

A test of the senses in the search for a shoal mate

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Ever had to find your friend in a crowd? Imagine at a festival your mate saying: "I'll be wearing a yellow t-shirt by the hotdog stall behind the jazz stage." Using this information, you could walk around listening out for the romping double bass, and as you get closer and start to hear the trills of the trumpet, begin to sniff out the frying onions and sizzling sausages. Once you have located the hotdog stand, you only need to look for a bright yellow t-shirt and you will find your friend. Young coral reef fish use the same strategy, research from the Radboud University Nijmegen and the University of Bristol has found.

By testing how young French grunts (a common [fish](#) in Curaçao and throughout the Caribbean) responded to local sounds, smells and visual cues, the researchers have unlocked, for the first time, the mystery of how centimetre-long juvenile fish can navigate from the high seas to find their shoal mates in amongst the roots of mangrove trees or blades of seagrass.

First the team tested which habitat noises the fish were attracted to using auditory choice chambers. They found that newly-settled fish, just returned to the coast after developing in the plankton for several weeks, were most attracted to recordings of coral reefs. But these fish don't set up home on coral reefs, which can be dangerous places for a young fish. Instead they seek the relative safety of nursery grounds in the mangroves and seagrass beds where they will grow for the first few months.

The second experiment tested which habitat smells the fish were

attracted to using olfactory mazes shaped like a 'Y'. In contrast to the hearing study, the fish were attracted not to the smells of [coral reefs](#), but to the smells of the muddy soft-sediment habitats of seagrass and mangroves.

Dr Chantal Huijbers of the Radboud University Nijmegen said: "It seems that to find shore the fish use coral reef noise, which is the loudest habitat noise and can be heard by fish from 100s to 1000s of metres. Once in the right proximity, they can then sniff out their preferred nursery habitats."

In the third experiment, the team tested whether fish were attracted to the sights of suitable habitat or to potential shoal mates. Observing their behaviour in a square arena, they found that fish couldn't pick apart different types of habitat, but were highly attracted to the sight of a familiar looking fish.

Finally, to test the strength of this attraction to other fish, the team went back to their olfactory y-maze, and let fish identify their preferred scent, before opening a window that let the study fish see other individuals. They then switched the smells, but found that the fish ignored the loss of their preferred scent and opted to stay in sight of their new shoal mates. This suggests that once visual contact has been made, other cues become less important. Their mission has been accomplished.

Dr Steve Simpson of the University of Bristol said: "This study is the first to look at the hierarchy of different sensory cues that allow young fish to complete a life-or-death navigational task. Hearing then smell guides fish at the macro scale, but at the fine scale vision takes over as the fish locate their new shoal mates."

Dr Ivan Nagelkerken of the Radboud University Nijmegen said: "This study demonstrates the complex behaviour employed by young juvenile

coral reef fish, and highlights the importance of maintaining a mosaic of different habitats and healthy local populations in order for the French grunt, and many fish like it, to complete their life cycle."

More information: 'A test of the senses: fish select novel habitats by responding to multiple cues' by Chantal Huijbers, Ivan Nagelkerken, Pauline Lössbroek, Ines Schulten, Andjin Siegenthaler, Marc Holderied and Steve Simpson is published in *Ecology*.

Provided by University of Bristol

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