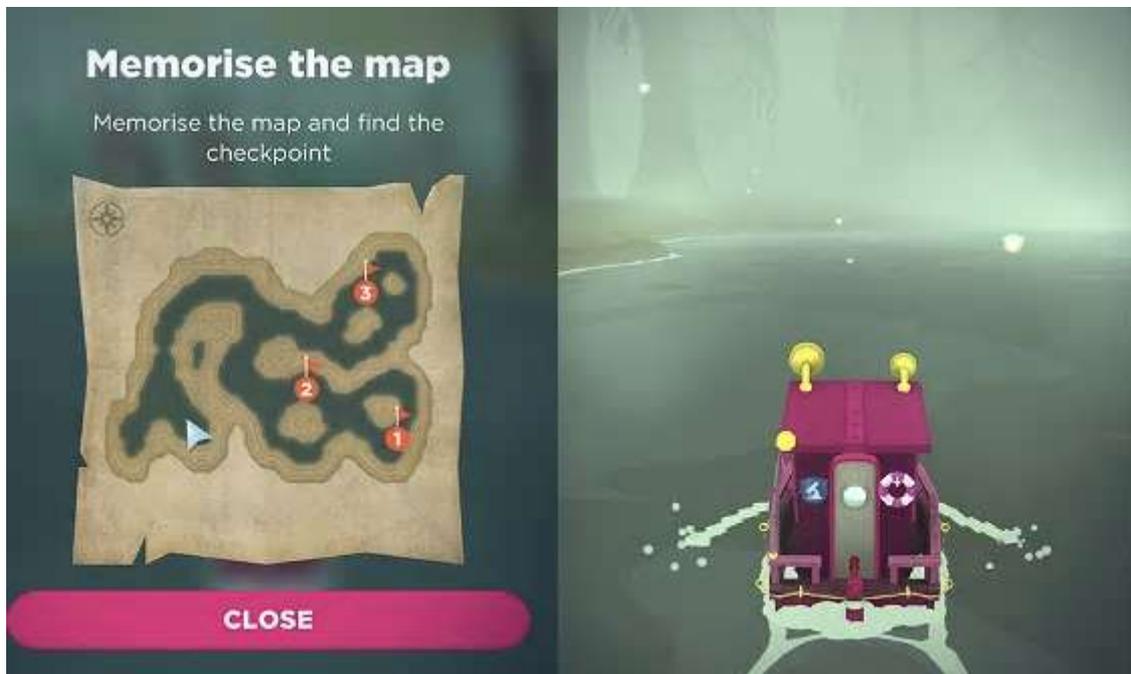


Sea Hero Quest: how a new mobile game can help us understand dementia



By understanding how healthy people steer around their environment, scientists hopes to pin down how spatial navigation goes wrong in Alzheimer's disease

Sea Hero Quest is a new mobile game which neuroscientists hope will provide new insights into spatial awareness and help tackle dementia. Photograph: *Glitcher*

If there's one thing that I've learned in the few short years that I've been a fully-fledged scientist, it's that time is one of the most valuable commodities that you can give a researcher. In all its myriad forms, time is invaluable to the scientific process - time to develop ideas, time to write grants. The time that you need to run an experiment. Critically, the time that participants are willing to give you in the pursuit of knowledge. It's a precious thing, for everyone involved.

Like with many things we take for granted, it's easy to forget the importance of time until it's gone. This is a point that becomes acutely salient in the case of [Alzheimer's disease](#). Once a definitive diagnosis has been made, the average life expectancy for patients with the disease is around six years. It robs people of their future, but more than that, Alzheimer's disease robs them of their past - short term memory loss is a common indicator, and as the disease progresses, it can eat into memories from earlier in life.

But it's not just time that's an issue when it comes to Alzheimer's disease. Space is a problem too - or rather, spatial navigation. Being able to successfully steer your way around different sorts of surroundings is obviously a pretty important skill to have. Broadly, there are two frames of reference that you can use to do it. 'Egocentric' frames of reference rely on remembering the locations of landmarks in relation to your own body - so, for instance, if you take a fixed route to work, you might learn to turn left at the shop, then turn right when you see the petrol station. In contrast, 'allocentric' navigation relies on creating and remembering a mental map of an environment, and remembering the location of landmarks in relation to other landmarks. Deficits in both of these navigation systems [appear in the early stages of Alzheimer's disease](#), but the precise way in which they decline isn't yet fully understood. Part of the problem is that we don't really have a good grasp of how healthy people use these systems, or what they do when they get lost. That has important implications in the clinic, because if a patient presents with spatial navigation problems, it's can be difficult to tell whether that's because they are showing signs of dementia, or whether it's just because they're generally poor at navigation.

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Study shows inflammation-reducing chemical prevents memory and behavioural problems in diseased mice, raising hopes for human treatment

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This is where a team led by Professor Michael Hornberger at UEA and Dr Hugo Spiers at UCL come in. At the start of May, they launched a new mobile game called [Sea Hero Quest](#). The game puts you in the shoes of an unnamed sailor, whose father is slowly losing memories of his life as a seafaring explorer. To try and help him remember his past, your job is to travel around cartoon waterways in search of pieces of his old journal. At the start of a level, you're given a top-down map of the waterways that shows a number of buoy markers you need to navigate through. Once you've memorised it, you simply need to sail your ship around the 3D world and hit each buoy in numerical order. The information about the route you take, and what you do if you get lost, is saved and transmitted for further analysis.

"The idea was to create a global benchmark for navigation behaviour in healthy people on a population level," says Professor Hornberger. "The perfect way to do this was via online gaming, as many online games use virtual reality and can be played anywhere." By getting this sort of data in a huge sample of people, the idea is that Hornberger and Spiers can gain a more nuanced insight into whether there are any differences in how people of different ages, sex and even geographical location navigate. "For example, what is the normal navigation for a 55

year old man from England?" Hornberger explains. "The game is meant to be challenging, as we want to see how healthy people navigate and get lost. This will then inform new approaches towards dementia diagnosis and management."

Detecting dementia: the first steps towards dignity

While we are a long way off a cure for dementia, new techniques might help us in the drive to identify it earlier, explains **Tania Browne**

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While the game can't be used to diagnose dementia, the data collected from it has the potential to inform a wealth of research into Alzheimer's disease in the future. "We are sampling the position and heading direction from each player in the game every 500ms, which will allow us to use artificial intelligence approaches on the data to potentially predict where people get lost," explains Hornberger. Ultimately then, by understanding how healthy people lose their way, and whether there are any systematic patterns in the decline of spatial navigation abilities over time, it might be possible to better adapt the environments that people with Alzheimer's disease live in - from care homes to entire towns.

Sea Hero Quest took 12 months to set up and launch, and initially, will be available to download until the end of the year. Hornberger explains that the goal by then was to have 100,000 people play the game for at least two minutes. As of this week, it's been downloaded over 960,000 times. The plan is to update

the app in June, with more levels that investigate other aspects of spatial navigation.

"From the beginning it was clear to us that we didn't want to create another online cognitive experiment - instead we wanted to have a fun, casual mobile game which would collect valid scientific data," Hornberger says. "This was also important so that we wouldn't only get citizen scientists playing the game, but the general public." The key to this experiment being a success, then, is to get the best possible representation of the population at large. For that, all the research team needs is two minutes of time from as many people as possible. Two minutes. Nothing really, in the grand scheme of things. But in the quest to understand dementia, it could mean a potential lifetime.