Claessen, M. (2017). Lost after stroke: Theory, assessment, and rehabilitation of navigation impairment.

The general objective of this thesis was to better understand the navigation problems that nearly a third of stroke patients are faced with. Insight into these types of problems is currently very limited in this patient group. I adopted four approaches to address this main objective, corresponding to the four parts of the thesis. In the first part, I performed a systematic inventory and interpretation of neuropsychological case studies on patients with navigation problems. This literature review led to a model describing three main types of navigation impairments. One type of navigation impairment is related to defective knowledge of landmarks or environmental scenes. These patients experience navigation problems as they are unable to recognize or use landmarks for navigational purposes. I also identified location-based navigation impairment as a distinct category. These patients have difficulties with knowledge about locations and their interrelationships. Lastly, defective path knowledge can lead to navigation problems. The aim of the second part was to develop both a subjective and an objective assessment instrument of navigation ability, eligible for implementation in clinical practice. The Wayfinding Questionnaire (WQ) was found to be internally valid and clinically relevant to serve as a self-report screening instrument for navigation-related complaints. The WQ helps the clinician in determining whether additional and objective assessment of navigation ability would be advisable. This can be done by way of the Virtual Tübingen (VT) test, a comprehensive navigation test battery which allows for detailed assessment of the multiple aspects of navigational knowledge. Importantly, the VT test was found to be a valid alternative to real-world navigation tests, which are associated with many practical limitations. Regarding the aim of the third part, I illustrated how to design navigation assessment in a theory-driven manner (based on the model presented in Part 1) by making use of the VT test in individual patients and groups of patients. This approach connects the theoretical and clinical views on the study of navigation ability. In the fourth part, I explored rehabilitation possibilities for patients with impaired navigation ability. My navigation training was the first to rehabilitate patients with navigation problems by teaching them to adopt an alternative navigation strategy using virtual reality techniques. In general, this thesis serves as a bridge between scientific research and clinical practice, and, as such, should be interpreted as an attempt to bring these two fields closer together. That is, the basic knowledge on the (neuro)cognitive architecture of navigation ability arising from this thesis (see Chapter 2 and Part 3) was successfully translated into clinical applications for assessment (see Part 2) and rehabilitation of navigation ability in brain-damaged patients (see Part 4).