

HASOMED RehaCom[®]

Cognitive therapy



Physiognomic Memory



Cognitive therapy

by HASOMED GmbH

This manual contains information about using the RehaCom therapy system.

Our therapy system RehaCom delivers tested methodologies and procedures to train brain performance. RehaCom helps patients after stroke or brain trauma with the improvement on such important abilities like memory, attention, concentration, planning, etc.

Since 1986 we develop the therapy system progressive. It is our aim to give you a tool which supports your work by technical competence and simple handling, to support you at clinic and practice.

User assistance information:

Please find help on RehaCom website of your country. In case of any questions contact us via e-mail or phone (see contact information below).

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Dear user,
please read the entire instruction manual before trying to operate RehaCom.
It's unsafe to start using RehaCom without reading this manual.
This manual includes lots of advice, supporting information and hints in order to reach
the best therapy results for the patients.

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1 Training description

1.1 Training task

The training with the module **Physiognomic Memory** is a very realistic form of training.

In the **acquisition phase**, the patient is shown several faces of different individuals on the screen (Fig. 1). The word *Memorize* appears in the upper right-hand corner of the training screen. At higher [levels of difficulty](#), the face must also be associated with a name, a profession and a telephone number.

The patient's task is to memorize faces and any associated information: names, professions, and telephone numbers. For example, in Fig. 1, the patient should memorize the face with the name and the profession. Using the left and right arrow keys, the patient can skim through the selection. When all the information presented have been memorized, the patient can end the acquisition phase by pressing the OK button.

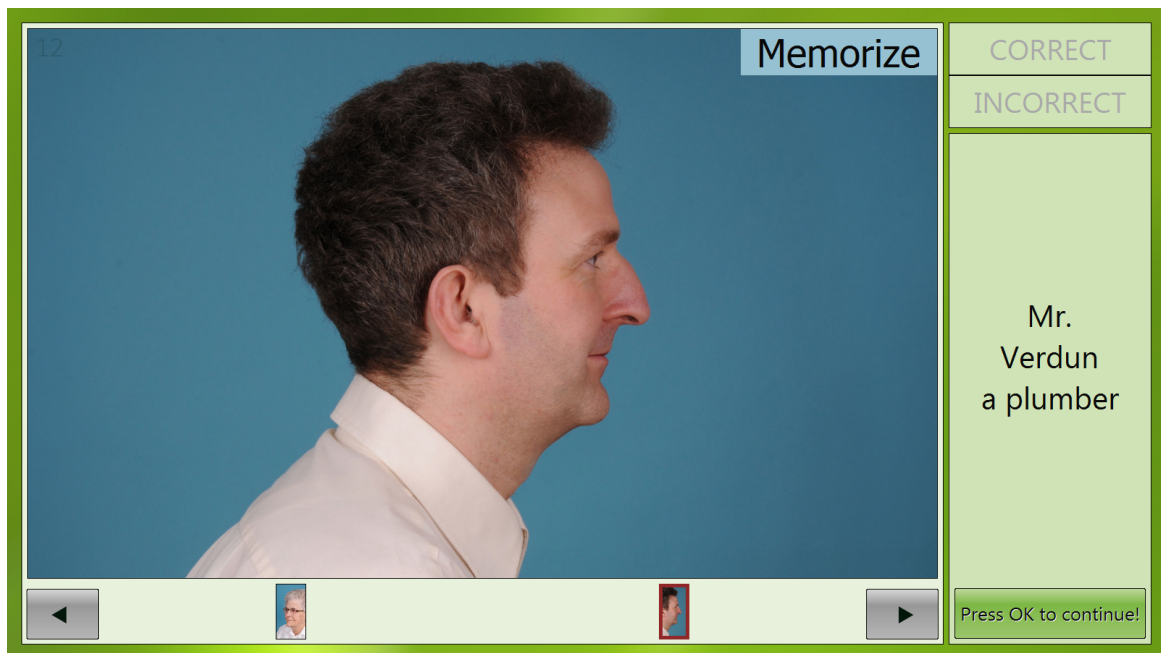


Fig. 1: Acquisition phase at level 12

There then follows the **recognition phase**. The word *Recognize* appears in the upper right-hand corner of the training screen. A row of thumbnail pictures appears below the training window.

