horizontal line is visible. At easier levels, a sun is indicated in the middle for a better orientation of the client. In irregular temporal intervals, different objects or symbols, e.g., animals, cars, bikes, motorcycles etc., appear on the horizontal line. At higher levels of difficulty, the symbols become smaller, the horizon disappears, and additional deflecting stimuli are shown and fade again.

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**Exploration (EXPL)**

The module EXPL is used for treating visual exploration disorders. During training, the serial search is used in which localised objects undergo a detailed analysis.

**Indications**

Homonymous restrictions of the visual field, disorders of visual exploration as a consequence of visual field loss, visual neglect, and/or Balint’s syndrome. Due to the use of non-verbal material, the module is also suitable for clients suffering from linguistic restrictions and restrictions in understanding words. Suitable for persons aged 8 and up.

**Training Task**

Different stimuli (symbols) appear on a black background from which the client is required to select all stimuli they memorised before by systematically searching the area. A circular cursor moves over the field line by line (with interlace). In this way, the exploration movement of the client is controlled. Each time, the relevant symbol is within the moving circular cursor, the client has to press the OK button of the RehaCom Panel.

**Training Material**

For exploration training, squares, triangle, circles, stars, and symbols are used.
Responsiveness (REA1)  

The module REA1 aims to improve reaction speed and accuracy to visual and acoustic stimuli. Simple reaction tasks, simple choice, and multiple choice reaction tasks are used for training the client to react to certain stimuli as quickly and differentially as possible.

Indications
Impairment of responsiveness after cerebral lesions, disorders of selective attention performances, disturbances of visual and acoustic discrimination, cognition, and/or behavioural performance. Suitable for persons aged 8 and up. The module is less suitable for persons with severe ametropia (visual refractive error) or poor hearing.

Training Task
Responsiveness is trained using simple reactions, simple choice, and multiple choice reactions with visual and/or acoustic stimuli. The training contains only visual (module 1) or visual and acoustic stimuli (module 2). After a stimulus has appeared, the client must press a particular button on the RehaCom panel as fast as possible. During acquisition phase, the client familiarises himself with a concrete task. He has to memorise the assignment of relevant stimuli to corresponding buttons. Then the training is performed with a selectable number of stimuli. Reaction speed and accuracy are measured and evaluated.

Training Material
Over 200 visual stimuli and 6 acoustic stimuli in 3 variations each are included in the training. The therapist has the possibility to add visual and acoustic stimuli (pictures or sounds through the integrated program editor).

Spatial Operations (RAUM)  

The module RAUM trains the spatial perception (one- and two-dimensional) in the following categories: estimation of positions and angles, estimation of relations (filling of vessels) and dimensions.

Indications
For training of basic cognitive functions of spatial perception. Due to non-verbal material, even clients with restrictions in language and understanding words can work with the module. The training is less suitable for clients with highly intellectual impairment or distinct attention disorder.

Training Task and Training Material
When estimating the position, two big fields are indicated on the screen. One field shows a fixed position. The other one shows the same object in a different position. The task is to move the picture in the right field to the same position. When estimating angles, 2 angles are shown in both fields which have to be adjusted to the same size by means of the arrow buttons of the RehaCom panel. When estimating relations, vessels with a given amount of liquid have to be filled or emptied. When estimating size, objects of different size are shown in both fields which must be brought to equal size with the arrow buttons. This task is available in a one- or two-dimensional version. The short-term memory for spatial perception is trained in higher levels of difficulty when the reference object disappears with the first changes to the object.
### Memory for Words (WORT)

This module WORT trains the ability to recognise single words. During the “learning phase”, a certain number of words are shown on the screen. Once the client has memorised these words, they will move to the next stage. A conveyor belt appears with a range of different words moving along it. The client’s task is to recognise all words shown during the “learning phase”.

**Indications**

Impairment of vocabulary and reduced recognition performance, especially for clients with beginning amnestic syndrome. This occurs in persons with diffuse cerebro-organic damage and left hemispheric or bilateral lesion (especially of the limbic lemniscus with damage of the thalamic parts). Also suitable for clients with functionally caused impairments and for children aged 11 and up.

**Training Task**

During the “learning phase”, the client has to memorise a list of words (from 1 up to 10 words). With an increasing level of difficulty, the number of words in the list as well as the difficulty of the words to be memorised grows. The words presented during the “learning phase” must then be selected from a number of different (irrelevant) words.

**Training Material**

The words appear big and clearly visible on the screen. The movement of the words across the screen happens continually and fluently. The speed of the words “rolling by” can be adapted.

