



Exploring the Effects of Virtual Reality on Unilateral Neglect Caused by Stroke: 4 Case Studies

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BACKGROUND

- Unilateral neglect is one of the more common deficits caused by stroke
- Of the many impairments caused by stroke, it has been suggested that unilateral neglect may have the most profound impact on functional recovery following stroke
- although there are a number of treatment options available for the rehabilitation of neglect caused by stroke, they all have some limitations in terms of clinical feasibility, client acceptability, and/or evidential support. At this point, there is not a single treatment approach that can be considered superior.
- VR may be capable of rehabilitating unilateral neglect because VR allows the user to repeatedly attend to, and interact with stimuli presented in the affected side of space

OBJECTIVES

The purpose of this study was to explore possible effects of VR on unilateral neglect caused by stroke, as reported by tests of neglect. To explore whether participants reported any functional changes in their daily life.

METHODS

Participants: required to be over the age of 18, be able to communicate in English, be able to provide informed consent, be experiencing the effects of neglect resulting from stroke, and have functional use of at least one arm (so they could interact with the VE).

Design: a single subject design, the A¹BA² pattern was used

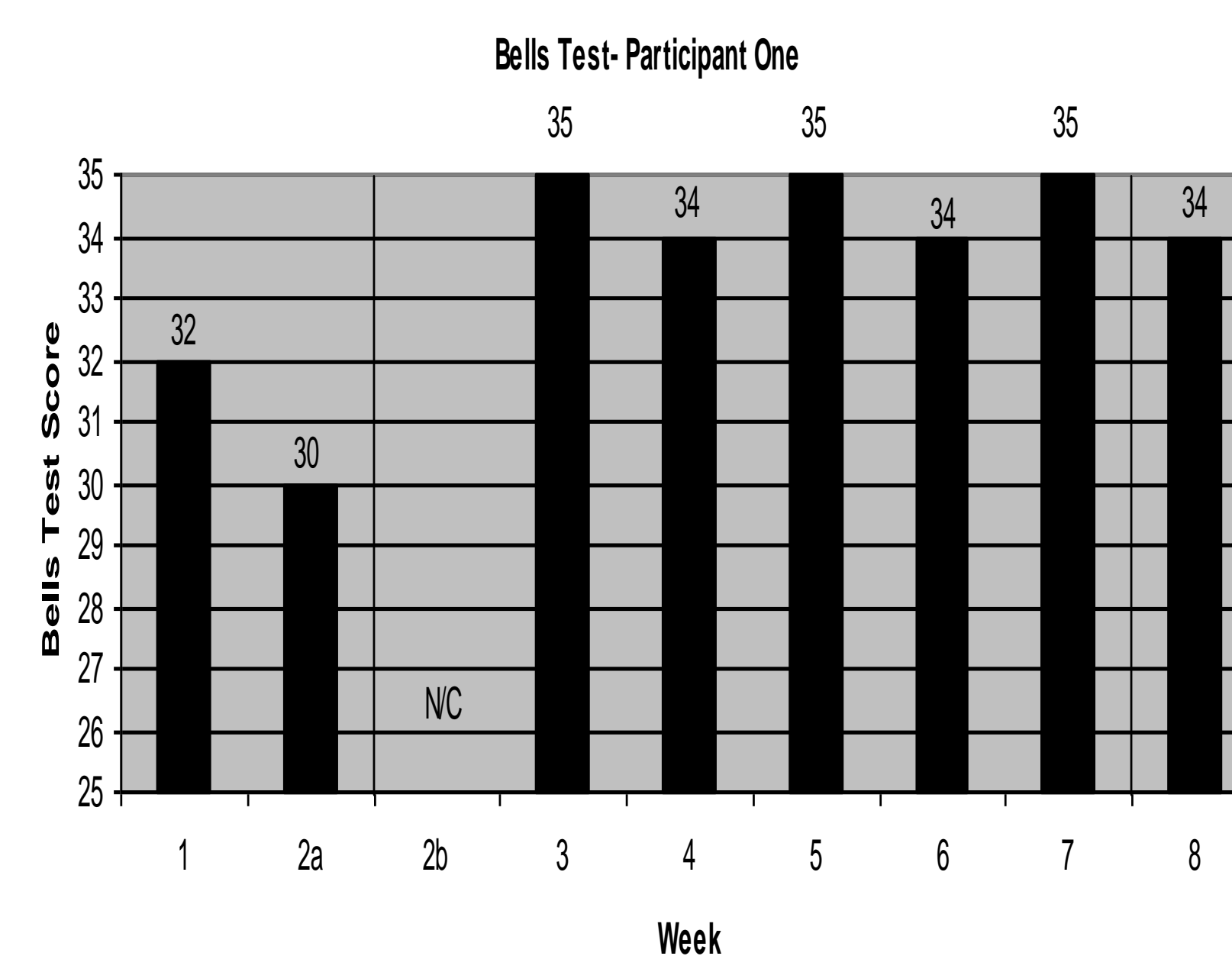
Outcome Measures: The Behavioural Inattention Test (BIT)^b, a comprehensive assessment of unilateral neglect, involving six 'Conventional', pencil and paper subtests and nine more functional, 'Behavioural' subtests. The Bells test^c, a pencil and paper cancellation test which involves scanning for target symbols (bells) which are dispersed amongst a number of distractor symbols (such as houses, apples, birds, and trees). The presence of unilateral neglect is detected by examining the total number (and laterality) of omissions.

