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Where we grow up influences our sense of direction

- A study has found that our spatial navigation ability in adulthood is explained in large part by the topography of the place where we grew up.
- People who grew up in a complex city such as Paris had a better sense of direction than those who grew up in a "grid-lined" city like Chicago, for example.
- These results were obtained by comparing the performance of nearly 400,000 people from 38 different countries who played a video game, Sea Hero Quest.

An international research team co-led by a CNRS researcher has demonstrated that people's spatial navigation ability is influenced by their geographical origin. Growing up in rural or urban areas, or in cities of varying complexity, influences our sense of direction in adulthood. These results, published in Nature on 30 February 2022, were obtained using data collected from the video game Sea Hero Quest.

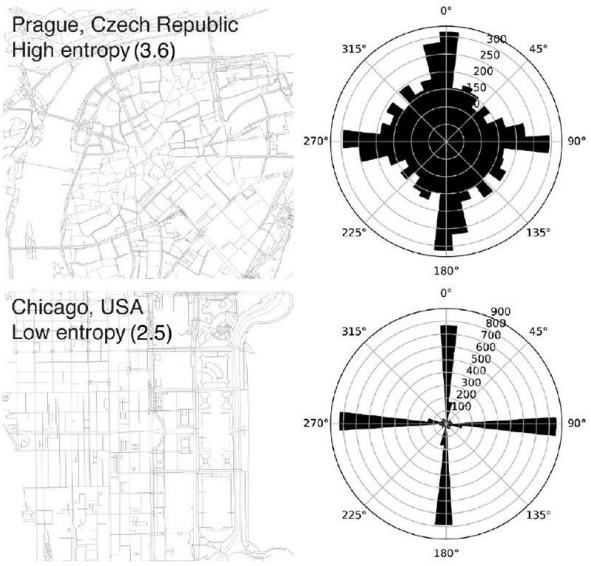
The streets, alleys, paths and parks of our childhood leave a strong mark on us, with heretofore unsuspected benefits. A research team led by scientists from the Laboratoire d'Informatique en Image et Systèmes d'Information (LIRIS, CNRS/INSA Lyon/Université Claude Bernard Lyon 1) and the Institute of Behavioural Neurosciences at University College London has found that where people grow up influences their sense of direction in adulthood. From a diverse set of origins, from rural to cities of varying complexity, they had uneven skills in terms of orienting themselves.

First, the scientists have found that, on average, people who grew up in the countryside have a better sense of direction than people who grew up in cities. This extent of this difference varies from country to country: very strong in Canada, the United States, Argentina and Saudi Arabia, much less so in Austria, France, India and Vietnam.

The research team then looked at the maps of the major cities in these countries to categorize them according to layout complexity. While cities like Chicago are arranged in grids, with most branch lines at a right angle, cities like Paris form a more heterogeneous network, with nearly every angle present. Thus, according to their results, growing up in a city with a complex topography confers a better sense of direction.

The research also shows that people generally orient themselves better when confronted with topographies close to those travelled during childhood: they are better at navigating great distances if they come from rural areas, and better on a grid plan if they grew up in a city "with right angles".

These results were achieved with Sea Hero Quest, a video game developed to study Alzheimer's disease. After having memorized the game map, players are set objectives at several levels. It can be difficult to recruit participants to an experiment, and even more so to reproduce an experiment under identical conditions, and video gaming is a way to address these problems. For this study, from Sea Hero Quest we compared the sense of direction of nearly 400,000 people in 38 countries around the world.



Comparison of the complexity (and entropy) of two major cities, Prague and Chicago. The circles on the right show the number of branches with given angles: almost all angles are represented in Prague, while the Chicago crossroads are almost all at right angles.
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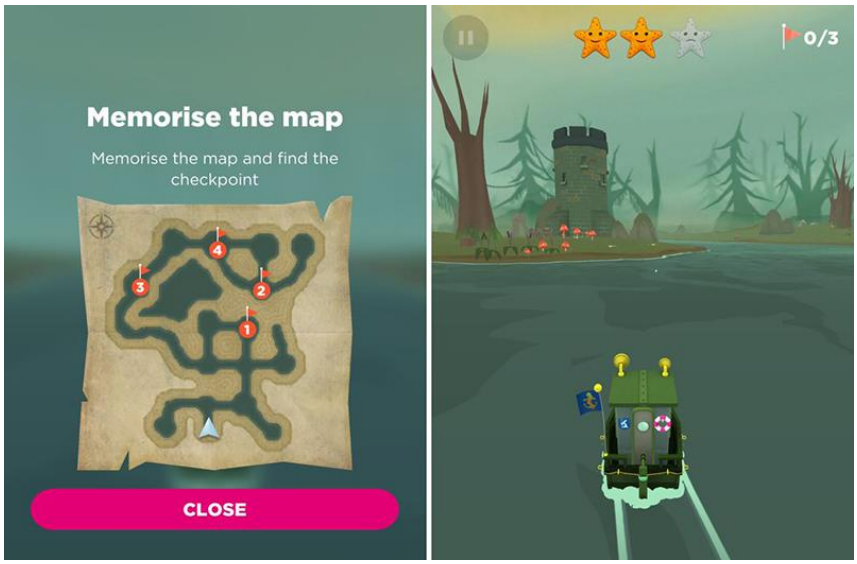

Sea Hero Quest game interface. At the beginning of each level, the players must memorize the map of the area (right) and then reach the goal points in the correct order by locating themselves in the environment (left).
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Video recordings of sample levels of Sea Hero Quest are available here**.**

Bibliography

Entropy of city street networks linked to future spatial navigation ability. Coutrot, A, Manley, E., Goodroe, S., Gahnstrom, C., Filomena, G., Yesiltepe, D., Dalton, R.C., Wiener, J. M., Hölscher, C., Hornberger, M. and Spiers, H. J. *Nature*, 30 March 2022. DOI:10.1038/s41586-022-04486-7

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