The Virtual Schoolyard
Attention Training in Virtual Reality for Children with Attentional Disorders

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PROBLEM

Developing novel effective means of treatment for **children** with **attentional disorders** is one of the main goals and challenges in child psychology.
Virtual reality (VR) technologies provide possibilities to assess and **train** cognitive abilities, as well as cognitive and behavioral impairments or disorders, in a controlled virtual environment (VE).

CHALLENGES

We identified the following key requirements for providing an effective training environment and propose the listed solutions:

Requirements:
► Motivation
► Engagement
► Sustained Focus
► Repeated Trainings
► Ambition

Solutions:
→ Gamification
→ Visually appealing VR simulation
→ Automatically increasing difficulty of games
→ Schoolyard exploration after each session
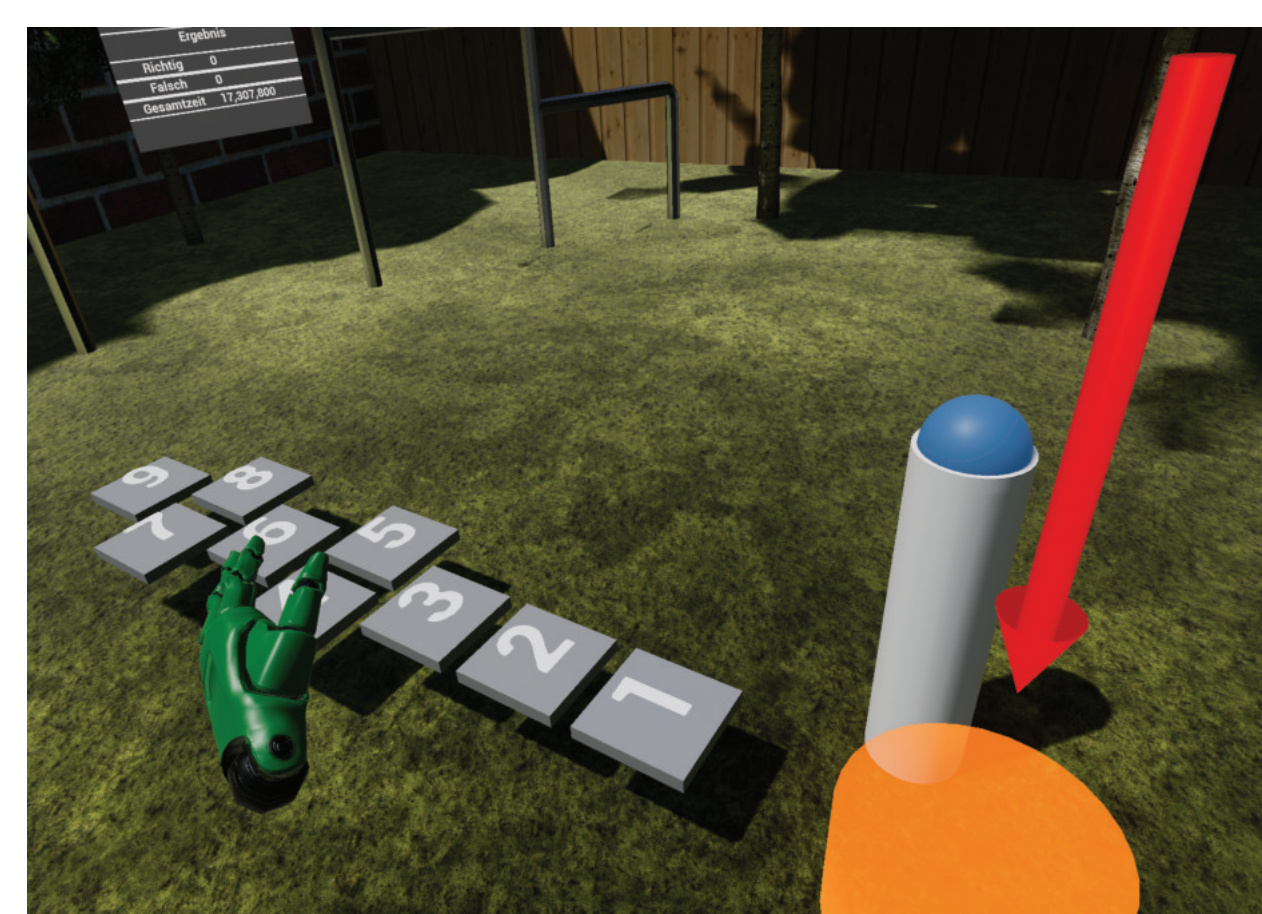→ Challenge with high scores

Gamified schoolyard

Score display

APPROACH

Four attention domain modules are used to train different cognitive abilities:

Working Memory: *Hopscotch*

Users train their working memory by memorizing and repeating a certain sequence of fields, which either glow or are recited by audio.

Focused Attention: *Card Sorting*

Users learn to focus their attention on the cards and reduce their distractability by training to ignore distractions (e.g. a paper plane).


Vigilance: *Catching Butterflies*

Users train their ability to sustain attention over a longer period of time (watching a swarm of butterflies), while waiting for a rare target stimulus (the red butterfly which has to be cought).

