

## Chapter 60

# Games Improving Disorders of Attention Deficit and Hyperactivity

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### ABSTRACT

*In Portugal, there are between 35 000 to 75 000 children suffering from Attention Deficit Hyperactivity Disorder. The need to act prominently in children with these disorders suggests the creation of various serious games that can be executed with a computer, aiding affected children and assisting health professionals. This chapter presents two games that intend to help children to improve their capacity to speed information processing, enhance executive functions, and enhance use of working memory by performing a set of exercises presented in the form of educational games. It also enables the assisting physician to monitor the execution of these exercises. With the completion of the tasks of the games, children may, in an appealing way, improve their skills and thereby overcome their difficulties. This chapter presents the research methodology followed to the creation of the games, and the preliminary promising tests. Future research directions are also discussed.*

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## **INTRODUCTION**

Difficulties with attention, impulsiveness, or hyperactivity, or all three characterize children diagnosed as having attention deficit hyperactivity disorder (ADHD) (DSM-IV-TR, 2002; Barkley, 2006). These deficiencies arise relatively early in childhood (Barkley & Biederman, 1997), are persistent over time in most diagnosed cases (Barkley, 2006), and result in impairment in numerous domains of major life activities (Barkley, 1997). Recent theories of ADHD have suggested that these symptoms may represent, a rise from, or at least be associated with problems in executive functioning (Barkley, 1997; Nigg, 2001). That functioning is believed to involve inhibition, persistence, working memory, and goal-directed problem solving, reflecting more intentional than attentional activities (Barkley, 2006).

Agitation, restlessness, disorganization, immaturity, poor social relationships, social inconvenience, learning problems, irresponsibility, lack of persistence and laziness, are some of the symptoms attributed to these children (Lopes, 2003). Children and Adults with ADHD are usually described as having chronic difficulties such as inattention and/or impulsivity hyperactivity. It is believed that these characteristics are manifested early on, to a degree that is inappropriate for their age or level of development and a variety of situations that diminish their ability to pay attention, restricting their movements, inhibit their impulses and regulate their behavior in relation to rules, time and future (Familia, 2010).

Studies indicate that about 3-7% of school-age children have ADHD (Biederman, *et al.*, 2004; Westby & Watson, 2003) and that this disturbance is more common in males than in females. If these disorders are not accompanied and treated early, its consequences will impair the adult life of the individual. In Portugal, there are between 35 000 to 75 000 children suffering from disorders of ADHD (Mendonça, 2009).

The goal of the research team is to develop a games based platform that allows the development of neuropsychological competencies such as the working memory (including the visual-spatial and auditory memory), the executive functions (planning tasks and problem resolution), and the speed processing response. Through play, children can improve their skills and thus overcome their difficulties. Games may be a pleasant and challenging way to help children to help themselves. The article focuses on the development of two of those games.

This chapter is divided in the following sections: the first section presents key concepts regarding games, technological games, and serious games; the following section give some background on attention deficit hyperactivity disorder (ADHD); the fourth section relates attention deficit hyperactivity disorder and serious games; the games improving disorders of ADHD section details the methodology used throughout the work done and the key results achieved; at last the article discuss some future research directions and the main conclusions.

## **GAMES, TECHNOLOGICAL GAMES, AND SERIOUS GAMES**

This section does a brief introduction about games key concepts, technological games, and serious games. It begins with the structural elements existing in all the games and the interaction patterns that a player may have when gaming. Those elements and the interaction patterns are the basis of the games developed and presented in this work. It is then pointed the relevance of playing in the development of the human being. Technological games, and their distinguishable aspects, are discussed. Finally serious games are presented.

There is considerable difficulty in determining the origin of many games, because games have been around a long time, and people didn't maintain records about something considered as

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