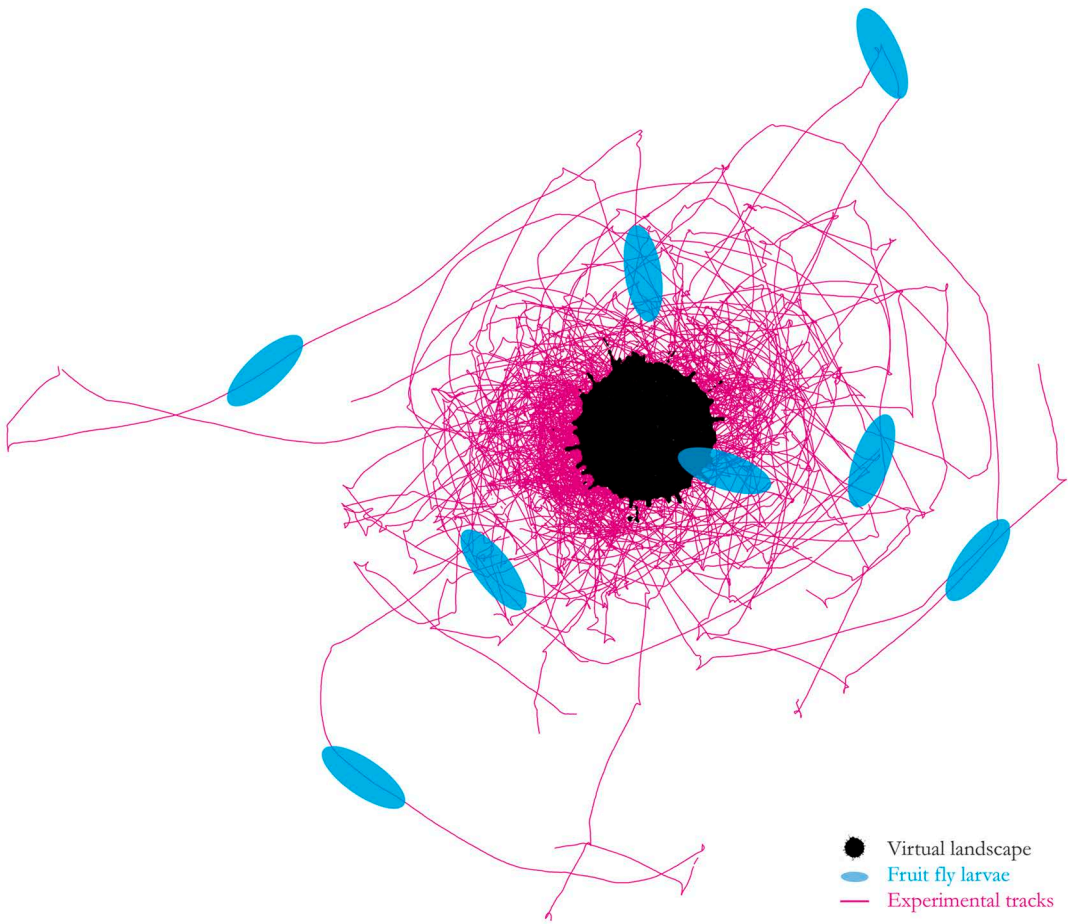



Animal “tache”



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The fly's "tache" is a concrete instantiation of its Umwelt. The Umwelt is the perceptual world from the point of view of the organism. Thus, it both conceals and reveals what is meaningful for the fly, and what isn't. Flies (in the adult and larval stages) really care about light and odor gradients, as they use those cues to find food and escape from dangers. The power of genetics in *Drosophila*, the fruit fly, allows us to create fly larvae that are blind but can literally smell light. In order to make them blind, one needs to genetically knock down the eyes of the larva, and also the photoreceptors that tile its entire body. Now they should not be able to see anything! To make them smell light, one plays with a very cool and now commonly-used technique in current neuroscience: optogenetics. By inserting in the fly's genome a piece of DNA (borrowed from an algae!) that expresses light-gated ion channels in whatever fly's neurons we target, we can control the activity of those neurons by simply shining blue light on them at different intensities. Doing so in the olfactory neurons at the nose of the larva, we can make flies believe that pulses of light are indeed odor traces of banana. Now they should be able to smell light! The larva, crawling in darkness under a blue LED landscape, will trace naturalistic chemotaxis trajectories. Let us bear in mind that nervous systems evolved to move. So, from the animal's perspective, movement is not the end of a reflex arc, but a part of a control loop. Action is in service of perception. We can set this up in a closed-loop tracking system which measures very precisely the position of the fly's nose and delivers—in real time and as the fly moves around freely—the exact amount of blue light that would correspond to the olfactory Umwelt we wish the animal to experience. Recalling the myth of Sisyphus, our fly in virtual reality will wander around a chemical void (a "tache" of odour) filled with smelly photons (a "tache" of light). One cannot refrain to wonder to what extent we, humans, also circle around our own blind spots...