Response Inhibition: *Whack a Mole*

Users train their ability to control their impulses and resist a certain temptation or urge by only hitting green logs and inhibiting the impulse to hit red logs.
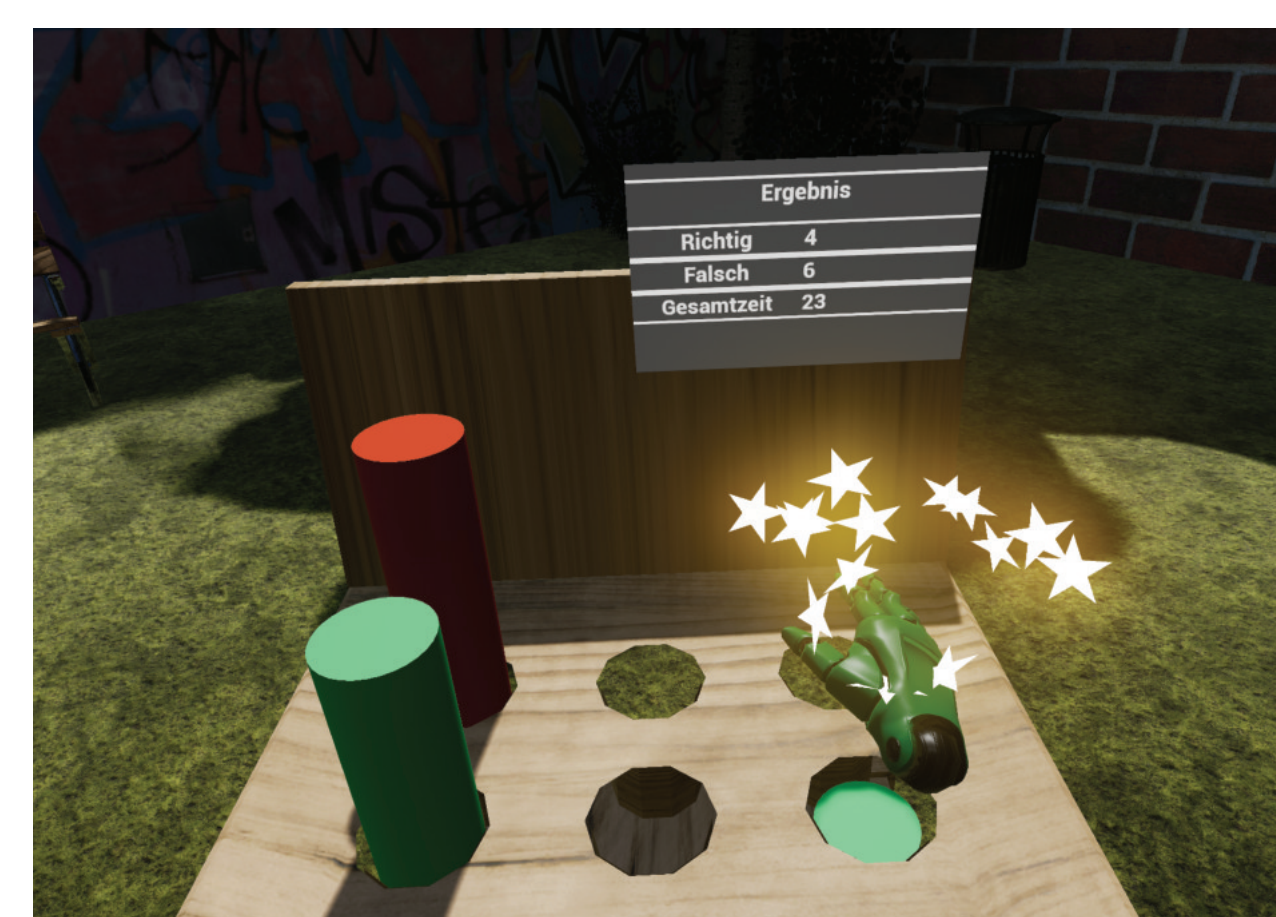
RESULTS

We evaluated the feasibility of our training tool with 6 adolescents (50% females, age 15 - 18), suffering from *somatization* as well as from *obsessive-compulsive* and *depressive* symptoms. Except for one participant, all subjects reported to have had a **strong sense of immersion** in the VE (Md = 6, range: 3 - 7). Similarly, all except for one participant rated the application as **very usable** on a Visual Analogue Scale (Usability: Md = 75.50, range: 35 - 90) and indicated that they would mostly **like to use the technology**. Finally, five out of six participants wished to have access to the application. These preliminary results show that **our tool is immersive, motivating and engaging** and therefore feasible for studies with children and adolescents with attentional disorders.

FUTURE WORK

An ongoing study at the Medical University of Vienna/Vienna General Hospital led by clinical psychologists uses our four training modules in a series of therapy sessions with children and adolescents suffering from ADHD. Measurements before, during and after the treatment will show whether the therapy with our tool has a positive and – if so – lasting effect on specific attentional abilities in affected children and adolescents.

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