

A Magnocellular Deficit and a Parvocellular Preservation in Normal Aging: Dissociation of the two Cognitive Visual Systems in a categorization task.

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The study aimed at evaluating the modification during normal aging of the two main systems of visual processing using a comportemental test : the dissociation between the parvocellular (high contrast and central presentation) and the magnocellular (low contrast and peripheral presentation) systems was tested using a categorization task of photographs of natural objects.

The experiment included two age groups (MMSE >26 and normal visual acuity): 30 young (mean age of 20.7) and 30 older observers (mean age of 72.4). They had to perform two semantic categorization tasks of 24 pictures each (animal vs. vegetal or tool and piece of furniture vs. vegetal or tool). Picture contrast level varied (8% or 30 %) and pictures were presented centrally or at 21.7  of eccentricity (left or right).

Results showed a mean age-related increase in RT and decrease in percent correct. Accuracy and response time decreased when contrast decreased, when eccentricity increased and when the target was a piece of furniture rather than an animal. A 4-way interaction was also observed between age group, picture eccentricity, picture contrast, and object semantic category : the more pronounced decrease of performance according to picture contrast found for the older than for the young participants, was higher for central picture than for peripheral picture, especially for piece of furniture relative to animal. However, there was no statistical difference of performance according to age group when pictures were presented centrally and at high contrast, whatever the semantic category.

Altogether, these results are consistent with an age-related deficit in the magnocellular system whereas the parvocellular system seems to be spared. Moreover, the magnocellular dysfunction can account for the category-specific deficit found in aging considering that the visual primitives (presumably the low spatial frequency content) required for identification of manufactured objects are preferentially conveyed by the magnocellular system.

Key words : Visual processing, Normal aging, magnocellular deficit