University of Amsterdam

Symposium

Transience vs. Persistence

of emotional memories

Emotional events have a privileged status in memory. In extreme cases, emotional memories can become debilitating as for instance seen in post-traumatic stress disorder (PTSD).

In this multidisciplinary symposium, internationally renowned experts including Honorary Frijda Chair Stephen Maren will address questions including: How are emotional memories represented in the brain? Under what conditions do emotional memories come to expression, and when do they become susceptible to change? How can the science of memory plasticity be harnessed for treatment development?

29 June 2023
09.00-18.30

Speakers
Aline Desmedt, Université de Bordeaux
Nikolai Axmacher, Ruhr-Universität Bochum
Jay Gottfried, University of Pennsylvania
Merel Kindt, University of Amsterdam
Emily Holmes, Uppsala University

Visiting Honorary Chair in Cognitive Science
Stephen Maren, Texas A&M University

Vlaams Cultuurhuis de Brakke Grond
Nes 45
1012 KD Amsterdam

abc amsterdam brain & cognition

Register now!

For registration & more information:
abcsymposium.nl

Time	Topic	Lecturer
09.00-09.30	Registration at De Brakke Grond	
09:30-09:45	Introduction to the symposium	
09:45-10:45	*Frijda lecture:* Hippocampal engrams and emotional memory	Prof. dr. Stephen Maren
10:45-11:15	Coffee break	
11:15-12:00	Contextualizing trauma-related memory prevents and/or treats PTSD-like memory	Prof. dr. Aline Desmedt
12.00-13.45	Lunch break & poster session at room 'de Tuinzaal'	
13:45-15:15	Memory traces of stressful and traumatic experiences	Prof. dr. Nikolai Axmacher
	The Noxious, the Sublime, and the Aroma of Stroopwafel	Dr. Jay Gottfried
15:15-15:45	Coffee Break	
15:45-17:15	Emotional Memory: An Emergent Phenomenon	Prof. dr. Merel Kindt
	Mental imagery and reducing intrusive memories after trauma	Prof. dr. Emily Holmes
17:15-17:30	Poster prizes & concluding remarks	
17.30-18.30	Drinks	

Prof. dr. Stephen Maren
Texas A&M University, USA

Hippocampal engrams and emotional memory

Recent advances have unveiled new methods to capture and manipulate neuronal ensembles—so-called "engrams"—that mediate memory. Several lines of work now suggest that emotional memories that underlie clinical disorders of fear and anxiety may be encoded within engrams in the hippocampus. Reactivating and manipulating these ensembles may prove effective for therapeutic reductions in fear. In the clinic, incidental or imaginal reminders are used for safe retrieval of traumatic memories of experiences that occurred elsewhere. However, it is unknown whether indirectly retrieved traumatic memories in animals reactivated hippocampal engrams underlying fear memory. I will present recent work showing that an indirect retrieval cue can drive behavioral fear responses by reactivating hippocampus-dependent context memories. Hippocampal engrams representing these memories could be captured and reactivated. Indirectly retrieved memories could be attenuated by hippocampal protein synthesis inhibition. Additionally, hippocampal fear memories appear to underlie relapse after extinction. Ultimately, this work reveals that clinical interventions that rely on indirect retrieval of traumatic memories, such as imaginal exposure, may open a window for editing or erasure of neural representations that drive pathological fear.

Prof. dr. Aline Desmedt
Université de Bordeaux, FR

Contextualizing trauma-related memory prevents and/or treats PTSD-like memory

Validating a key clinical hypothesis, our latest data obtained with the single animal model mimicking both components of PTSD-related memory (i.e., contextual amnesia and traumatic hypermnesia) demonstrate that contextual amnesia of trauma, which depends on hippocampal dysfunction, induces the development and persistence of traumatic hypermnesia. Reciprocally, promoting the (hippocampus-dependent) contextualization of a traumatic event can prevent and/or treat PTSD-like memory in mice.

Prof. dr. Nikolai Axmacher

Ruhr-Universität Bochum, DE

Memory traces of stressful and traumatic experiences

Memories form our identity, but we can also be haunted by involuntary and intrusive memories for experiences that are unpleasant, stressful, or even traumatic. In my presentation, I will discuss how cognitive neuroscience can contribute to a mechanistic understanding of the distorted memory traces underlying memory for stressful and traumatic events. These studies may allow us to understand some of the phenomenological features of these memories, such as their specificity for central events (weapon focus effect), their overgeneralized and sensory nature, and the fact that they may be ubiquitously triggered by neutral cues.

