Jun, H., & Bailenson, J. (2021). Nonverbal synchrony, media, and emotion. In Routledge International Handbook of Emotions and Media (pp. 303-315). Routledge.

Nonverbal synchrony, media, and emotion

Hanseul Jun, Jeremy Bailenson

Media often have a nonverbal component to it. Whether using simple emoticons attached to text messages, or facial expressions which are conveyed via videoconferences, the success of mediated interpersonal interactions often relies on understanding the emotions of others. While understanding the psychological mechanisms behind emotion are intricately complex, most people can effortlessly recognize the emotional state of others, and when appropriate, generate an empathetic response. This empathic ability is assisted by our ability to automatically simulate other people's behavior and emotions (Iacoboni, 2009). The so-called "mirror-neurons" that scholars have isolated support the existence of this automatic ability. When a person sees others exhibiting a particular behavior or emotion, these neurons respond as if the person is experiencing such behavior or emotion. For example, babies cry when they see other babies cry (De Vignemont & Singer, 2006).

Long before the discovery of mirror neurons, communication researchers demonstrated that people in interpersonal interactions follow temporal patterns. The timing of verbal and nonverbal messages conveys critical information, above and beyond the content of those messages. If messages fall within a specific temporal pattern of communication, researchers have described the timing as *synchrony*. As researchers seek to understand both the role of emotion

and communication, examining the mechanisms behind mirroring behavior provides insights into the process and outcomes of interpersonal interactions.

Synchrony was first documented by Condon and Ogston (1966). In their pioneering work, they filmed two subjects talking to each other and then meticulously studied individual film frames to observe subjects' nonverbal behavior. The authors documented a consistent timing between utterances and nonverbal behavior. According to Condon and Ogston, "Nonverbal behavior displays a consistent harmony between speech and body motion which suggests a highly integrated organism" (p. 345). They argued that this coordinated behavior occurs automatically, as opposed to a process about which participants were aware. Building on their work, Kendon (1970) studied interpersonal communication in a larger group, and confirmed that movements of listeners were coordinated to the speech and movements of the speaker.

Definitions

While it is clear that general correlations among verbal and nonverbal behavior exist in interpersonal communication, coming up with a specific definition of nonverbal synchrony has proven challenging. Reflecting this difficulty, the academic field of nonverbal synchrony research maintains a wide variety of definitions. In addition to these differing theoretical explanations of the concept, there are also many different approaches to empirically measure nonverbal synchrony. In this section, we discuss both the definitions of nonverbal synchrony and the measurement techniques.

The simplest and strictest definition of nonverbal synchrony is mimicry (Chartrand & Bargh, 1999). Following this definition, people are in synchrony only when they move along similar parameters. For example, to be in synchrony with a person looking upward, one has to look upward in a similar manner at the same time or at least shortly thereafter. While this approach provides a clear definition of synchrony, it fails to fully capture the subtleties of nonverbal behavior.

Therefore, the definition can be extended to include contingent movements across multiple nonverbal channels (Condon & Ogston, 1966). For example, when one person is making a hand gesture and another person merely changes gaze behavior to look at the first person, they would be considered as in nonverbal synchrony. This expanded definition also includes utterances, for example standing up in response to the voice of another.

A further extension of the definition includes patterned movements in which people explicitly move in the same way. Consider for instance marching bands and soldiers walking in formation, who form nonverbal synchrony by walking at the same frequency. With this definition in mind, researchers such as Schmidt and O'Brien (1997) have studied nonverbal synchrony by looking at the rotation of swinging pendulums. Two participants formed a dyad and both held their own pendulum. Compared to a condition in which dyads were neither allowed to look at each other nor at the other person's pendulum, the condition in which people were allowed to look at the other person's pendulum led dyads to elicit more similar pendulum swings.