### 2-Dimensional Operations (VR01)

The procedure “Two-dimensional operations” trains the positioned relationship with two-dimensional presentation. The task is to find the picture of a matrix which exactly corresponds to a “comparison picture”. The corresponding picture is twisted towards the “comparison picture”.

**Indications**

Loss of performance in visual-constructive tasks, items of the position-in-space-exploration as well as in spatial orientation in clients with damages of the frontal lobe and with right hemispheric temporal and parietal damage. The training is indicated for clients with lesions in this area, with diffuse brain damage or low intellectual abilities. The training is less suitable for clients with severe intellectual impairment or distinct attention deficit disorder.

**Training Task**

On the screen, several objects are displayed which have to be compared to an object on the edge of the screen. The client has to find the object corresponding to the “comparison picture” in every detail. Regarding the corresponding picture in the matrix, the “comparison picture” in the plane is rotated.

**Training Material**

Geometric figures like triangles, squares, hexagons, etc. are used as objects. In high levels of difficulty, the training material becomes more complex up to concrete objects and maps.
**Verbal Memory (VERB)**

The module VERB aims to improve the short-term memory of verbal information. For this purpose, short stories are displayed on the screen. The client has to memorise all details told in the story. Afterwards, they must reproduce them when asked by the programme.

**Indications**

Disorders or impairments of the short-term or medium-term verbal memory. They might occur in almost all diffuse brain damage (dementia, alcohol abuse, etc.) as well as in bilateral or left-hemispheric lesions of different aetiology. The training can also be used to improve memory performance in children aged 11 and up.

**Training Task**

A short story is shown on the screen. The client should memorise as many details of the story as possible (names, numbers, events, objects). The learning phase can be completed by pressing the OK button. After that, the client must answer questions about the content of the story.

**Training Material**

More than 80 short stories are available. Depending on the setting, either the computer or the therapist selects a story for the client. An extension of the pool of stories is possible by using an integrated editor.

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**Divided Attention 2 (GEA2)**

In the module GEA2, the client has to pay attention to several external stimuli whilst driving a car. They have to observe the landscape passing in front of them as well as the car dashboard attentively and have to react to acoustic information in a differentiated way.

**Indications**

Disturbances in focusing on certain aspects of a task, such as reacting quickly to relevant stimuli while ignoring irrelevant stimuli. This occurs in 80% of all patients after stroke, TBI, diffuse organic brain impairment (e.g. as a result of chronic alcohol abuse or intoxication) as well as in other diseases of the central nervous system. Also suitable for children aged 10 and up without significant developmental deficits.

**Training Task and Training Material**

On the screen, the view through the windscreen of a car as well as at the car’s dashboard is simulated. On the left, the speedometer is shown. Within the speedometer there is a green area marking the speed the client should drive. Below the green area you can see a red arrow indicating the current speed of the car. The red arrow always has to be within the green area of the speedometer. For accelerating the car, you have to push the arrow key up, for slowing down push the arrow key down. There is a display for the way to go and for the expired time. The aim is to drive a certain distance within a limited time. The client has to pay attention that the display of the distance is always in front of the time display. As soon as the car starts to move by pressing the arrow keys on the RehaCom panel, irrelevant as well as relevant objects start to move perspective towards the user. Additionally to visual objects also acoustic stimuli are presented.
Spatial Operations 3D (RO3D)

The module RO3D is used for training spatial awareness and attention. For this purpose, several three-dimensional objects are shown on the screen which must be compared to a reference object. All objects on the screen can be rotated freely, thus a three-dimensional view is possible. As an option, stereo glasses for a real 3D presentation can be used.

Indications
For treatment of cognitive disorders, especially of spatial perception functions. In addition, the module can also be used to continue attention training on a high level. By using non-verbal material, the client can work with the module even with restrictions in language and understanding words. The training is less suitable for clients with severe intellectual impairment or distinct attention deficit disorder. Suitable for persons aged 10 and up.

Training Task and Training Material
In the upper half of the screen, a three-dimensional object is shown. In the lower half, three to six objects are shown which are more or less similar to each other depending on the level of difficulty. The client has to find the object below which matches exactly the object in the upper half of the screen. All objects on the screen can be rotated in three dimensions and thus can be viewed from all sides. As training material, a total of 432 3D bodies in 67 groups are available.

