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Psychology

We 'click' better in conversations with quick responses

Richard Sima

THE connection we feel to others when we have a good conversation isn't based solely on the content of the chat. Research shows that the faster people respond to one another, the more they feel in sync.

Conversations involve turn-taking, with back-and-forth replies happening within a mere quarter of a second on average.

This response speed is key for feeling social connection, according to experiments by Emma Templeton at Dartmouth College in New Hampshire and her colleagues. The faster the response, the more people felt as if they both liked and "clicked" with their conversation partner, be they strangers or close friends.

In one experiment, Templeton's team paired up 66 English-speaking strangers for 10 conversations, each 10 minutes long, with different people, and asked them to rate how much they enjoyed the experience. Conversations with shorter gaps and faster response times, including interruptions, were the ones people said they enjoyed more and felt more connection in (*PNAS*, doi.org/gn7d8h).

The team also asked people to listen in on conversations they didn't participate in. They perceived exchanges with shorter response times as being more connected. When Templeton's team played audio clips of conversation but artificially manipulated the response times, people listening in on these chats reported that the participants seemed more connected when the response times had been shortened to one-fifth of their original length rather than being untouched or doubled.

250

Milliseconds between responses in a conversation, on average

Astronomy

Gravitational wave echoes could reveal dark matter

Leah Crane

GIROSCIENCE/ALAMY

An illustration of gravitational waves spreading in space

THE entire universe is suffused with gravitational waves, ripples in space-time caused by the motion of massive objects. As they flow across things like stars and planets, parts of these waves should slow down and travel just behind the original ripple in a kind of echo that could let us examine celestial objects we can't see – maybe even dark matter.

Only the most massive objects in the universe create measurable gravitational waves. Most of the ones that have been detected so far have come from pairs of black holes coalescing. As the black holes move, they create ripples that travel outwards at approximately the speed of light.

But the gravity of other cosmic objects, even those less massive than a black hole, can slow down the ripples as they pass by. The parts of the wave that are slowed down would then arrive at our detectors later, in what researchers call a gravitational glint.

Glenn Starkman and Craig Copi at Case Western Reserve University in Ohio calculated how this phenomenon would affect the signals of the gravitational waves that we detect on Earth.

They found that gravitational glints created by relatively massive objects, such as stars, could theoretically be spotted with the detectors we have now (arxiv.org/abs/2201.03684).

"All gravitational waves should have these glints, it is just a question of how strong they are"

"We can use gravitational waves to explore the universe – to explore the contents of the universe, not just the sources of gravitational waves," says Starkman.

Because gravitational waves travel directly through everything, they could even provide us with an opportunity to peer inside neutron stars or other exotic cosmic objects. If dark matter – a mysterious substance thought to make up around 80 per cent of all matter – exists in the form of massive objects or dense clusters of particles, this method could even help us probe its nature.

"These effects are particularly remarkable because they provide a way to use gravitational waves to possibly learn about objects that do not necessarily emit gravitational waves at all," says Lucy McNeill at Kyoto University in Japan. "This includes things that don't interact with light, such as dark matter candidates." All we need to do is observe a gravitational wave that came from behind the object in question.

"All gravitational waves should have these glints," says Starkman. "It's just a question of how strong the signals are."

He and Copi calculated that the glints should typically be about 10 per cent as strong as the gravitational waves that produce them. With the sensitivities of current detectors, that means we should be able to spot about one every three years.

"If this is true, it would be quite exciting," says Paul Lasky at Monash University in Australia. "Having said that, I foresee a lot of technical problems in actually being able to confidently extract this signal from the data for that one event." He says we may need "considerably more sensitive" gravitational wave detectors.

The researchers are now working with gravitational wave observers to figure out how we might be able to identify gravitational glints and what we could learn about their sources. "Stars may fade and dark matter may never glow, but they can't hide from gravity," says Starkman.