Neuroscience research has provided evidence that nonverbal synchrony is a contributing mechanism when people form emotional bonds, and signal an effort to understand the mental

states of others (Iacoboni, 2009). Specifically, mirror neurons are considered the root mechanism driving multiple facets of synchrony (Keysers et al., 2003; Gazzola, Aziz-Zadeh, & Keysers, 2006; Acharya & Shukla, 2012). From this perspective, emotional contagion--when one person's emotional behavior directly triggers similar responses in other people--can be considered as a form of synchrony (Hatfield, Cacioppo, & Rapson, 1993).

Measurements

Definitions that provide conceptual guidance are often improved once researchers implement those concepts with actual data analysis. Over the past few decades, the attempts to measure nonverbal synchrony reflect the existing resources at the given time, as well as the research questions which were important to a given discipline. In early studies without computers, human observers looked at film frames and checked whether subjects moved between them. They transcribed utterances and matched them with nonverbal behavior, on a frame-by-frame basis, on a shared timeline for largely descriptive analyses. While this provided valuable insight into nonverbal synchrony, it required massive efforts to look at the movements of participants per frame since many of these early studies occurred before the advent of statistical software which could easily analyze big data. Perhaps, due to these difficulties, the early findings were mostly anecdotal.

Later, human observers started to look at videos using computers. While looking at joint movements was still a popular method, there were researchers who instead chose to ask human

coders to rate the overall/gestalt movements of the subjects in each frame on a Likert scale, as rating frames on an overall Likert scale was relatively easier to conduct than rating many body parts individually. Both approaches provided time series for the amount of movements, which are required for computer-based statistical analyses on nonverbal synchrony.

In the 1990s, researchers started using automated methods without human observers. For example, motion energy analysis (Grammer & Honda, 1999) measures synchrony by calculating differences in shading of a scene on a pixel-by-pixel basis. This approach radically reduced the amount of work required for nonverbal synchrony studies and fostered usage of larger datasets. Also, depth cameras have been adopted to measure synchrony. Won, Bailenson, Stathatos, and Dai (2014) measured angles of joints between skeleton models inferred from depth cameras to calculate synchrony of dyads over time. Measurements have been developed alongside the definitions of synchrony with experiments that adopted these measurements and examined theories based on these definitions. In the following, we will introduce the studies and their findings that led the development of definitions and measurements.

Empirical Findings

Empathetic Synchrony/Mirroring

One way to consider synchrony is when people exhibit similar mental states. In particular there have been many studies examining the synchrony of emotion. The literature has utilized various terms for this process, including emotional contagion, empathy, and emotional mirroring.

In a study on emotional contagion and its effects, Barsade (2002) demonstrated how people are "walking mood inductors." In this study, contagiousness of emotion was examined in a two-by-two design with both emotional valence (i.e., pleasantness) and energy being either high or low. The 94 participants were assigned to 29 groups with a group size of two to four participants per group, in addition to a confederate. The confederate acted in a manner consistent with one of the four given conditions (i.e., pleasant with high energy) and manipulation checks proved successful according to participant self-report. In the analysis, both participant self-reports and video coders found a positive correlation between the pleasantness of confederates and the subsequent mood of the participants, though the energy variable had no effect.

Moreover, Pfeifer, Iacoboni, Mazziotta, and Dapretto (2008) conducted research supporting the association between mirror neurons and interpersonal skills. In their study with 16 children of about 10 years old, they surveyed the interpersonal skills of the participants by questionnaires of both the children and their parents. FMRI was used to measure the activation level of the mirror neurons of the participants while asking the participants to imitate or observe

seeing photos of people exhibiting various emotions. The researchers found a positive association between the level of the interpersonal skills of the participants and their level of mirror neuron activation.

Providing a more robust result with longitudinal data of 4739 participants for 20 years, Fowler and Christakis (2008) examined how geographical closeness of social networks are related to the spread of happiness. In their study of emotional contagion on a large time-scale, they found happiness spreads more from close neighbors than from far ones, and that people in general are happier when they are connected to larger numbers of happy individuals. Connections that are both socially and geographically close (e.g., nearby mutual friend, next door neighbor) had especially large effects.