For levels 1–6, only the faces have to be selected from a large range of pictures. Here, the patient's memory for faces only is developed. The patient uses the arrow keys to move the selection frame between thumbnails in the row of pictures. When a picture is selected that the patient thinks is the face of the same person from the acquisition phase, then he or she presses the OK button. The decision is then

evaluated as "correct" or "incorrect."

Beginning at level 7, additional information is assigned to the shown person during the acquisition phase (see Tab. 1 in Levels of difficulty for what information and at what levels). Then the recognition phase prompts the patient in one of two ways based on the parameter settings:

- by means of question *"Who is ... ?"* and/or
- by means of *"Multiple Choice"*.



Fig. 2: Reproduction mode "Who is ...?"

In the recognition phase **"Who is ... ?"** (see Fig. 2), the following types of questions are used to find the required individual:

- "Who is Mr. Verdun?"
- "Who is a Plumber?"
- "Whose number is this?"

The patient then moves through the selection of pictures until the correct picture has been found. The selection is confirmed by pressing the OK button.

In the mode "Multiple choice" (Fig. 3), several names, professions, and/or telephone numbers appear in the right-hand column. The patient selects the best answer for each face that's presented. **For the faces that were not presented during the acquisition phase, the patient should select "unknown."** The word **"unknown"** is always seen in the first position of the list. The patient's selection is confirmed by pressing the OK button. Every picture must have a response before the level can be completed.



Fig. 3: Reproduction mode showing "Multiple Choice"

When the recognition phase is complete, the patient is then informed as to whether a change of level is recommended. When the number of [recognition tasks](#) increases (i.e., by adding name, job, or telephone number), additional directions are given.

As an alternative to the RehaCom keyboard, the module **Physiognomic Memory** can also be used with a mouse, a touch screen device, or the computer keyboard.

1.2 Performance feedback

When a correct decision is made, a green **correct** field lights up for one second. If an incorrect decision is made, a red **incorrect** field is shown, and if the [acoustic feedback](#) is enabled, a typical error sound can be heard.

On the training screen, the level of difficulty is displayed in the top left-hand corner.

1.3 Levels of difficulty

The variation in the units of information per level is set up to ensure an adaptive level of difficulty. Tab. 1 shows the levels of difficulty with the 4 different types of recognition.

- Recognition of faces.
- Recognition of faces with names.
- Recognition of faces with names and jobs.

- Recognition of faces with names, jobs, and telephone numbers.

Level	Number of faces to memorize	Number of decisions	Types of recognition
1	1	1	face
2	2	2	face
3	3	3	face
4	4	4	face
5	5	5	face
6	6	6	face
7	2	2	face, name
8	3	3	face, name
9	4	4	face, name
10	5	5	face, name
11	6	6	face, name
12	2	4	face, name, job
13	3	6	face, name, job
14	4	8	face, name, job
15	5	10	face, name, job
16	6	12	face, name, job
17	2	6	face, name, job, phone number
18	3	9	face, name, job, phone number
19	4	12	face, name, job, phone number
20	5	15	face, name, job, phone number
21	6	18	face, name, job, phone number

Tab. 1: Structure of the level of difficulty

The data in the column "Number of decisions" is used for [performance evaluation](#). The number of decisions is doubled if the parameter [reproduction mode](#) is set to "both."

A collection of approximately 50 male and female portraits, of all ages, has been produced for this module. Every person has been photographed from 4 different angles

- Looking right at about 45°,
- Looking at the camera (0°),
- Looking left at about 30° and
- Looking left at about 60°.

The patient must memorize the qualities of the face only and cannot base their physiognomic memory skills on irrelevant information like the color of a tie or a specific garment. The influence of head position on recognition is eliminated by using 4 different angles for each person. The specifics of the respective face must be recognized. The abstraction capability is stipulated (i.e., identical pictures

between acquisition and recognition phases can be used by selecting this feature in the parameter menu).

