

{rokbox title=|Two-current choice flume images extracted from the trial videos :: Image: Authors|thumb=|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-density-differences-between-water-masses-preclude-laminar-flow-in-two-current-choice-flumes-gouraguine-et-al-2019-thumb.jpg|images/stories/ieo/imagenespublicaciones/centro-oceanografico-baleares-ieo-density-differences-between-water-masses-preclude-laminar-flow-in-two-current-choice-flumes-gouraguine-et-al-2019.jpg|rokbox}

Adam Gouraguine, Carlos Díaz-Gil, Josefin Sundin, **Joan Moranta**, Fredrik Jutfelt, 2019.

[**Density differences between water masses preclude laminar flow in two-current choice flumes.**](#)

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Abstract: Two-current choice flumes are used to measure preference and avoidance behaviour in response to chemical cues in aquatic animals. If used correctly, they produce two parallel, non-overlapping, laminar water currents in which the animal can move freely and choose between the two currents. As climate change is affecting water temperature, and altered precipitation patterns are changing water salinity, two-current choice flumes are increasingly being used to test the choice between water currents of different temperatures and salinities. This inevitably means that water currents of different densities are being used simultaneously in the flume. Here, we investigated the tolerance range for density differences due to temperature and salinity in five common flume designs. Through dye tests and stepwise modifications of temperatures and salinities we determined the limits for laminar and non-overlapping flows. We also developed an automated method for quantifying the overlap precisely and objectively. The tolerance for density differences between the water currents where laminar and non-overlapping flows were maintained was surprisingly low, withstanding ± 0.5 °C temperature differences, and ± 0.1 PSU salinity differences, i.e. a maximum density difference of 0.28 gL^{-1} . Above these very narrow limits we found a range where the flumes showed partly overlapping, stratified water currents that preclude easy determination of cue preference. We conclude that two-current choice flumes are not suitable for testing the behavioural choices of aquatic animals using water currents of anything other than minor differences in temperature and/or salinity.

Keywords: Behavioural response, Choice flume, Physicochemical cues, Teleost, Quality control