Emotional contagion is not only found in interpersonal situations but also in social media. In their large-scale study of 689,003 people on online social networks, Kramer, Guillory, and Hancock (2014) found an effect of seeing emotional Facebook posts on the word choices people make. In one condition, people saw a reduced amount of positive posts in their Facebook News Feed, while in the other condition people saw a reduced amount of negative posts in their feed. Both conditions were paired with a control condition that had randomly omitted posts matching the frequency of omission in the experimental conditions. The researchers conducted a linguistic analysis of the words used in the posts of the people in each condition using Linguistic Inquiry and Word Count. They found that people in the reduced negativity condition used more positive words and less negative words compared to the control condition. Similarly, people in the

reduced positivity condition used less positive words and more negative words. This suggests that emotional contagion also takes place in social media settings.

Detecting Synchrony

Many studies have been designed to measure the extent of synchrony in communication. Chartrand and Bargh (1999, Study 1) observed unintentional mimicry between strangers which they named the Chameleon effect. They asked dyads to describe photographs together for 10 minutes, while there was actually one confederate in each dyad who rubbed her or his nose or shook her or his foot. The task was videotaped and analyzed by two independent judges, who found that participants mimicked the nonverbal behavior of confederates. For example, when participants were in front of confederates who were rubbing their noses, they were more likely to rub their own noses compared to when they were interacting with confederates who did not rub their noses.

In addition, Schmidt, Morr, Fitzpatrick, and Richardson (2012) investigated verbal and nonverbal behavior while participants told one another knock-knock jokes. This task was chosen to create phases of speaking and listening in the dyads. The researchers used both human raters and motion energy analysis to extract time series of the amount of activities from the videos of the participants. To examine the effect of synchrony, they compared actual dyads to randomly chosen participant video dyads (i.e., not ones who actually interacted) that would not have the effect of being an actual dyad. With the dyads, researchers conducted the cross-spectral that the

phases of speaking and listening for each participant were derived based on participants' activity time series measured by human observers and computers which calculated pixel changes. The phases were then compared to gauge interpersonal synchrony between both actual and control dyads. They found that actual dyads assimilated to each other during their interaction while control dyads did not.

Contexts and individual traits can determine whether synchrony occurs. Tschacher, Ress, and Ramseyer (2014) found that the type of interaction influences synchrony. Participants in their experiment were asked to engage in a cooperative task, namely designing a five-course meal they would dislike, or a competitive task in which they debated social or political topics (e.g. 'do tuition fees at university make sense?'). The results showed that people elicited higher nonverbal synchrony in a cooperative task compared to the competitive task. Furthermore, as the researchers also measured the level of affect (i.e., liking each other) between people before and after the task, they used this data to conclude that "affect may have been caused by synchrony rather than that affect caused synchrony." This result sheds light on the question of causality between synchrony and affect supporting the hypothesis of synchrony causing affect.

The studies mentioned above rely on analysis in which human observers watch video recordings, and it is important to validate whether there are hidden variables that may influence this synchrony measurement. In order to investigate whether video resolution has an effect on synchrony measurement of human raters, Bernieri, Davis, Rosenthal, and Knee (1994) studied human raters with videos in various spatial resolutions and did not find a significant difference in how people rated synchrony.

Manipulating Synchrony

Some studies specifically manipulate synchrony as an independent variable. They have examined the effect of manipulated synchrony on interpersonal constructs, such as rapport, liking, and joint performance.

Chartrand and Bargh (1999, Study 2) studied the effect of synchrony with participants who met a confederate who was pretending to be another participant, and talked for 15 minutes about photographs they received from the experimenter. For half of the participants, the confederate mirrored their posture, movements, and mannerism and for the other half, the confederate sat in a neutral relaxed position. After their interactions, participants were asked how much they liked the confederate, and how smooth the interaction with the confederate was. Compared to the confederates who did not mimic the participants, the participants liked the mimicking confederates more, and found the interactions with them smoother.

