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Nordic nations, North Americans and Antipodeans rank top in navigation skills

People in Nordic countries, North America, Australia, and New Zealand have the best spatial navigational abilities, according to a new international study involving Northumbria University, Newcastle.

The findings, which have been published today in Current Biology, emerged after researchers assessed data from over half a million people in 57 countries who had played a specially-designed mobile game. *Sea Hero Quest* was developed to aid understanding into spatial navigation, which is a key indicator in Alzheimer's disease.

With so many people taking part, the team were able to reveal that spatial navigation ability across all countries declines steadily across adulthood. They also found that men performed better than women, but the gender gap narrowed in countries with greater gender equality,

A country's GDP also had a significant bearing with Nordic countries among the highest performing along with those in North America, Australia, and New Zealand.

The *Current Biology* paper is the first publication of findings from a collaborative project led by Deutsche Telekom, using Sea Hero Quest. Researchers from UCL, the University of East Anglia, McGill University, Bournemouth University, ETH Zurich and Northumbria University are involved in this major project, which is seeking to establish benchmarks in navigation abilities as people play a game exploring a sea world, in order to help dementia research.

[Professor Ruth Dalton](#), Head of Northumbria's Department of [Architecture and Built Environment,](#) is an expert in building usability and wayfinding. She helped the game developers to design virtual levels that can examine how people are finding their way around without getting lost.

She said: "It is really exciting to see this first publication emerge from the Sea Hero Quest team in which we show, for the first time, significant differences in navigational ability of players of the game depending upon their country of origin as well as fascinating correlations with other factors.

"This will be the first of many papers as we begin to interrogate the vast data set produced via the Sea Hero Quest mobile game, ultimately leading us to creating a test for dementia which is our final goal."

The study's lead author, Professor Hugo Spiers of UCL, said: "We've found that the environment you live in has an impact on your spatial navigation abilities. We're continuing to analyse the data and hope to gain a better understanding of why people in some countries perform better than others."

[How Sea Hero Quest will help the fight against dementia](#) from [Northumbria University](#) on [Vimeo](#).

In total, data has been collected from over four million people who have played Sea Hero Quest game. However, for this particular study, the researchers restricted the data to those who had provided their age, gender and nationality, and were from countries with at least 500 participants.

As part of their analysis, the research team corrected for video game ability by comparing participants' main results to their performance in tutorial levels which assessed aptitude with video games.

While age most strongly correlated with navigational performance, researchers also found that country wealth, as measured by GDP (gross domestic product), correlated with performance. The researchers say this relationship may be due to associations with education standards, health and ability to travel. They focused on GDP for this analysis as it was a standard metric available for every country, but as part of the ongoing research project they will follow up with further comparisons of other factors.

The researchers also speculate about more specific factors. Top performing countries including Finland, Denmark, and Norway all share a national interest in orienteering, a sport relying on navigation, while the other top performing countries – New Zealand, Canada, the United States, and Australia – all have high rates of driving, which may also boost navigation

ability.

Comparing the country-level results to the World Economic Forum's Gender Gap Index, the researchers found a correlation between country-wide gender inequality and a larger male advantage in spatial navigation ability. The gender gap in game performance was also smaller in countries with greater economic wealth.

"Our findings suggest that sex differences in cognitive abilities are not fixed, but instead are influenced by cultural environments, such as the role of women in society," said study co-author Dr Antoine Coutrot, who completed the research at UCL before moving to the French National Centre for Scientific Research (CNRS).

Gender equality has previously been found to eliminate differences in maths performance in school. The current study is the first to connect gender inequality to a more specific cognitive measure.

The researchers say that an adapted version of the game, which was first launched by Deutsche Telekom in 2016, may be used in the future as a screening tool for an early warning sign of dementia. It could also be used as a means to monitor disease progress and as an outcome measure for clinical trials.

"Standard current tests for dementia don't effectively tap into the primary initial symptom of being disoriented in space, so we are trying to find an easy way of measuring that, efficiently validated by crowd-sourcing our data," said Professor Spiers.

"It's promising to see that the effect of nationality is relatively small, as it suggests that the game could be used as a relatively universal test for spatial navigation abilities," said co-lead author Professor Michael Hornberger (The University of East Anglia).

The data collected by Sea Hero Quest is stored in a secure T-Systems server in Germany and all analysis is conducted on entirely anonymous data.

From September 2018, Deutsche Telekom will be providing access to this unprecedented data to aid future discoveries, not only in dementia but across

the wider field of neuroscience research.

Access will be granted via a bespoke, secure web portal, allowing cloud based analysis of the data. It is facilitated by T-Systems.

"We are excited to announce that we will be making this unique data set accessible to researchers across the world to continue to support studies of this kind," said Deutsche Telekom Chief Brand Officer, Hans-Christian Schwingen.

"Sea Hero Quest demonstrates the power of mobile technology in helping to collect important data at scale, advancing research into some of the most pressing healthcare issues of our time."

Tim Parry, Director at Alzheimer's Research UK, which funded the analysis, added: "The data from Sea Hero Quest is providing an unparalleled benchmark for how human navigation varies and changes across age, location and other factors.

"The ambition is to use these data insights to inform the development of more sensitive diagnostic tools for diseases like Alzheimer's, where navigational abilities can be compromised early on. With such a huge number of people participating in Sea Hero Quest, this really is only the beginning of what we might learn about navigation from this powerful analysis."

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Contacts

Rik Kendall
Press Contact
PR and Media Manager
Business and Law / Arts, Design & Social Sciences
rik.kendall@northumbria.ac.uk
07923 382339

Andrea Slowey
Press Contact
PR and Media Manager
Engineering and Environment / Health and Life Sciences
andrea.slowey@northumbria.ac.uk
07708 509436

Rachael Barwick
Press Contact
PR and Media Manager
rachael.barwick@northumbria.ac.uk
07377422415

James Fox
Press Contact
Student Communications Manager
james2.fox@northumbria.ac.uk

Kelly Elliott
Press Contact
PR and Media Officer
kelly2.elliott@northumbria.ac.uk

Gemma Brown
Press Contact
PR and Media Officer
gemma6.brown@northumbria.ac.uk