The assignment of a person to a name, a profession, or a telephone number is always identical. In this way, in the process of the training, the long-term effects can be set up which allow early recognition of individuals. To avoid interference during the training session, faces that have already been recognized are no longer used in the recognition phase as long as other pictures are available.

If required, new pictures can be used for the Physiognomic Memory module (e.g., people in the rehab center, people connected with the patient). The editor tool, which is accessible from the Parameter settings, is included to allow you to integrate these pictures.

1.4 Training parameters

Specific settings for the training module can be adjusted (see Fig. 4). This section describes each setting and explains how to adjust them.



Fig. 4: Parameter menu

Duration of session:

A training duration of 25–30 minutes is recommended.

Level up:

After each exercise, a percentage value is calculated from the number of correct decisions in relation to the number of possible decisions (see Tab. 1). If the percentage correct exceeds the percentage in the level up parameter, then the patient continues to the next level of difficulty. For patients with a weaker performance level, it may help if this level up percentage is reduced before training begins. Doing so can increase motivation for such patients. However, if the patient's performance improves, the default setting for the level up percentage should be restored.

Level down:

If the patient percentage correct is less than the percentage in the level down parameter, then the patient continues at the next lower level for further training.

Again, it may be helpful to reduce this percentage for weaker patients at the beginning of the training so that the patient would only have to go back a level when a greater number of errors is made.

Repetition:

When a particular level of difficulty is repeated (where the patient's percentage correct is between the values for "level up" and "level down"), the repetition parameter establishes in how many consecutive tasks the identical faces are shown. In this way, the possibility exists for patients with a weaker performance level to work repeatedly with the same faces and to memorize the specifics of these faces. New faces appear according to the adjusted number of repetitions as well as after a change in level. If new faces are to be used in every task, the parameter has to be set to 0.

Reproduction mode:

The reproduction modes "Who is...?" and "Multiple choice" have already been described (see [Training tasks](#)). There is also the mode "both," which starts with the mode "Multiple choice" and then "Who is..?" follows. The mode "both" puts a higher demand on the patient's memory and should be used with patients who have a high performance level.

Input mode:

An alternative mode of input to the RehaCom keyboard is the mouse or the touch screen. When using the mouse, one must click on the left and right arrows in order to move through the pictures or click on the OK button to end the acquisition phase. For the recognition phase, the interaction differs by reproduction mode. In the mode "Who is...?," interaction is the same as it is in the acquisition phase. In the "Multiple choice" mode, the patient must click on the desired choice for each picture. When using the touch screen, the patient simply touches his or her choice.

Another input option is the Single key Input: One picture will be selected automatically. After a specific period of time, the frame will move to the next picture. The patient presses the **OK** button on the RehaCom keyboard when the picture is selected to confirm the selection. This alternative is especially recommended for patients with motor problems.

Single key interval:

When using Single key input, the Single key interval sets the amount of time until the next picture will be selected. The amount of time can range from 1,000 milliseconds (ms) to 10,000 ms.

Acoustic feedback:

If the acoustic feedback is enabled, then a typical error sound can be heard every time the patient makes an incorrect decision. If there are a few patients training in the same room, the acoustic feedback can cause interference. In this case, the acoustic feedback should be turned off.

Identical pictures:

If this option is enabled, the pictures that appear in the recognition phase have the same head position (the angle of the face in relation to the screen) as in the acquisition phase (see [Levels of difficulty](#)). The pictures in the acquisition phase and in the recognition phase are identical. Selecting this option makes the task easier, so it can be used with patients who have difficulty with the recognition task. However, after the patient's performance improves, this option should be switched off.

Picture material:

A control file stores all the content used in the training module (a link to each picture and associations to the names, professions, and telephone numbers that a patient is asked to memorize). The control file DEFAULTenu.GES is also used to install, and later to validate, the module. However, it is possible to integrate new pictures into training with corresponding information. When people from the patient's daily environment (personnel of the rehabilitation center, relatives and acquaintances) are used, then a very patient-specific type of training is possible. To edit the pictures or content, click the Edit button; an [Editor](#) window is opened with which one can modify the available control file and/or a new control file can be made.

