Winrich Freiwald, Ph.D.

DENISE A. AND EUGENE W. CHINERY PROFESSOR, LABORATORY OF NEURAL SYSTEMS

Faces are our primary source for recognizing people and for reading their emotional and mental states. Freiwald studies how the brain's visual system extracts social meaning from a face and then drives other circuits, activate memories, direct attention, inspire thought about others, generate feelings, and guide social actions. He aims to uncover how these circuits make us human how their alterations lead to psychiatric and neurodevelopmental syndroms.

From patterns of light received by the eyes, the brain constructs our perception of a three-dimensional world, inhabited by objects with shape, color, and motion. To understand the mechanisms that make this happen, Freiwald studies a particular category of objects: faces. Because a dedicated circuit exists for processing them, faces offer a unique opportunity to study object recognition. Likewise, as potent stimuli for attention, emotion, memories, thoughts, and actions, faces provide a powerful means to study the brain's social, emotional, and cognitive functions.

Using a technique called functional magnetic resonance imaging (fMRI), Freiwald discovered that the brain is equipped with specialized neural machinery for face processing. By combining fMRI with electrophysiological and cutting-edge imaging techniques, he and his colleagues showed that this machinery is composed of a fixed number of face-selective regions, each dedicated to a different dimension of facial information. All but one of these regions are interconnected to form a face-processing network. Because this system is specialized to process only one class of complex forms, and because its computational components are spatially segregated, it offers a unique opportunity to dissect the neural mechanisms and fundamental principles
of object recognition.

Freiwald's lab aims to understand the inner workings of this system. They are particularly interested in how face selectivity emerges in a single cell; how information is transformed from one face area to another; what contribution each face area makes to different abilities, such as the recognition of a friend or a smile; and how the face areas interact.

The lab uses the face-processing network to uncover the basic organization of the brain itself, revealing how populations of neurons extract and integrate information, how information propagates through neural networks, and why visual information processing is organized in hierarchies. Furthermore, by studying how the face-processing system is functionally embedded in the brain, the Freiwald lab explores its links to social behavior, such as how a smile can elicit an emotional response and cause someone to smile back, and how a face can activate old memories. Understanding the circuits that implement these complex functions may aid in understanding conditions characterized by atypical social or emotional responses, such as autism.

The Freiwald lab also studies how the brain exerts attentional control, how attention interacts dynamically with the environment, and how attention and object representations interact. Vision is an active process, aided by attention, and it selects what is relevant and dismisses what is not. Freiwald uses fMRI to determine the entire network of brain areas involved in attention, its connections, and functional properties. The group has also identified a new brain area for attention control. Faces, due to their high social importance, give rise to specific attentional deployments, and the lab aims to utilize this link to better elucidate general attention mechanisms.

EDUCATION

Pre-diploma, biology, 1990
University of Göttingen

Diploma, biology, 1993
Ph.D., 1998
University of Tübingen

POSTDOC

Massachusetts Institute of Technology, 2001–2002

Hanse Institute for Advanced Study, 2002–2003

Harvard Medical School, Massachusetts Institute of Technology, Massachusetts General Hospital, 2003–2005

POSITIONS

Head, Primate Brain Imaging Group, Centers for Advanced Imaging and Cognitive Science, 2004–2008
Bremen University

Assistant Professor, 2009–2015
Associate Professor, 2016–2018
Professor, 2018–
Co-director, Price Family Center for the Social Brain, 2021–
The Rockefeller University

AWARDS

Irma T. Hirschl/Monique Weill-Caulier Trust Research Award, 2009

Klingenstein Fellowship, 2010

Sinsheimer Fund Scholar, 2010

Pew Biomedical Scholar, 2010

NSF CAREER Award, 2011

McKnight Scholar, 2011

New York Stem Cell Foundation Robertson Neuroscience Investigator, 2013

W. Alden Spencer Award, 2016

Gabrielle H. Reem and Herbert J. Kayden Early-Career Innovation Award, 2017

The Rockefeller University Distinguished Teaching Award, 2017

Perl-UNC Neuroscience Prize, 2018

Golden Brain Award, Minerva Foundation, 2018

Vannevar Bush Faculty Fellowship, 2019

Karl Spencer Lashley Award, 2020

Kavli Prize in Neuroscience, 2024

António Champalimaud Vision Award, 2024

Lewis S. Rosenstiel Award, 2025

International Prize of Translational Neuroscience, 2026

HONORARY SOCIETIES

Göttingen Academy of Sciences and Humanities

The Norwegian Academy of Science and Letters

SELECTED PUBLICATIONS

Ianni, G.R. et al. Facial gestures are enacted through a cortical hierarchy of dynamic and stable codes. *Science* 391, eaea0890 (2026).

Landi, S.M. et al. A fast link between face perception and memory in the temporal pole. *Science* 373, 581–585 (2021).

Landi, S.M. and Freiwald, W.A. Two areas for familiar face recognition in the primate brain. *Science* 357, 591–595 (2017).

Sliwa, J. and Freiwald, W.A. A dedicated network for social interaction processing in the primate brain. *Science* 356, 745–749 (2017).

Freiwald, W.A. and Tsao, D.Y. Functional compartmentalization and viewpoint generalization within the macaque face-processing system. *Science* 330, 845–851 (2010).