Plan a HoliDay (PLAN)

The module PLAN is closely related to everyday life. The client has to implement daily plans of different scope. The aim is to improve executive functions respectively to establish strategies for planning. “Plan a HoliDay” makes demands on basic and – especially in higher levels of difficulty – more complex cognitive skills.

Indications
Disorders of cognitive functions, especially of planning skills. The ability to plan and to organise everyday life is one of the most complex human skills. It can be affected by any brain damage, especially by damages of frontal structures or diffuse cerebral damages. The module Plan a HoliDay can also be used for training memory skills. However, it is not recommended in very heavy amnestic disorders. The presence of a therapist is strongly recommended for seriously impaired clients.

Training Task
The training task is to prioritise a list of tasks in optimal order. For this purpose, a plan is shown on the screen with different buildings and roads from bird’s-eye view. The client has to visit one building after another according to their time schedule and enter them in their diary. There are three different request types:
- Note priority
- Minimise travelling time
- Maximise the number of completed tasks.

Training Material
For making the training more variable and interesting, Plan a HoliDay provides an almost endless number of different tasks, since new combinations of tasks can be generated randomly.
The module EINK is a realistic training in which the client has to solve tasks on the computer like shopping in a supermarket. The aim of the training is to improve the systematic action and the easy development of concepts in concrete and clear situations. This is associated with an improvement of different memory functions as well as selective attention.

Indications
Deficits in working memory and difficulties in concept development and action planning as a result of TBI, stroke, cerebral tumour surgery or cerebral haemorrhage. The module can also be used for maintaining the mental performance of elderly people as well as for children aged 11 and up. Not suitable for clients with attention deficits.

Training Task
The client gets a shopping list of all articles that they have to look for in a supermarket and put into a trolley. When all articles are in the trolley, the client can leave the supermarket by using the “cash” button. Beyond a certain level of difficulty, additional demands are made on the client’s mathematical abilities. For shopping, a certain amount of money is specified, the products are marked with prices, and the client has to find out whether they have enough money for shopping.

Training Material
The training module currently uses more than 100 articles illustrated photo-realistically (food, household objects, etc.). These articles appear on shelves from which the client must choose them. The training programme disposes of a voice output, which means all articles are named when selected.

Both modules are used for treating non-aphasic reading disorders (e.g. in the case of homonymous hemianopsia near the fovea) and disorders in overview and visual search in clients with homonymous hemianopsia, visual neglect or Balint’s syndrome. Prof. Zihl, Professor of Neuropsychology at the University of Munich, developed and clinically tested the modules.

Indications
Disorders of the visual exploration and the saccadic eye movement. These occur as a result of cerebral infarcts in the area of distribution of the middle or posterior cerebral artery or of neglects. The training is less suitable for clients with severe visual deficiencies (visual acuity < 20%) or with alexia. Serious memory disorders as well as attention disorders will affect the success of training in a negative way. Suitable for children aged 8.

Training Task
Reading: Words or numbers of different length appear on the screen which the client has to read aloud. By limiting the display time, the client is assisted to understand words or numbers as a whole. Visual search: On the screen, combinations of stimuli are shown with a defined stimulus serving as target stimulus, the other stimuli as distracting stimuli. The client must search the screen quickly and carefully and indicate absence or presence of the target stimulus.

Training Material
Words of different length (3-16 letters), short sentences (2-4 words), and numbers (3-6 digits) serve as objects for reading training whose length and display time can be adjusted individually. For visual search, letters and shapes of different colour are used.
Vigilance (VIGI)

The module VIGI is made for developing vigilance and sustained attention. The ability to maintain attention over a longer period of time is improved. The task of the client is to observe the conveyor belt to select those objects differing from the sample objects in one or several details.

Indications
Disorders or impairments of long-term (continuous) attention of different aetiology and genesis. The training module is especially useful in disorders affecting the fields of tonic attention. Improvements in cognitive performances as well as some transfer effects can be expected in patients with vascular brain damage, TBI, and dementia.

Training Task
On a conveyor belt, objects pass by which the client has to compare constantly with one or more permanently visible reference objects. The client has to identify all objects which are not identical to the objects shown on the conveyor belt. He must remove all incorrect objects from the conveyor belt within a given area.

Training Material
Depending on parameter settings, concrete or abstract objects are presented. For concrete objects, 5 graphic pools with everyday objects can be used. For abstract objects, 3 graphic pools with symbols and geometric figures are available. 3 modifications (easy, medium, and difficult) are possible for each object. Altogether, 88 objects with 4 pictures each can be used.