When setting up the training for a new patient the following defaults are set up automatically:

Current level of difficulty	1
Duration of training	25 Minutes
Level up	80 %
Level down	60 %
Repetition	0
Reproduction mode	"Who is ...?"
Input mode	Buttons
Acoustic feedback	on
Identical pictures	off
Picture material	DEFAULTenu.GES

Tab. 2: Default parameters

1.5 Data analysis

All training sessions are placed in a chart within the Results tab. A training session is selected by double clicking on the bar in the chart. Once selected, the results of the session are presented in the Table and Chart tab.

Explanation of columns in the results table or under More Details on the results page

Level	Current level of difficulty
Total mistakes	Total number of errors

Total mistakes [%]	Total errors in [%] in relation to the decisions
Mistakes picture	Wrong face selected
Mistakes names	Wrong name selected
Mistakes jobs	Wrong job selected
Mistakes phone	Wrong telephone numbers selected
Acqui.-time	Acquisition time in s
Repro-time	Reproduction time in s
Train. time task	Effective Training time in h:mm:ss
Breaks	Number of breaks caused by the patient

Tab. 3: Results

The parameter settings used during the training are displayed directly below the table. The graphical presentation of the results (e.g., percent total mistakes, acquisition time per task) is also displayed on the Table and Chart tab.

1.6 Editor physiognomic memory

A control file contains all the profiles of individuals that the patient will see in the training sessions. Each profile consists of information that links each picture with a name, profession, and telephone number.

The control file can be changed or a new control file created. The customization of the content allows for a very personal type of training to be offered in which individuals with whom the patient is familiar can be used in the training (e.g., relations, friends, people from the rehab center).

For this reason, there are 2 strategies available:

- integrating more people into the current control file (recommended); or
- setting up a new control file.

If a new control file is set up, a minimum number of photos are required in order to maintain an adaptive type of training. Tab. 4 shows that pictures of at least 14 people are required in order to train using levels of difficulty with up to 4 people to select from the series. If there are not enough pictures available, then restrictions occur. If necessary to make 18 profiles (the minimum number of profiles to access all levels), the staff of the rehab center should also be included in a personal control file for an individual patient. These pictures could also be used in control files for other patients. They can then be supplemented with patient specific pictures (e.g., spouse, children, parent, friend).

In order to avoid confusion, names, jobs, and telephone numbers should not be repeated.

Number persons	Number possible levels	Possible levels
10	5	1,2,7,12,17

12	9	1–3,7,8,12,13,17,18
14	13	1–4,7–9,12–14,17–19
16	17	1–5,7–10,12–15,17–20
18	21	1–21

Tab. 4: Minimum requirements for a patient-specific control file.

Before a specific type of training becomes possible, photographs of the people to be integrated must be procured. They should show the face of the person clearly and they should be of good quality. It is also possible to use the entire figure of the person for training.

In the editor window, there are four places to link a picture to a profile. For each person, four different photographs should be obtained. If this is not possible, then pictures will have to be used in the editor more than once.

The photographs must be scanned in the JPG format with a suitable scanner. The scanned picture should have a size of 1,700 x 1,000 pixels. Smaller sizes can cause the picture to become pixelated during training. The JPG files must be stored in the folder for the Physiognomic Memory module located in the RehaCom directory (e.g., \REHACOM\GESI).

After all the pictures have been gathered, the editor for Physiognomic Memory can be started. The contents of the current control file are shown. A new empty control file can be created by selecting New from the File menu, or the current file can be stored under another name by selecting Save As from the File menu. The file DEFAULTenu.GES, which was used to validate the module, cannot be modified. To make modifications to this file, the file must first be saved under another name.

Fig. 5: Profile of relevant person in the Physiognomic Memory editor

The editor lists relevant and irrelevant people under separate tabs.

Relevant people are associated with pictures, names, jobs, and telephone numbers (see Fig. 5). They are used in acquisition. The information for irrelevant people serves as "filling" in the "multiple choice" mode. Identical information may never occur in both lists. For example, if in the "relevant persons" list, the profession roofer is used, then the editor prevents that profession from being used in the "irrelevant persons" list. The same applies to names and phone numbers.

