POSTER

Egocentric and allocentric spatial frames of reference: a direct measure

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Keywords Egocentric · Allocentric · Frames of reference

Background

In the literature about Spatial Cognition, spatial reference systems are typically classified into two main categories: egocentric and allocentric (Paillard 1991; Pani and Dupree 1994). Egocentric frames of reference use the organism as the centre of the organization of surrounding space, therefore memorized spatial representations maintain the perspective under which spatial information has been experienced and for this reason the access to spatial locations is not equally easy but depends on the relation between the required location and the organism. Allocentric frame of reference specify location and orientation independently of body's position; derived representations are centred on objects or environmental features.

Aims

The main purpose of our study is to devise a task that measures directly the capacity to use egocentric and allocentric frames of reference. This was achieved by manipulating the frame of reference required to give distance judgements. Further, the influence of peripersonal and extra-personal space on spatial frames of reference was studied. In humans, egocentric frames of reference represent the primary inter-face between the organism and the environment (e.g. Millar 1994). For this reason, in Experiment 1 we expected a faster and more accurate egocentric than allocentric performance. Experiment 2 controlled that the results were not affected by a possible artefact: stability of the egocentric frame of reference vs variability of the allocentric one.

Experiment 1

Method

Participants had to memorize triads of 3D objects (20 s) in peri-personal and extra-personal space (respectively at 60 and 100 cm from the trunk of the viewer). Afterwards, they had to give egocentric ("which object is closer to you?") and allocentric judgments ("which object is closer to the pyramid?"). Accuracy and latency measured the performance.

Results

The ANOVA (egocentric/allocentric, peri-/extra-personal space as within variables) revealed a main effect due to egocentric judgements being more accurate than allocentric ones [$F(1, 39) = 39.99$, $P < .001$]. No significant difference due to peri- ed extra-personal space ($F < 1$) and no interaction ($F < 1$) emerged. Further, egocentric judgements were faster than allocentric judgments [$F(1, 39) = 48.55$, $P < .001$], but neither main effect of perceived space [$F(1,39) = 1.20$, $P > .05$] nor interaction ($F < 1$) appeared.

Experiment 2

Method

Participants had to study six triads of objects from ix different positions. Each egocentric position was matched to a different configuration. In this way, egocentric and allocentric frames of reference varied for for each configuration.

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Results

The ANOVA (egocentric/allocentric judgments, stable/variable egocentric positions) confirmed that egocentric judgments were more accurate [$F(1, 38)=28.514$, $P < .001$] and faster [$F(1, 38) = 31.084$, $P < .001$] than allocentric ones. The performance was not affected by the stability versus variability of the egocentric learning positions.

Conclusions

The task based on spatial judgments provided from memorized information is able to distinguish between egocentric and allocentric frames of reference. A facilitation of the egocentric coding emerges which is not due to an experimental artefact. This pattern of results confirms the primacy of the egocentric coding due to the way of interacting between individuals and environment.

References

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