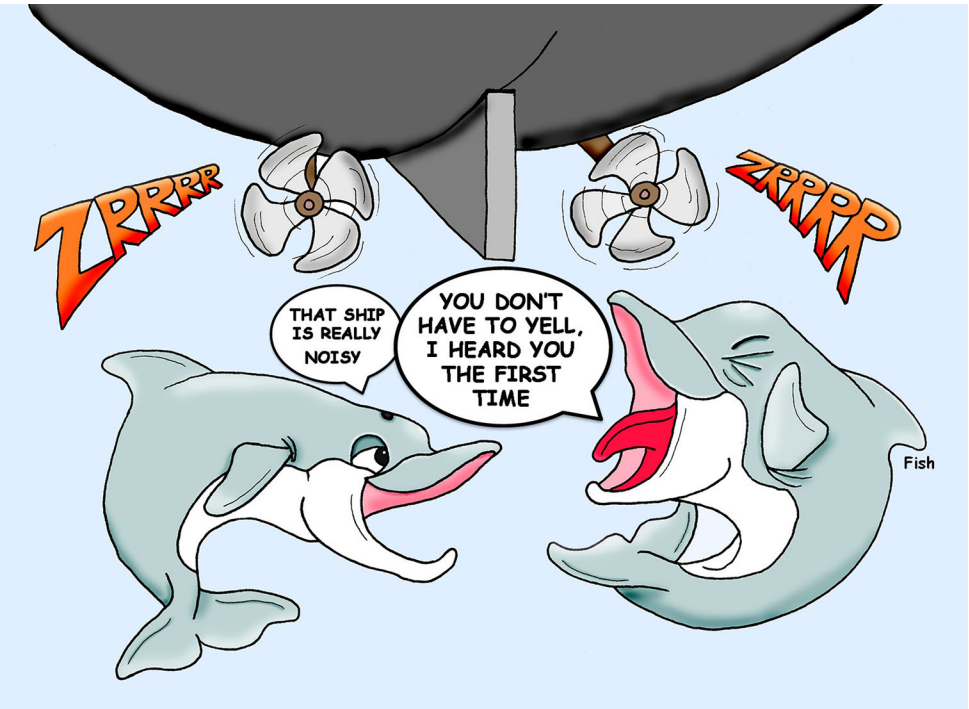
INSIDE JEB

Bottlenose dolphins turn up the volume less than other cetaceans



In 1909, Etienne Lombard wrote to the French Academy of Sciences describing how people involuntarily raised their voices when a loud sound was played in one ear; yet, the volume of their voices returned to normal as soon as the noise ceased. Known now as the Lombard effect, it now turns out that many other creatures – including bats, birds and whales – turn up the volume when background noise gets too loud. However, bats and birds only increase their volume by a fraction in noisy conditions, restricting the distances over which they can communicate, while whales raise their voices much more, matching the background increase decibel for decibel, enabling them to remain in touch with their pod-mates over greater distances. With this in mind, Ida Kragh, from Aarhus University, Denmark, and Frants Jensen, currently at Woods Hole Oceanographic Institution, USA, with an international team of collaborators from Denmark, Scotland and the USA, tested how much a smaller member of the cetacean family, common bottlenose dolphins (*Tursiops truncatus*), raise their voices when noisy vessels pass near.

'The study was conducted with a long-term resident community of common bottlenose dolphins in Sarasota Bay, Florida, studied since 1970, during which time both the human population and boat traffic have nearly quadrupled', says Randall Wells, from the Mote Marine Laboratory, USA, explaining that the animals frequently encounter noisy boats in the busy waters. The team attached sound recording tags to 26 dolphins – including mothers, their calves and pairs of males – before retrieving the tags when they detached up to 24 h later. After the team skilfully analysed 3855 whistles collected from a total of 222.5 h of recordings, it was clear that the dolphins raised the volume of their whistles when a boat went by, but by only a fraction (0.1–0.3 dB whistle increase for every 1 dB rise in the background noise), unlike larger whales, which match the background volume of increase. Yet, when they compared how much the dolphins turned up the volume when generating their unique identification whistles (known as signature whistles, which they use to stay in touch with their pod), they only increased by 0.1 dB for every 1 dB increase in the background noise. However, Jensen explains the apparently small increase by saying, 'Signature whistles tend to be loud, and if you are already calling out as loud as you can, it's difficult to compensate further when a boat goes by'.

Like Lombard's patients early in the 20th century, common bottlenose dolphins increase the volume of their voices when the background noise increases, but not as much as whales do. The team also warns that it is important for scientists to differentiate the effects of background noise on different types of communication, to understand how animals adapt to our intrusions into their worlds.

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Kragh, I. M., McHugh, K., Wells, R. S., Sayigh, L. S., Janik, V. M., Tyack, P. L. and Jensen, F. H. (2019). Signal-specific amplitude adjustment to noise in common bottlenose dolphins (*Tursiops truncatus*). *J. Exp. Biol.* **222**, jeb216606. doi:10.1242/jeb.216606

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