

Challenging the importance of vision for the development of an extrinsic spatial framework: evidence from the blind and sighted

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Background

Sighted people can not only construct a mental map of the environment from the information gathered from active navigation (Tolman 1948), but also they can generate an accurate mental representation of the spatial layout of an area from verbal description alone (Taylor and Tversky 1992). In contrast, for the blind, it has been suggested that vision is crucial for adaptive spatial processing, with those who have never seen being forced to rely on an egocentric encoding of the spatial environment (e.g. Millar 1994; Ungar 2000). This brings into question the nature of the spatial mental representations used by the blind, and indeed whether or not the blind are able to construct 'allocentric' mental maps in the same way as are the sighted. Using a tactile version of the Taylor and Tversky (1992) paradigm, this experiment compared the capacity of the blind and sighted to generate mental maps, derived from verbal description.

Method

Twenty sighted and 20 congenitally or early-totally blind individuals, age and IQ matched individuals listened to two environments described from a survey perspective and two from a route perspective, responding to a series of true/false statements after each text. They were also required to generate tactile maps of two of the four environments.

Results

Initial comparisons indicated that there was no difference between the blind and sighted on this task. However, when the blind group was split into subgroups of: born totally blind but premature (retinopathy of prematurity); born totally blind but not premature and finally early blind (total sight loss at 12–24 months old), differences between the blind and sighted were identified. Specifically, those with retinopathy of prematurity performed significantly worse than not only did the sighted, but also those who were blind from birth but not premature and the early blind. There were no differences in performance between the born totally blind (not premature) and the sighted, with a trend towards the early blind, and not the sighted, outperforming all the other groups.

Conclusions

The implication of the spatial ability subgroups within the 'early blind' group is profound. If a lack of vision does not result in a performance deficit on this very complex allocentric task, then vision is not necessary for the development of an adaptive spatial framework. Nevertheless, if the 'early' blind, with their minimal visual experience, can be considered super-performers, then vision does have an important role to play in the setting up of an optimum spatial framework, although too much may be detrimental to the construction of an optimal allocentric spatial framework. These results are considered in the context of current theories on spatial processing.

Keywords Mental representation • Visual impairment • Allocentric

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