Effect of juggling expertise on pointing performance in peripheral vision

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Résumé

Patients with a lesion of the posterior parietal cortex may present with optic ataxia, which causes an under estimation of retinocentric distances in the contralesional field. This results in hypometric pointing in peripheral vision. In contrast to this lesion, learning to juggle causes a hypertrophy of the grey matter of this same area which can be observed in MRI. Our hypothesis is that hypertrophy of the parietal cortex of jugglers would improve performance in peripheral vision, which fits with the subjective experience of jugglers' third eye.

We tested the peripheral vision pointing abilities of a group of novice and expert jugglers. In a peripheral vision target pointing task, six right visual field axes (±67.5◦, ±45◦ and ±22.5◦) and three eccentricities on each axis (30◦, 40◦ and 50◦).

Our analyses showed that the hypometries of both groups increased with target eccentricity. There was a significant decrease in hypometry in the upper visual field for the group of expert jugglers (i.e. compatible with the third eye tracking of the balls' trajectory peaks) whereas no difference was found in the lower visual field.

Our results and a previous study confirm that the parietal cortex is involved in the perception of peripheral visual space. Its mechanism of action may be a compensation of the cortical magnification of visual areas by attentional mechanisms. In the case of expert jugglers, the hypertrophy of the cortex could allow for a better focus of attention in the periphery and thus improve pointing performance.

Mots-Clés: peripheral vision, pointing, juggling

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