

Questions on Fish learning

Charlie

Odling-Smee and Braithwaite explain that pulling sticklebacks from five ponds and five rivers from a similar geographical location lowers the chances that confounding variables, such as water clarity and predation, would interfere with their hypothesis that habitat stability influences use of visual cues. In the discussion section, they mention that three of the five ponds were rich in sediments, making visibility considerably less than in any of the rivers, and this is reason to believe that the variable of visual clarity does not likely interfere with their data. Why should this be true? What if ponds and rivers are inherently different in such confounding variables, and one of them is causing river fish to rely less on visual cues than pond fish rather than habitat stability?

Jeff

Odling-Smee and Braithwaite mention that they use a "stimulus shoal" as a reward. *Gasterosteus aculeatus* are social fish, so wouldn't they learn socially? Doesn't isolating one generally disrupt the animal's behavior? Suppose upon being separated the fish 'panics'--wouldn't that take away from its decision making ability and alter the test results?

Ian

What relevance do you think scoring "hesitancy", or "confusion" has in an experiment like this?

Heidi

The researchers labeled a number of behaviors, such as "hesitancy", "confusion", "pause" (a three second or more stop), and "reversal" (a 180-degree turn), that were used in the study to classify the actions of the fish (see "VCR Recordings"). The latter two behaviors make sense in the context of the results, but why would the researchers choose to include behaviors such as "hesitancy" and "confusion", especially if these behaviors may be subject to anthropomorphism? If using terms like this is not appropriate, then why include them in the write-up of the paper?

Alex

Why do you think interspersing probe trials with the postcriterion trials resulted in more disruption of pond sticklebacks than river sticklebacks? (704)

Why do you think pond fish paused more than sticklebacks during probe trials? (705)

Jessica

Is there some component of "algorithmic behavior" that makes it more expensive than the use of visual cues? If spatial orientation needs to be achieved in both river and pond settings, why don't all stickleback fish use body-orienting cues to establish location?

Heather

In what particular sorts of situations would it be beneficial to river fish to use spatial cues (as opposed to simply not using visual cues) to find resources? If their environments are constantly changing, what benefit is there to learning at all?

Rosie

It makes logical sense that fish living in rivers are being constantly swept along by the current and don't remain in the same place for too long, and thus they aren't able to use visual landmarks, such as a large rock or a colorful plant, to orient themselves and remember where sources of food are. In contrast, it follows that pond fish stay in the same environment and can use visual landmarks to point the way towards food sources. In addition to these differences making sense, however, the article discusses how and why these two fish populations learn differently. Why is it beneficial to each population to learn or not learn by these cues? Although it makes intuitive sense that river fish wouldn't rely on visual landmarks, how could relying on them actually be detrimental to the fish?

Zach

What are some examples of the costs of learning? What is the effect of switching the position of the reward each trial, if they are trying to prove that habitat stability is a primary reason for the pond/river difference in the use of visual cues? What could be the proximate or ultimate causes for this disparity?

Carlie

The authors say that "experiments have shown that neither pond nor river fish can track the rewarded end by responding to olfactory or uncontrolled visual cues within the maze (L. Olding-Smee, unpublished data)."

What are some examples of uncontrolled visual cues and how could these be tested for?

Ben

The authors go to considerable lengths to explain how they avoided confounding variables, but some aspects of the experiment still seem unconvincing. For example, the probe trail assumes that the fish is making a choice based on memory, either of a landmark or a direction, but can one be certain these are the only factors? Is there a way to know for sure (besides a magic map of neurological functions)?

Christine

In the Discussion section, the authors mention that the observed differences in the use of landmarks for spatial orientation between fish groups may be due to a difference in "ability to perceive visual landmarks or to learn associations based off of this information." Is there a potential study design which could address whether either sensory processing or memory forming abilities is responsible for this difference? Are they mutually exclusive?

Britta

In the discussion, the authors contemplate the possibility of plasticity in the fishes' learning (p.706). Is it possible that the river fish could learn to use visual cues over time, if they were trained enough? It seems like this "training" might work better if there was some cost to not finding the food reward quickly, rather than relying on fast reward locating alone. I wonder if finding the food faster is really enough motivation for learning on its own.

Neal

Are the different styles of orientation in the lake and river fish genetic or instinctive?

Curran,

What did the authors do to reduce the possibility that an ecological factor other than habitat stability could covary in a consistent way with the pond-river dichotomy?

Hannah

How do perceptual processes or learning and memory biases guide and enable learned behavior?

Thor

I wonder if you've heard of anything like this where an organism could learn to pay attention to a new set of environmental cues.