Dr. Jay Gottfried
University of Pennsylvania, USA

The Noxious, the Sublime, and the Aroma of Stroopwafel

Sensory systems have evolved to detect and extract behaviorally relevant cues from the environment to optimize behavior. In the particular instance of the olfactory system, these same mechanisms are manifest, taking the form of odorous volatile molecules that can convey airborne messages at remote distances from an odor source. At its most basic level, the binding of an odorant to an olfactory receptor enables organisms to home in on things they need and to withdraw from things best avoided. In this manner, the sense of smell is a predictive sense, clueing in the organism about what is yet to come, and thus minimizing the chance of missing out on lunch or becoming another animal's next meal. The fundamental message here is that when it comes to the olfactory system, the very properties of approach and avoidance are inescapably embedded within the human realm of liking and disliking. To this end, my presentation will discuss the broad roles of the human olfactory system in shaping behavior, as viewed through the manifold lens of evolution, ecology, molecules, rewards, rotten eggs, and possibly a touch of stroopwafel.

Prof. dr. Merel Kindt
University of Amsterdam, NL

Emotional Memory: An Emergent Phenomenon

Throughout the course of history, the understanding and treatment of mental disorders have made significant progress by exploring the concept of emotional memory. Many psychological interventions are built upon the assumption that mental disorders stem from emotional memory and that addressing this aspect leads to a reduction in symptoms. While not all treatment methods explicitly acknowledge the role of emotional memory in symptom development, numerous contemporary cognitive-behavioural therapy (CBT) and related techniques implicitly aim to target maladaptive memories, such as schemas and beliefs. These treatments, operating under the narrative of emotional memory have proven successful in reducing symptoms across various mental disorders. However, there is currently limited evidence to support whether treatment effectiveness is truly achieved by modifying underlying representations of emotional memory. In the realm of clinical science and practice, there is a lack of consensus regarding the precise definition of emotional memory. This lack of agreement makes it difficult to provide evidence that the observed effects of treatments are genuinely attributable to changes in emotional memory. It is possible that emotional memory, rather than being the proposed mechanism of action, merely

serves as a theoretical construct that offers a compelling rationale for clinical researchers and practitioners. On the other hand, several decades of experimental research involving both humans and non-human animals support the idea of a causal relationship between adverse experiences and the development of psychological symptoms, and more generally, show that emotional events shape one's beliefs, predictions and behaviours. A foundational premise of modern biomedical research is that fundamental discovery provides the basis for the development of interventions to ameliorate and cure disease. Although the primary focus of behavioural neuroscience research was not specifically on the treatment of mental illnesses, it is undeniable that fundamental investigations into learning and memory have played a substantial role in advancing the understanding and treatment of anxiety disorders. Nonetheless, the complexity of living systems, coupled with the increasing levels of freedom from protein to neuron to animal to human, poses a substantial challenge for translating the concept of emotional memory into the understanding and treatment of mental disorders. To address this challenge, it is essential to establish a clearer definition and operationalization of emotional memory. This endeavour will not only facilitate the development and improvement of treatments but also enhance our understanding of the underlying mechanisms. Moving forward, it is vital to prioritize research efforts that expand the conceptualization and operationalization of emotional memory across different levels of analysis: from laboratory experiments to clinical applications.

Prof. dr. Emily A. Holmes
Uppsala University, SW

Mental imagery and reducing intrusive memories after trauma

Mental imagery allows us to time travel. So doing can have a powerful impact on our emotions, motivation and behaviour. Intrusive image-based memories can “flash backwards” to past trauma. Mental imagery can "flash forwards" to the future, such as in suicidal thinking or goals in hypomania. Although images can seem fleeting and elusive, our research methods to investigate imagery are advancing. Better understanding mental imagery offers insights to improve interventions. We will explore reducing the number of intrusive memories after trauma using an imagery competing task intervention approach. Both lab studies and recent clinical trials will be discussed. In particular we will consider healthcare workers with intrusive memories from their work in the covid-19 pandemic, and a recent Bayesian adaptive design optimisation trial (in press).

Honorary Frijda Chair in Cognitive Science

The Frijda Chair is named after Nico Frijda (1927-2015), who was professor of Psychology at the University of Amsterdam and a pioneer of cognitive science in the Netherlands. Each year, the Amsterdam Brain and Cognition center at his *alma mater* awards this chair to a prominent researcher in the field of brain and cognitive sciences, on the basis of outstanding interdisciplinary achievements.

In 2023, the *Honorary Frijda Chair in Cognitive Science* is awarded to prof. dr. Stephen Maren. Maren's lecture is called Hippocampal engrams and emotional memory and will be presented at the closing symposium held in the de Brakke Grond in Amsterdam

Biography prof. dr. Stephen Maren

Prof. dr. Stephen Maren is the Charles H. Gregory Chair of Liberal Arts and Professor of Psychological and Brain Sciences and a Presidential Impact Fellow at Texas A&M University. He was named University Distinguished Professor in 2018. Prof. dr. Stephen Maren is a recipient of the American Psychological Association Distinguished Scientific Award for an Early Career Contribution to Psychology (2001) and the D. O. Distinguished Scientific Contributions Award (2017). He is also a Fellow of the American Psychological Association and Association for Psychological Science, Past-President of the Pavlovian Society, and is currently the Editor-in-Chief of Behavioural Brain Research. He has been continuously funded by the National Institutes of Health since 1995 and is a recipient of the 2015 McKnight Memory and Cognitive Disorders award.


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