Bailenson and Yee (2007) examined the effect of mimicry with a mechanical device that approximated handshakes. Participants were recruited as dyads. One participant of each dyad shook hands with the mechanical device feeling the participant's own handshake (the *mimic* condition) while the other person felt the recorded version of the other participant's handshake (the *non-mimic* condition). Male participants liked mimickers more than non-mimickers, while female participants showed no difference in liking.

Maddux, Mullen, and Galinsky (2008) conducted two studies to investigate the effect of mimicry on negotiation outcomes. In their first study, they paired participants and assigned the role of job candidate to one and the role of recruiter to the other. The participant pairs were assigned to one of three conditions: the job candidate mimicking the recruiter's mannerisms, the recruiter mimicking the candidate's mannerisms, and a control condition without intentional mimicry. In the negotiation between the pairs, participants who mimicked the other person performed better. In other words, recruiters who mimicked the candidate performed better than other recruiters, and candidates who mimicked the recruiter performed better than other candidates. In their second study, participants were paired and either assumed the role of buyer or seller. Half of the buyers were asked to mimic the seller while the other half were in the control condition. Compared to buyers who did not mimic the seller, buyers who mimicked the seller were significantly more likely to reach an acceptable deal.

Miles, Nind, and Macrae (2009) studied the effect of synchrony on rapport. Participants watched two stick figures walking together or heard the footsteps of two people walking together. The frequencies of steps were always the same, but their phases were different. For both visual and auditory stimuli, simultaneously stepping when the other person stepped increased the amount of rapport perceived by the participants.

Wiltermuth and Heath (2009) measured the effect of synchrony on financial behavior in three studies. In their first study, they had participants walk in step synchronously or out of step asynchronously in groups of 3. Afterwards, the trios engaged in a standard financial decision-making game where they could behave selfishly or could cooperate with the group. The

game was designed such that participants can maximize their payoff by being cooperative, but only when they are all cooperative at the same time. Participants who walked synchronously chose to cooperate significantly more often than participants who walked asynchronously providing behavior evidence supporting the benefit of synchrony. In Study 2, participants wore headphones in groups of three and heard the national anthem of Canada— "O Canada." For some participants, the three audio signals were synched and for others they were on a delay relative to one another. Depending on condition, researchers asked some trios to sing together and some to raise a plastic cup when they heard the phrase "O Canada." Participants in synchronous conditions cooperated more and received significantly more money in the game compared to control conditions. In Study 3, they examined the effect of synchrony in a cooperative task, but with competitive incentives. Synchronous actions caused participants in groups to cooperate more than asynchronous actions, even in a competitive setting.

Valdesolo, Ouyang, and DeSteno (2010) examined whether synchrony directly has an effect on joint performance, or by increasing perceptual sensitivity. They demonstrated that a synchronous action between dyads (i.e. synchronously moving back and forth in rocking chairs) increased perceptual sensitivity of participants, which has been measured through a cognitive task after the synchronous action. In the cognitive task, participants looked at a monitor, which had a yellow rectangle at its middle and a blue ball passing behind the yellow rectangle. In some trials the blue ball paused behind the yellow rectangle, and participants were asked whether or not the ball paused. Participants were considered more perceptually sensitive when they were more accurate in detecting the ball pause. In turn, perceptual sensitivity had a significant effect on joint performance, which was measured through another physical joint task using a labyrinth.

Participants in dyads were asked to move a ball out of the labyrinth, and their joint performance was measured based on the completion time of the labyrinth task. Two models were examined in this study. One was a model only accounting for the effect of synchrony on joint performance that found this effect to be statistically significant. However, in the model that also included perceptual sensitivity as a mediator from synchrony to joint performance, the main effect from synchrony to joint performance was no longer significant.