METHODS

- This study consisted of 8, weekly 1 hour sessions, all of which were conducted at the University of Toronto, Neurorehabilitation lab.
- During the first session, demographic information was collected from each participant, and the Bells test and the BIT (Version A) were administered, A¹ phase. At the beginning of the following session, the Bells test was re-administered, (end of the A¹ phase). During that same session, the treatment was introduced to the participants, (beginning of (B) phase -6 sessions in total).
- The IREX^a system of projected VR was used.
- 10 one-minute trials of Birds and Balls and Soccer were given.
- During the final session of the (B) phase, the BIT (Version B) was administered in addition to the Bell's test.
- One week later, the Bell's test and the BIT (Version A) were administered one final time,

RESULTS

Participant 1 a 53-year-old woman who sustained a right hemispheric stroke 13 months prior to beginning this study. On participant 1's Bells test scores (Figure 1), a positive change in level was observed between A¹ and B phases.

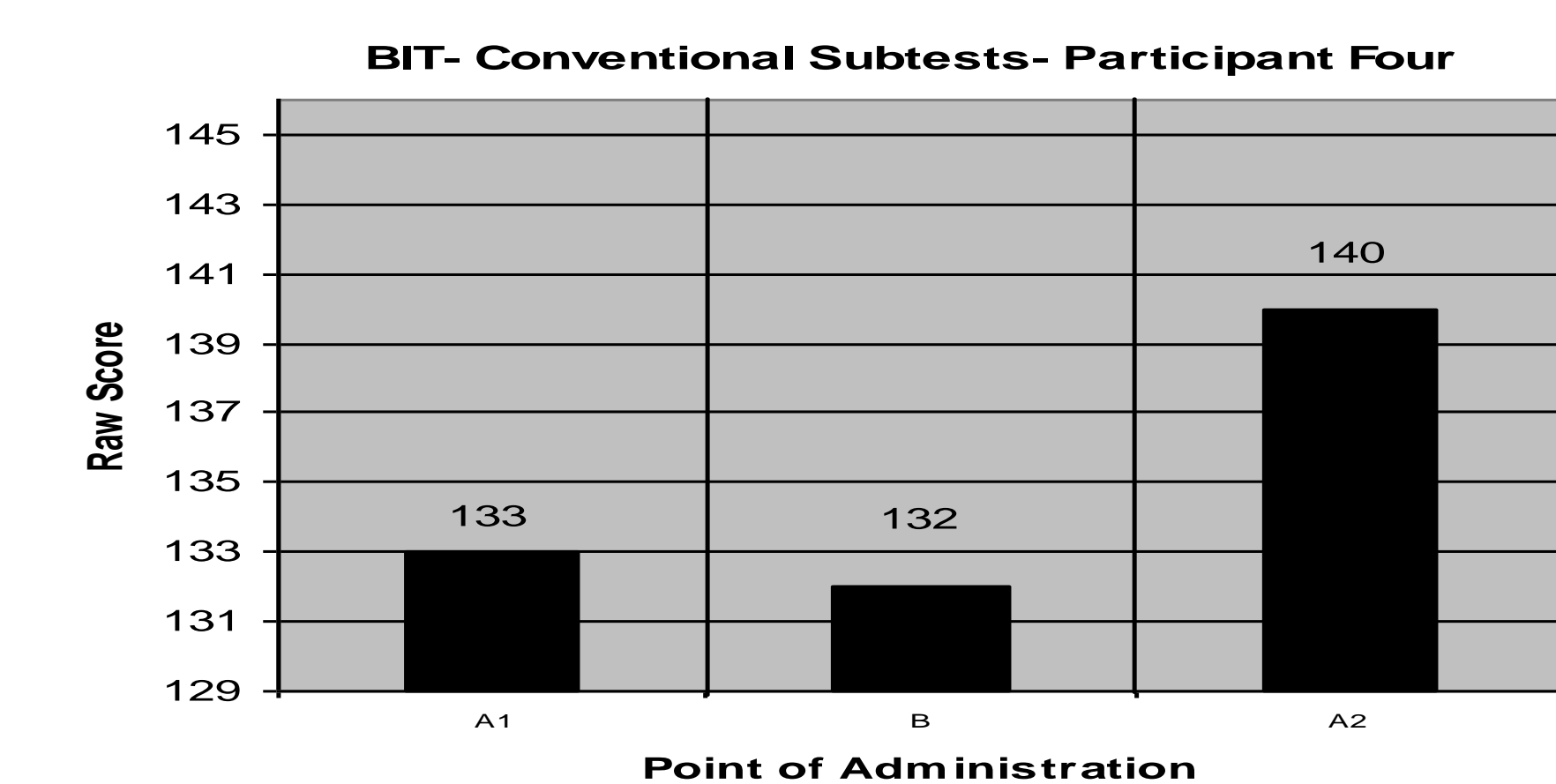
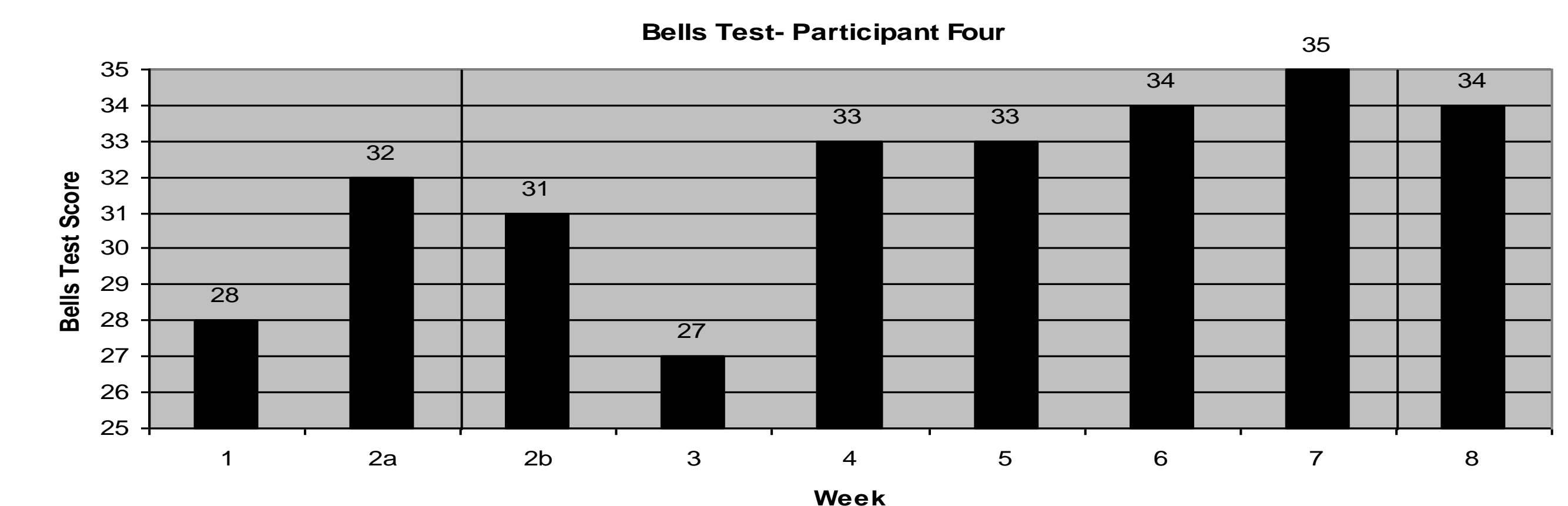


