ORAL PAPER

# The effect of familiarity on egocentred and allocentred spatial representations of the environment

Gennaro Ruggiero • Tina Iachini

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### Background

Spatial representations of the environment may change as a result of increased familiarity; yet there are few studies about this topic (Evans and Pezdek 1980; Thorndyke and Haves-Roth 1982). These studies have suggested that familiar environments are represented in an allocentric way, whereas unfamiliar environments in an egocentric way. A representation is egocentric if maintains the perspective under which spatial information has been experienced. This means that access to spatial locations is not equally easy but depends on the relation between the required location and the organism. An allocentric representation is based on frames of reference independent of the organism's position and centred on objects or environmental features. However, in these studies the factor "familiarity" was confused with the way of exploring the environment (real exploration for familiar participants, maps for unfamiliar participants), and consequently it was difficult to interpret the results unambiguously. Further, there are few studies based on locomotor exploration of real environments and they have shown unfamiliar environments that are represented egocentrically, although salient environmental axes may acquire a certain relevance (Iachini and Logie 2003; McNamara et al. 2003). Overall, in all these studies the patterns of results were interpreted as verifying the "allocentric" or "egocentric" view according to a specific theoretical definition and there was no direct measure of allocentric vs egocentric coding.

Second University of Naples, Naples, Italy e-mail: gennaro.ruggiero@unina2.it

#### Aims

In this research we investigated the influence of familiarity on egocentric and allocentric frames of reference used to represent in memory a large-scale outdoor environment explored by locomotion. Familiar and unfamiliar participants were compared on a new task based on relative distance judgments that allowed to manipulate directly the spatial frames of reference required. Both groups explored a real-world large-scale environment by locomotion. Based on previous literature (e.g. Evans and Pezdek 1980), we hypothesized that the allocentric performance should be more accurate within familiar than unfamiliar participants. This should be verified by a familiar/unfamiliar x egocentric/allocentric interaction.

### Method

Participants had to study five triads of buildings by walking along a path linking three buildings each time. Afterwards, they were led to a prescribed position and had to provide egocentric distance judgments: "Which building is closer to you?", and allocentric distance judgments: "Which building is closer to the building X?". Accuracy and latency measured the performance.

### Results

As regards the Anova accuracy, а two-way (familiar/unfamiliar as between variable, egocentric/allocentric as within variable) revealed a significant interaction between familiarity and spatial judgments [F(1, 38) = 6.537; P < 0.05]. Post-hoc analyses showed that familiar participants were more accurate than unfamiliar participants in the allocentric



G. Ruggiero (⊠) • T. Iachini Department of Psychology,

performance. Finally, familiar participants were faster than unfamiliar participants [F(1, 38) = 6.35; P < 0.01] and egocentric judgments were faster than allocentric ones [F(1, 38) = 6.17; P < 0.001].

## Conclusions

The direct manipulation of the egocentric/allocentric frames of reference required to provide the relative distance judgments gave a direct evidence that with increasing familiarity the environment is represented in memory in a more allocentric way.

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