Abstract

Therapies that help restore abilities in individuals with brain damage are being investigated to help individuals with FAS. These methods focus on rehabilitation and exercises for the brain which improve specific cognitive capacities. We present Cognitive Carnival, a computer game therapy based on cognitive exercises, designed to improve the child’s motivation and engagement of the tasks. Three minigames were developed, each based on improving one of three cognitive principles: executive function, continuous performance, and working memory. These minigames will be used in controlled therapy sessions with neuropsychologists for children with FAS to determine their effectiveness as a rehabilitative tool.

Fetal Alcohol Syndrome (FAS) is a disorder that is caused by the ingestion of alcohol during pregnancy. Alcohol is a teratogen (substance that is toxic to the developing brain) and can result in abnormal brain development (brain damage). Children with FAS are faced with numerous obstacles, including significant problems with executive functions, attention, memory, and language. These conditions impede children with FAS from succeeding in school and living normal lives.

There is estimated to be 0.5 to 2.0 children diagnosed with FAS per 1,000 births in the United States during the 1980’s and 1990’s [May and Gossage 2001]. It especially prevalent in remote communities. There is no cure. However, therapies that help restore abilities in individuals with brain damage are being explored to help individuals with FAS. These methods focus on rehabilitation by means of an intervention by psychological professionals. The therapies are able to leverage the brain’s plasticity to improve cognitive function [Neu 2002]. While adult brains show low levels of plasticity, children have more neurons and their brains continue to grow into their early 20’s. Consequently, neurogenesis can be leveraged by supervised mental exercise.

Classical therapy involves a trained therapist visiting local school, often times for a single child, to administer the therapy. The therapy itself consists of a set of exercises which the child performs. This model of therapy, while effective, is inefficient and often times impractical for many areas. Additionally, the therapy has no built-in reward system and often times the therapist will offer the child candy or a small prize which provides little engagement with the tasks themselves.

The minigames are intended for a controlled environment where a child with FAS is supervised by a neuroscientist. Over a course of weeks, the child will play each minigame, progressing through the difficulty levels as their abilities increase.

Cognitive Games as Therapy for Children with FAS

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