Curriculum Vitae

Zurich, 1. Feb 2021

1. Personal information

Family name	Klaver
Given name	Peter
Place of birth	Utrecht, NL
Date of birth	11.06.1971
Nationality	Dutch, Swiss
Marital status	married, 2 children
Email	peter.klaver@hfh.ch
OrcID	0000-0002-6541-9975
ResearchGate	https://www.researchgate.net/profile/Peter_Klaver

2. Education

2017	Titular professsor in psychology, University of Zurich
2011	Habilitation, *venia legendi* in psychology, University of Zurich "On the harmonious meeting of visual perception and memory circuitries"
1996-1999	PhD (2001) Otto-von-Guericke University Magdeburg «Visual attention and short-term memory: mechanisms of working memory as seen from a cognitive neuroscience perspective"
1989-1995	MSc (1995) University of Groningen, Experimental Psychology/Psychophysiology

3. Positions

Since 2018	Head Centre for Research and Development, University of Applied Sciences in Special Needs Education
2015-2019	Senior lecturer in developmental cognitive neuroscience, School of Psychology, University of Surrey, UK
Since 2015	Guest lecturer, Institute of Psychology, University of Zurich
2010-2015	Lecturer/research group leader, Institute of Psychology, University of Zurich
2009-2010	Research group leader, Centre for MR Research, University Children's Hospital ZH
2006-2008	Postdoctoral fellow, Centre for MR Research, University Children's Hospital Zurich
2005-2006	Postdoctoral fellow, Institute of Psychology, University of Zurich
2000-2004	Postdoctoral fellow, Clinic of Epileptology, University Hospital Bonn, DE

4. Institutional responsibilities

Head Centre for Research and Development, Lecturer and principal investigator of several projects with collaborations at the UZH, ETH and University Children's Hospital Zurich; Guest lecturer at the University of Zurich

5. Approved research projects

2021-2024	SNSF Research Infrastructures "ZEPPELIN Longitudinal Study –Follow-up", Co-PI, CHF 850'000
2016-2018	Faculty Research Support Fund, University of Surrey, FHMS "The impact of maternal iodine deficiency during pregnancy on long-term brain development: an AVON Longitudinal Study of Parents and Children (ALSPAC)", PI, GBP 5'442

2011-2013	Zurich Center for Integrative Human Physiology “Linking the major system markers for typical and atypical brain development: a multimodal imaging and spectroscopy study”, Co-PI, CHF 646’727
2009-2012	SNSF “Common neural mechanisms of working memory and episodic memory in typical and atypical development”, PI, CHF 318’296
2007-2008	Hartmann-Müller Foundation “Visual perception in very low birth weight children: relating fMRI to neurodevelopmental profiles”, PI, CHF 46’230

Total amount CHF 1’967’794

6. Supervision of junior researchers

PhD	University of Zurich: Daiming Xiu, Carmen Ghisleni, David Yoh von Allmen, Karoline Wurmitzer, Sanne van der Mark, Janine Lichtensteiger, Mengia Dosch, Stephanie Rotzer
MSc (< 5 years)	Surrey: David Plans, Imogen Whiteside, Alyssa McGranahan, Tien Pham, Alex Tindale, Naomi Kefford, Achvini Sriskanthanathan; Zurich: Simone Blaser

7. Teaching activities

PhD	Lecturer at the ZNZ PhD program and Zurich Center for Integrative Human Physiology (ZIHP) at the University of Zurich. Member of PhD steering and exam committees of PhD candidates since 2010 (Surrey: James Ebajemito, Leo Furlan, Alison Cooper; Ghent: Michel Quak; Wurzburg: Maximilian Geiger; Zurich: Anastasios Ziogas, Judith Graser, Katrin Preller, Sandy Krammer, Aline Studerus-Germann; Bern: Katharina Wehrmann).
MSc	Head research methods in psychology program at the University of Surrey, Numerous MSc courses in psychological neuroscience and developmental disorders at the University of Surrey (2015-2018) and UZH (2008-2018)
MA	Lectures at the University of Teacher Education in Special Needs (since 2008)
BA	Numerous BA courses in psychological neuroscience and developmental disorders at the University of Surrey (2015-2018) and UZH (2010-2015)

