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Neuroforma is an innovative platform for motor, cognitive and balance control exercises. It consists of a large display, a computerized system for data analysis and an optical system for movement analysis in 3D technology. The device is sturdy and easy-to-use. In addition, its space-saving design makes it suitable for use in less spacious facilities as well as easy to move around.

How it works:

While using **Neuroforma**, the patient stands or is seated in front of the screen, which shows their real, mirror reflection. Around that reflection, virtual objects appear. The patient's task is to move their body in such a way that the reflection displayed on the screen catches, hits or moves the appearing objects.



Virtual reality technology enables the patient to receive constant, immediate biofeedback. After each exercise, the patient can consult simple statistics, which are also available in a form of long-term reports presenting their progress for every task separately.



Application:

- Neurological rehabilitation
- Neuropsychological rehabilitation
- Physiotherapy
- Geriatrics
- Posttraumatic rehabilitation
- Orthopaedic rehabilitation
- Support in development of children with disabilities
- Health prophylaxis

Crucial motor functions to be improved:

- Hand-eye coordination
- Synchronization of movements
- Contralateral movement coordination
- Joint mobility
- Strength and muscle endurance
- Speed of response
- Movement control
- Load distribution
- Balance control

Crucial cognitive functions to be improved:

- Concentration on task
- Divided attention
- Inhibitory control
- Memory
- Using knowledge in possession
- Visual perception
- Counting
- Reading
- Decision making
- Problem solving



Exercising with Neuroforma:

Attractive virtual environment

Patients perform tasks in an attractive virtual environment that reinforces their involvement and motivation and improves their attitude towards exercising and satisfaction with rehabilitation services. The above-mentioned factors also boost effectiveness of the therapy.

Unique motor-cognitive tasks

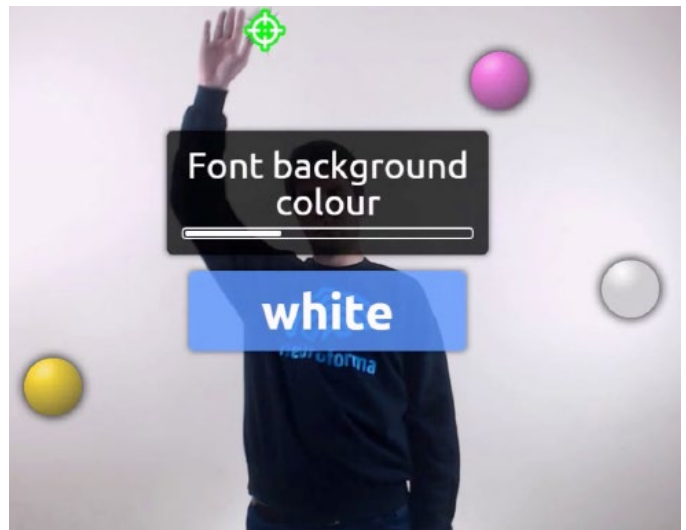
The Neuroforma system is based on a collection of interactive exercises. Combining motor and cognitive tasks in a so-called dual-task paradigm is what makes the system unique. The patient controls the objects displayed on the screen by moving their own body, which serves to improve their physical abilities. At the same time, the patient also needs to complete cognitive tasks on various levels of complexity. The inclusion of cognitive elements in motor exercises benefits all patients and is particularly important in neurological rehabilitation. Effectiveness of Neuroforma exercises has been demonstrated by many studies (e.g. Stryła & Banaś, 2015).

Innovative mirror therapy module

The mirror therapy module is a set of specialised exercises targeted primarily at patients recovering from strokes. In the Neuroforma system, a traditional mirror has been replaced by a camera and a display screen. Advanced analysis and image transformation enable patients suffering from hemiparesis to see a reflection of their non-functional limb moving symmetrically and exactly the same way as the unaffected one. Effectiveness of mirror therapy with Neuroforma has been proved scientifically (e.g. Opara et al., 2016).

