FISH COGNITION AND BEHAVIOR pdf

1: Fish Cognition and Behavior, 2nd Edition

"Fish Cognition and Behavior is an essentialread for anyone interested in fish welfare, psychology, sensorybiology, neurobiology, conservation, and the application of pureresearch." â€" The Quarterly Review of Biology.

Play media Video of an archerfish shooting at prey Tool use is sometimes considered as an indication of intelligence in animals. There are few examples of tool use in fishes, perhaps because they have only their mouth in which to hold objects. Archerfish family Toxotidae squirt jets of water at insects on plants above the surface to knock them into the water; they can adjust the size of the squirts to the size of the insect prey and learn to shoot at moving targets. The researchers had also tagged the fish by threading a bead in front of their dorsal fin. Some fish snagged the string with their bead, resulting in food delivery. These fish eventually learned to swim in a particular way to repeatedly make the bead snag the string and get food. Because the fish used an object external to their body in a goal-oriented way, this satisfies some definitions of tool use. Yet it can be sophisticated, and the fact that fish can make judicious repairs to their creation suggests intelligence. Construction methods in fishes can be divided into three categories: Two species, the giant mudskipper Periophthalmodon schlosseri and the walking goby Scartelaos histophorus, build a special chamber at the bottom of their burrows into which they carry mouthfuls of air. Once released the air accumulates at the top of the chamber and forms a reserve from which the fish can breathe â€" like all amphibious fishes, mudskippers are good air breathers. If researchers experimentally extract air from the special chambers, the fish diligently replenish it. The significance of this behaviour stems from the facts that at high tide, when water covers the mudflats, the fish stay in their burrow to avoid predators, and water inside the confined burrow is often poorly oxygenated. At such times these air-breathing fishes can tap into the air reserve of their special chambers. The fish carry these pebbles one by one in their mouths, sometimes stealing some from the mounds of other males. The females deposit their eggs on the upstream slope of the mounds, and the males cover these eggs with more pebbles. Females lay their eggs among those pebbles. The stone accumulation is free of sand and it exposes the eggs to a good water current that supplies oxygen. The mounds serve to impress females or to allow species recognition during courtship. The mounds, up to 2 m in diameter, are intricate with radiating ridges and valleys. Some of them adorn the entrance of the nest with unusually colored algae or even shiny tinfoil experimentally introduced in the environment. Social intelligence[edit] Fish can remember the attributes of other individuals, such as their competitive ability or past behavior, and modify their own behavior accordingly. For example, they can remember the identity of individuals to whom they have lost in a fight, and avoid these individuals in the future; or they can recognize territorial neighbors and show less aggression towards them as compared to strangers. In an experiment with Siamese fighting fish , two males were made to fight each other while being watched by a female, whom the males could also see. The winner and the loser of the fight were then, separately, given a choice between spending time next to the watching female or to a new female. The winner courted both females equally, but the loser spent more time next to the new female, avoiding the watcher female. The observer fish were then given a choice of associating with either B or D both of which they had seen win once and lose once. All eight observer fish spent more time next to D. Fish in this species prefer to associate with more subordinate individuals, so the preference for D showed that the observers had worked out that B was superior to C, and C to D, and therefore D was subordinate to B. However, most of the observations of deception can be understood as instinctive patterns of behavior that are triggered by specific environmental events, and they do not require a fish to understand of the point of view of other individuals. Distraction display[edit] Adult male bowfins distract potential predators away from their fry by thrashing as if injured. In the threespine stickleback Gasterosteus aculeatus , males sometimes see their nest full of eggs fall prey to groups of marauding females; some males, when they see a group of females approaching, swim away from their nest and start poking their snout into the substrate, as would a female raiding a nest. They often follow courting pairs of the closely related species T. When those pairs lay eggs, T. On four different occasions in the field out of observation bouts in total , a male T. That female released eggs, at which point the male darted to the eggs and ate them. In a variant behaviour, some N. The fish then

remained immobile for several minutes. Their colour pattern was blotchy and suggested a rotting carcass. Small inquisitive cichlids of other species often came near and they were suddenly attacked by the predator. About a third of the death-feigning performances led to an attack, and about one-sixth of the attacks were successful. They turn over onto their sides at the bottom of the sinkholes they inhabit and remain immobile for as long as 15 minutes, during which they attack the small mollies that come too close to them. In , off the coast of southeastern Brazil, one juvenile comb grouper was observed using this tactic to catch five small prey in 15 minutes. There are a few examples in fishes. They also quickly learn to invite preferentially those individual eels that collaborate most often. This can be achieved when the two symbols have the same total surface area, density and brightness as the three symbols. It has been argued that several aspects of such choice reflect an ability by fish to distinguish between numerical quantities. For example, fish can learn a particular route after following an experienced leader a few times. Ninespine stickleback , when given a choice between two food patches they have watched for a while, prefer the patch over which more fish have been seen foraging, or over which fish were seen feeding more intensively. Hatchery-raised salmon can be taught to quickly accept novel, live prey items similar to those they will encounter once they will be released in the wild, simply by watching an experienced salmon take such prey. Fathead minnows , for example, can learn the smell of a predatory pike just by being simultaneously exposed to that smell and the sight of experienced minnows reacting with fear, and brook stickleback can learn the visual identity of a predator by watching the fright reaction of experienced fathead minnows. One example in fish comes from research with male three spot gouramis Trichopodus trichopterus. Individuals trained to associate a light-stimulus with the imminent arrival of food exhibit this associative learning by approaching the surface where the food is normally dropped immediately the light-stimulus is presented. However, if a subordinate is placed in a tank with a dominant individual and the light-stimulus is presented, the subordinate immediately assumes the submissive posture rather than approaching the surface. The subordinate has predicted that going to the surface to get food would place it in competition with the dominant, and to avoid potential aggression, it immediately attempts to appease the dominant. They can even form queues while doing so. But cleaning sessions do not always end up well, because wrasses or wrasse-mimicking parasitic sabre-toothed blennies may cheat and eat the nutritious body mucus of their clients, rather than just the ectoparasites, something that makes the client jolt and sometimes flee. This system has been the subject of extensive observations which have suggested cognitive abilities on the part of the cleaner wrasses and their clients. For example, clients refrain from soliciting a cleaning session if they have witnessed the cleaning session of the previous client ending badly. One captive individual was observed carrying a small ball of aluminum foil a good conductor of electricity to the outflow tube of the aquarium filter, letting the current push the ball away before chasing after it and repeating the behaviour. One example of short-term stocking involves climbing perch Anabas testudineus. Individuals were kept singly in aquaria and fed with pellets dropped at the surface. When the pellets were dropped one after the other at 1-s intervals, the fish took them as they reached the surface and stocked them inside the mouth. On average, the fish placed 7 pellets in their mouth before moving away to consume them. When starved for h before the feeding test, they doubled the number of pellets stocked 14 on average ; the underside of their heads bulged under the load. The behaviour may be an indication that competition for food is normally severe in this species and that any adaptation to secure food would be beneficial.

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Contents Preface and Acknowledgements xii List of Contributors xiii Foreword xvi 1 Fish Cognition and Behaviour 1 Introduction 1 Contents of this book 2.

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