Researchers have found that ocean acidification leads to changes in the ways that clownfish normally respond to sound. As many species rely on hearing for orientation, habitat selection, avoiding predators and communication, ocean acidification could compromise auditory behaviour crucial for survival.

Since the Industrial Revolution, the oceans have absorbed approximately 142 billion tonnes of CO$_2$, resulting in ocean acidification at a rate far faster than any time in the last 650,000 years, and causing the average pH of the ocean to drop by 0.1 units, becoming more acidic. If global emissions continue at the same rate as today, atmospheric CO$_2$, currently at 390 ppm (parts per million), is predicted to reach 730–1020 ppm by 2100, and will cause a further drop in ocean pH of 0.3–0.4 units.

Previous studies have identified effects of high concentrations of dissolved CO$_2$ on the sensory behaviour of fish, including the loss of ability to distinguish odours. The results of this study provide the first evidence that ocean acidification could also have a negative impact on the ability of fish to respond to sound. They add to the growing body of evidence that ocean acidification could have severe impacts throughout marine ecosystems and ultimately on society, and emphasise the need to cut CO$_2$ emissions.

The researchers examined the effect of high concentrations of CO$_2$ on young clownfish (*Amphiprion percula*). The fish, all from the same clutch of eggs, were reared and tested in laboratory conditions based on Intergovernmental Panel on Climate Change predictions of atmospheric CO$_2$ concentrations for the 21st century. The test concentrations of atmospheric CO$_2$ were: 390ppm (current day concentration), 600, 700 and 900ppm. The researchers exposed the young fish to a predator-rich daytime recording of a reef in a marine protected area in a test chamber and recorded whether the fish chose to move away from the recorded sounds or not.

Most young fish reared under present-day atmospheric concentrations of CO$_2$ chose to move away from the recorded predator sounds, as predicted. They spent, on average, 73% of the time away from the speaker. However, those reared in CO$_2$ enriched conditions did not show this avoidance behaviour, spending between 58% and 64% of their time near the speaker. Each fish was exposed to the recorded sounds in a holding tube for one minute, after which they were allowed to swim free, and their position recorded every five seconds for two minutes.

The researchers offer some possible explanations for the observed behavioural patterns, including a reduction in the ability of the fishes' brains to transmit information, and a reduction in ability to process sound information, but they conclude that further experimentation is needed to identify the exact mechanism.

As the conditions simulated in this study will be reached within relatively few fish generations, the breakdown of behavioural responses to sound, as well as previously documented changes to other behaviours, suggest that marine species may soon face an era of severe evolutionary selection.