Balance control training

The module for balance control training with a force platform serves as an extension of the basic Neuroforma station. Exercises were devised to improve proprioception, reinforce correct motor patterns and strengthen postural muscles. Some exercises include tasks that require involvement of upper extremities and balance control simultaneously. This module ideally supplements rehabilitation of neurological and orthopaedic patients, as well as of elderly people.



Key benefits for health facilities:

- **Boosting competitiveness:** Neuroforma enables the facility to expand its offer with innovative rehabilitation based on virtual reality technology and biofeedback.
- **Increasing service efficiency:** Neuroforma combines experience and expertise with cutting-edge technological and scientific achievements.
- **Boosting financial effectiveness:** one comprehensive tool is enough to perform procedures encompassing many different specialist fields in various patient groups.

Key benefits for therapists:

- **Improvement of the rehabilitation process:** Neuroforma automatically collects and saves information on the training process and its outcomes and stores it in patients' profiles.
- **Increased control over exercises:** the therapist decides how a given exercise should be designed and Neuroforma presents it and provides ongoing instructions to the patient.
- **Improved utilisation of the therapist's potential:** various exercises combining tasks from many rehabilitation fields enable the therapist to engage all their skills and oversee therapy of various functions simultaneously.

Key benefits for patients:

- **Increased satisfaction and engagement:** attractive tasks in the form of simple games complemented by subtle motivating elements change dull exercises into motivating challenges.
- **Increased procedure effectiveness:** intensive, multi-dimensional, clinically proved rehabilitation with Neuroforma results in considerably faster progress and affects many aspects of patient's life.
- **Underscoring patient's progress:** easy-to-read training statistics, automatic adjustment of the complexity level to each patient's maximum skills, and simple reports on their progress emphasise every single improvement.

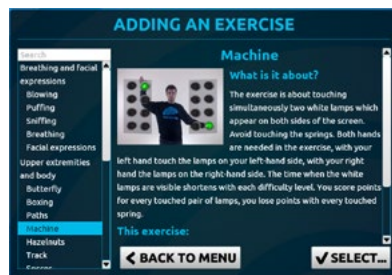
Neuroforma functionalities:

Creating patient profiles

All information about the patient and their training sessions is stored in patient's profile. The number of profiles is unlimited.

Creating training sessions

Diversified exercise base allows for many options to choose from. Clear division into categories and user-friendly interface enable quick search for tasks which are best suited for each patient.

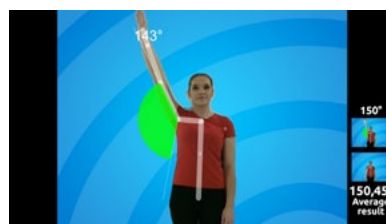


Adjusting exercise parameters

The therapist selects baseline difficulty level, number of repetitions and range of motion. If any exercise turns out to be too easy or too difficult, it will be modified by intelligent algorithms embedded in the system. 28 diversified difficulty levels ensure precise adjustment to current abilities of all patients.

Multimedia assistance

Multimedia resource collection consisting of tutorial videos supports patients during the first phases of training with Neuroforma, and can be turned off at later stages of rehabilitation. They familiarize the patient with the purpose of every exercise and present how each exercise should be done.



Automatic posture correction

The optical system automatically detects patient's position and adjusts the image displayed on the screen accordingly. If the patient changes their position incorrectly while performing exercises, the system will immediately prompt them to correct their posture.

Automatic training session

The computerized system presents exercises according to predefined settings. It displays prompts, statistics and motivational messages between subsequent tasks.

Result visualisation

After a session is completed, the therapist and the patient can see session results presented in the form of clear diagrams, and analyse patient's progress for every task separately.

Neuroforma software:

- Motor and cognitive exercise base
- Mirror therapy module
- Training session editor
- Patient base and result reporting module
- Module for exercise parameter adjustment
- 3-dimensional posture correction module
- Multimedia instruction module

Basic equipment:

- Neuroforma software
- Large display
- Computerized system
- Optical system in 3D technology



Extension - balance control module:

- Additional set of exercises
- Module for measurement of balance control parameters
- Wireless force platform
- Folding security railing



Extension – an offloading arm:

- Functional device offloading the upper extremity: adjustable support rate, working on all levels.