Valdesolo and DeSteno (2011) showed that induced synchrony between two people causes helping behavior from one to the other. Their study had two confederates and the participants interacted with one of the confederates at the beginning of the study. During the interaction, participants tapped a sensor following the beat of an audio clip. For half of the participants, the first confederate tapped to the same beat, but did not for the other half. After the interaction, participants were asked to rate how much they liked and felt similar to the confederate with whom they interacted. Then the second confederate appeared and engaged in an ostensibly cooperative task with the interacted confederate. Eventually, the first confederate became a victim, as the second confederate was uncooperative. Experimenters measured the level of compassion of the participants, then allowed participants to engage in the task to measure how much time the participants spent helping the first confederate (i.e., the victim). Participants helped the victim confederate for a longer time when the confederate tapped synchronously, compared to when they tapped asynchronously.

Providing an informative summary of the studies that manipulated the level of synchrony, in their meta-analysis on the effect of synchrony with 42 studies, Mogan, Fischer, and Bulbuila

(2017) investigated the effect of induced synchrony on prosocial behaviors, perceived social bonding, social cognition, and positive affect. Synchrony had a medium-sized effect on prosocial behaviors, a small-to-medium-sized effect on perceived social bonding and social cognition, and a small-sized effect on positive affect. Considering perceived social bonding and positive affect, having a larger group in synchrony had a significant positive effect. This study found synchrony to have positive outcomes in social settings.

Synchronizing Virtual Humans

Virtual Reality (VR) perceptually surrounds people and provides synthetic sensory information that makes the environment feel as if it were real. Since researchers can track the movements of VR users precisely, and also can create virtual humans that are programmatically responsive to movements of users, VR opens a new research opportunity to study interpersonal synchrony.

There are two directions to utilize VR in the context of synchrony research. First, one can use VR as a tool to study synchrony, given that programmable virtual humans allow for high experimental control. On top of this, the VR tracking system is able to record movements unobtrusively at a high sampling rate (Blascovich, Loomis, Beall, Swinth, Hoyt, & Bailenson, 2002). VR is particularly useful when a variable is hard to control, such as the body movements of confederates, or extremely expensive, such as hiring a large group of actors.

Inspired by the Chameleon effect (Chartrand and Bargh, 1999), Bailenson and Yee (2005) examined the effect of nonverbal mimicry with an embodied agent. In their study, participants met a virtual agent advocating for a campus security policy through a VR headset. Participants were assigned to two different conditions: some agents mimicked the head movements of the participant with a 4-s delay (the *mimic* condition), while the others mimicked the head movements of a previous participant in the mimic condition (the *recorded* condition). After meeting the agent, participants were asked to rate the social presence of the agent, how agreeable the agent was, and how positive the impression of the agent was. Compared to participants in the recorded condition, participants in the mimic condition gave marginally higher scores on how agreeable the agent was, and significantly higher scores on social presence and impression from the agent, thereby demonstrating the Digital Chameleon effect in VR.

Verberne, Ham, Ponnada, and Midden (2013) examined the effect of mimicry on trust with virtual humans on a traditional computer screen. The authors based the study on previous work on mimicry and trust with real people (Maddux, Mullen, & Galinsky, 2008). Participants of this study wore a cap with a sensor that could measure head translation and rotation, so the virtual agent rendered on the monitor in front of the participants could mimic their head movements. Similar to the Digital Chameleon study, researchers assigned the participants to the mimic condition (agent mimicking the participant with 4-s delay), or the recorded condition (agent mimicking a previous participant in the mimic condition). The virtual agent explained a series of cooperative games to the participants, who then played those with the agent.

Participants also completed measures about trust and likeability of agents after the games. Participants liked and trusted mimicking agents more than non-mimicking agents.

