

Electroencephalography (EEG) Analysis of the electrical potential differences generated by a school of fish.

LS Couzin, FB Bio, Universität Konstanz, Universitätsstr. 10, 78464 Konstanz, Germany
Dept of Psychology, University of Konstanz, Universitätsstr. 10, 78464 Konstanz, Germany

Summary

*In the planned research project, aquarium fish that exhibit strong swarming behavior will be studied using electroencephalography (EEG). The arrangement of EEG electrodes in a water tank will enable the recording and analysis of the resulting electrical potential differences of the fish swarm as a whole. The overarching research question is: Does the model system of schooling fish exhibit a similar rhythm-mediated behavioral response to that known from neural collectives? Freshwater fish with strongly pronounced schooling behavior that are available in Europe will be used: redhead tetras (*Hemigrammus bleheri*) and rosy barb (*Puntius denisonii*).*

The fish are purchased from a pet shop in Konstanz and returned for sale after the experiments. A spherical aquarium with a diameter of 60 cm and a volume of 105 l is used.

The size of the fish shoal will be varied from 5 in increments of 5 up to 30, in accordance with the recommendation of at least 2 liters of water per fish measuring approximately 1.5-2 cm. The central hypothesis is that the collective movement of the fish shoal is associated with a measurable electromagnetic field pattern. The strength of this field pattern will vary with the size of the shoal, hence the variation in fish shoal size from 5 in increments of 5 up to 30. A total of 6 individual recordings are planned (one per group size). Each recording will last 10 minutes. During the recording, the fish are allowed to swim freely, and no additional obstacles within the tank and/or external stimulation of any kind are planned. Passive EEG Ag/AgCl electrodes will be attached to the inner wall of the spherical tank. The signals will be recorded using a conventional CE-certified EEG amplifier (<https://mbraintrain.com/>).

Registration details

Status of the study	Registered
Date of registration	2026-03-09
Notified date of accessibility	2031-02-23
DOI	10.17590/asr.0000434
Planned start of the study	2025-09-01
Planned end of the study	2026-12-31
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