Physiognomic Memory (GESI)

The module GESI is important for training the recognition of faces. The assignment of faces to names and professions are also practised in everyday life. Faces are shown from different sides. The client has to decide whether he has already seen the picture of this person before. In higher levels of difficulty, he has to memorise additional verbal information about the person (name and profession).

Indications
Suitable for clients with visual prosapognosia where the ability to recognise faces and to connect meaningful associations to them is impaired or lost. The problem can also be related to memory components that are responsible for remembering faces. Visual prosapognosia is caused by lesions of the temporal lobe (often right hemispheric). The training is therefore indicated for all clients with right-sided or bilateral lesion of the temporal lobe of different aetiology in which the mentioned impairments are observed.

Training Task
During “learning phase”, the client has to memorise a specific number of faces. Then they must pick these faces out of a “line-up” of different faces. In higher levels of difficulty, a name and a profession are also shown. The client has the task now to find out the face associated with the name or the profession.

Training Material
A total of 47 persons have been photographed from four different directions. The pictures reach photo quality. It is possible to add additional photos from the client’s environment via an integrated editor.
The module AKRE trains reaction speed and reaction precision to acoustic stimuli. The sounds are familiar to the client from their everyday life.

Indications
Impairments in reaction speed and reaction precision to acoustic stimuli as well as acoustic discrimination disorders. The training makes high demands on mental flexibility and focused attention. If the client is sensitive to interferences, an excessive demand situation must be avoided. Suitable for persons aged 8 and up.

Training Task
During preparation phase, the client learns to assign the sounds (e.g. books, cutlery, television, camera, etc.) or geometric figures. When the cards are shown face down, the client has to remember the correct position of each card.

Training Material
Currently, about 60 sounds with corresponding background noises are available. Pictures shown on the screen as well as acoustic stimuli create realistic situations (e.g. at home, at the beach, on a farm, etc.).

The module AKRE trains reaction speed and reaction precision to acoustic stimuli. The sounds are familiar to the client from their everyday life.

Indications
Impairments in reaction speed and reaction precision to acoustic stimuli as well as acoustic discrimination disorders. The training makes high demands on mental flexibility and focused attention. If the client is sensitive to interferences, an excessive demand situation must be avoided. Suitable for persons aged 8 and up.

Training Task
During preparation phase, the client learns to assign the sounds (e.g. a ringing telephone, a barking dog, etc.) to the buttons on the RehaCom panel. The training starts after a practice phase. The client hears different sounds and has to press the corresponding buttons on the RehaCom panel as fast as possible.

Training Material
Altogether, 464 pictures of concrete objects, geometric figures, and letters are available. The number of simultaneously displayed cards varies from 3 to a maximum of 16.
The module CALC supports clients to improve their arithmetic skills which are needed in many areas of daily life. Depending on the type of disorder, basic or more complex tasks are trained. Handling money as well as written addition and subtraction are included for the training of complex mathematical problems.

Indications
Impairments of arithmetic cognitive skills. Disorders of cognitive functions can be diverse. They range from reduced basal disorders when estimating sizes and quantities to problems in applying basic arithmetic operations and difficulties in solving complex mathematical problems.

Training Task
The training has a high diversity of tasks. The client starts with simple comparisons of size or quantity and with sorting tasks. After that, basic arithmetic operations adding and subtracting are trained, both mentally and in writing. In higher levels of difficulty, the client is instructed in very realistic situations to handle money. He has to offer the exact amount of money, give change or check their own change. Finally, multiplication and division tasks are available.

Training Material
Size and quantity tasks are trained using pictures of simple objects until the client passes on to calculations with numbers. Written addition and subtraction is shown in small numbers in the carry over. For money handling pictures of realistic banknotes and coins are used.

The module KONS is used for training the visual reconstruction of concrete pictures. The client has to memorise as much detail as possible in a given picture. The picture is then divided into several pieces like in a puzzle. Next, the picture has to be reconstructed correctly.

Indications
According to relevant specialist literature, constructive apraxia is mainly caused by parietal lesions. For managing the tasks in this training module, however, not only constructive abilities are needed but also attention and memory performances. Therefore, these cognitive functions are also demanded and trained. The training is indicated for clients with light or medium performance loss in the visuo-constructive field or with generalised functional disorders. This performance decrease is often found in diffuse organic brain damage caused by intoxications, alcohol abuse, etc. Suitable for persons aged 8 and up. The training is particularly suitable for clients with serious apraxia, amnesia, and concentration disturbances.

