

Two studies examine virtual vs. in-person interactions and what's going on in our brains

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Early in the pandemic, video conferencing became the only way many of us could work, socialize, see a doctor or take a yoga class, among many other activities. By now, it's become a fixture of the work-from-home lifestyle. Two new studies led by Stanford Medicine researchers examined whether we work, behave and feel differently in these virtual versus in-person interactions and what's going on in our brains.

They found that while people generally worked just as effectively in both situations, online interactions tended to reduce a particular aspect of conversation known as turn-taking—switching speakers. In these [virtual meetings](#), less turn-taking was linked to less positive feelings about the interaction, according to the study published April 5 in the *Journal of Neuroscience*.

"One mechanism of how video conferencing changes the way we cooperate is by changing our speech behavior," said Stephanie Balters, Ph.D., postdoctoral scholar in the lab of Allan Reiss, MD, the Howard C. Robbins Professor in Psychiatry and the Behavioral Sciences.

In another paper recently published in *Cerebral Cortex*, researchers reported a follow-up finding.

They found a simple way to increase positive feelings about an interaction, whether in person or online: expressing appreciation for the other person. In fact, as two people exchanged appreciations (for their partner's creative ideas, for example), neuroimaging showed that the parts of their brains involved in social cognition lit up in synchrony.

Balters is the lead author and Reiss is the senior author of both studies.

Lab work

To mimic work interactions in a laboratory setting, the researchers

paired up 72 participants. Half the pairs met in person; the other half, over Zoom. Their interactions were recorded on video and audio, and their brain activity was monitored using portable functional near-infrared spectroscopy neuroimaging, which measures changes in oxygenation of different parts of the brain.

Each pair was asked to collaborate on three work-related tasks that used different cognitive skills.

"We could have chosen all kinds of tasks, but because we wanted it to be applicable to the [work environment](#), we chose a problem-solving task, a creativity task and an emotion-sharing task," Balters said.

In the problem-solving task, researchers asked participants to identify the four most important traffic safety rules on U.S. highways. In the creativity task, participants designed a solution to increase water conservation in California households. And in the emotion-sharing task, they discussed times when their needs were not met and how they felt.

Before and after each task, participants took several surveys in which they recorded their own assessment of their energy and stress levels, how well their duo performed on the tasks, how well they cooperated and their sense of closeness with their partner. Afterward, the researchers reviewed recordings of the interactions and gave an objective rating of how well each pair performed on the tasks.

Taking turns

One behavioral difference stood out—the virtual pairs took fewer turns switching between speakers than the in-person pairs did. In other words, each person spoke longer before the other responded or interrupted.

"I think people can empathize with that," Balters said. "If you interrupt

one another on Zoom all the time, it's kind of awkward, so it appears people just reduce this turn-taking initiation."

Pairs who took more turns switching between speakers reported a greater sense of cooperation and positive feelings about their subjective performance. These pairs also performed better on the tasks as rated by the observing researchers.

"For the virtual pairs, we saw a decrease in turn-taking and that is actually a negative thing for their social interaction and task performance," Balters said.

Perhaps with the lack of other cues like [body language](#) and facial expressions in the [virtual environment](#), turn-taking has an outsized influence on how we perceive an interaction, Balters said.

Lighting up the brain

When researchers studied the neuroimaging data, they found distinct patterns: During in-person interactions, researchers saw the most interbrain coherence (when the activity in two brains matches) during the emotion-sharing task, while virtual interactions generated more coherence during the problem-solving and creativity tasks. More coherence isn't necessarily better, said Balters, because it could simply mean the same parts of both brains are working harder. For instance, if the auditory center of the brain is lighting up, that could just mean the partners are struggling to hear each other.

The researchers also identified certain patterns of brain coherence linked to more turn-taking.

"Once we understand what happens in the brain with neuroimaging, we can develop better technological interventions," Balters said. "We might

be able to help [video conferencing](#) companies improve their systems with new features that facilitate turn-taking and make brain activity as close as possible to in-person interactions."

For now, the researchers tested a non-technological intervention. After the tasks were completed, the participants were asked to spend two minutes expressing appreciation for their partner. The brief exercise made a big impact on [brain activity](#).

"We found increased interbrain coherence across many different areas of the brain associated with social cognitive processing," Balters said.

Afterward, both in-person and virtual pairs reported feeling more connection with their partners.

"That means, no matter the forum, expressing appreciation to your partner is beneficial because it will increase how connected you feel," Balters said.

More information: Stephanie Balters et al, Virtual (Zoom) Interactions Alter Conversational Behavior and Interbrain Coherence, *The Journal of Neuroscience* (2023). [DOI: 10.1523/JNEUROSCI.1401-22.2023](https://doi.org/10.1523/JNEUROSCI.1401-22.2023)

Stephanie Balters et al, Expressing appreciation is linked to interpersonal closeness and inter-brain coherence, both in person and over Zoom, *Cerebral Cortex* (2023). [DOI: 10.1093/cercor/bhad032](https://doi.org/10.1093/cercor/bhad032)

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