

How dolphins learn to work together for rewards

September 19 2018, by Stephanie King



Two bottlenose dolphins (*Tursiops truncatus*) cooperate in a button-pressing task requiring precise behavioural synchronization. Credit: Dolphin Research Center, Author provided

Cooperation can be found across the animal kingdom, in behaviours such as [group hunting](#), [raising of young](#), and [driving away predators](#).

But are these cooperating animals actively coordinating their behaviour,

or are they simply acting individually to accomplish the same task at the same time?

In a study, [published today](#) in *Proceedings of the Royal Society B*, we showed that [bottlenose dolphins](#) actively coordinate their behaviours. That is, they can learn to work together and synchronise their actions to solve a cooperation task and receive a reward.

Testing teamwork

For this study, conducted at the Dolphin Research Center in the Florida Keys, we created a task in which pairs of dolphins had to swim across a lagoon and each press their own underwater button at the same time (within a 1-second time window).

Each trial began with both dolphins and their respective trainers located at the opposite side of the lagoon from the buttons, about 11 metres away. The trainers would either both give a "press the button" hand signal at the same time, or one trainer would give the signal first, while the second trainer asked her dolphin to wait up to 20 seconds before giving the signal.



Two bottlenose dolphins (*Tursiops truncatus*) cooperate in a button-pressing task requiring precise behavioural synchronisation. Credit: Dolphin Research Center, Author provided

If the dolphins pressed their buttons at the same time, a computer played a "success" sound, and the dolphins returned to their trainers for fish and social praise.

If the dolphins pressed their buttons at different times, a "failure" sound was played and the trainers moved on to the next trial.

The strict timing requirement meant they had to work together. If their goal was simply "press my button", then when they were sent at different times, they would press at different times. To succeed, they had to understand their goal as "press the buttons *together*".

The question, then, was whether the dolphin sent first would wait for the other dolphin before pressing its button, and whether they could figure out a way to coordinate precisely enough to press simultaneously.

Swim fast, or coordinate?

We found that the dolphins were able to work together with extreme precision even when they had to wait for their partner. Interestingly, their behavioural strategies and the coordination between them changed as they learned the task.

Keep in mind that the dolphins had to figure out that this was a cooperative task. There was nothing about the situation that told them in advance that the buttons had to be pressed at the same time.

To help them learn, we started by sending them simultaneously and gradually increased the timing difference between them.

When one dolphin figured out the game first, if their partner was sent first on a particular trial, they knew that the partner (who had not figured out the game) was not going to wait.

So in the early phases, we found that many successes were achieved not by the first dolphin waiting, but by the second dolphin swimming extremely fast to catch up.

But once both animals understood the task, this behaviour disappeared and the timing of their button presses became extremely precise (with the time difference between button presses averaging just 370 milliseconds).

This shows that both partners now understood that they didn't need to swim fast to succeed; instead, they needed to synchronise their actions.



Triple synchronous dive by a trio of allied male bottlenose dolphins (*Tursiops aduncus*) in Shark Bay, Western Australia. Credit: Stephanie King / The Dolphin Alliance Project, Author provided

Synchrony in the wild

In the wild, dolphins synchronise their [behaviour](#) in several contexts. For example, [mothers and calves](#) will surface and breathe at the same time, and males in alliances will perform the same behaviours at the same time in [coordinated displays](#).

The synchrony in these displays can be remarkably precise, and is thought to actively promote cooperation between partners.

The results of our study suggest that this behavioural synchronisation that [dolphins](#) show in the wild may not be a hardwired response to a specific context, but may in fact be a generalised ability that they can apply to a variety of situations.

More information: Kelly Jaakkola et al. Bottlenose dolphins can understand their partner's role in a cooperative task, *Proceedings of the Royal Society B: Biological Sciences* (2018). [DOI: 10.1098/rspb.2018.0948](#)

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