Training Material
For this module, photographs and drawings are used, e.g. houses, faces, everyday objects or paintings. The pictures appear on the screen in very high resolution.
The module WISO is important for the rehabilitation of patients with disorders in visuo-motor coordination. A cursor and a rotor are displayed on the screen in different forms and colours. The client has to move the cursor to the middle of the rotor with the joystick and follow the movements of the rotor.

Indications
Damages of the motor cortex (frontal lobe) causing deficits in the control of fine motor skills. They can be observed most clearly in coordination disorders of hand and finger movements. In many cerebro-organic diseases and damages, e.g. cerebral insults, haemorrhage, spacious tumours, craniocerebral trauma, etc., visuo-motor functions are also affected. The training is indicated for all disorders of fine motor skills. Suitable for persons aged 11 and up.

Training Task
On the screen, a circular disc (rotor type abstract) and a dot are shown differing strongly from each other due to different colours. The client has to move the dot into the circular disk by means of the joystick or mouse. Then the disk starts moving along an unpredictable track. The client tries to follow the movement with the joystick (represented by the dot). In “rotor type concrete”, e.g. a flower is used instead of the circular disk and a beetle or a bee replaces the dot.

Training Material
For operating the training, a huge circular disk describing a given movement, and a dot that can be moved with the joystick, is used. In order to make the training more variable and interesting especially for children, 25 pairs of pictures are used as rotor / cursor in the “concrete” mode.
Effectiveness Studies

RehaCom has evolved since it was first launched 25 years ago. It was developed by therapists and is meant to be used by therapists. RehaCom’s origins date back to 1986 when Professor Hans Regel (Neuropsychologist) first started doing research in the field of attention. Since then, numerous studies and results of research covering diverse areas have proven the effectiveness of RehaCom.

ADHD, Germany

Evaluation of a computer-based neuropsychological training in children with Attention-Deficit Hyperactivity Disorder (ADHD)

Frauke Amonn, Jan Fröhlich, Dieter Breuer, Tobias Banaschewski and Manfred Doepfner in NeuroRehabilitation 32 (2013) 555–562 DOI:10.3233/NRE-130877

BACKGROUND: We report the effects of a computer-based neuropsychological training in children with Attention-Deficit Hyperactivity Disorder (ADHD). We hypothesized that a specific training focusing on attentional dysfunction would result in an improvement of inattention, observable in test performance, behavior and performance during experimental school lessons and in parent and teacher ratings of the related core symptom.

METHOD: We chose a within-subject-control-design with a 4 week baseline period and subsequent 12 to 15 weekly training sessions. 30 children (6 to 13 years old) with a diagnosis of ADHD (ICD 10: F 90.0) and no other comorbidities participated in the study.

RESULTS: The training revealed significant improvement in training parameters of the neuropsychological training and in the symptoms of inattention and deportment as rated during experimental school lessons. However, generalization of training effects as measured by parent and teacher ratings was not detected.

CONCLUSIONS: We conclude that neuropsychological training could be helpful as one adjunct module in the complex treatment of ADHD but to prove clinical value, similar training programs must focus more strongly on individually existing neuropsychological deficits. Training programs should be more intensive and should eventually be combined with home based training access.

Stroke/ Visual field, Germany

A Randomized Controlled Trial Comparing 2 Interventions for Visual Field Loss With Standard Occupational Therapy During Inpatient Stroke Rehabilitation

Claudia Mödden, Marion Behrens, Iris Damke, Norbert Eilers, Andreas Kastrup and Helmut Hildebrandt in Neurorehabil and Neural Repair, DOI: 10.1177 /1545968311425927, published on 2 December 2011

BACKGROUND AND PURPOSE: Compensatory and restorative treatments have been developed to improve visual field defects after stroke. However, no controlled trials have compared these interventions with standard occupational therapy (OT).

METHODS: A total of 45 stroke participants with visual field defect admitted for inpatient rehabilitation were randomized to restorative computerized training (RT) using computer-based stimulation of border areas of their visual field defects or to a computer-based compensatory therapy (CT) teaching a visual search strategy. OT, in which different compensation strategies were used to train for activities of daily living, served as standard treatment for the active control group. Each treatment group received 15 single sessions of 30 minutes distributed over 3 weeks. The primary outcome measures were visual field expansion for RT, visual search performance for CT, and reading performance for both treatments. Visual conjunction search, alertness, and the Barthel Index were secondary outcomes.

RESULTS: Compared with OT, CT resulted in a better visual search performance, and RT did not result in a larger expansion of the visual field. Intragroup pre–post comparisons demonstrated that CT improved all defined outcome parameters and RT several, whereas OT only improved one.

