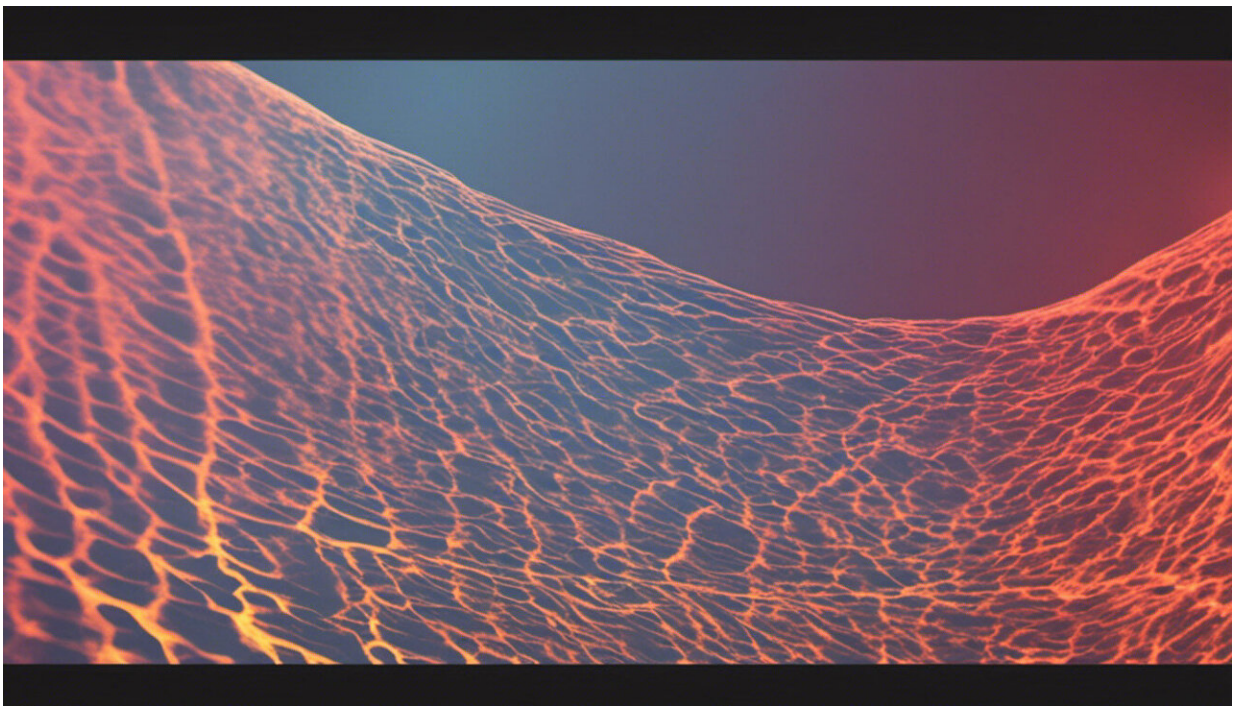


Ever noticed time seems to move faster when you're in control of things? Science can explain why

July 6 2016, by Sara Lorimer



Credit: AI-generated image ([disclaimer](#))

We've all been there: waiting for a boring meeting to finish or for a bus to arrive and time just seems to drag on far more slowly than usual. Yet our most enjoyable moments seem to whizz by at lightning speed. It seems obvious that more boring events appear to take longer than the

ones that stimulate us. But there's another reason we sometimes experience time differently.

If we understand what causes an event or we cause it ourselves, the time between the cause and its effects seems to be shorter than an event we have no [control](#) over. This phenomenon, known as temporal binding, can help us uncover some important truths about the relationship between cause and effect and whether or not we are really responsible for different actions.

Temporal binding works in a curious way. The cause of an event seems to be shifted later in time towards its effect, which in turn is shifted backwards in time towards the cause. From our perspective, the two events are drawn in towards each other, essentially bound to one another in time.

Patrick Haggard and his colleagues at UCL [were the first](#) to come across this phenomenon. They asked volunteers to press a button that produced a sound after a short delay. The volunteers found the action of pressing the button and the consequence of the sound seemed to happen closer together in time than when they weren't responsible for pushing the button.

Intentional binding

The same effect didn't occur when the tone came after an involuntary muscle twitch (caused by stimulation to the brain), or after another tone following the same delay. So the researchers referred to the phenomenon as "intentional binding" as they believed that it was the person's voluntary involvement (and so their intention to act) that bound the action and consequence together in time. Because of this, the phenomenon was [quickly seen](#) as a new way of assessing how much people feel in control in certain situations without having to actually ask

them.

Recently, researchers have even applied temporal binding to the famous Milgram electric shock experiment to see if people feel responsible for actions they have been coerced into doing. Milgram's [original experiment](#) involved instructing participants to administer electric shocks to each other in order to see if people would obey an order that caused harm.

Haggard used a similar setup but also asked participants to estimate the time between when they pressed the button that caused the shock and the time when the shock was administered. The [researchers found](#) that when the participant was coerced into giving an [electric shock](#) they experienced the time between their action and the outcome as longer than when they choose to act voluntarily.

Based on this, the researchers concluded that when someone is coerced into doing something they feel less in control or less responsible for their own actions than when they carry out actions voluntarily. This has fascinating implications for situations such as war crimes trials, where defendants often claim they were [simply obeying orders](#) and so aren't responsible for their actions.

Temporal binding has also been used to study medical conditions and produced some interesting results there too. Researchers [have found](#) that people with schizophrenia experience greater temporal binding than those without the condition. This suggests sufferers feel an exaggerated sense of control over the outcome of their actions, which may help explain why they delusionally believe they have control over things that they could not be plausibly responsible for.

Cause not control

Although temporal binding has been quickly adopted as a way of measuring feelings of control and responsibility, Marc Buehner at Cardiff University has shown that this effect is more likely to be about causal relationships. [Buehner found](#) that we experience binding when we simply observe one thing causing another, even when we aren't directly responsible for it. For example, when a mechanical lever presses a button that then produces a sound.

This essentially shows that our experience of [time](#) can be influenced and shaped by our beliefs about cause and [effect](#). Binding is still greater when there is human action involved, but this is likely due to human action and consequence simply being a [special type of cause and effect](#).

An interesting suggestion is that binding occurs as a way for us to learn about the world. Perhaps we parcel up events that are related to one another to help us more clearly understand how the world works, how things relate to one another and how our actions impact the world around us. To test this theory, researchers at Queen's University, Belfast and Cardiff University are in the process of looking at how children experience binding. Perhaps children experience greater binding as a way of efficiently learning about a world that they have less understanding of than adults.

On the other hand, children may experience binding to a lesser extent than adults because they may simply be less able to select and use information from their environment. Alternatively, binding may be steady throughout our lives and reflect an inbuilt and unchanging way of experiencing and learning about the world. Whatever the outcome, this research could provide us with invaluable information about how we learn about the world.

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