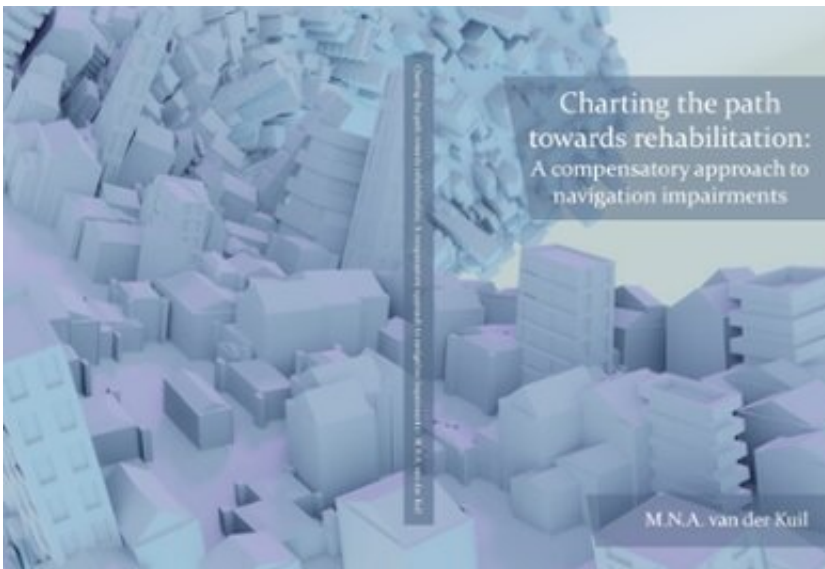


Virtual game helps people with acquired brain injury relearn how to navigate

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Cover of Milan van der Kuil's dissertation. Credit: Leiden University

When trying to find their way, some people pay attention to their surroundings while others remember where they need to turn left or right. People with acquired brain injury (ABI) report having problems with navigation.

To help them relearn how to navigate, neuroscientist Milan van der Kuil has developed a virtual game that serves as [rehabilitation therapy](#). Van der Kuil's Ph.D. defense will take place on 24 January.

When someone has difficulty with egocentric navigation caused by [brain damage](#), it helps to develop the alternative—allocentric—strategy: Pay attention to recognizable landmarks in the surrounding area and try to make a mental map of the environment. Conversely, people who have lost this bird's eye view benefit from learning an egocentric strategy for a fixed route. Van der Kuil states, "People with acquired [brain injury](#) can use this game to practice using these allocentric or egocentric strategies at home."

Easy to walk around in a virtual environment

But first patients have to understand their limitations and know what their strengths are. Van der Kuil therefore looked at how to explain this as clearly as possible so that people with this impairment know what they can do well and what the different ways are of coping with their limitations and using their strengths.

"People have to practice with complex theory and a [computer game](#)," Van der Kuil says. He therefore carried out a user-friendliness study and studied how people are able to walk around as easily as possible in a virtual environment and absorb information effortlessly. What did the participants think of the software? "They were enthusiastic, and thought it was fun and easy to use."

Is it possible to influence navigation strategy?

Van der Kuil looked at the extent to which you can influence someone's navigation strategy using external training by conducting a validation study with students as a proof of concept. In the experimental group, 50% of the participants changed strategy, which was more often than the [control group](#). In particular, students who followed the egocentric training switched from an allocentric to an egocentric strategy. Van der

Kuil suspects that was because in this task egocentric navigation was less taxing.

Van der Kuil demonstrated that the training also works in practice in a study with patients who experienced navigation problems. He divided them into two groups: A test group and a control group. He used a questionnaire to determine the extent of the navigation problems experienced by the test persons. Further on in his Ph.D. research he went on to assess patient goals and set objective measurements.

One participant's rehabilitation goal was, "I want to do my shopping myself again." Van der Kuil had to make this kind of goal measurable by quantifying the goal together with the patient and expressing it in a range. For example, it is completely impossible to find the way; halfway together with a partner; halfway without a partner; the whole way with a partner; the whole way alone.

Rehabilitation therapy

The study showed that patients experienced fewer problems with navigation after taking part in the training. They also achieved their rehabilitation goals. The objective measure for navigation skills did not improve, but, as Van der Kuil explains, the training was focused on developing a compensation strategy, not on training particular skills.

"This is the first standardized rehabilitation [training](#) that can in principle be used for all kinds of navigation problems," he claims. He advises those treating patients with acquired brain injury to screen their patients for [navigation](#) problems using the 'Wayfinding questionnaire' and the Leiden Navigation Test, both of which have been developed in the Leiden Navigation Lab. "You can then determine whether the [rehabilitation](#) therapy is appropriate for the patient."

Provided by Leiden University

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