

**Symposia (detailed program)**

Campus Biotech, Geneva, Switzerland · 4–7 October 2026

## Wednesday, October 7<sup>th</sup>

### Afternoon Symposia · Three Parallel Tracks · 15:00 – 17:00

Parallel sessions in three rooms · coffee break 16:00 – 16:15 in H8 Hall · Talk summaries are condensed from the submitted symposium abstracts.

#### Track A · Mechanisms, predictors & causal inference · Auditorium H8

*Predictors of neurofeedback success: From individual differences to frontoparietal control networks (ID23)*

Chairs: **Jessica Peter & Amelie Haugg** (Univ. Bern / Univ. Zürich)

What determines successful neurofeedback learning, and what enables its generalization beyond the training context? Three perspectives on the substantial variability in learning success, from population-level machine learning to the role of frontoparietal cognitive control networks.

**Daniel Reiter** (Univ. Vienna) — *Predicting neurofeedback learning success — A machine learning analysis*

A comprehensive dataset compiled from 35 rt-fMRI neurofeedback studies (732 participants) was analyzed with interpretable machine learning (LightGBM, SHAP) to predict neurofeedback performance and improvement above chance. The most influential predictors were age, sex, health status, neurofeedback run length and the presence of a pre-training transfer run — while study ID emerged as the single most impactful feature, highlighting the critical role of unmeasured study-specific factors.

**Amelie Haugg** (Univ. Zürich) — *Multiple-demand network engagement is associated with neurofeedback transfer success within the visual word form area*

Fifty-nine adults (typical and poor readers) were trained to up- or down-regulate activity in the visual word form area, with successful transfer to no-feedback runs emerging only after training. Transfer success correlated strongly with engagement of the multiple-demand network during training ( $r \approx 0.8$ ) in both regulation directions, suggesting that transfer depends on domain-general cognitive control mechanisms independent of strategy.

**Katharina Distel** (Univ. Bern) — *Networks involved in downregulation of hippocampal activity in individuals at risk for Alzheimer's disease*

In a single-blind randomized controlled trial, biomarker-confirmed individuals at risk for Alzheimer's disease downregulated either hippocampal activity (N=38) or intraparietal sulcus activity (N=37), with greater hippocampal downregulation associated with greater memory improvement. Successful downregulation recruited cognitive control regions (dlPFC, dACC), but the relationship was not uniform: initial recruitment supported top-down control, whereas sustained overactivation was associated with poorer performance.

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**Track B · Multivariate decoding, AI & next-gen feedback signals · Room H8-01-D**

*Semantic neurofeedback of emotions: From basic mechanisms to experimental paradigms and first applications (ID110)*

Chair: **David Linden** (Maastricht Univ.)

Real-time representational similarity analysis (rt-RSA) and multivariate neurofeedback allow participants to regulate not just the intensity but the content of their mental representations. Semantic neurofeedback of emotions lets participants navigate their emotional space — a potentially more transparent and effective route for treating mood disorders.

**Rainer Goebel** (Maastricht Univ.) — *Principles and methodological advances of RSA and MDS-based emotion neurofeedback*

Traditional emotion neurofeedback based on mean regional activity cannot distinguish between specific emotions. Semantic neurofeedback uses RSA to estimate each participant's similarity space of emotions from localizer runs, feeding either a multiple-thermometer display or a two-dimensional semantic map built with multidimensional scaling (MDS), including a custom MDS implementation with heuristics that improve feedback during navigation of emotional space.

**Xuelei Wang** (RWTH Aachen Univ.) — *From semantic maps to digital avatars: Representational similarity-based real-time fMRI neurofeedback of emotional states*

A multivariate rt-RSA framework compared ongoing brain activity with participant-specific patterns for joyful relaxation, sadness, enthusiasm and anger, presenting feedback as either an abstract circular semantic map or a dynamic digital avatar. The map study demonstrated distinguishable multivariate emotion patterns and within-run improvements; preliminary avatar analyses suggest naturalistic feedback is feasible, with specificity and underlying affective dimensions under investigation.

**Anneke Goblirsch** (Maastricht Univ.) — *Navigating emotional space with semantic neurofeedback: Pilot results, signal optimization, and future directions*

First real-time results from a 7T pilot study in five participants targeting four personalized emotions show significant above-chance accuracy in navigating toward target emotions on an MDS-based semantic map. Systematic offline analyses optimized the parameters of the feedback signal to maximize representational sensitivity and classification stability, informing the updated setup of the ongoing study.

**Raimund Kleiser** (Johannes Kepler Univ. Linz) — *Semantic real-time fMRI for the treatment of anorexia nervosa*

This study adapts semantic neurofeedback to the demands of everyday clinical practice in patients with anorexia nervosa, embedded in an fMRI design assessing attention, emotional processing and the perception of selected food stimuli. By integrating task-based assessments with semantic neurofeedback, it aims to characterize disorder-relevant neural representations and explore their modulation potential for novel neurotherapeutic interventions.

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### Track C · Acquisition, signal quality, real-time tooling & BCI · Room H8-01-F

*Advances in M/EEG real-time processing (MNE-RT / GEDAI / AJDC) (ID143)*

Chair: **Patrick Neff** (Univ. Hospital Zürich / Univ. Regensburg)

Three open tools advancing real-time M/EEG for neurofeedback and closed-loop neuromodulation: a standardized Python framework in the MNE ecosystem, and two novel online denoising approaches for artifact-robust closed-loop experiments.

**Payam S. Shabestari & Patrick Neff** (Univ. Hospital Zürich / EPFL / UNIGE) — *MNE-RT (formerly ANT): Advancing neurofeedback in Python*

MNE-RT is an open-source, Python-based framework within the MNE ecosystem for real-time electrophysiology, neurofeedback and closed-loop neuromodulation, integrated with MNE-Python and Lab Streaming Layer. A two-stage workflow computes subject-specific forward/inverse models and blink templates, then supports live interactive preprocessing and automated artifact suppression (e.g., ORICA), extracting features from band-limited power to functional connectivity and graph learning, with benchmarked latencies from ~25  $\mu$ s to ~500 ms.

**Victor Ferat & Tomas Ros** (M/EEG FCBG Platform / CIBM, UNIGE) — *GEDAI: A novel online EEG denoising framework for real-time brain-computer interfaces*

GEDAI is an algorithmic framework for adaptive, low-latency online EEG denoising that dynamically isolates transient artifacts — ocular, muscular and powerline — without pre-recorded calibration data or channel-dense configurations. Leveraging real-time spatial (leadfield) filtering and adaptive statistical thresholds, it preserves fine-grained spectral power while outperforming current artifact rejection routines in signal-to-noise recovery and execution speed.

**Cassandra Dumas & Marie-Constance Corsi** (Paris Brain Institute / INRIA) — *Automatic ocular artifact correction in electroencephalography for neurofeedback*

A blind source separation framework based on Approximate Joint Diagonalization of Fourier Cospectra (AJDC) is proposed for correcting ocular artifacts, a major source of the variability that leaves 15–30% of users unable to achieve reliable closed-loop control. Across three open-access eye-blink datasets, AJDC effectively isolates blink-related activity while preserving non-frontal neural signals, and its minimal calibration time makes it well suited to online applications.