LEARNING PATHS FROM REAL NAVIGATION: THE ADVANTAGE OF INITIAL VIEW, CARDINAL NORTH AND VISUOSPATIAL ABILITY

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Muffato, V., & Meneghetti, C. (2020). Learning a Path from Real Navigation: The Advantage of Initial View, Cardinal North and Visuo-Spatial Ability. Brain sciences, 10(4), 204. https://doi.org/10.3390/brainsci10040204

SPATIAL COGNITION 2020/1

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BACKGROUND

- Navigation is a common complex activity
- Learner's initial view prompt the spatial representation's orientation (Wilson et al., 2007; Tlauka et al., 2011)
- The representation can be integrated with allocentric information (e.g., Meilinger et al., 2015).
- Cardinal points can be taken for reference (world-based information) in environment representation
- Cardinal points seem to influence a representation's proprieties of familiar environments (Tlauka et al., 2011), less evidence for newly acquired environments.
- Individual visuospatial factors are relevant to environment representations (Hegarty et al., 2006)

AIMS

(i) The spatial representation formed after navigation follow a particular orientation due mainly to the initial egocentric view? or to a combination of this initial egocentric view with allocentric (world-based) information?

(ii) Is there a role of visuospatial abilities (perspective taking), and self-reported sense of direction in supporting environment representations?

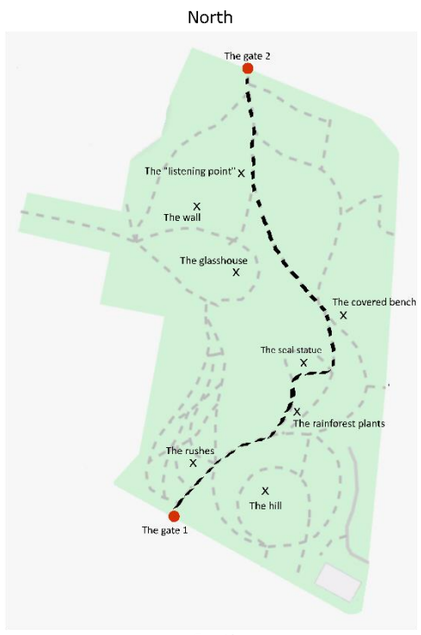
METHOD

PARTICIPANTS

91 young old participants (76 females, *M* age = 21.89, *SD* = 2.25), unfamiliar to the park

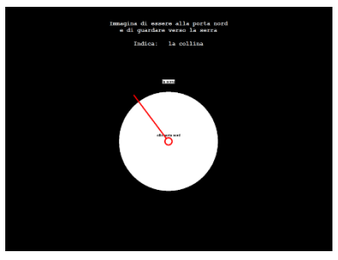
1) LEARNING PHASE (no map available)

46 participants walking from cardinal south to north (SN learning)



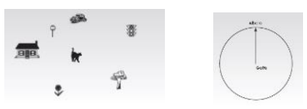
45 participants walking from cardinal north to south (NS learning)

2) RECALL PHASE



SN and NS pointing task

3) VISUOSPATIAL MEASURES



-Object perspective taking task (De Beni et al., 2014; Hegarty & Waller, 2004)

-Sense of direction scale (do you think you have good sense of direction?) Pazzaglia & Meneghetti 2017

RESULTS and DISCUSSION

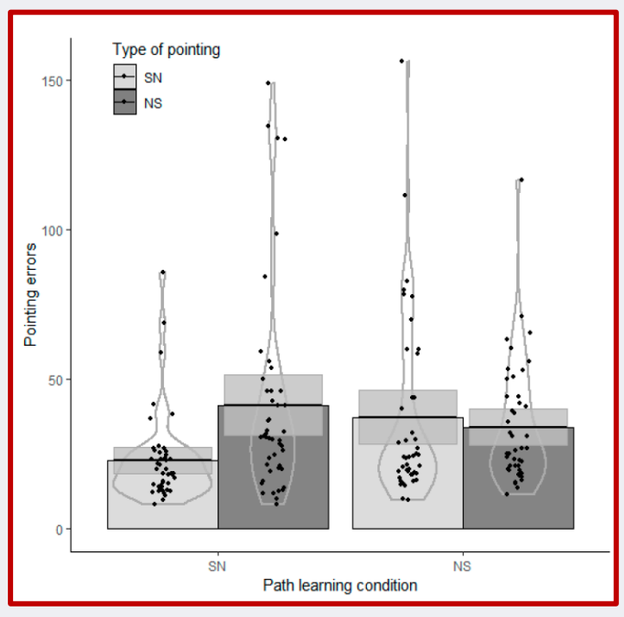
Means and standard deviations by learning condition and correlations between measures of interest

	SN-Learning		NS-Learning		1	2	3
	M	*SD*	*M*	*SD*			
1. sOPT (max. 180° [a])	45.42	26.36	41.39	19.73	-		
2. SDSR (max. 65)	44.33	7.96	46.40	7.77	−0.183	-	
3. SN pointing (max. 180° [a])	22.74	15.07	37.21	30.65	0.313 **	−0.038	-
4. NS pointing (max. 180° [a])	41.27	34.68	33.93	20.17	0.368 ***	−0.107	0.130

sOPT: Short Object Perspective Taking; SDSR: Sense of Direction and Spatial Representation. [a] Degrees of error. ** $p \leq 0.01$; *** $p \leq 0.01$.

Stepwise linear regression models

	AIC	β	*p*
Step 0	1723		
Gender		0.03	0.646
Knowledge of the cardinal north		−0.00	0.988
Step 1	1717		
Learning condition		0.27	0.009
Type of pointing		0.34	0.001
Learning condition × type of pointing		−0.35	0.006
Step 2	1695		
sOPT		0.37	<0.001
SDSR		−0.01	0.889



Learning a path with an initial heading aligned with the cardinal north promotes a north-oriented mental representation

Participants' perspective-taking ability support mental representation accuracy

SN-learning: performance was better (fewer degrees of error) for SN pointing than for NS pointing; NS-learning: performance in SN and NS pointing was similar

CONCLUSION

(i) Mental representations incorporate both initial view and allocentric information (cardinal directions)
(ii) this representation is supported by individual perspective-taking ability

REFERENCES

Hegarty, M.; Richardson, A.E.; Montello, D.R.; Lovelace, K.; Subbiah, I. Development of a self-report measureof environmental spatial ability. Intelligence 2002, 30, 425–447.

Meilinger, T.; Frankenstein, J.;Watanabe, K.; Bültho, H.H.; Hölscher, C. Reference frames in learning from maps and navigation. Psychol. Res. 2015, 79, 1000–1008.

Pazzaglia, F.; Meneghetti, C. Acquiring spatial knowledge from dierent sources and perspectives: Abilities, strategies and representations. In Mind andWorld. Essays Inspired by Barbara Tversky; Zacks, J.M., Taylor, H.A., Eds.; Routledge: Abingdon, UK, 2017; pp. 120–134.

Tlauka, M.; Carter, P.; Mahlberg, T.; Wilson, P.N. The first-perspective alignment e ect: The role of environmental complexity and familiarity with surroundings. Q. J. Exp. Psychol. 2011, 64, 2236–2250.

Wilson, P.N.;Wilson, D.A.; Griffiths, L.; Fox, S. First-perspective spatial alignment effects from real-world exploration. Mem. Cogn. 2007, 35, 1432–1444.