



# Winrich Freiwald, Ph.D.

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**Faces are our primary source for recognizing people and reading their emotional and mental states. Freiwald studies how the brain's visual system extracts social meaning from a face and then influences other circuits to generate emotional reactions, activate memories, direct attention, and guide social actions. He aims to uncover how facial recognition circuits drive cognition and how alterations of these circuits lead to psychiatric disorders.**

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 attention and 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, and thoughts, faces provide a powerful means to study the brain's social 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 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  
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  
Kavli Prize in Neuroscience, 2024  
Antônio Champalimaud Vision Award, 2024

## HONORARY SOCIETIES

Göttingen Academy of Sciences and Humanities

## SELECTED PUBLICATIONS

Stemann, H. and Freiwald, W.A. Evidence for an attentional  
priority map in inferotemporal cortex. *Proc. Natl. Acad. Sci. U.S.A.*  
116, 23797–23805 (2019).  
Shepherd, S.V. and Freiwald, W.A. Functional networks for social  
communication in the macaque monkey. *Neuron* 99, 413–420  
(2018).  
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).