

Virtual reality for cognitive rehabilitation: from new use of computers to better knowledge of brain black box?

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ABSTRACT

Virtual reality based technologies are one of the emerging tools that appear to have great potential for use in cognitive rehabilitation but it still is unclear how brain capacities are involved and what is the best approach to such training. At first, virtual reality was mainly used in single user virtual environments, but social interaction should also be addressed using collaborative virtual environments (CVE). In a CVE, multiple users can interact and collaborate with each other, solve complex tasks and learn with each other. Regarding to impact of behavioral disturbances in family stress and social re-entry, such tools need to have a wider use in future years.

Quantitative aspects are encouraging as some improvement have been shown after few training sessions. Home retraining or telerehabilitation based on VR may bridge the gap between lack of specialized resources and growing number of patients. Qualitative design of VR tools is more questionable. Choice of errorless or errorfull designs may depend on the severity of disturbances. Most VR tools emphasize the explicit component of tasks, even procedural aspects are a main strength of VR retraining programs. VR and augmented reality tools give various stimuli and indicators but their best modalities stay unclear, as most data are coming from learning studies in normal subjects more than rehabilitation studies in brain injured patients. Specific research studies to explore impact of sensorial transmodal effects and emotional involvement in VR tasks are requested. Rehabilitation protocols utilizing virtual environments are moving from single applications to cognitive impairment (i.e. alert, memory, neglect, language, executive functions) to comprehensive rehabilitation programs with the aim of efficient improvement in autonomy and transfer of benefits in real life conditions. A core issue that presents challenges to rehabilitation is decreased ability of persons with brain injury to transfer learning from one situation or context to another. The multicontext approach to cognitive rehabilitation proposes treatment methods for teaching use of strategies across a wide range of meaningful activities to promote generalization and enhance functional performance.

VR offers a very promising and exciting support for cognitive rehabilitation but we have to move from mimicking “in room” or desk rehabilitation practice to specific VR programs to maximize benefits and to get optimal improvement in cognitive and behavioral autonomy of patients.

Full papers will be published in the Conference Proceedings and will be available to delegates at the conference on Sept. 10.

Full papers will be released on-line in the ICDVRAT archive on March 15.