

Poster: The language of fish

Region

North Coast, Gascoyne Coast, West Coast, South Coast, Indian Ocean Territories

Summary

In the ocean, as on land, communication happens between individuals and between species.

The language of fish

In the ocean, as on land, communication happens between individuals and between species. Messages are signalled in various ways for a multitude of functions including courting, defence, schooling, migration and danger signals. Fish make all sorts of slaps, whispers, grunts and thumps; however sound is not the only way that fish and other marine animals communicate. Visual communication – such as colour, posture, movement and pattern – and chemical messaging are also important.

Can fish talk?

Many species of fish produce sounds (called 'vocalisations') to communicate with each other. These vocalisations range in frequency from around 50 Hz – 8,000 Hz. Fish have the ability to transmit sounds over distances of up to 150 m, however this may be affected by the water depth, temperature and salinity.

Most animals that produce sounds do so as warnings to predators or competitors, to attract mates, or as a flight response. There are three main ways in which fish make noises – stridulation, drumming and hydrodynamics.

'Stridulation' refers to noises that are made when skeletal body parts are rubbed together. This often occurs during feeding when the jaw teeth are grazed together. Leatherjackets use this method to make noise both in and out of the water.

'Drumming' occurs when the sonic muscle pulsates against the swim bladder – a gas filled sac used to regulate buoyancy. The majority of drumming sounds are produced at frequencies ranging from 45 – 300 Hz. Butterfly fish are known to use their swim bladder in communication. The swim bladder is also used as a 'resonator' to pick up sounds and amplify them, as well as a sound receiver.

'Hydrodynamic' sounds are produced as fish travel through the water, and change direction or speed quickly.

Body language

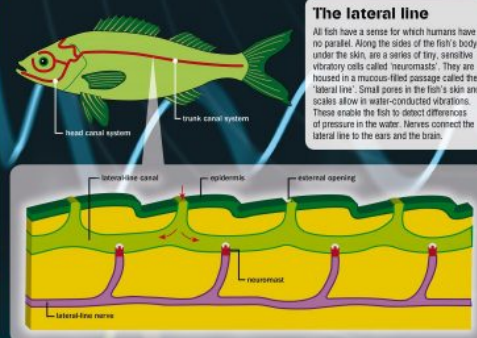
Fish have a variety of non-verbal signals to communicate. These may include behaviours such as charging, biting, chasing and fin flaring.

Cleaner wrasse are brightly coloured but also advertise themselves by 'dancing' in the water, or other such body postures. Its 'cleans' (for example large gobies and even sharks) display complicated behaviours to request cleaning services and then adopt a passive posture to assure the wrasse that it is safe.

Deep sea fishes exist in the dark – there is no light by which they can see one another's signals. So many produce their own light (called 'bioluminescence') as a means of communicating with others of their species.

The lateral line

All fish have a sense for which humans have no parallel. Along the sides of the fish's body, under the skin, are a series of tiny, sensitive vibratory cells called 'neuromasts'. They are housed in a mucous-filled passage called the 'lateral line'. Small pores in the fish's skin and scales allow in water-conducted vibrations. These enable the fish to detect differences of pressure in the water. Nerves connect the lateral line to the ears and the brain.



Creature feature

Damselfish

Specialises in light and strong lateral display patterns. Each species has its own display pattern and can recognise the kind of fish that is displaying the same area as their habitat space.

Seahorses

Seahorses have been discovered to communicate by vibrating the top edge of their snouts, which they use to prey on.

Toadfish

These fish use their swim bladder to make a rhythmic sound. It is thought that toadfish use this sound to attract mates or to warn of danger by vibrating their swim bladder.

Mullet

Well known for their 'trunk' – generating sounds in the region of 100 Hz or higher.

Sharks

Sharks really do sniff out their prey! It works as sick fish pheromone at the ocean surface. Sharks can sense these vibrations from up to 100 m away. Pheromones tell the shark there are sharks that can communicate alerts to other fish.

Crustaceans

Crustaceans produce clicking sounds by dragging their hard shells.

Old Wives

These fish are considered fish to the ground. They are the fish which are caught by the ground of its teeth when the fish is stressed.

How do fish hear?

Fish 'hear' in two ways – through their ears, and through detecting vibrations in the water.

Fish do have ears! They simply don't have external ears as in many land animals and humans. Unlike human ears, which have three regions (the outer, middle and inner ear), in fish, only the elaborate inner ear is present.

The inner ear contains small calcium carbonate stones called 'otoliths'. As the fish moves, the otoliths (which are housed in small, fluid-filled alcoves) move and messages are relayed by the nerve endings that have been touched by the otoliths.

Humans hear sounds as they vibrate on the eardrum. Fish do not possess eardrums, however, sound and vibrations are 'felt' all over the body. Water is a much more efficient conductor of sound than air and hence even small disturbances may be 'heard' over long distances.

As a fish's body contains a high proportion of water within it, the sound waves penetrate the skull and reach the inner ear without the aid of the special passage (auditory canal) needed by land vertebrates. The skeleton and the swim bladder provide the fish's sound resonance.

Chemical stimuli

Fish have a keen sense of smell and can detect small changes in water chemistry. Juvenile fish may use scent to recognise members of the same species and form schools. Urine is used to mark territory by many animals, but also to attract mates. Female crabs and many female fish secrete chemicals into the water via their urine to lure males.

Many fish produce pheromones to attract females or to let males know they are ready to mate. Male sea lampreys have been known to release a smelly acid during their spawning season to draw females to their nests. Barnacles also release pheromones into the sea to attract free-swimming larvae to their colony.

The colour of nature

Sharks and rays cannot see colour. Not surprisingly, they are plain coloured creatures, in blues, greys and browns. If patterned, they tend towards simple spots and speckles. On the other hand, bony fish have (on the most part) excellent colour vision. For many, their bodies are accordingly brilliantly coloured and patterned.

These bright colours communicate a range of things including aggression, fear, attracting females, signalling territorial ownership, threatening rivals, and promoting the presence of venomous spines or other defence system. Colour changes may also include camouflage or disguise, hence hiding from or deceiving predators.

Some fish have elaborate light patterns or patterns of luminescent spots. These are useful in courtship displays, establishing territories or to identify themselves to other fish of the same species.

Phenomena are chemical released to send messages to other members of the same species

THE SPEED OF SOUND IN SEAWATER IS ABOUT 1,500 METRES PER SECOND

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