Hale and Hamilton (2016) tested whether mimicry leads to trust and rapport with virtual humans who are displayed by a projector. In the first study, participants interacted with a virtual agent that mimicked them with a 1-s delay, mimicked them with a 3-s delay, or did not mimic them. Of all their outcome variables—rapport, trust, similarity, and smoothness—, a significant effect of mimicry (mimicking agents vs. non-mimicking agents) was only found with rapport. The effects of time delay, in comparison between 1-s delays and 3-s delays, were also insignificant for all measures. In the second study, participants interacted with agents in a similar way as participants in the first study, but twice with a different agent each time. One of the agents was ethnically similar to the participant while the other was not. Participants completed a virtual maze task with the two agents with whom they had interacted. The researchers found no significant effect of synchrony based on the measures of the first study and the additional measures after the virtual maze task.

Tarr, Slater, and Cohen (2018) examined the effect of synchrony on presence and social closeness in VR. In the study, participants wore a VR headset and met two virtual agents which were controlled by a computer. Participants did not know they were controlled by a computer, and were told they were in a group movement task. Half of the participants were assigned to the synchrony condition—with a 0.25-0.58 second delay)—and the other half were assigned to the non-synchrony condition—with a 1.67-4.33 second delay. The delays were in ranges, so the virtual agents in front of the participant could avoid being synchronized to each other by having

different amounts of delay. Compared to participants in the non-synchrony condition, participants in the synchrony condition felt the agent was significantly more present and socially closer to them. Also, they found the task was significantly more difficult.

Communication Theories Related to Synchrony

Social Information Processing Theory/Hyperpersonal Communication

The field of communication has many theories which explain how people communicate online, a sub-field known as computer-mediated communication (CMC). Very few of them directly shed light on synchrony, given that historically, CMC has focused largely on text chat which typically lacks nonverbal channels. Depicting media usage as an adaptive process, social information processing theory (Walther, 1992) claims that people can send messages that convey social and emotional information through media such as texts and emails. Though it may take a longer time than face-to-face communication, people can adapt to the limitations (e.g. text-only) and achieve similar quality to face-to-face communication in social interaction. In other words, according to the social information processing theory, the lack of nonverbal cues of CMC does not prevent people from forming relationships with others through exchanging messages. In Walther's seminal paper on this topic, he reviews work by Sherblom (1988) which found that cues about status can be embedded into emails, supporting the assumption that people can communicate relationships through CMC. For example, upward email messages, sent from someone hierarchically lower in an organization to someone higher, more often included a

signature compared to downward email messages. Hancock and colleagues (2010) have demonstrated a similar effect in organizations using linguistic analyses.

To examine the social information processing theory, Walther (1995) compared CMC to face-to-face communication in a longitudinal study, which ended up supporting the existence of hyperpersonal communication, which involves instances of CMC that surpass face-to-face settings as a method for relational communication. Experimenters formed trios of participants and had them meet one another three times over an academic quarter, and recorded the conversations. Coders then evaluated various measures of interpersonal communication using the recordings of the conversations. Based on the human coders of the study, the participants in the CMC condition scored significantly higher than the participants in the face-to-face condition for five measures: Immediacy/Affection, Similarity/Depth, Composure/Relaxation, Dominance, and Task/Social Orientation. This result led to the hyperpersonal communication theory (Walther, 1996) stating that "[t]here are several instances in which CMC has surpassed the level of affection and emotion of parallel face-to-face interaction." This provides a theoretical foundation to consider CMC more than a supplementary replacement of face-to-face interaction.

Common Ground

Common ground describes the tacit assumptions that communicators share (Clark, 1996). Communicators do not solely depend on information from other people, but also receive information from circumstances and assume that others have the same contextual information.

