Chapter 7
Implementing Cognitive Exercises in Electronic Form for Supporting Patients with Alzheimer’s Disease: The Greek Case

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ABSTRACT
Main goal of this chapter is the development of computerized cognitive exercises for rehabilitation of patients with Alzheimer’s disease. More specifically, in traditional rehabilitation settings cognitive exercises are administered by using the paper-and-pencil procedure. This chapter is focused on the transferring of these interventions to an electronic form, enriched with multimedia and interactions that cannot be achieved in the printed form. The presented work tries to automate the procedure and facilitate the psychologist’s work. Computer-based intervention programs can exploit all the possibilities of adjusting the difficulty levels of exercise, the speed, the images, using audible signals, accelerating the processing of results for psychologists and much more that add value to creation of such programs. This chapter explores whether and how this kind of exercises can be successfully transferred in an electronic form.

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INTRODUCTION

There is no specific treatment for Alzheimer’s disease so far, as there are no drug treatments available that can provide effective treatment, but treatments for symptoms are available and research continues. The main method is by providing the appropriate medication to the patients. Although current Alzheimer’s treatments cannot stop Alzheimer’s from progressing, they can temporarily ameliorate dementia symptoms and improve quality of life for those with Alzheimer’s and their caregivers. Today, there is a worldwide effort under way to find better ways to treat the disease, delay its onset, and prevent it from developing. Additionally to pharmaceutical treatment, a form of cognitive exercise can be very useful, by improving mental abilities and brain functionality. An intervention that uses properly structured exercises to improve, maintain or restore mental function is called Cognitive Training (CT) (Valenzuela, 2008). The rehabilitation of cognitive impairments in patients with Alzheimer’s disease is a form of non-pharmaceutical treatment that is used in order to restrain the cognitive damage and enhance mental abilities. Research with CT (also known as “brain fitness”) has shown its beneficial effects on brain plasticity and functional re-organization of brain damaged areas. Also, such exercises do not require the patient’s participation in complex activities, on the contrary, they engage them in simple, ordinary activities, with which they are already familiar.

CT can be applied in various ways, using different instruments and stimuli. The fundamental processes of cognitive training are repeating specific procedures and providing individualized guidance. Electronic multimedia enriched cognitive exercises (i.e. electronic Cognitive Training - eCT) use suitable modality for such activities. Furthermore, they provide all the necessary means to repeat a procedure and to adjust it according to the specific needs of each person. ECT provides the opportunity of the adjustment to the individual needs and cognitive level of each patient. In addition, eCT applications allow simulating real life events and everyday situations, so that the user can engage in realistic scenarios. Therefore, s/he can develop and improve core functionalities and reactions, which are helpful in her/his ordinary living. The theme of the exercise can be adapted depending on the cultural characteristics or according to the cognitive deficits of the user. There are also capabilities for many more customization options, so that the cognitive approach is personalized to each user. Furthermore, eCT applications produce important output of performance automatically so that the user is informed immediately if an activity is completed correctly or not. Providing immediate feedback and adaptive interventions during the training could:

- Enhance the performance of the patient.
- Lead to better results.
- Strengthen further the motivation of the patient to perform better, which is very important for the participation in the sessions and reduces the disease’s deterioration.

To this direction, eCT applications can monitor and store the details of each patient such as performance and overall progress. In addition, eCT applications can take advantage of multimedia elements (image, audio and video) to mobilize and attract the user and make training enjoyable.

BACKGROUND

The last few years, computer-based cognitive interventions have spread dramatically. There are programs targeting at every age, sex and status and for every level of the disease (Gates et al., 2011). CT is a method that can help both as a prevention method and non-invasive treatment technique by repeatedly stimulating various networks of the

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