To edit a profile, double click on the entry in the list or select an entry and then click the edit button. To add an entry, click the New button. Editable fields will display in a new window. It is the user's responsibility to select the correct pictures. The generation of patient specific control files for the module Physiognomic Memory may seem more complicated than it really is. The best thing to do is to try it yourself.

If you have questions, please contact our support team. Addresses and phone numbers can be found at rehacom.com or rehacom.us

2 Theoretical concept

2.1 Foundations

Memory is understood to be a process leading to a relatively stable change of the behavior ([Kolb & Whishaw](#), 1985).

Impairments in memory capacities are often found in [patients with brain insults](#) of various origins, which may lead to serious handicaps in their professional and private life. The clinical image of such a disturbance is inconsistent and can selectively afflict particular memory areas concerning duration and character of the learning material. In memory disturbances, a distinction is made between **retrograde** and **anterograde amnesia**. The first refers to the inability to remember a particular period before the disease, whereas the latter refers to the inability to memorize new things (after the lesion of the brain).

The first attempts to study and understand the complex functional system of our memory were carried out at the beginning of the 19th century. In the basic research and clinical reality, a distinction is made between the **short-term memory** and the **long-time memory** ([Atkinson & Shiffrin](#) 1968, [Warrington](#) 1982), the procedural and the declarative ([Cohen & Squire](#), 1980), the semantic and the episodic ([Tulving](#), 1972), the verbal and the non-verbal or figural memory, explicit and implicit ([Graf & Schacter](#), 1985) capacities.

The description of the structure of memory, based on the duration of information storage, results from the outcome of interdisciplinary research:

- sensory memory (retention time of a few hundred milliseconds),
- short-term memory ([Broadbent](#), 1958; [Wickelgreen](#), 1970) and working memory (cf. [Baddeley](#), 1997) with an availability of information for a few seconds up to one minute, and
- long-term memory with a retention time from minutes to hours, weeks, or years.

The capacity of short-term memory, the memory span, is in healthy people 7 ± 2 information units. The model of the working memory assumes that several neural subsystems are involved which store predominantly visual-spatial information and phonological information ([Hömborg](#), 1995). In addition to short-term retention of information, working memory also processes content in parallel. Some indicators for evaluating the functioning of working memory are the recall of numbers backwards, or the recall of visual memory span backwards.

The functions described as long-term memory are often divided into

- explicit memory; which stores semantic knowledge and biographic data (episodic knowledge) and can be recalled and named directly, and
- implicit (procedural) memory; which stores memories about motor sequences or rules which cannot be described directly ([Hömborg](#), 1995).

Theories about the physiological and morphological correlation of memory processes have been postulated by, among others, [Hebb](#) (1949; cf. [Kolb & Whishaw](#), 1985). Models on rules of coding, storing, and recalling of contents or their organization is still very controversial.

An important result of memory research is the current treatment of memory as an integral part of cognitive activity, and as an active process. In this sense, memory functions are not only processes of information acquisition, long-term storage, and recall (in the sense of a passive store). Rather, existing memory contents have an impact on future information processing and undergo a **re-evaluation** for practical behavior ([Hoffmann](#), 1983). Therefore, they also modulate a person's emotional experiences.

The diversity of the memory regions plays an important role in distinguishing memory functions. An evaluation of a patient's cognitive skills is possible only after extensive analysis, which includes the phase of acquisition, short- or long-term retention, and recall or recognition of new and old memory contents (with or without external help). Possible interference effects may impair the storage or recall of information, which should be taken into account in [patients with attention disturbances](#).

Four methods in the rehabilitation of [memory disorders](#) are distinguished ([von Cramon](#), 1988):

- repeated presentation of learning material,
- learning memory strategies,
- using external aids, and
- teaching specific knowledge about memory and possible disturbances ([Glisky & Schacter](#), 1989).

When a patient's visual perception capacities are disturbed, restoring those capacities seems possible through direct stimulation. In contrast, restoring impaired memory functions is acknowledged to be hardly possible ([Sturm](#), 1989). That means neuropsychological training of memory capacities should concentrate on substitution and compensation strategies.

The sections [Training aim](#) and [Target groups](#) provides further information.

