

Assessing visual processing capabilities using the virtual reality device Oculus Rift

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Does Oculus Rift provide sufficient test-reliability for the neuropsychological assessment of visual processing capabilities?

We assessed three visual processing components based on Bundesen's Theory of Visual Attention^{1,2}:

- Threshold of conscious perception
- Capacity of visual working memory
- Visual processing speed

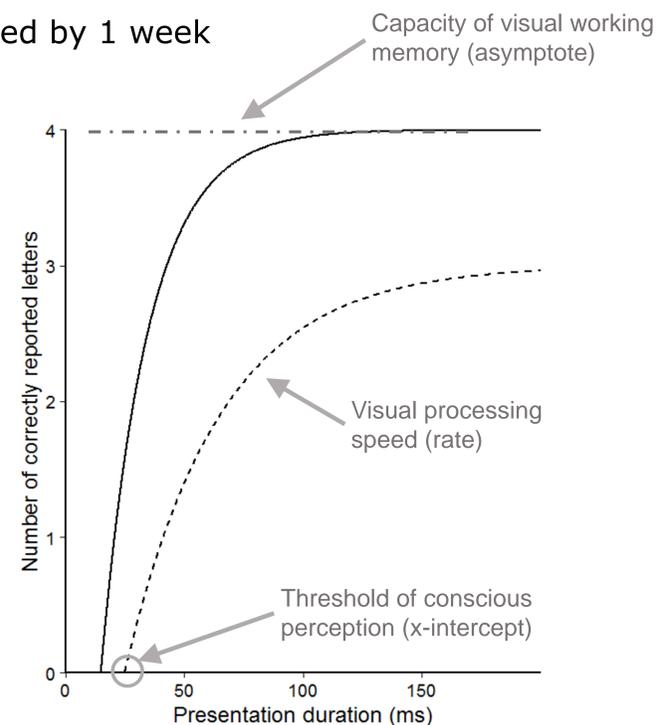
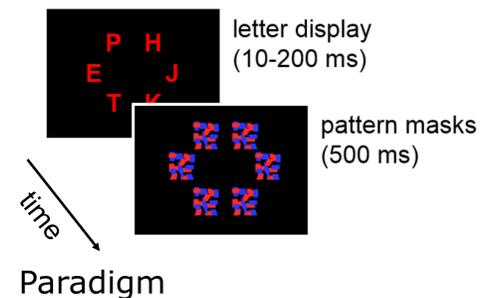
To this end, we used the virtual reality device Oculus Rift and a CRT screen, the current gold-standard.

We compared the two devices in terms of the test-retest reliability of measured visual processing components.

Method

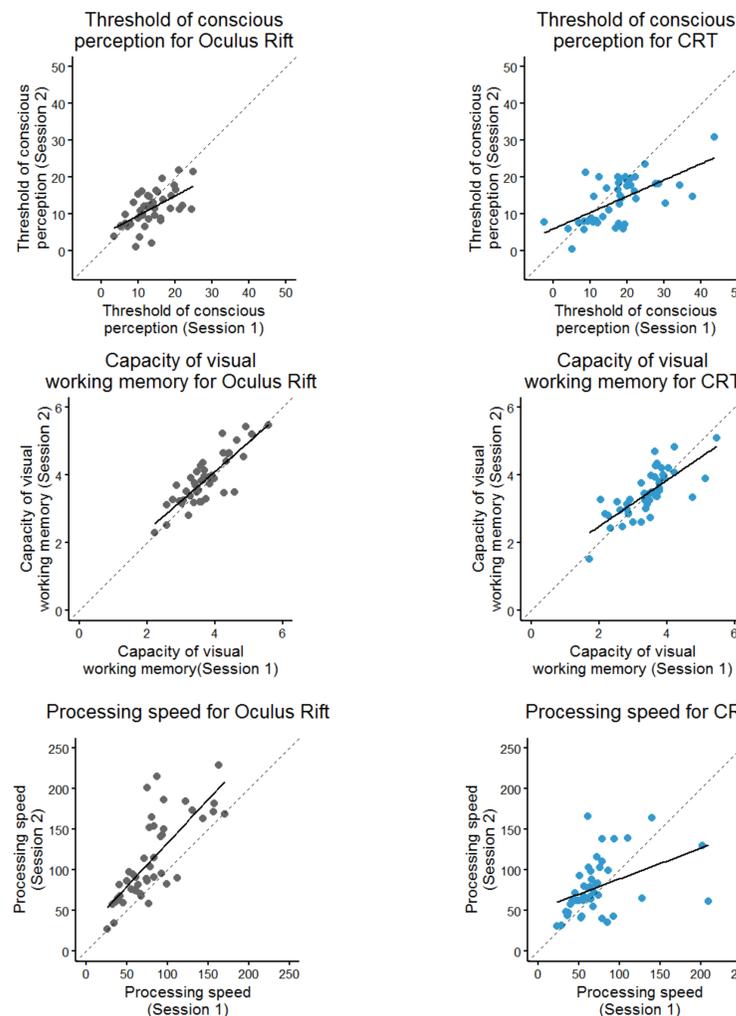


N = 44
2 sessions per device, separated by 1 week



Visual processing components^{1,2}

Results



Test-retest reliabilities (Pearson's *r*)

	Oculus Rift	CRT
	<i>r</i> (<i>p</i>)	<i>r</i> (<i>p</i>)
Threshold of conscious perception	.58 (<i><.001</i>)	.63 (<i><.001</i>)
Capacity of visual working memory	.84 (<i><.001</i>)	.74 (<i><.001</i>)
Processing speed	.76 (<i><.001</i>)	.41 (.006)

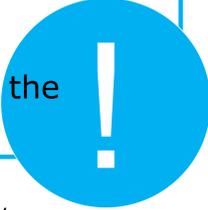
Test-retest reliabilities did not differ between devices regarding:

- the threshold of conscious perception ($Z = 0.391, p = .696$, Steiger's test)
- the capacity of visual working memory ($Z = 1.141, p = .254$)

Visual processing speed was more reliably assessed with Oculus Rift than the CRT ($Z = 2.550, p = .011$).

Oculus Rift and the CRT did not differ in the test-retest reliabilities of the threshold of conscious perception and the capacity of visual working memory. For visual processing speed, Oculus Rift provided a higher test-retest reliability than the CRT.

These findings show that the virtual reality device Oculus Rift can be used for the neuropsychological assessment of visual processing capabilities.



References

- [1] Bundesen, 1990, Psych Rev
- [2] Bundesen, Vangkilde, Petersen, 2014, Vis Res