8. Memberships in panels, boards and review activities

Associate Editor	Frontiers in Developmental Psychology
Reviewer (selection)	Child Neuropsychology, Cognition & Emotion, Cerebral Cortex, Current Biology, Developmental Medicine & Child Neurology, Developmental Neuropsychology, Developmental Psychology, Developmental Science, Frontiers in Behavioral Neuroscience, Neuropsychologia, Pediatric Research, Swiss Journal of Psychology
Grant reviewer	Action Medical Research, BBS Research Counsil UK, India Aliance System, Leverhulme Trust, Luxemburg National Research Fund (FNR), MRC Research Counsil UK, Wellcome Trust DBT fellowship
Ethics committees	University of Surrey (2017-2018), University of Zurich, Faculty of Arts (2011-2014)
Steering committees	Institute of Psychology Steering Committee, UZH (delegate 2011-2014), Schweizer Zentrum für Heilpädagogik (since 2019), Founding member and member steering committee of the Zurich Developmental Science Network (founded 2019), member of the Kommission F&E Kammer PH (since 2019)

9. Active memberships in scientific societies

Organization of Human Brain Mapping, Society for Psychophysiological Research, German Psychological Society, Schweizer Zentrum für Heilpädagogik (SZH)

10. Prizes, awards, fellowships

DGPs	PhD stipend (1996-1999)

11. Career breaks

2015	appointment search after being on temporary contracts at the UZH (Mar-Aug 2015)
1999-2000	appointment search after being on temporary contract during PhD at the University of Magdeburg (Oct 1999-Mar 2000)

Major scientific achievements

How do humans acquire knowledge about the world? Answering this question is central for the understanding and promoting of children's achievement at school and further academic and work career. Within this field of research my focus lies on the study of the psychological and biological underpinnings of typical and atypical development of learning, memory and higher visual cognition. Specifically, I aim at unraveling how two dominant neural systems, the ventral and dorsal visual system support learning and memory and how early developmental risk factors affect learning through these systems. I pursue the hypothesis that both visual systems independently support learning and memory. The ventral system largely supports episodic memory formation and is primarily influenced by bottom-up processing, the dorsal system supports working memory processing and episodic memory retrieval and is under influence of top-down mechanisms. The hippocampus is an important target brain region in that study, as it is vulnerable for early biological and psychological stress, it is central area for learning and memory and it has a unique developmental trajectory that interacts with both dorsal and ventral visual streams.

VISUAL KNOWLEDGE ACQUISITION

A central idea is that dorsal and ventral visual streams support memory under the modulatory influence of attention and executive control. This idea is supported by my discoveries of a neural marker of visual working memory, which I used to show that visual working memory depends on sustained visual-spatial attention (Klaver, Talsma et al., 1999; Klaver, Smid et al., 1999; Talsma, Wijers et al., 2001). I could further demonstrate that semantic knowledge biases memory formation in the ventral visual stream and hippocampus (Fernández, Klaver et al., 2002; Klaver, Fell et al., 2005; Klaver, Schnaidt et al., 2007), emotional arousal modulates the ventral visual stream during memory formation in a bottom-up fashion (Xiu, Geiger et al. 2015), fast temporary neural binding between the anterior ventral visual stream and the hippocampus supports memory formation (Fell, Klaver et al., 2001, 2003), and inter-hemisphere connectivity supports memory consolidation (Geiger, O'Gorman et al., 2016). My recent findings that neural activity in the hippocampus supports verbal and visual working memory in parallel to a dorsal neural network (Von Allmen, Wurmitzer et al., 2013, Boran, Fedele et al., 2019, Boran, Hilfiker et al., 2020), that memory load and visual cues bias capturing of visual selective attention (Klaver, Fell et al., 2004; Klaver & Talsma, 2013) and that learning through useful feedback is modulated by frontal activity (Dainton, Winstone et al. 2020) further strengthen the idea that attention supports memory processing in ventral and dorsal visual streams in bottom-up and top-down processing lines, respectively.