2.2 Training aim

The objective of the **Physiognomic Memory** module is to systematically practice the [functions of memory](#), specifically the storing and recognition of faces and the pairing of information with these faces.

The module **Physiognomic Memory** offers the therapist ways to help the patients

develop effective memory strategies and practice them to overcome deficits in memory processes.

While memorizing faces or names, as well as the formation of *face-name connections*, the following "internal" strategies proved to be beneficial: ([Schuri, 1988](#)):

Recognizing the face:

- Affective evaluation and judgment through spontaneously associated personality features
- Arrangement according to types and arrangement with known faces
- Description and searching for characteristic features

Recognizing the name:

- Affective evaluation
- Association with known persons with same or similar name
- Association with a meaning within the name
- Recognition of patterns using the first letters as well as shaping and sound features of names

Connecting faces and names:

- Affective evaluation of the face-name combinations (Does the name fit the person?)
- Verbal connection of relevant features between faces and names
- Connection of relevant features with the aid of visual ideas

Spontaneous individual strategies found by the patient should be discussed and developed into effective strategies. Please note that processes that function automatically in healthy people will require a conscious effort for patients who suffer from amnesia. These additional strategies may then represent additional demands on the patients.

Complementary training modules to the module **Physiognomic memory** (GESI) are: **Verbal Memory** (VERB), **Figural Memory** (BILD) and **Topological Memory** (MEMO). The module **Shopping** (EINK) requires additional action planning skills.

2.3 Target groups

Patients with brain injuries often have difficulty learning new information and storing or recalling information from [long-term memory](#).

In addition to being prone to distraction and attention deficits, the patients who have a brain injury often have problems keeping track of things if confronted with a lot of information. They have difficulty ordering information and encoding it for long-term storage. Deficits in [working memory](#) and attention disturbances prevent the

information from transferring to long-term storage.

Such memory [disturbances](#) can occur after numerous different types of injuries to the brain (e.g., primary and secondary degenerative diseases of the brain, hypoxia, infections) in vascular cerebral injuries (e.g., infarcts, hemorrhages), skull-traumas and tumors with lesions on one or both sides. Neurosurgical operations also can often lead to memory disorders. Damage to the medial temporal or thalamic regions, mammillary bodies, frontal cerebral structures, parahippocampal gyrus, or hippocampus often lead to memory disturbances.

During infarcts, the areas of the anterior cerebral artery and posterior cerebral artery as well as the polar thalamus artery are above all of great importance concerning memory disorders.

In relation to [prosopagnosia](#), it has been proven that injuries to the right-hand side of the brain are critical ([Morris, Abrahams, & Polkey, 1995](#)).

Memory disturbances are often accompanied by different disorders in brain performance, such as attention and linguistic problems, which have a strong impact on memory performance. Also problems in the patient's ability to plan actions, skills in problem solving, or lack of understanding about the illness can reduce the effectiveness of therapeutic memory strategies because the use of therapeutic strategies outside the clinical setting is often inconsistent.

The training module was specifically developed for patients who suffer from disturbances to memory for faces who have trouble with face-name associations.

The ability to associate faces with pictures is in most cases not as problematic as the ability to associate the person with names, professions and telephone numbers. The latter ability is often seriously affected if the patient's memory for verbal memory is also lacking. For patients who suffer from amnesia, names and therefore name-face association are very difficult to remember because, at first, many names represent insignificant words and accordingly no connection to a semantic concept occurs.

The short-term and long-term storing of names and faces is highly relevant in social situations and for participating in conversations; it is highly relevant in dealing with information on a day-to-day basis. One of the possible results of such a disturbance in memory is that patients are often insecure in the presence of other people and also experience other social fears.

Alongside the use for [neuropsychological rehabilitation](#), the module can also be used for additional training of a cognitive nature (i.e. cognitive training of school-age children and in the field of geriatrics).

This type of training can also be used to assist in improving in the performance of memory for verbal contents with children 11 years and older. It is advisable that a

therapist be available at all times. The module uses child-friendly instructions for patients up to the age of 14 and the instructions and words are on the vocabulary level of an average 10-year-old.

Patients who suffer from strong attention problems should first train with the RehaCom module Attention & Concentration.

2.4 Bibliography

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