Title

“Memory stimulation - Which scientific benefits ? Which exercises ?”

Keywords
games - cognitive training - e-training

Abstract
Aging is responsible for a progressive decline of cognitive functions. A number of scientific works found that cognitive stimulation had a significant positive impact as well for maintaining a high-quality cognitive competence as for delaying the onset of Alzheimer’s disease. Beside more classical leisure pursuits, cognitive stimulation can help seniors to understand their memory decline and to improve their abilities. Cognitive training can be done through paper exercises or e-training sessions. We report our experience of a personalized interactive cognitive e-service which proposes various games to train cognitive functions. The objective of cognitive training is threefold: improve cognitive performance, transferring these abilities to everyday activities and improve self-esteem. Its biological effect is mediated through cerebral reserve and cognitive reserve.

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Analysis

From antiquity, man has always felt the need to strengthen their memory with mnemotechnical methods. Mature individuals also wish to preserve their memory in order to maintain “good health”, as aging is responsible for a progressive but unequal cognitive decline of the individual components. Cognitive stimulation is one of the main possible measure, following the principle “Use it or lose it!”.

Numerous studies proved the cognitive relevance of regular intellectually stimulating hobbies and training exercises, on the three cognitive areas of memory, reasoning and attention speed. Such activities are also able to delay the onset of Alzheimer’s disease. Studies also prove neuronal plasticity and thus possibilities of regeneration or adaptation of the brain, even as aging occurs. Cognitive reserve is an active process of adaptive neuroplasticity which eases the optimization of cognitive performance, either by recruiting other brain regions, or by using new or alternative cognitive strategies.
The psycho-social consequences of such structured stimulations are essential in terms of educational methods, regaining self- confidence and strengthening social links.

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But memory is not a muscle that can be over-trained in a mechanical manner. So it is dangerous for seniors to believe that it is possible, necessary and desirable to increase their ability of learning things by heart. Rather than self-repetition, literature has greatly proved the spontaneous or trained efficiency of other techniques for mature individuals based on categorization, semantic organization into a hierarchy or mental visualization.
Memory stimulation exercises should, on the one hand, strengthen existing natural cognitive strategies, and on the other hand improve learning, development and maintaining of new strategies based on logic and reasoning.
The various types of cognitive trainings are “Paper-pen exercises”, “Memory Activities” and “Memory Workshops”, and Computer exercises.

This last type comfort the idea of “not demonizing your computer!”, as despite popular belief, elderly people are not scared of computers.
Considering this, the Happyneuron website was developed in 2006 by a scientific team including the author, in order to offer such computerized and supervised cognitive training. The website currently offers about 50 fun and educational exercises, split into 5 cognitive sectors: memory, attention, language, executive functions and visio-spatial.
All exercises are organized in the same way: a home screen with general information about the exercise, a “Know more” part to explain the cognitive mechanism and the aim of the exercise, an “Example” part to educationally explain the course of the exercise.
Accuracy and time for answering are taken into account for the results. The computer allows interaction on three levels: (1) a calibration in percentiles considers three classical demographical variables, being age, gender and socio-educational level, (2) the subject’s results are compared with the appropriate calibration, they also include commentaries, and (3), a computer supervisor (coach) adapts the program to each user.
The analysis of 628 subscribers reveals women are the main users (64%) and a predominant academic level (56%). There are more men at academic level (63% against 52% for women). Whilst the average age is 41.8, we can observe 3 age peaks around 22, 44 and 57, regardless of the gender, even though these peaks are more emphasized for women. 9% of subscribers are older than 70, which shows that these exercises really are suitable for people aged 70 and older. On the average, 6 exercises are carried out each time someone logs on.
We also analyzed the progress of performances of 39 subscribers who were particularly assiduous and carried out an average of 1099 exercises and an average of 3 to 4 exercises each daily login session. There were 27 women and 12 men, 29 of them being at academic level (74%). The training behavior of these 39 subscribers showed three profiles: 16 people carried out exercises from each cognitive sector, 14 people did essentially memory exercises and 9 people mainly focused on executive functions. The threshold for significant progress was crossed at 376 exercises. On the average these subscribers realized a progress of 12% within 18 weeks.
Since 2004, the MNESIS research project also studies the uses of Internet tools as a means of social integration and cognitive stimulation in a nursing home, which lead to the development of the ActiVitalTM software package.
This software has been divided into three parts, specifically applicable to elderly residents: (1) 10 simplified exercises for cognitive training, (2) an editing tool for a residence journal, and (3) a simplified messaging tool for seniors to send and receive emails.
It turned out that residents’ self-esteem increased with their ability to use the computer and on accomplishing exercises. They bonded with other residents (mutual assistance to explain the process to each other) and their families (exchanging emails, grandson coming to help

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his grandmother, etc.). Many residents, who particularly liked this group writing activity, met and collaborated whilst editing the residence journal.
Indeed, this software allowed these seniors in nursing homes to re-acquire a certain intellectual curiosity and to regain self-confidence and self-esteem.
Computer exercises will probably experience a strong and rapid development, for new nursing home residents will arrive who will have used computers in their jobs. Due to our experience of a website for all and of a simplified software package for nursing home residents, we not only recommend the use of computerized exercises to stimulate the residents' cognitive performances, but also the use of software aiming at challenging their creativity and helping to establish or maintain social linking amongst residents or with their families. On top of the biological aspects which seniors may not perceive, there is a triple objective in cognitive stimulation: showing them that they are able to improve their performance, helping them to translate positive training effects to daily life situations, and finally, strengthening their self-esteem, at a time in life when they experience all kinds of rebuffs.

Links

http://www.happy-neuron.com/docs/French%20Geratrics%20Journal%20-%20Dr.%20B%20Croisile%20Publication.pdf

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