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Dolphins' Bubble Nets Inspire Better Sonar



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Sonar is used effectively to detect objects and surfaces underwater, however when it comes to "bubbly areas" such as where waves break around reefs and shores, standard sonar doesn't work. It's no secret that dolphins have amazing sonar capabilities, even when it comes to detecting prey inside bubble nets they catch themselves, though no one knows how they're able to do it. Looking at the success of dolphins, scientists from University of Southampton decided to think like a cetacean and came up with a new novel approach to sonar that is proving to be successful in these airy areas. The team realized that dolphins make bubble nets in which man-made sonar doesn't work, so either the dolphins are "blinding" themselves or they're using a more sophisticated sonar than humans have ever devised. So, the team decided to think like a dolphin — what kind of sonar would the animal need to use to find prey in bubbly water? Professor Leighton and his colleagues have developed a new sonar concept called twin inverted pulse sonar (TWIPS), which exploits the way that bubbles pulsate in sound fields.

"TWIPS uses trains of twinned pairs of sound pulses. The first pulse of each pair has a waveform that is an inverted replica of that of its twin. The first pulse is emitted a fraction of a second before its inverted twin," [reports University of Southampton](#).

The new technology has so far been successful in tests, including finding a small disc in bubbly conditions similar to breaking waves, and in trials aboard

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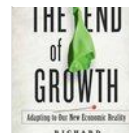
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the research vessel RV Bill Conway.

As Gizmag points out, "Interestingly, even though dolphins were the inspiration for TWIPS, it's still not known whether they actually use such a system. 'Key ingredients of a TWIPS system appear in separate species but they have never been found all together in a single species,' said Leighton. 'There is currently no evidence that dolphins use TWIPS processing, although no-one has yet taken recordings of the signals from animals hunting with bubble nets in the wild. How they successfully detect prey in bubbly water remains a mystery that we are working to solve.'"

Brand new technology, plus an unsolved mystery in the animal kingdom -- fun all around!

The only question we still have is how this new sonar might impact dolphins themselves, along with other whales. While it is a topic of hot debate, research has shown that [military sonar has serious -- even fatal -- impacts on whales](#).

And marine noise pollution itself impacts [everything from fish to coral reefs](#).

So how might this new form of sonar affect nearby animals? That is still unclear. However, future applications for the new sonar have been identified:

Possible future marine applications for TWIPS include harbour protection and the detection of bubbles in marine sediments and manufacturing.

Technologies based on the same basic principles could be used in medical ultrasound imaging, which was already using pairs of inverted pulses to enhance (rather than suppress) contrast agents injected into the body. The TWIPS principle would work with other sensors such as in Magnetic resonance imaging (MRI). Professor Leighton has proposed TWIPR (Twin Inverted Pulse Radar) for the detection of improvised explosive devices or covert circuitry.

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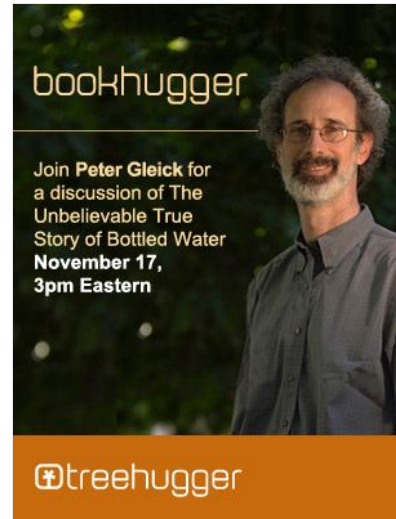
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