

Induction of lateralized spatial bias among normal subjects

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Abstract The use of bisection protocols has established an asymmetric perception of space among both normal and right brain-damaged (RDB) subjects, demonstrating that space perception differs from physical space. Applied to normal individuals, line bisection task indicated small leftward deviations from veridical midpoint which are usually referred to as “pseudoneglect” (Bowers and Heilman 1980), whereas large errors in the opposite direction are characteristic of RDB patients exhibiting left neglect syndrome. Chokron et al. (1995, 1993) proposed that pseudoneglect could be induced by specific scanning directional trends related to reading habits (left-to-right reading for French subjects and right-to-left reading for Israeli subjects). Moreover, improvements of neglect signs due to prismatic adaptation led Rossetti et al. (1998) to hypothesize that sensorimotor experience could induce a supramodal change in spatial representations. The present study offers the opportunity to investigate the spatial cognitive functions in normal individuals as well as in neglect patients, and to thoroughly understand the positive effect of prismatic adaptation on neglect signs. According to above-mentioned studies (Chokron and De Agostini 1995; Chokron and Imbert 1993; Rossetti et al. 1998), we assumed that lateralized sensorimotor experience can be involved in the spatial bias exhibited by normal individuals and neglect patients.

In the present study, we submitted healthy participants to a short lateralized pointing task (toward the left or right hemispace). According to our hypothesis, pointing in one hemispace even for a short time should subsequently generate a bias in space organization as measured by perceptual and visuomotor line bisection

tasks. To test this hypothesis, 27 righthanded healthy volunteers (left-to-right readers) participated in the study. Experimental procedure consisted in three stages: (1) pre-test baseline measurement of performance in two versions (visuomotor and perceptual) of line bisection task, (2) asymmetric pointing task (toward targets displayed in the left hemispace for half of participants and toward targets displayed in the right hemispace for the remaining half) and (3) post-test measurement (identical to pre-test) of visuomotor and perceptual subjective midpoint in line bisection.

Results indicate that a lateralized pointing task induces deviations in the visuomotor as well as in the perceptual estimation of the subjective centre toward the stimulated hemispace. These spatial biases varied as a function of the group pointing (left or right pointing), spatial location and length of lines. These findings are discussed with regards to pseudoneglect and neglect phenomena. In addition, these findings led us to propose an alternative explanation of behavioural benefits of prismatic adaptation in neglects patients.

Keywords Visual imagery • Individual differences • Object and spatial imagery

References

- Bowers D, Heilman KM (1980) Pseudoneglect: effects of hemispace on a tactile line bisection task. *Neuropsychologia* 18(4–5):491–498
- Chokron S, De Agostini M (1995) Reading habits and line bisection: a developmental approach. *Brain Res Cogn Brain Res* 3(1):51–58
- Chokron S, Imbert M (1993) Influence of reading habits on line bisection. *Brain Res Cogn Brain Res* 1(4):219–222
- Rossetti Y, Rode G, Pisella L, Farne A, Li L, Boisson D et al (1998) Prism adaptation to a rightward optical deviation rehabilitates left hemispatial neglect. *Nature* 395:166–169

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