DEVELOPMENT of VISUAL KNOWLEDGE ACQUISITION

Individual differences in the development of executive functioning and attention are important predictors for school and academic achievement and central for the study of knowledge acquisition. Congruously, I studied the differential developmental trajectories of neural systems underlying learning, memory and higher visual cognition. In several studies I found that early maturing brain areas are used more extensively when high order areas are not yet specialized and that functional specialization in late maturing brain areas depends on a dorsal attention network. I could observe such mechanisms in the visual and memory system. Visual dorsal and ventral streams show dissociable developmental trajectories. Early maturing areas are used more extensively and later maturing specialized areas are used less extensively at younger age (Klaver, Lichtensteiger et al. 2008; Lichtensteiger, Loenneker et al. 2008; Loenneker, Klaver et al. 2011; Klaver, Marcar et al. 2011). In the memory system, the posterior

hippocampus plays a more important role in visual working memory capacity in children as compared with adults, while functional specialization in the anterior hippocampus and depends on activity in the dorsal attention network (Von Allmen, Wurmitzer et al., 2014). Glutamate mediated synaptic pruning might play a role in these specialization processes (Ghisleni, Bollmann et al., 2015).

DISORDERS of VISUAL KNOWLEDGE ACQUISITION

How can we help children with learning difficulties? My aim is to promote the research on prevention, intervention and training of learning difficulties by studying psychological and biological mechanisms of knowledge acquisition in these children and in children who are at risk for learning disorders. My involvement as co-PI in the recently awarded ZEPPELIN 9-13 project fits in this pursuit. There I am interested in the development of resilience and recovery of neurocognitive functioning of children following early invention in families at risk. The REVISA project evaluates educational support for children with vision deficiencies. Earlier projects were funded by the Hartmann-Müller Foundation ("Visual perception in very low birth weight children: relating fMRI to neurodevelopmental profiles") and SNF ("Common neural mechanisms of working memory and episodic memory in typical and atypical development"). I found that impaired neural specialization of high order visual functions depends on the functional connectivity with areas that have a critical developmental burst during the period of premature birth (Klaver, Latal et al. 2015). I also found evidence that deficient functional specialization in the ventral visual stream relates to an impaired dorsal attention network in children with learning disorders such as developmental dyslexia (Van der Mark, Bucher et al. 2009, Van der Mark, Klaver et al. 2011), developmental dyscalculia (Rotzer, Loenneker et al. 2009), and ADHD (Bollmann, Ghisleni et al., 2017). In a sample of adolescents who were surgically corrected for congenital heart disease we found evidence for brain abnormalities that are predictive for IQ (Von Rhein, Buchmann et al. 2014) and functional reorganization of working memory related neural networks (Klaver, Knirsch, et al., 2016). In my recent studies I collaborated with researchers who found negative impact of maternal deficiency on children's intellectual ability (Bath et al. 2013) to test if maternal iodine predicts cognitive and brain development using data from the Avon longitudinal study on parents and children (ALSPAC).

METHODOLOGY, NETWORKS, PHYSIOLOGY and HORMONES

Understanding knowledge acquisition cannot be achieved without developing research methods further. I therefore put much emphasis on methodological development. In several studies I developed novel neuroimaging tools and experimental designs. For example, in Klaver, Talsma et al (1999) I was the first to report the contralateral negative slow ERP wave (CNSW), which is now used extensively in the field of working memory research (cf. CDA in Vogel & Machizawa 2004). In Fell, Klaver et al. (2001, 2003) I helped developing tools for intracranial EEG analyses to investigate neural communication between subregions of the medial temporal lobe during memory formation in patients with intractable epilepsy. In Klaver, Lichtensteiger et al. (2008) and Lichtensteiger, Loenneker et al. (2008) we set up a suitable environment for scanning children from six years onwards and in Loenneker, Klaver et al. (2011) I developed structural connectivity tools to investigate age dependent architectural restructuring of pathways within the visual system. I have further used multimodal imaging and spectroscopy studies and developed methods to integrate the techniques. For example, we investigated the neural development of functional connectivity in dependence of GABA/glutamate in the saliency and executive network (Ghisleni, Bollmann et al. 2015). We could show that a decrease in glutamate with age mediated a decrease in subcortical functional connectivity, suggesting that synaptic pruning supports both glutamate decrease and focalization of neural networks during development. In recent studies I have worked on methods to record mobile EEG in real life situations. In one supervised MSc thesis at the University of Surrey, I used mobile EEG during car driving in order to test whether reduction of attention span is measurable via mobile EEG. In a current project I am developing useful measures of brain synchronization via mobile EEG to test brain-to-brain interactions between students and the effect of that interaction on learning. I expect that such measures become relevant as an early measure for predicting social and behavioral maladaptation or resilience of children at risk such as in the ZEPPELIN project.