

Spatial mental models derived from the integration of information from different perspectives

Francesca Pazzaglia • Holly A. Taylor • Diego Varotto

Keywords Spatial mental models • Spatial representation

Background

People experience environments in many different ways: by moving through it, by inspecting it from above (flying, being in a skyscraper), by listening to a description, by studying a map. One salient point of difference between these experiences is the perspective on the environment, route or survey. Yet research to date has not conclusively outlined how people integrate information from different perspectives in a unique mental model and how perspective differences during learning impact the resultant cognitive maps. Some research suggests that the cognitive maps reflect the perspective differences (e.g., Thorndyke and Hayes-Roth 1982); other studies suggest a single, well-integrated representation which affords cognitive flexibility (Taylor and Tversky 1992). One suggestion offered to reconcile these findings focuses on learning goals and subsequent attentional focus differences while experiencing the environment (Taylor et al. 1999) Another potential explanation focuses on individual differences. The present study examines how people integrate spatial information from route and survey perspectives, when they are provided with information from both perspectives and with specific directions that focus attention either on landmarks or on intersections along a path. Participants' individual differences in spatial representation are also recorded.

Method

In two experiments participants learned a route through

a virtual urban environment by navigation and by inspecting a schematic map either before or after navigation. While going through the environment, their attention was focused, through directions, on either landmarks, intersections, or no focus. After learning, participants completed several pointing tasks, drew a map, navigated along the learned route and also completed a self-report questionnaire on spatial representation (QSR, Pazzaglia et al. 2000) which assessed potential individual differences that could impact performance.

Results

Results showed that participants were able to integrate information from different spatial perspectives and that they took an advantage from the inspection of the map, but only under certain conditions. Spatial perspective, instructions, and individual differences in spatial representations interacted to affect performance. These results will be discussed in context of spatial mental models and their influences on spatial cognition and navigation.

References

- Pazzaglia F, Cornoldi C, De Beni R (2000) Individual differences in spatial representation and in orientation ability: presentation of a self-report questionnaire. *Giornale Italiano di Psicologia* 27(3):627–650
- Taylor HA, Tversky B (1992) Spatial mental models derived from survey and route descriptions. *J Mem Lang* 31(2):261–292
- Taylor HA, Naylor SJ, Chechile NA (1999) Goal-specific influences on representation of spatial perspective. *Mem Cogn* 27(2):309–319
- Thorndyke PW, Hayes-Roth B (1982) Differences in spatial knowledge acquired from maps and navigation. *Cogn Psychol* 14(4):560–589

F. Pazzaglia (✉) • D. Varotto
University of Padua, Padua, Italy
e-mail: francesca.pazzaglia@unipd.it

H. A. Taylor
Tufts University, Medford, MA, USA