We did not see a similar pattern of change on either the Conventional subtests or the Behavioural subtests of the BIT for participant 1.

Participant 2 a 49-year-old woman who sustained a bilateral stroke 7 years prior to beginning this study. A ceiling effect was noted on participant two's Bell's test scores and on the Behavioural subtests of the BIT, limiting the interpretability of these results. However, this ceiling effect was not as pronounced with the Conventional subtests of the BIT. Improvement was noted.

Participant 3, a 55-year-old woman who sustained a right hemispheric stroke 11 years prior to beginning this study. Instability in performance on the Bell's test and the BIT was noted. Despite this variability, the overall direction of change was positive.

Participant 4, a 40-year-old man who sustained a bilateral stroke four and a half years prior to beginning this study. Little variability was noted, and a clear acceleration trend was observed across participant 4's Bell's test scores (Figure 4), This positive direction of change was also observed on both the Conventional subtests (Figure 5) and Behavioural subtests (Figure 6) of the BIT.



CONCLUSION

Given our participants' post stroke recovery times, we feel that the results of this study coupled with verbal reports of functional changes from participants themselves may have clinical implications specifically for individuals who are no longer benefiting from traditional treatment approaches, yet still experience effects of neglect. We also acknowledge that this study was preliminary in nature and suggest that further research is warranted.

REFERENCES/NOTES

- a. Vivid Group, 317 Adelaide St., Toronto, M5V 1P9, www.vividegroup.com
- b. Wilson B, Cockburn J, Halligan P. Behavioural Inattention Test: Manual. Suffolk, UK: Thames Valley Test Company; 1987.
2. c. Gauthier L, Dehaut F, Joannette Y. The bells test: A quantitative and qualitative test for visual neglect. *International journal of Clinical Neuropsychology*. 1989;11:49-54.