

Cartographic Implications of Geometry Choice in Participatory Mapping: A Comparative Study of Two-Wheeled Urban Mobility in Olomouc and Reykjavík

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Keywords: participatory mapping, cartographic design, geometry, PPGIS, urban mobility, visualization; cycling

Abstract:

Participatory mapping is widely used to collect experiential spatial data in urban mobility research and citizen engagement. However, limited attention has been paid to a fundamental cartographic issue: **how the choice of mapping geometry (points, lines, polygons) shapes both data collection and subsequent representation**. Drawing on perspectives from critical cartography and critical data studies, this paper argues that geometry is not a neutral technical decision, but one that influences how participants conceptualise space, express experiences, and how those experiences are ultimately interpreted.

The paper presents a comparative secondary analysis of two participatory mapping case studies focused on two-wheeled urban mobility ((e)-bikes and (e)-scooters) conducted in Olomouc and Reykjavík using the same online platform, EmotionalMaps.eu (Pánek & Benediktsson, 2017; Ritterová & Pánek, 2026).. In both studies, participants were able to use all three types of inputs (point, line, and polygon) with some limited opportunities to combine them. Comparing two contrasting urban and cultural contexts allows assessment of whether geometry effects remain consistent across settings.

The study addresses three questions: (1) How does geometry influence the type, density, and spatial distribution of collected data? (2) How does geometry affect participants' ability to express mobility-related experiences? (3) What are the consequences of geometry choice for visualisation and interpretation?

Methodologically, the paper combines quantitative spatial analysis (clustering, coverage, overlap, geometry frequency) with qualitative assessment of user inputs and resulting map outputs. It compares how different geometries generate distinct cartographic patterns, including point clusters, route networks, and generalised areas, and how these align with common visualisation techniques such as heat maps, line-density maps, and areal aggregation.

Preliminary results indicate that point data emphasise discrete locations but may oversimplify continuous experiences. Line geometries better capture movement and route perception but create challenges for aggregation and symbolisation. Polygon inputs enable expression of extent and ambiguity, yet often reduce spatial precision. Mixed-geometry inputs appear particularly valuable for representing complex mobility experiences.

By explicitly linking participatory data collection design with cartographic outcomes, the paper reframes participatory mapping as a cartographic practice rather than merely a data-gathering method. The findings are relevant for cartographers, GIScientists, and planners designing participatory tools that better reflect lived mobility experiences and support sustainable urban transport planning.

Acknowledgements

Funded by the Internal Grant Agency of Palacký University Olomouc, Faculty of Science, grant number: IGA_PrF_2026_026.

References

- Pánek, J., & Benediktsson, K. (2017). Emotional mapping and its participatory potential: Opinions about cycling conditions in Reykjavík, Iceland. *Cities*, 61, 65–73. <https://doi.org/10.1016/j.cities.2016.11.005>
- Ritterová, D., & Pánek, J. (2026). Sustainable two-wheeled mobility in Olomouc: a participatory mapping approach. *Journal of Maps*, 22(1). <https://doi.org/10.1080/17445647.2026.2644002>