

Interpreting spatial dysgraphia after stroke: straight ahead or straight above?

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Background and aims

Spatial dysgraphia after a right hemisphere lesion, associates signs of spatial compression in relation to spatial neglect, and a tilted writing which remains to be explained. Here we present a case study suggesting that tilted writing is due to a tilted representation of the vertical.

Methods

JW, a 75 year-old patient who underwent a right parietal hemorrhage showed a pusher syndrome and a writing tilted 11.1° upwardly without other signs of spatial dysgraphia. We comprehensively assessed and followed most aspects of spatial cognition (spatial neglect, verticality perception) and handwriting, until nine months post-stroke. Examination of JW's handwriting was performed by means of a graphic tablet quantifying writing orientation and speed, in the presence or not of spatial indexes, and after a transient modulation of verticality perception.

Results

In acute stage, spatial neglect was severe with predominant signs of body neglect. At three months, visual (VV) and postural (PV) perceptions of the vertical were tilted of 11° , counterclockwise. This transmodal tilt was similar both in direction and magnitude to the tilt found congruent on both features of writing: left-hand margin and lines. JW's writing speed was found slower than a control subject in the blank paper condition (1.67 vs 0.82sec/letter; $p<.001$), and faster when writing on lines inclined 24° upwardly (1.11sec/letter; $p<0.05$). The transient modulation of verticality perception (PV= 0.5°) was performed by tilting the patient for 10 min at 30° to the right side, in the dark. This PV modulation reduced the writing tilt, measured 20 min later (6.2° ; $p=.001$) and increased the writing speed (0.89sec/letter; $p=.002$). Nine months post-stroke, while spatial neglect had completely recovered, a congruent tilt both in verticality perception and writing persisted (5° and 8.8° , respectively).

Conclusion:

After right hemisphere stroke, a tilted writing is likely a sign of a tilted verticality representation.