Interpersonal communication is often based on people's assumption that this information, known as the *common ground*, is shared. CMC reduces the common ground between communicators, since it does not support every communication channel that face-to-face communication offers. For example, CMC does not require communicators to reside in the same physical space, so they don't share information about objects in the room. Similarly, CMC can be asynchronous, so information about time of day, temperature, and other temporal factors are not shared. Media such as email does not include the information of the location of the sender, which is necessarily apparent in face-to-face communication. Also, the sender is unlikely to infer which context the receiver will be in when the email gets read, given that it will happen in the future.

Social Presence

Another theory that may be relevant to our discussion of synchrony is social presence that was introduced by Short, Williams, and Christie (1976). Describing the saliency between communicators, it has since become a central construct to understand CMC. In their original paper introducing the construct, social presence was introduced as a way to describe the technological qualities of various media. Later, as research on CMC became more popular among research scholars, the term social presence evolved to capture the subjective feeling of being with another person, as opposed to describing technological affordances of the medium itself. The field adopted the term "immersion" to refer to the qualities of the medium. Many

scholars assume that higher social presence should be the goal of mediated communication (see Slater & Wilbur, 1997; Oh, Bailenson, & Welch, 2018, for a review).

VR allows for avatars—representations of people—to talk and gesture in real-time. A number of factors contribute to how effective this type of interaction can be in terms of social presence. In their meta-analysis on VR studies with a manipulation of the VR system and a measure of presence, Cummings and Bailenson (2016) found update rate and tracking level—the technical factors that are required to provide synchrony—are highly correlated to the level of social presence.

Transformed Social Interaction

In VR, social interaction can be transformed, as the virtual environments do not need to follow the restrictions of the real world. Assume a person is talking to others through a virtual human. Even though the person might not even be listening to the conversation, the virtual human can be rendered to be attentive and naturally reacting to others in the conversation through algorithms. This shows that the level of synchrony in interpersonal communication can be manipulated in VR.

Researchers have studied transformed social interaction and its effect. Bailenson and colleagues (2005) examined the effect of the presenter avatar matching eye-contact to the listeners—more than one—simultaneously in a virtual environment. Two participants received differentially rendered versions of the presenter avatar, which was controlled by experimenters

and redirected for each to maintain eye contact. The presenter was in one of three conditions: reduced, natural, and augmented. In the reduced condition, the actual head movements of the presenter were scaled down by a factor of 20 to allow for small movements, but the presenter's gaze was not directed at any participant. In the augmented condition, the presenter's head movements were also scaled down by a factor of 20 to allow for small movements. However, in this condition the presenter's head was directed towards each participant, to maintain eye contact with both. In the natural condition, the head movement of the presenter was directly represented in the virtual avatar. Female participants did detect that the presenter's head movements were manipulated and agreed significantly more with a passage the presenter read in the augmented condition, compared to the other conditions. However, these listeners felt less social presence from the augmented presenter, compared to the neutral and reduced presenter.

While the consequences of transformed social interactions still require future research, it becomes apparent that these transformations certainly have the potential to interrupt social interaction due to the disruption of synchrony. This need is even more pressing considering that manipulating synchrony may quickly transcend the experimental academic setting and become a faked reality in our daily lives.

Conclusion

The literature shows that people communicate in synchrony, especially in face-to-face conversations, and that synchrony has positive effects on communication. People consciously

and unconsciously communicate and react to synchrony, which leads to positive effects such as increased rapport and cooperative behavior between communicators. A prime example is that participants in the synchrony studies liked the confederates who mimicked them more than the confederates who did not mimic the participants. The positive effects of synchrony play a big role in the effectiveness of face-to-face conversations and other interpersonal communication.

Even though people automatically elicit synchrony in face-to-face conversation, this may not automatically occur in CMC. To what extent communicators can form synchrony through a medium becomes a crucial feature for communication media. Since mediated technology regularly degrades communication in comparison to face-to-face conversation, it is a significant challenge for media to create affordances such as synchrony in order to resemble face-to-face communication. VR may come the closest to mimicking face-to-face conversations, and ultimately enables transformations that may even open a window to surpass face-to-face communication.

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