Oral Communication
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A Virtual Reality Autoadaptive Serious Game for Post Stroke Cognitive Rehabilitation

Topic: Virtual Reality

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BACKGROUND

Stroke is a leading cause of long-term disability worldwide. Emerging technologies, including autoadaptive Virtual Reality Serious Games (VR-SG) offer innovative neurorehabilitation approaches for personalized and effective post-stroke treatment. Integrating these technologies into clinical practice permits to enhance rehabilitation quality, increases the intensity of therapy sessions, reduces costs, and mitigates healthcare staff workload. To harness this potential, we developed Autoadaptive REASmash, a search-and-reach non-immersive VR-SG on a 43" touch-sensitive screen. Grounded in Feature Integration Theory, our VR-SG is designed to rehabilitate visuospatial attention and distractor inhibition through autoadaptive exercise tasks. To optimize motivation, the VR-SG sustains a 75% success rate by dynamically adjusting parallel difficulty parameters such as distractor number, target-distractor salience, visual-field layout, time and beneficiary attentional cues. The main objective of the present study was to test the time taken by the Autoadaptive REASmash to stabilized difficulty to achieve a ~75% success rate maintained across sessions, regardless of the participant's degree and type of cognitive impairment.

METHODS

Fifteen first-time cortical-subcortical stroke survivors completed three bouts of 15-minute Autoadaptive REASmash sessions over a week, making responses using their less impaired hand. The study started by evaluating the first and easiest level, with all difficulty parameters set to their lowest values. To assess success rate tendency, we calculated the median success rate across levels and verified whether it fell within the expected range, setting 70% as the lower limit and 80% as the upper limit. To analyze the progression of difficulty parameters, we performed repeated-measures ANOVAs to identify significant differences across levels and between participants.

RESULTS

Autoadaptive REASmash successfully stabilized at a ~75% success rate per level, with median values, excluding the initial levels, ranging between 70% and 80%. Analysis of difficulty parameters revealed a rapid initial increase in challenge, followed by a much slower progression of difficulty moderation, with significant inter-participant variability.

CONCLUSION

Autoadaptive REASmash shows strong potential for personalized cognitive rehabilitation. The algorithm used by the VR-SG fine-tunes multiple metrics, tailoring therapy to specific deficits. By complementing traditional treatments, it may improve stroke recovery and reduce costs while ensuring high-quality care. Future research will examine long-term effects on larger populations.

Statement of Disclosures

None

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