Spatial Exploration Patterns And Navigation Efficiency

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Spatial Navigation Patterns

Experimental investigation of navigation patterns is rare in human spatial research. Previous studies described the possible functions of goal-directed exploratory behaviour in people with visual impairments (e.g., Gaunet & Thinus-Blanc, 1996). These studies concluded that systematic patterns occur in navigation and these are correlated with actual performance.

Based on these assumptions, Kallai et al. (2005) identified and measured patterns of spatial navigation of sighted participants. They found that frequently occurring navigation paths are good predictors of navigation performance and some are more dominant in the early phases of spatial learning.

The present study aimed to analyse the initial exploratory patterns and strategies of spatial navigation and relate them to spatial efficiency.

Participants

Thirty students from various courses of the University of Southampton participated in the study. There were 18 females and 12 males with a mean age of 30.54 years with SD = 9.97 and range between 18 to 50.

Materials

Participants were presented to a 3.5 x 3.5 meters sized squared space with large black curtains on each wall that masked every spatial information other than the locations of the five identical boxes (with different objects inside each box) provided within the room.

Procedure

The participants freely explored the novel environment for 1-minute (Phase 1) subsequently they were instructed to perform simple navigation tasks (Phase 2), whereby they were required to visit the objects either in a predefined order or in any order they wished. In the final part (Phase 3), they re-visited all the objects in an optional order.

Results

The routes were recorded in each phases and transcribed into a 6x6 grid matrix, where the recurring patterns were clustered into groups. Other measures such as total path length and deviation from an optimal route were examined as a function of the initial and final navigation patterns.

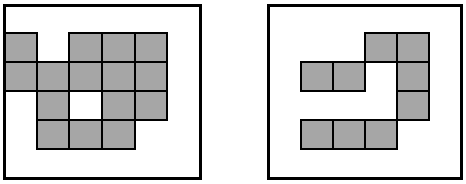

Figure 1: Bird's-eye view of an (a) initial exploratory pattern, and (b) final navigation pattern.

Discussion

The results showed that the initial patterns played a role in subsequent spatial navigation performance. The findings are discussed in terms of acquiring spatial knowledge, and how spatial organization and representation are utilized.

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