CONCLUSIONS: CT improved functional deficits after visual field loss compared with standard OT and may be the intervention of choice during inpatient rehabilitation. A larger trial that includes lesion location in the analysis is recommended.
Multiple sclerosis, Italy

Efficacy and specificity of intensive cognitive rehabilitation of attention and executive functions in multiple sclerosis

Mattioli Flavia, Chiara Stampatori, Deborah Zanotti, Giovanni Parrinello and Ruggero Capra in Journal of the Neurological Sciences 288 (2010) 101-105

OBJECTIVE: To evaluate the efficacy of a computer-based intensive training program of attention, information processing and executive functions in patients with clinically-stable relapsing-remitting (RR) multiple sclerosis (MS) and low levels of disability.

DESIGN, PATIENTS AND INTERVENTIONS: A total of 150 patients with RR MS and an Expanded Disability Status Scale (EDSS) score of ≤4 were examined. Information processing, working memory and attention were assessed by the Paced Auditory Serial Addition Test (PASAT) and executive functions by the Wisconsin Card Sorting Test (WCST). Twenty patients who scored below certain cut-off measures in both tests were included in this double-blind controlled study. Patients were casually assigned to a study group (SG) or a control group (CG) and underwent neuropsychological evaluation at baseline and after 3 months. Patients in the SG received intensive computer-assisted cognitive rehabilitation of attention, information processing and executive functions for 3 months; the CG did not receive any rehabilitation.

SETTING: Ambulatory patients were sent by the MS referral center. Outcome measures: Improvement in neuropsychological test and scale scores.

RESULTS: After rehabilitation, only the SG significantly improved in tests of attention, information processing and executive functions (PASAT 3 p=0.023, PASAT 2 p=0.004, WCST t p=0.037), as well as in depression scores (MADRS p=0.01). Neuropsychological improvement was unrelated to depression improvement in regression analysis.

CONCLUSIONS: Intensive neuropsychological rehabilitation of attention, information processing and executive functions is effective in patients with RR MS and low levels of disability, and also leads to improvement in depression.

Aquired/ traumatic brain injury, Cuba

Clinical Impact of RehaCom Software for Cognitive Rehabilitation of Patients with Acquired Brain Injury

Elízabeth Fernández, María Luisa Bringas, Sonia Salazar, Daymí Rodríguez, María Eugenia García and Maydané Torres in MEDICC Review, October 2012, Vol 14, No 4

We describe the clinical impact of the RehaCom computerized cognitive training program instituted in the International Neurological Restoration Center for rehabilitation of brain injury patients. Fifty patients admitted from 2008 through 2010 were trained over 60 sessions. Attention and memory functions were assessed with a pre- and post-treatment design, using the Mini-Mental State Examination, Wechsler Memory Scale and Trail Making Test (Parts A and B). Negative effects were assessed, including mental fatigue, headache and eye irritation. The program’s clinical usefulness was confirmed, with 100% of patients showing improved performance in trained functions.
Stroke, Korea

Effect of computer-based cognitive rehabilitation (CBCR) for people with stroke: A systematic review and meta-analysis

Yu-Jin Cha and Hee Kim in NeuroRehabilitation 32 (2013) 359–368 DOI:10.3233/NRE-130856

OBJECTIVE: We conducted a systematic review and meta-analysis to identify the effect of computer-based cognitive rehabilitation (CBCR) on improving cognitive functions in patients with stroke.

METHODS: Researchers performed a literature search using computerized databases such as the Cochrane Database, EBSCO (CINAHL), PsycINFO, PubMed and Web of Science. The following keywords were used: stroke, computer-based, cognitive rehabilitation, and others. The methodological quality was evaluated. Statistical heterogeneity and standardized mean difference were used to compute the overall effect size and that of subgroups. Also publication bias of the selected studies was analysed.

RESULTS: Twelve studies met the inclusion criteria including a total of 461 stroke survivors. Among studies, six RCT studies were rated as high methodological quality. Overall effect size was medium 0.54, and the 95% confidence interval was 0.33–0.74. The effect sizes of acute and chronic phase of stroke were both 0.54. They can be interpreted as medium effect size and were statistically significant. The statistical heterogeneity and publication bias were not significant.

CONCLUSION: The present study provides evidence that CBCR is effective on improving cognitive function after stroke. We recommend conducting meta-analysis on subgroups of CBCR programs in further studies.
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