Cognitive Virtual Environments

Using Immersive Virtual Reality For Working With People With Cognitive Disabilities

The goal of the CoVE project is to use the BP Visualization Center to build Immersive Virtual Reality scenes that help people overcome cognitive disabilities.

Virtual Reality in Rehabilitation

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A Cognitive Levers research project conducted at the Center for Lifelong Learning and Design. This project is sponsored by the Coleman Institute for Cognitive Disabilities

New, compensatory interconnections between nerve cells in the brain can replace missing or damaged functions resulting from traumatic brain injury, stroke, or childhood developmental disorders.

- This plasticity of the brain is a basis of rehabilitation strategies.
- In order to achieve restoration of cognitive functions, a subject must repetitively perform appropriate retraining exercises.

Recent research shows that new connections between nerve cells that result from training in *virtual* environments are essentially identical to those that occur after training in *real* settings.

- An advantage of virtual reality is that it allows us to easily vary training parameters and to explore especially effective scenes that may be difficult or unsafe to construct in the real world.
- Further, a *fully immersive* virtual environment mimics reality exceptionally well.

The *Hillside* program is a prototype, immersive virtual reality program written for visual therapy rehabilitation. The intention of this therapy is to help restore attention to events that occur in the visual periphery.

- A common problem after brain injury or due to developmental defects is a diminished ability to notice events in the periphery of the visual field, even though the person's sight is not impaired.
- Visual therapy exercises can retrain the attention mechanisms of the brain to compensate for this lost cognitive function.

The *Hillside* program transforms existing visual therapy techniques into an adaptable, three-dimensional, immersive virtual environment intended to allow fast and effective retraining.

- The program presents houses in the visual periphery and a church steeple at its center. While fixating on the steeple, the subject must notice a light that goes on in the window of one of the houses and then point a laser wand at it.
- As performance improves, the position of the houses can be varied and visual distracters can be added to increase the complexity of the scene.

We intend to use experience gained from this prototype to help us develop a broad range of immersive virtual reality environments that are effective in rehabilitation of cognitive functions.

The** Hillside Program **developed by Audrey Vernon